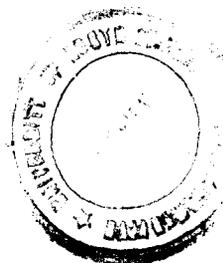


**SYSTEMATICS OF SILVANIDAE
(COLEOPTERA:CLAVICORNIA)
FROM INDIA AND SOME NEIGHBOURING AREAS**

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TARUN KUMAR PAL, M.Sc.
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S Y N O P S I S

This study is based on the material comprising 2411 adults and 507 larvae representing 62 species under 13 genera of the family Silvanidae; of 62 species 24 are new to science. The suprageneric and subgeneric relationships are worked out on the basis of detailed morphological studies of the adults and larvae in the light of redefinition of the family, genera and species. Descriptions of the larvae of Silvanoprus angusticollis, Protosilvanus lateritius, Ahasverus advena, Cathartus sp., Oryzaephilus mercator, Airaphilus serricollis, Psammoecus bipunctatus and Cryptamorpha brevicornis are made.

Distribution of the genera and species is dealt with. 318 illustrations and 11 maps are appended. The collections were made from Arunachal Pradesh, Assam, Meghalaya, West-Bengal, Sikkim, Orissa, Bihar, Uttar Pradesh, Rajasthan, Delhi, Himachal Pradesh, Kashmir, Maharashtra, Tamil Nadu, Karnataka, Kerala, Nepal, Bhutan etc. The representatives of the family usually live under bark, haystack, leaf garbage, flower and in stored grain.

This work as a whole makes a comprehensive review of the Silvanidae of India, Nepal and Bhutan.

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Pal, T.K. and Sengupta, T. 1977. A revision of Silvanus
(Coleoptera:Silvanidae) from India. Oriental Ins.
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Silvanidae include a few well-known insects that attack almost every stored food products of vegetable origin. Despite its economic importance and abundance in India no comprehensive work on this group from India has ever been published. As regards survey and systematic studies on the Indian Silvanidae nothing further is known since Grouvelle (1903-1919). All these facts taken into consideration a project on study of the Indian Silvanidae has been undertaken in 1974. For this study the author and the staff of Coleoptera Section of Zoological Survey of India made several surveys to different parts of India especially, North-East India, North-West India, and South India during 1974-1977 and collected about 3000 examples. Moreover, collections of the different Museums of India and abroad have been studied. The above material is representing 62 species under 13 genera, of which 24 species are new to science. Descriptions of the larvae of Silvanoprus angusticollis (Reitter), Protosilvanus lateritius (Reitter), Ahasverus advena (Waltl), Cathartus sp., Airaphilus serricollis (Reitter), Psammoecus bipunctatus (F.) and Cryptamorpha brevicornis (White) are made. The aim of the present investigation is first to explore the Indian silvanid fauna, second to improve the definition and characterization of the family, genera and species and to provide keys to the subfamilies, genera and species, and third to find out the interrelationships of the genera and species. Moreover, the present study includes many information about habits and habitats of the Indian Silvanidae.

I N T R O D U C T I O N

The family Silvanidae belongs to the section Clavicornia of the superfamily Cucujoidea under the suborder Polyphaga (Coleoptera : Insecta). This is a moderately large family and closely related to the family Cucujidae. The representatives of the family Silvanidae are commonly known as "flat bark beetles"; some are called "saw-toothed grain beetles"

Oryzaephilus surinamensis (L.)], "merchant grain beetles"

Oryzaephilus mercator (Fauvel)], "foreign grain beetles"

[*Ahasverus advena* (Waltl)] and "square-necked grain beetles"

[*Cathartus quadricollis* (Guérin-Méneville)]. The silvanids are small (1.35-4.50 mm in length), flat, usually reddish brown and rarely spotted and elytral puncturations are arranged in rows. Distinct superficial diversity is exhibited by adult silvanids and some are often confused in preliminary observations as they resemble members of other families namely, Cucujidae, Cryptophagidae and a few Languriidae. The family Silvanidae can be recognised by its tarsal formula being 5-5-5 in both sexes with penultimate segment smallest, front coxal cavities broadly closed behind externally, mesocoxal cavities opened outwardly; antennae usually short, thick and distinctly clubbed or maxillary palpi securiform or elytra often with a scutellary striole.

HISTORICAL REVIEW

The first described species of the family Silvanidae is Dermestes surinamensis by Linnaeus in 1767. Latreille (1804) first established the genus Silvanus for the species Ips unidentata Olivier and later he (1807) gave a detailed description of the genus Silvanus. Sturm (1826) transferred Dermestes bidentatus (Fabricius) to it and eventually many species were described under this genus, principally, by Reitter and Grouvelle. The first important attempt to arrange the genera of present day Silvanidae into groups was made by Erichson in 1846. He grouped Silvanus Latreille, Psammoecus Latreille, Telephanus Erichson and Platamus Sharp together with Dendrophagus Schonherr and Brontes Fabricius under 'Brontini' of the family 'Cucujipes'. The first supergeneric divisions were proposed by Lacordaire (1854) in his "Genera des Coléoptères". He proposed the tribe 'Silvanides' under the family 'Cucujipes' and included the genera Silvanus Latreille, Psammoecus Latreille, Laemophloeus Dejean, Phlaestichus Redtenbacher and Oma Newm. under this tribe and placed the genus Telephanus Erichson together with Dendrophagus Schonherr and Brontes Fabricius under the tribe 'Brontides'. Leconte (1861) and Leconte and Horn (1883) in the work "Classification of the Coleoptera of North America" characterized the family Cucujidae in detail and splitted the family into five subfamilies namely, Silvaninae, Passandrinae, Cucujinae,

Hemipeplinae and Telephaninae. They placed the genera Silvanus Latreille and Nausibius Redtenbacher under Silvaninae, and Telephanus Erichson and Psammoecus Latreille under Telephaninae. Casey (1884) in his "Revision of the Cucujidae of America North of Mexico" erected two tribes namely, Telephanini and Cryptamorphini under the subfamily Telephaninae. Sharp (1899) in 'Biologia Centrali - Americana' did not make any further notable alterations to Casey's classification regarding Cucujidae, though he transferred Rhizophaginae under Cucujidae. He placed the genera Silvanus Latreille, Platamus Erichson, Euplatamus Sharp, Nausibius Redtenbacher, Synobius Sharp, Cathartus Reiche and Telephanus Erichson in a single subfamily Silvaninae. Ganglbauer (1899) in his work "Die Käfer Von Mitteleuropa" considered two tribes namely, Silvanini and Psammoecini under the subfamily Silvaninae: Cucujidae and also recognised Casey's tribe Cryptamorphini. Böving (1921) was the first author who established the group as a distinct family based on larval characters and subdivided into two subfamilies namely, Silvaninae and Telephaninae. Wilson (1930) studied the genitalia and wing venation and also considered the group as distinct family. Crowson (1955) in his book "Natural classification of the families of Coleoptera" restored the independent family status of Silvanidae and divided into two subfamilies namely, Silvaninae and Psammoecinae. In Junk's "Coleopterorum Catalogus" Hetschko (1930) has listed thirtyeight

genera and three hundred and twelve species under Silvaninae : Cucujidae. Sengupta and Crowson (1966) excluded Hymaea Pascoe from the Silvanidae and later they (1969) attributed this genus to the family Phloestichidae Sengupta and Crowson. Recently Halstead (1973) has revised the genus Silvanus Latreille. He erected three new genera and gave generic status to Grouvelle's subgenera Protosilvanus, Parasilvanus and Cathartosilvanus. He also mentioned that several erroneous inclusions have been made under the genus Silvanus in Junk's "Coleopterorum Catalogus".

Westwood (1839) described the larva of Oryzaephilus surinamensis (L.) and ? Nausibius dentatus (Marsh.). Perris (1877) described the larva of Ahasverus advena (Waltl). Böving (1921) described the larvae of Coccidotrophus socialis Schwarz and Barber and Eunausibius wheeleri Schwarz and Barber. Roberts (1930) provided key to the tribes of the family Cucujidae. Böving and Craighead (1931) in the work "An illustrated synopsis of the principal larval forms of the order Coleoptera" gave definition of larval characters of the family and subfamilies of the family Silvanidae. So far, six larvae of Silvanidae have been described.

The first available record of Indian Silvanidae is of Reitter's description of the species Airaphilus serricollis in 1878a. In 1903 Grouvelle recorded four species from Darjeeling:

West Bengal and later he (1908-1919) described several other Indian species from other parts of India. His publications in 1908 and 1912 entitled "Coléoptères de la région Indienne" and "Notes sur les Silvanini" respectively are the most important works so far published on Indian Silvanidae. Halstead (1973) described two new species of Silvanus Latreille from India and cited detailed distribution of the other Indian species. Recently Pal and Sengupta (1977) have revised the genus Silvanus from India, where they have redefined the genus and described five more new species. Hitherto thirty species belonging to nine genera are recorded from India.

ECONOMIC IMPORTANCE

The representatives of the family Silvanidae are of much economic importance as a number of species are associated with stored products. Hinton (1945) mentioned that 600 species of beetles are associated with stored grain products, and among them included are a few most notorious pests from the Silvanidae. Aitken (1975) has listed 22 species of this family which are recorded from stored material. The most serious and commonly known of these pests all over the World are Oryzaephilus surinamensis and O. mercator. Ahasverus advena is also frequently found in various food stuff and Aitken has mentioned that this species is of secondary importance. Both adults and larvae cause serious damage to stored grains especially, rice, wheat, maize, barley, bread, dried fruits, oil seeds and rarely, in sugar, starch, drugs, tobacco, snuff and dried meats. The presence of these beetles in food stuffs particularly in cereal products and breakfast food cause loss by rendering the food unsalable or unpalatable. The saw-toothed grain beetle has sometimes proved to be the chief offender in grain shipments. Several workers have worked on the biology of these pests; chief works are : Woodroffe and Hill (1964) on Ahasverus advena, Breese and Wise (1959) on Nausibius clavicornis, Howe (1956) on Oryzaephilus surinamensis and O. mercator. The species Silvanopsis grouvelli sp.nov. has been found as a scavenger

of brood lac and was pointed out by Imms and Chatterjee (1915) as an enemy of lac insect. Cathartus quadricollis cause damage to woollen garments. Stebbing (1914) noted that in India Ahasverus advena makes gall in the teak leaves (Tectona grandis) causing defoliation, and recently Sengupta (unpublished data) found that this species infesting dry plum and cause serious damage to it.

Analysis of records of silvanid species found in stored and other economic products in India

<u>Name of the species</u>	<u>Locality</u>	<u>Date</u>	<u>Pest of/Habitat</u>
<u>Oryzaephilus</u>			
<u>surinamensis</u> (L.)	Calcutta:W.B.	3.iii.1978	Arhar pulses
	"	6.vii.1972	Rice (unboiled)
	"	10.ix.09	Dried Walnuts
	"	June,1889	Ship biscuits
	"	5.ii.1892	Date fruits
	"	11.xi.1970	Rice (unboiled)
	"	24.viii.1977	<u>Shorea robusta</u> seed
	Ghaibasa: Bihar	11.xi.1970	Rice (unboiled)
	Gorakhpur:U.P.	30.vi.1971	Rice (unboiled)
	Delhi	6.vii.1912	Rice (unboiled)
	Madras: Tamil Nadu	?	Sorghum seed
<u>O. mercator</u> (Fauvel)	Calcutta:W.B.	6.xii.1974	Corn-flake
	"	4.vi.1974	Cashew nut
	"	16.xi.1971	Wheat
	"	9.iii.1978	Cashew nut (sent to U.K. and returned due to infection)
	"	16.vii.1976	Rice (unboiled)

<u>Name of the species</u>	<u>Locality</u>	<u>Date</u>	<u>Pest of/Habitat</u>
<u>O. mercator</u> (Fauvel)	Chaibasa: Bihar	30.x.1964	Wheat
	"	11.xi.1970	Wheat
<u>Ahasverus advena</u> (Waltl)	Calcutta:W.B.	30.vii.1965	Copra consignment
	"	24.viii.1977	<u>Shorea robusta</u> seed
	Chaibasa: Bihar	15.i.1978	Plum
	M.P.	?	Teak leaf
	Maharashtra	?	Teak leaf
	Tamil Nadu	?	Teak leaf
	Vellyani: Kerala	18.ix.1959	Stored rice
<u>Silvanopsis</u> <u>grouvelli</u> sp.nov.	Namkum: Bihar	6.i.1971	Brood lac

HABIT AND HABITAT

The representatives of Silvanidae are found in a wide variety of habitats and commonly feed on fungus. Most of the Silvanidae are subcorticolous, found under the bark of fallen trees and logs. Monophagy, corresponding to strict host plant specificity is comparatively rare in Silvanidae. Halstead (1973) reported that fungal spores were observed in the gut of specimens, suggesting that mould occurs in the subcorticolous habitat may form part of their diet. He noted that in Europe and North America the species of Silvanus Latreille are usually prevalent beneath the bark of deciduous trees, chiefly Oak (Quercus spp.) and sweet chestnut (Castanea spp.) and less commonly under bark of Pine (Pinus spp.), whereas African and Oriental species of Silvanus have been found under bark of Ficus sp. In the present investigation the species of Silvanus have been recorded under bark of a number of plant species namely, Shorea robusta, Sterculia campanulata, Terminalia bialata, Boswellia serrata and Bombax sp. The species of Silvanoprus Reitter have been found mainly under bark of Schima wallichii and Castanopsis tribuloides. Protosilvanus Grouvelle is the most widely distributed genus and found under bark of number of plants, and Silvanoides cribricollis (Grouvelle) has been found under bark of fallen log. Several species are saprobionts and are associated with vegetable debris such as, piles of grass clipping, leaf garbage and haystack etc. Representatives of the genera Silvanoprus Reitter, Monanus Sharp, Airaphilus

Redtenbacher and Psammoecus Latreille commonly occur under haystack and leaf garbage. A few species are anthophilous or flower inhabiting, particularly the representatives of Cryptamorpha Wollaston and Silvanolomus Reitter. Monanus (Monanops) himalayicus sp. nov. has been recorded under bamboo (Bambusa aurandaceae) leaf sheath. A few species are stored grain pests namely, Oryzaephilus surinamensis (L.), O. mercator (Fauvel) and Ahasverus advena (Waltl) and whereas Silvanopsis grouvelli sp.nov. inhabits brood lac.

GEOGRAPHICAL DISTRIBUTION.

The Silvanidae seems to be more diversely represented in the tropical and subtropical climate than in temperate regions. The representatives of the family occur in all the main continental areas of the World, but so far a few species have been recorded from New Zealand and oceanic islands. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed twentysix genera from the Old World and twenty genera from the New World. Among the New World genera twelve are restricted to this part of the World, whereas of the Old World genera seventeen are restricted to this World and others are recorded from both the Old and New World. The two large subfamilies of Silvanidae namely, Silvaninae and Psammoecinae predominantly occur in the warmer part of the World and well-represented in the Oriental region including India. The third subfamily Cryptamorphae mainly occur in the temperate climate and also represented in India, especially in the higher altitudes.

The subfamily Silvaninae comprises a number of genera, of which Silvanus Latreille, Silvanoprus Reitter, Monanus Sharp, Airaphilus Redtenbacher are comparatively larger than others. Among these genera Silvanus and Silvanoprus are widely distributed and abundantly occur in India. Of these two genera, Silvanus is more diverse in Oriental, Ethiopian and Australian regions and a few species are known from the New World; whereas Silvanoprus

is predominant in Oriental region and also recorded from Madagascar and tropical Africa, and only one species is known from the New World.

Twelve species of Silvanus Latreille are recorded so far from India (Map 2) including two new species described in this work. Of these species S. lewisi Reitter is widely distributed in India, and also recorded from various parts of Oriental region, Australia and Africa. S. difficilis Halstead is recorded from North and South India, whereas S. rossi Halstead is known only from North India, and S. recticollis Reitter is recorded from the gangetic plain. These three species are also recorded from various parts of the Oriental region and of them S. difficilis is distributed to various parts of Australia, Africa and the New World. Halstead (1973) mentioned that S. bidentatus (F.) is truly a palaeartic species and recorded as far as 66°N and seems to be introduced to Orient. This species is recorded from Nilgiri Hills in India. The distributional records of other Indian species of Silvanus described by Pal and Sen Gupta (1977) are as follows : S. imitatus (Assam), S. curvispinus (Assam), S. nigrans (Darjeeling dist.: West Bengal), S. ruficarpus (Assam, Uttar Pradesh), S. gibbus (Assam, West Bengal and Madhya Pradesh). The two new species namely, S. andamanicus and S. indicus are described from Andaman Is., and Bihar and Kerala respectively.

Silvanoprus Reitter is fairly a large genus, so far nine species are known from India (Map 3), of which four are described here as new. Of them S. cephalotes (Reitter) and S. scuticollis (Walker) are widely distributed in the Oriental region. Of these the former species is unknown from Europe, whereas S. scuticollis is recorded from France and also from Guyana and Africa. The species S. cephalotes, S. scuticollis and S. longicollis (Reitter) commonly occur all over India, whereas S. angusticollis (Reitter) is recorded only from Himalaya and Nilgiri Hills. Four new species of Silvanoprus are described here and their distribution are as follows: S. indicus (Sikkim, Meghalaya), S. nepalensis (Nepal), S. prolixicornis (Uttar Pradesh) and S. palnicus (Tamil Nadu). Another species S. distinguendus Halstead (MS. name) is recorded from South India and Sri Lanka.

Majority of the species of the genus Monanus Sharp are represented in the Oriental region and only a few are known from Australia. The subgenus Monanus (Monanops) is known chiefly from Sumatra, and in the present study a new species Monanus (Monanops) himalayicus is described from Darjeeling district of West Bengal. Of the two species of Monanus (s.str.) found in India, M. (M.) concinnulus (Walker) occur abundantly all over India, whereas M. (M.) longicornis (Grouvelle) is known only from the West coast of India (Malabar) (Map 7).

The genus Airaphilus Redtenbacher is more diversely represented in the temperate climate than in tropics and commonly found in Europe, Mongolia and China. This genus is represented in India by two species namely, A. serricollis Reitter from Tamil Nadu and West Bengal, and A. abnormis Grouvelle from Maharashtra and West Bengal (Map 8).

Protosilvanus Grouvelle is comparatively a small genus and widely distributed in the Oriental region. Protosilvanus is hitherto represented in India only by P. lateritius (Reitter), which is very common and abundantly occur throughout India. In the present study two new species namely, P. minutus and P. dehradunus are described from West Bengal and Uttar Pradesh respectively (Map 4).

The genus Oryzaephilus Ganglbauer comprises ten species from the World, of which O. surinamensis (L.) and O. mercator (Fauvel) are well-known stored grain pests and cosmopolitan in distribution. These two species also occur abundantly in stored products in India. Two new species namely, O. elevatus and O. genalis are described from Tamil Nadu and Orissa respectively (Map 6).

Ahasverus Gozis is a small genus and rather common in the temperate climate than in tropics. This genus is represented in India (Map 5) by single species A. advena (Waltl), which is a stored grain pest and cosmopolitan in distribution.

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Silvanopsis Grouvelle is a small Oriental genus, represented by two species namely, S. raffrayi Grouvelle and S. simomi Grouvelle from Singapore and Philippines respectively. In the present study this genus is recorded for the first time from India and two new species namely, S. grouvelli from Assam and Bihar, and S. nepalensis from Nepal are described (Map 8).

Silvanolomus Reitter is a small genus, known from the Oriental, African and Australian regions but was unknown from India. S. denticollis (Reitter) is recorded for the first time from Bihar, Karnataka and Kerala in India. An additional new species namely, S. meghalayensis is described from Meghalaya (Map 8).

Halstead (1973) described the genus Silvanoides based on two species namely, S. cheesmanae Halstead and S. foveicollis from Solomon Is., New Guinea and Philippine Is., and Solomon Is. respectively. In the present study S. cribricollis (Grouvelle) (= S. cheesmanae Halstead) is recorded for the first time from India (Meghalaya) (Map 5).

Cathartus Reiche is a small genus, represented mostly in the tropical and subtropical parts of both the New and Old World. This genus is yet to be recorded from India, but C. quadricollis (Guérin-Méneville), a widely distributed species associated with stored products and is recorded from Bangladesh (Map 5).

The genera Psammoecus Latreille and Telephanus Erichson constitute the subfamily Psammoecinae. The former genus predominates in the Old World and especially in the Oriental region, whereas Telephanus predominates in the New World. Eight species of Psammoecus are hitherto recorded from India. In the present study additional seven species are recorded, of which five are described as new (Maps 9 & 10). Of the above species, P. trimaculatus Motschulsky is the most common and widely distributed in India. P. decoratus Grouvelle, P. delicatus Grouvelle, P. graciosus Grouvelle, P. nitidus Grouvelle and P. impressicollis Grouvelle are recorded only from South India, whereas P. andrewesi Grouvelle and P. lepidus Grouvelle are recorded both from North and South India. P. simoni Grouvelle is recorded for the first time from India (West Bengal).

The subfamily Cryptamorphae includes the only genus Cryptamorpha Wollaston and this genus is more diversely represented in Australia and New Zealand. In India this genus is so far recorded by two species namely, C. infans Grouvelle from Nilgiri Hills, and C. sculptifrons Reitter from Darjeeling and Sikkim. C. sculptifrons is also known from Bhutan, China and Japan. In the present study four new species are described from Eastern Himalayas (Map 11).

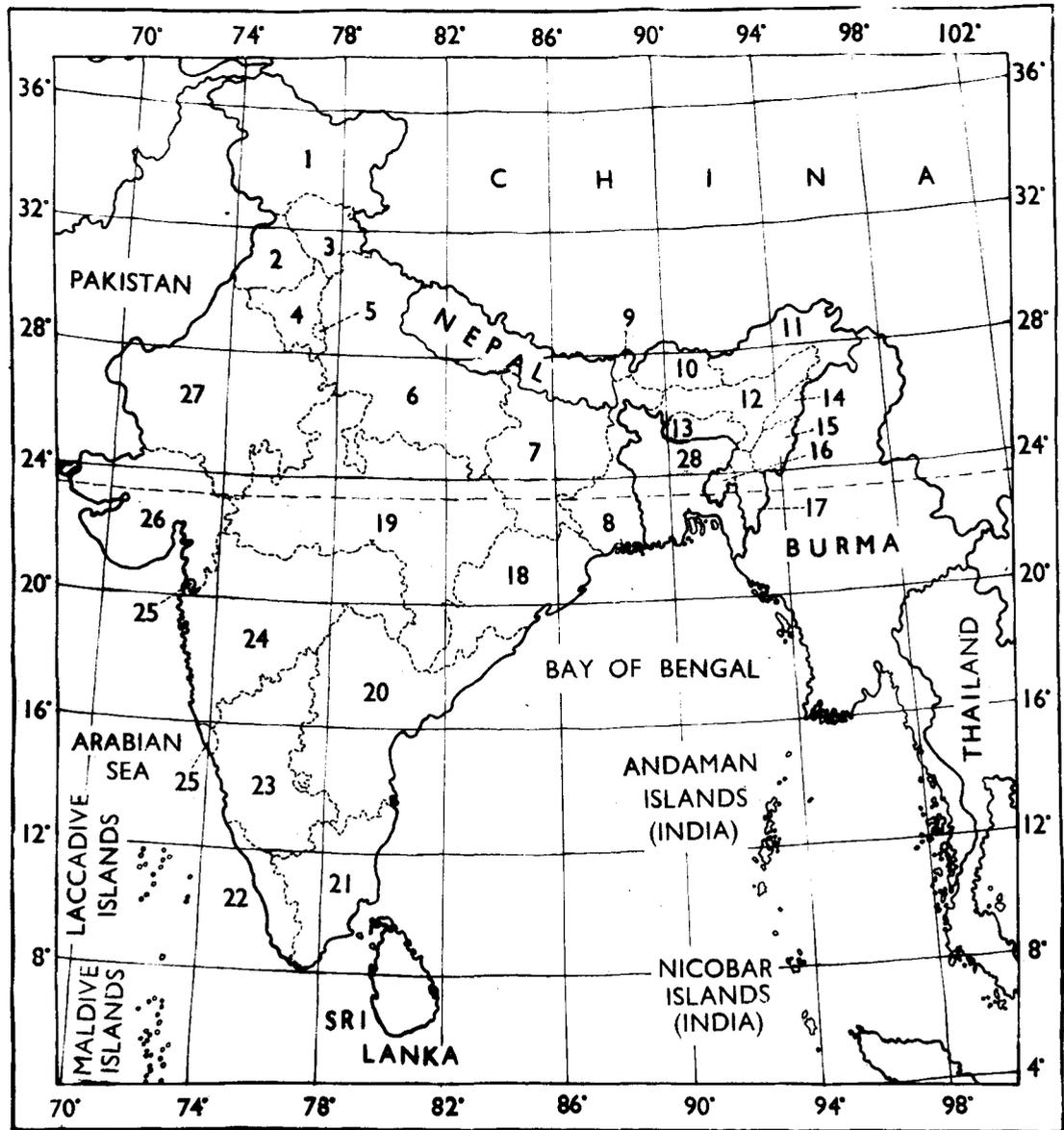
Distributional records of the family Silvanidae of the World is incomplete due to lack of survey especially, in the tropical and subtropical parts of the World. Moreover, their minute

size and hidden habitats are often overlooked by the collectors. For the present study the author and staff of Coleoptera Section of Zoological Survey of India made several surveys all along the foot hills of the Himalaya, gangetic plains and southern parts of India especially, in the Nilgiri Hills. Moreover, the collections of Silvanidae from Zoological Survey of India, Forest Research Institute Dehra Dun and Coimbatore Agricultural College, Tamil Nadu, along with the collections from the different European Museums and Institutions are studied and incorporated in the distributional records.

Relative species composition of World-Orient-India (including Nepal and Bhutan) of the Indian genera :

<u>Genus</u>	<u>World species(No.)</u>	<u>Oriental species (No.)</u>	<u>Indian species (No.)</u>
<u>Silvanus</u> Latreille	24	15	12
<u>Silvanoprus</u> Reitter	20	15	9
<u>Protosilvanus</u> Grouvelle	7	7	3
<u>Silvanoides</u> Halstead	2	2	1
<u>Ahasverus</u> Gozis	11	1	1
<u>Cathartus</u> Reiche	4	1	-
<u>Silvanolomus</u> Reitter	4	2	2
<u>Silvanopsis</u> Grouvelle	4	4	2
<u>Oryzaepphilus</u> Ganglbauer	11	5	4
<u>Monanus</u> Sharp	22	14	3
<u>Airaphilus</u> Redtenbacher	29	2	2
<u>Psammoecus</u> Latreille	77	22	15
<u>Cryptamorpha</u> Wollaston	28	7	6

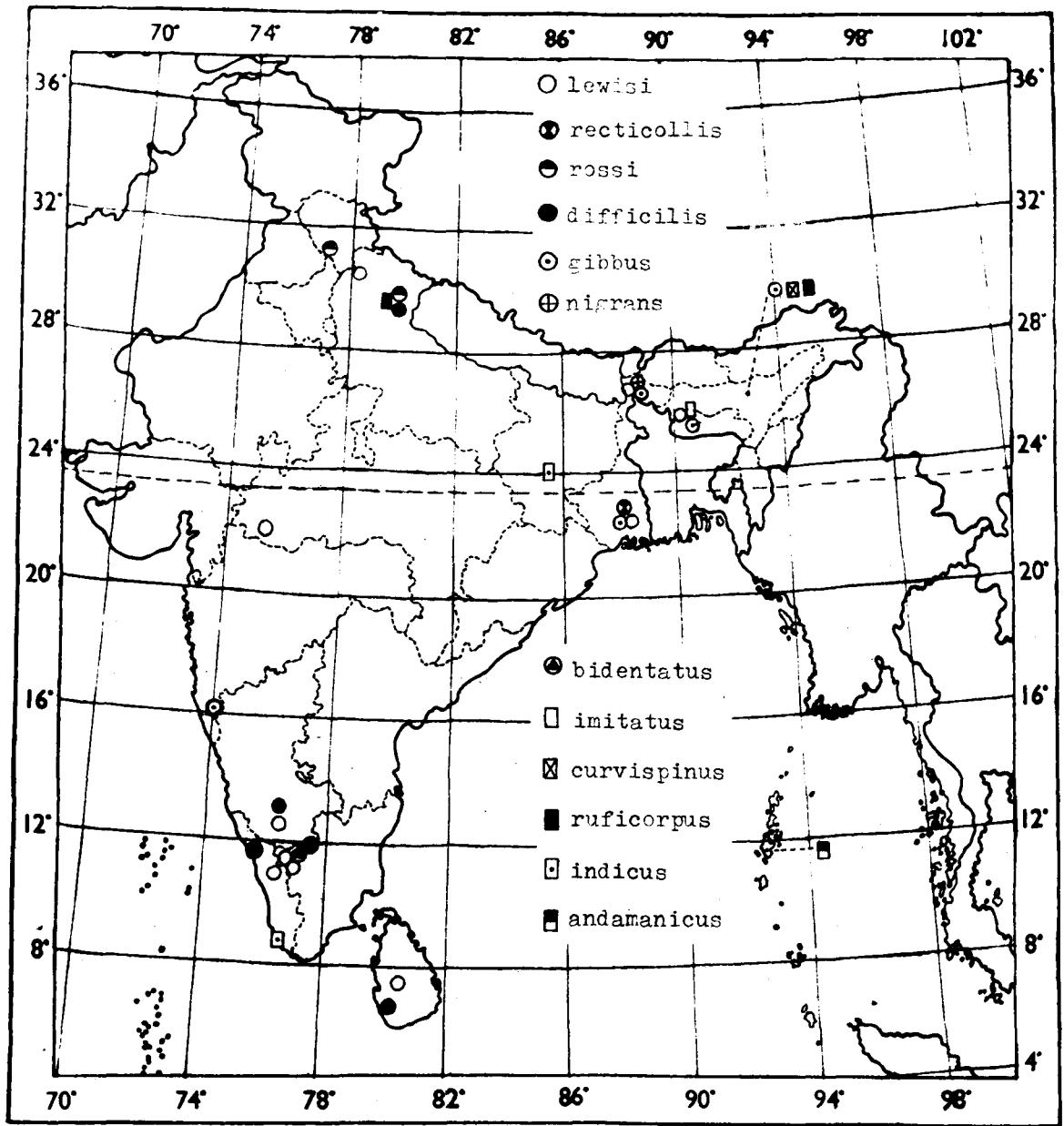
Map 1. Map of India showing the States and Union territories of India.



- | | | | |
|---------------------|-----------------------|--------------------|----------------------|
| 1. JAMMU & KASHMIR | 8. WEST BENGAL | 15. MANIPUR | 22. KERALA |
| 2. PUNJAB | 9. SIKKIM | 16. MIZORAM | 23. KARNATAKA |
| 3. HIMACHAL PRADESH | 10. BHUTAN | 17. TRIPURA | 24. MAHARASTRA |
| 4. HARYANA | 11. ARUNACHAL PRADESH | 18. ORISSA | 25. GOA, DAMAN & DIU |
| 5. DELHI | 12. ASSAM | 19. MADHYA PRADESH | 26. GUJRAT |
| 6. UTTAR PRADESH | 13. MEGHALAYA | 20. ANDHRA PRADESH | 27. RAJASTHAN |
| 7. BIHAR | 14. NAGALAND | 21. TAMIL NADU | 28. BANGLADESH |

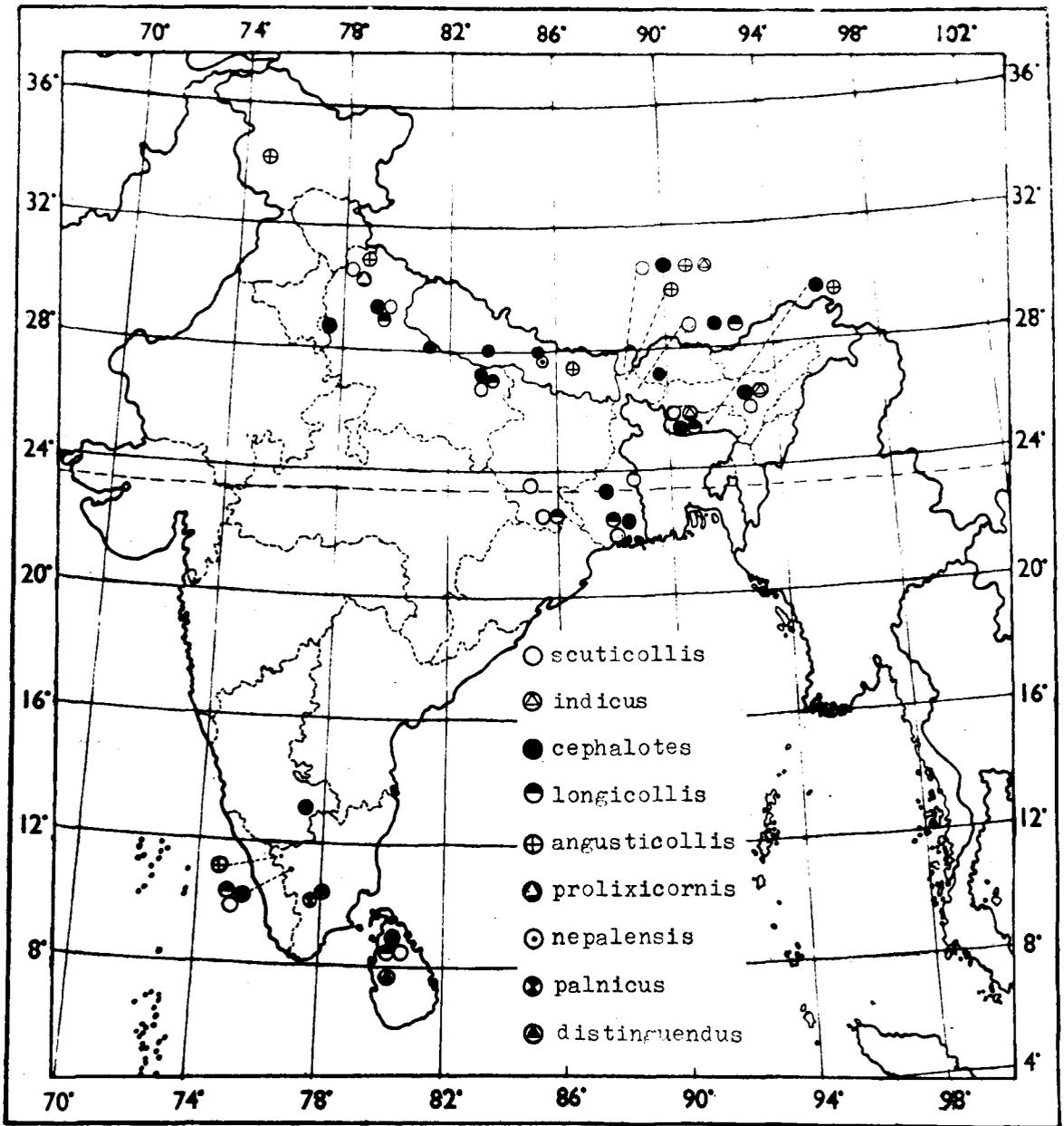
MAP 1

Map 2. Distribution of the Indian species of
Silvanus Latreille.



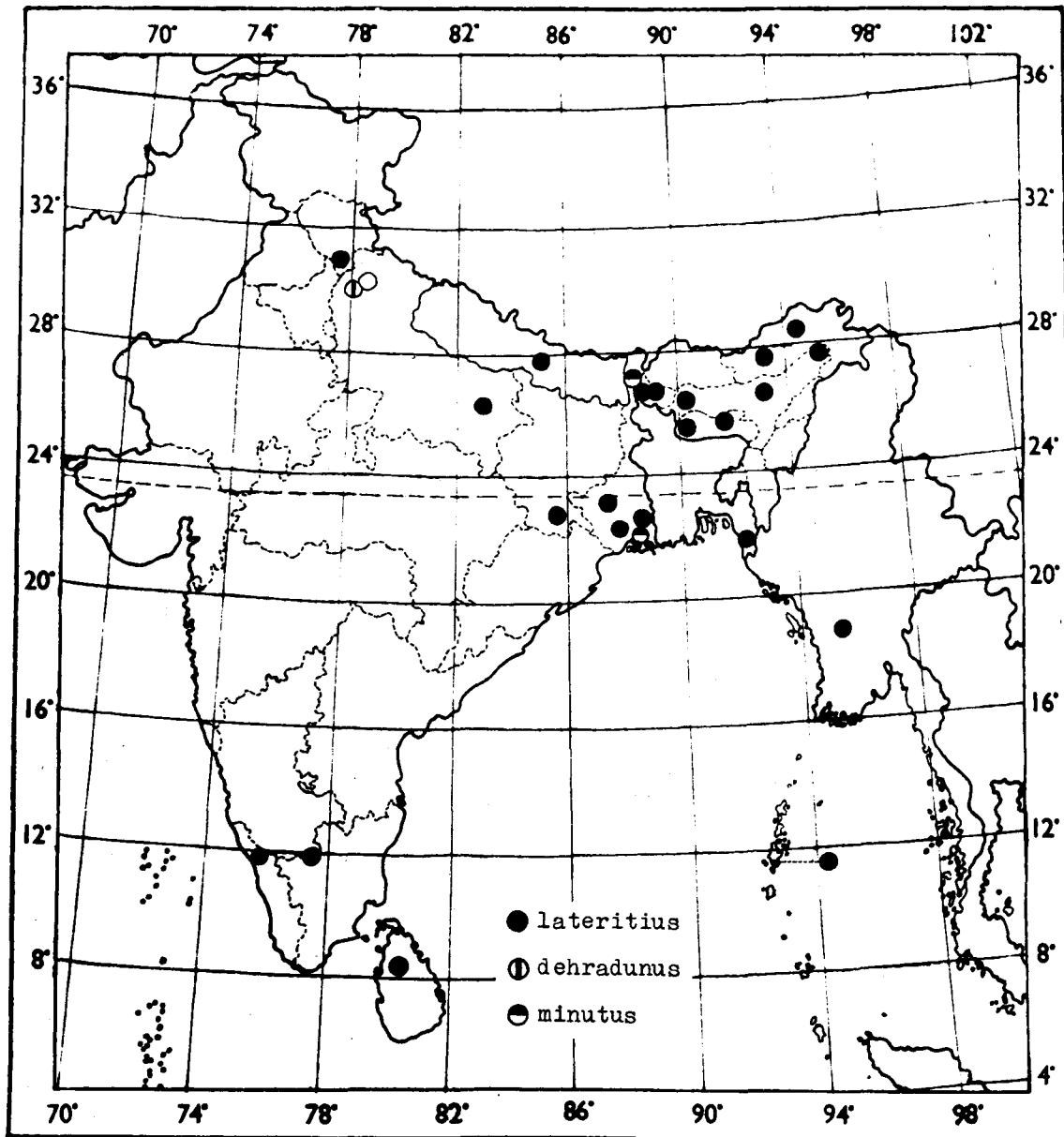
MAP 2

Map.3. Distribution of the Indian species of
Silvanoprus Reitter.



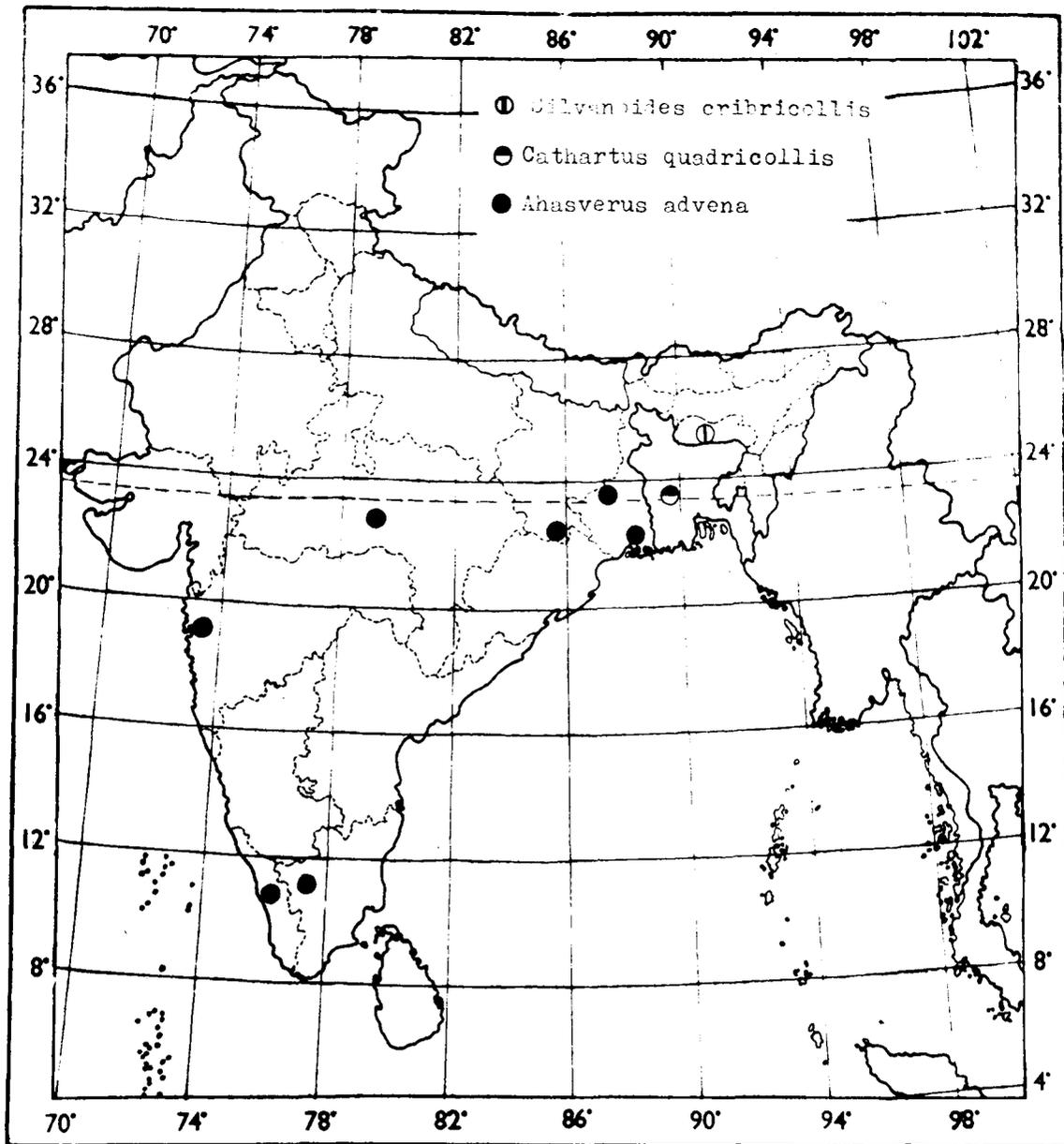
MAP 3

Map 4. Distribution of the Indian species of
Protosilvanus Grouvelle.



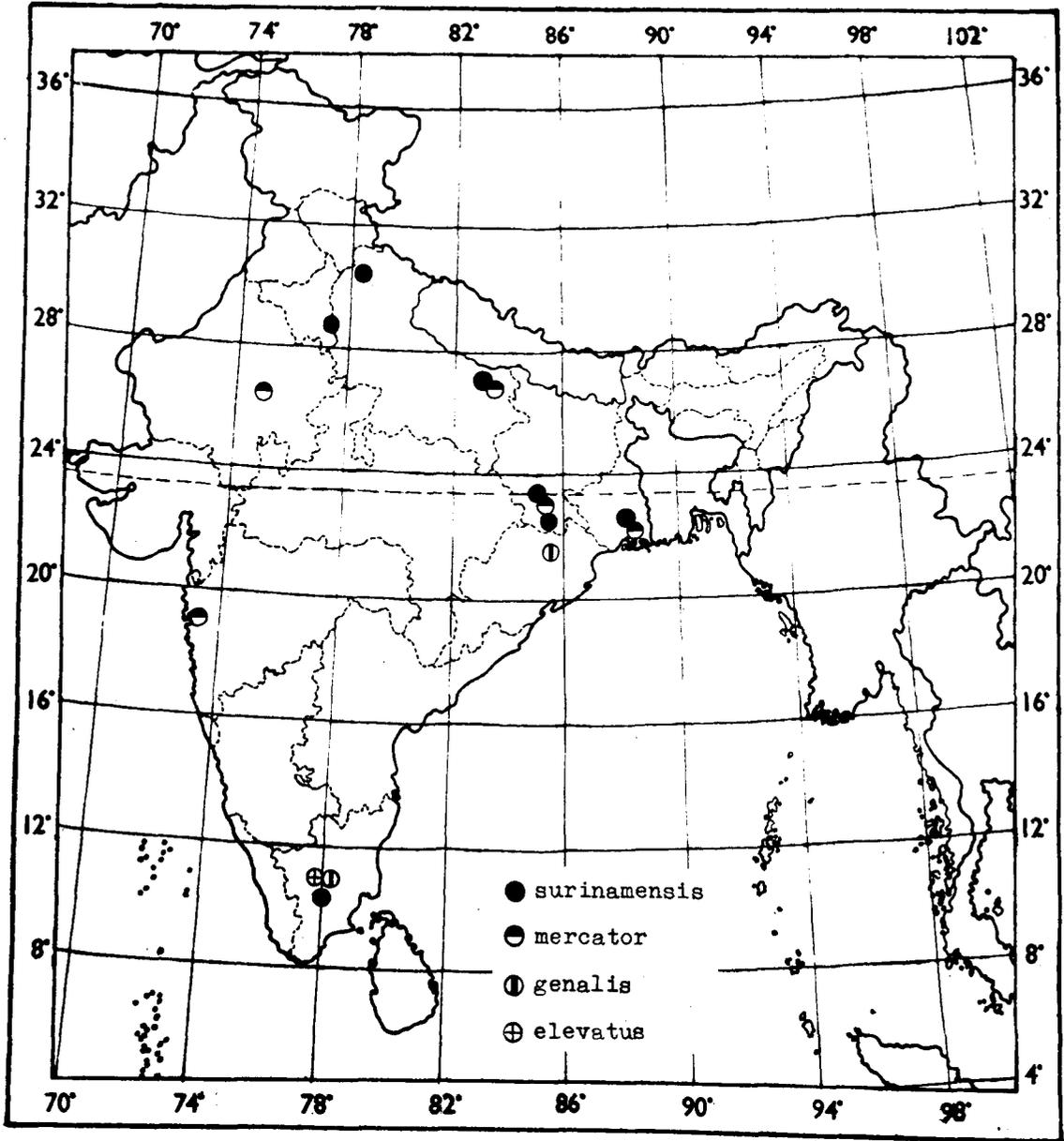
MAP 4

Map 5. Distribution of Silvanoides Halstead,
Cathartus Reiche and Ahasverus Gozis
in India and neighbouring areas.



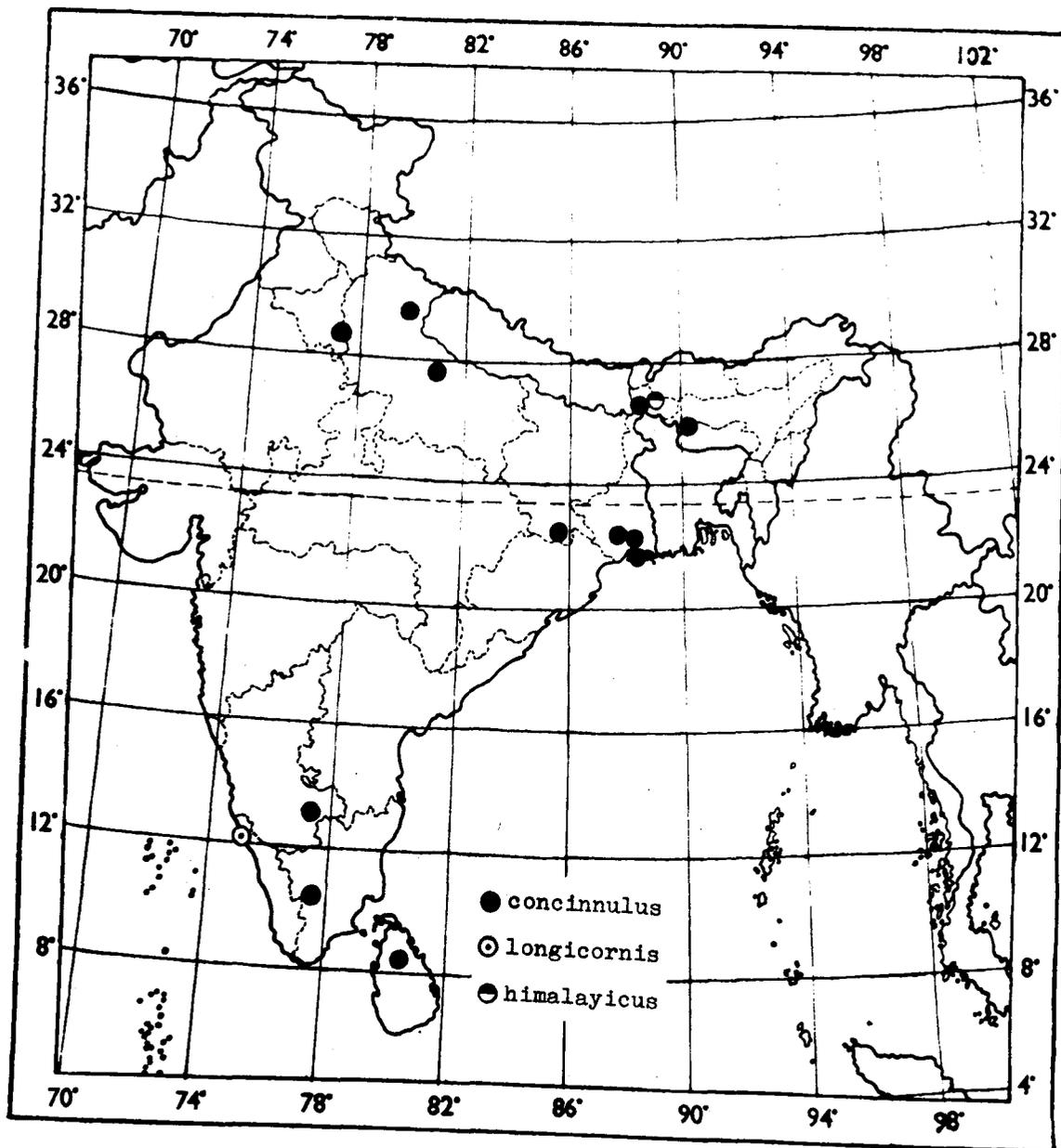
MAP 5

Map 6. Distribution of Indian species of
Cryzaephilus Ganglbauer.



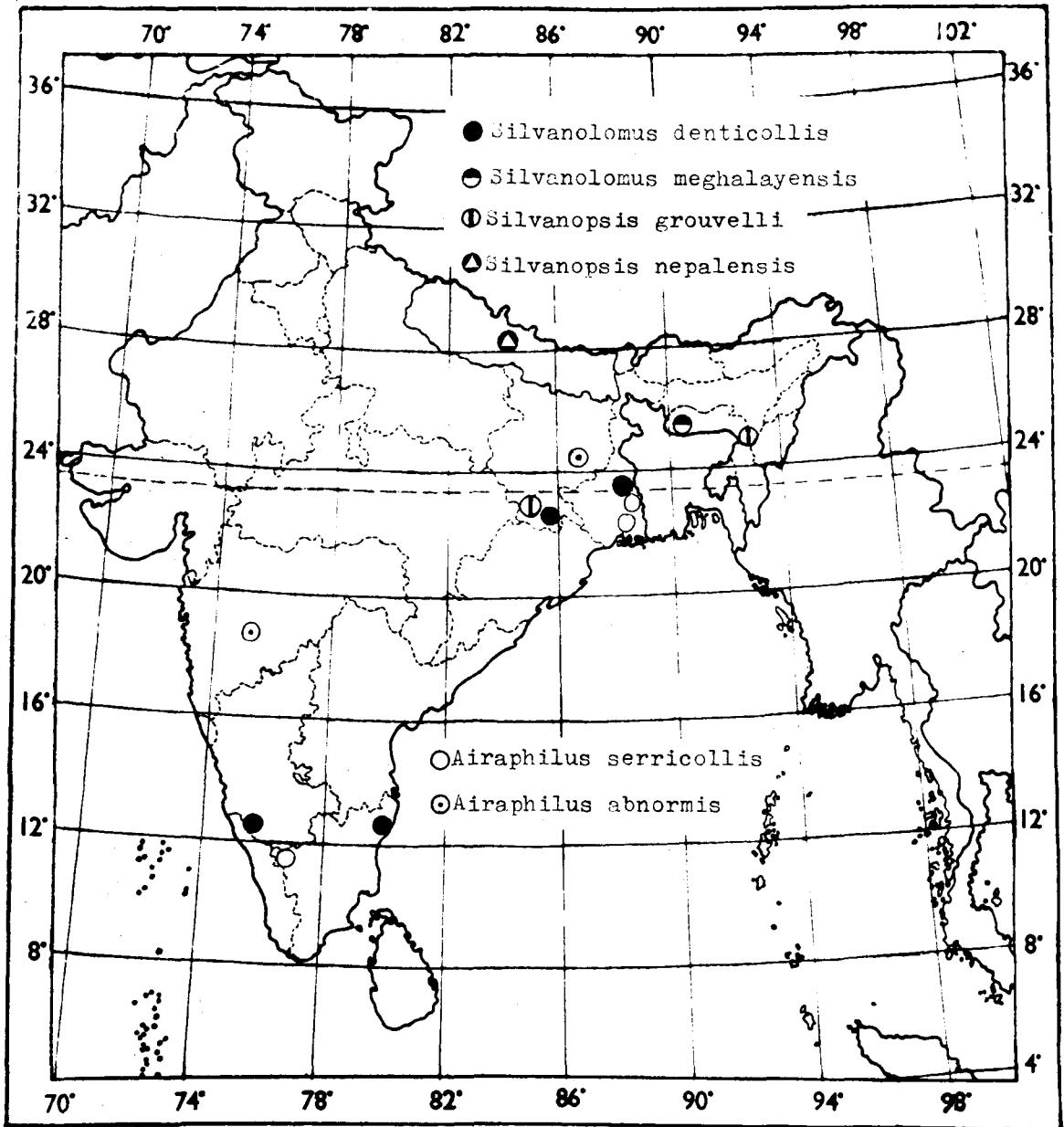
MAP 6

Map 7. Distribution of Indian species of
Monanus Sharp.



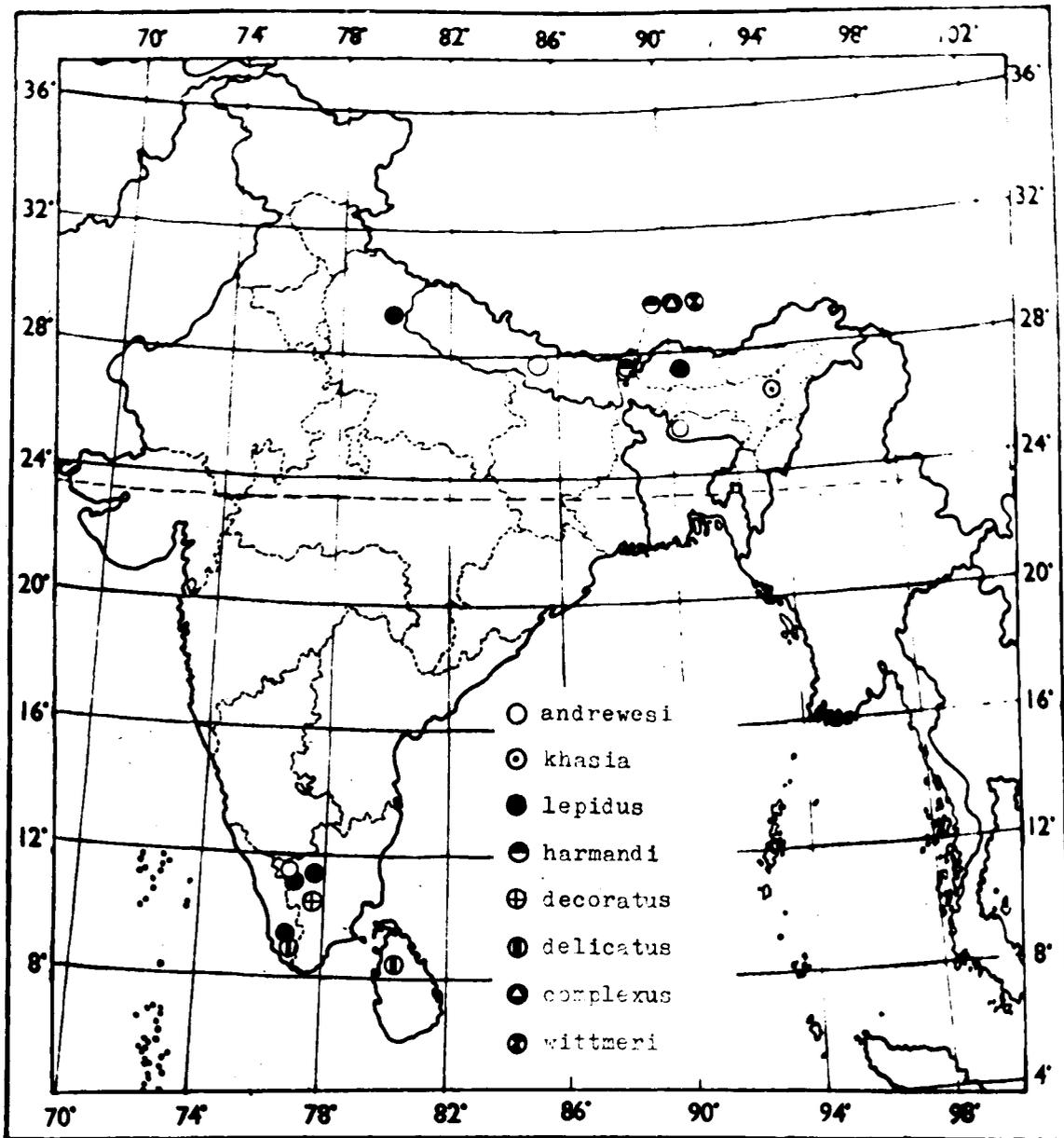
MAP 7

Map 8. Distribution of Indian species of
Silvanolomus Reitter, Silvanopsis
Grouvelle and Airaphilus Redtenbacher



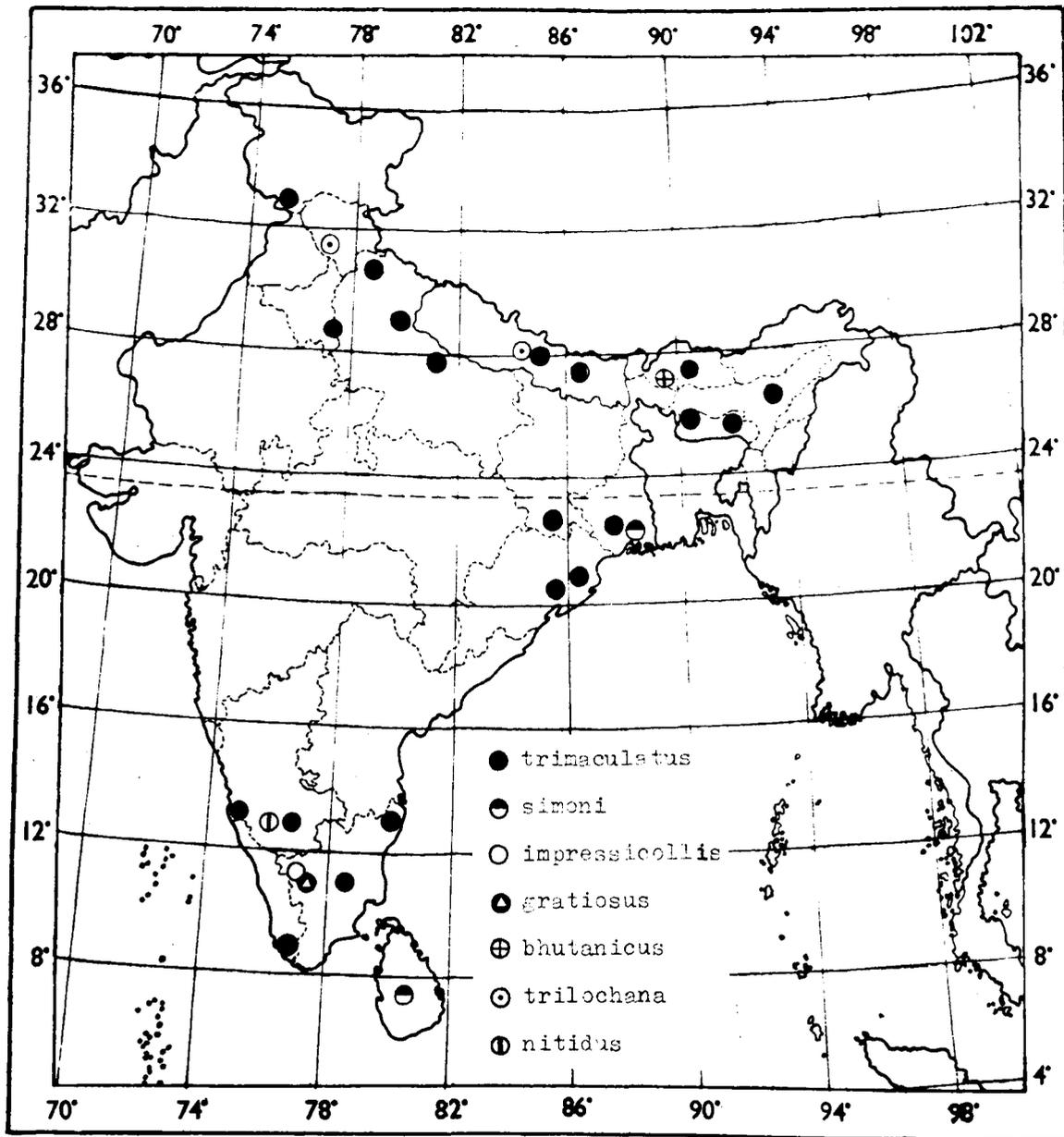
MAP 8

Map 9. Distribution of 8 Indian species
of Psammoecus Latreille



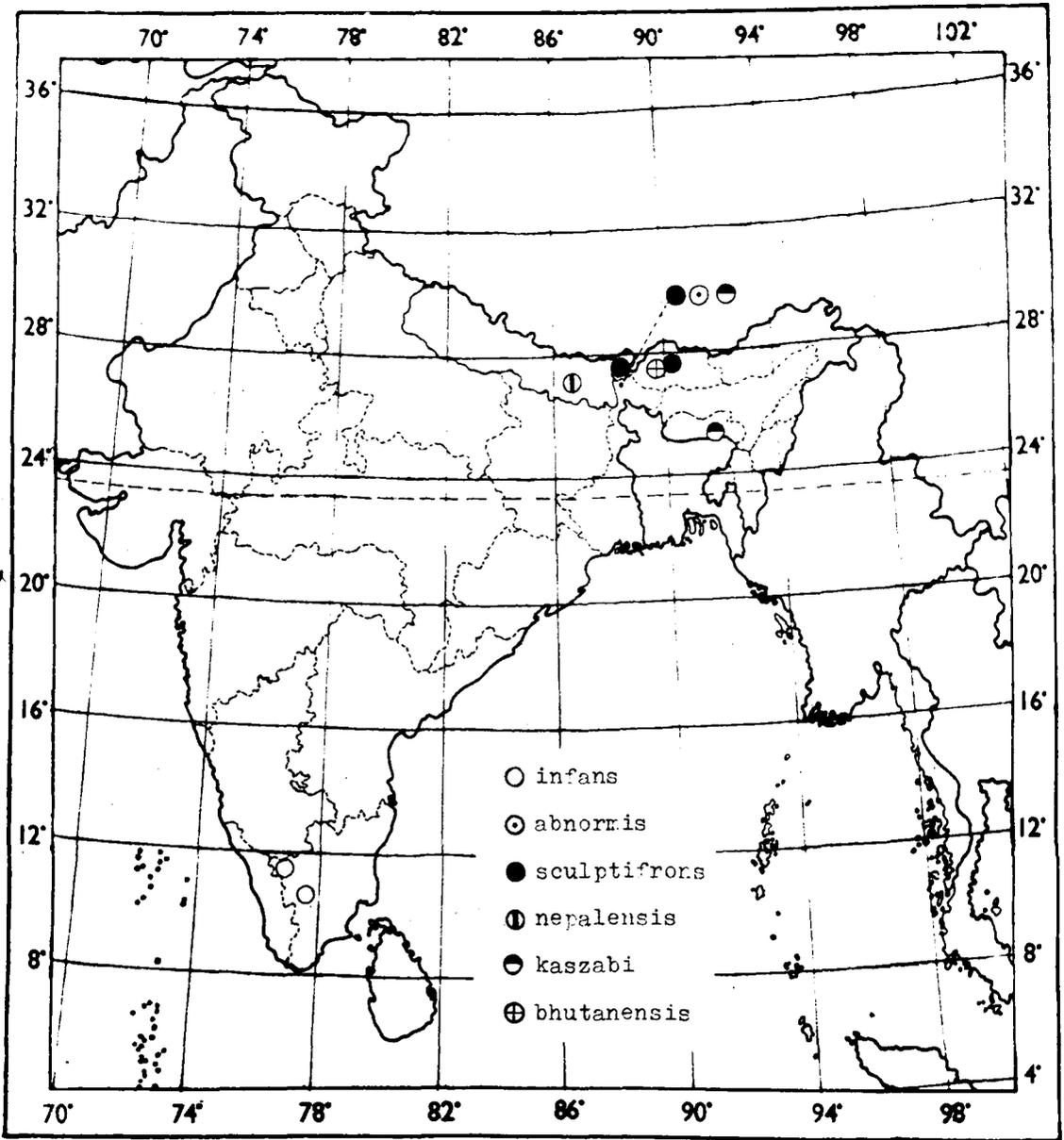
MAP 9

Map 10. Distribution of 7 Indian species
of Psammoecus Latreille.



MAP 10

Map 11. Distribution of Indian species of
Cryptamorpha Wollaston



MAP 11

MATERIALS AND METHODS

MATERIALS

This study is based on the material comprising 2411 adults and 507 larvae. Materials for the present study are provided chiefly by the collection of Zoological Survey of India, Forest Research Institute, Dehra Dun and Coimbatore Agricultural College. A large number of collections from different European Museums and Institutions are also studied in the present work namely, British Museum (Nat.Hist.), London, U.K.; Muséum d'histoire Naturelle, Paris, France; Muséum d'histoire Naturelle, Genève, Switzerland; Naturhistorisches Museum, Basel, Switzerland; Termesztudományi Museum, Budapest, Hungary; Deutsches Entomologisches Institut, Eberswalde, E. Germany; Museo Civico di Storia Naturale, Venezia, Italy; and Pest Infestation Control Laboratory, Slough, Bucks, U.K. Moreover, the author has got the opportunity to study the reference collection of Zoological Survey of India. Larvae studied for this work were mainly collected and reared by the author. Larvae of Ahasverus advena were obtained by donation from Dr. D.G.H. Halstead.

METHODS

Collecting techniques - Many species living under bark are collected by sifting the bark with the help of a chopper. Adults and larvae are picked up by a wet sable hair brush and collected in tube filled with 70% alcohol. A large number of species occur

in haystack and in leaf garbage. The hays or vegetable debris adhering to the ground are pulled off from underside and are shaken several times on a tray, beetles and larvae are then collected from the tray similarly by a brush in tube filled with 70% alcohol. Silvanids that live in flower are collected by gently beating the flower on a tray or by sweeping with a butterfly net. The adults and larvae of stored grain silvanid pests are collected by careful examination of infected grains and seeds, and kept them in 70% alcohol.

Slide preparation - Mounted dry specimen is relaxed by putting it in water for about half an hour. The relaxed specimen is transferred on a glass slide with a drop of water and separated from the mounting board with the help of needles. The elytra and wings are dissected out under a dissecting microscope. The specimen is then boiled in 10% KOH Soln. in a hard glass test tube for about 10-15 minutes until the specimen appears clear or semitransparent. The specimen is then transferred to distilled water for 5-10 minutes for washing. The washed specimen is passed on to absolute alcohol through 30%, 50%, 70% and 90% grades of alcohol and for atleast 5 minutes in each grade. The detached elytra and wings are similarly dehydrated as mentioned above. All the parts are kept in absolute alcohol for about 10-15 minutes for complete dehydration and then transferred to clove oil. The specimen and

its parts are then placed on a clear glass slide with a drop of clove oil and finally dissected under a stereoscopic binocular microscope. The dissected parts are mounted in Canada balsam by cover slip.

Preserved larva is boiled in 10% KOH Soln. for 10 minutes to dissolve the muscles and then washed in distilled water. The larva is then passed on to clove oil through different grades of alcohol as mentioned above. Alcoholic Borax Carmine Soln. is sometimes used after 70% alcohol for staining the specimen. The larva is dissected on a glass slide under a binocular microscope, and the dissected mouthparts, head and rest of the body is mounted in Canada balsam.

Illustration - All the illustrations are made with the aid of a squared eye-piece. Dorsal and ventral figures of the whole specimen are drawn under stereoscopic binocular microscope and figures of the dissected parts under monocular microscope.

CHARACTERS STUDIED

ADULT

A. Size : All the species dealt with here fall within the range of length of 1.36 to 4.47 mm. Majority lie between 2.00 to 3.00 mm. Consequently size is rarely a very useful character in identification of species.

B. Colour : The prevalent colour of the species is reddish brown and sometimes yellowish or blackish. Some species namely, Monanus concinnulus, Psammoecus spp. and Cryptamorpha spp. have their characteristic black markings on elytra, which often provide an useful character for distinguishing the species.

C. Shape : General body shape is elongated and varies from somewhat ovoid (Ahasverus, Silvanolomus, Psammoecus) to nearly parallel-sided (Silvanus, Silvanoprus, Protosilvanus, Cathartus, Oryzaephilus). The dorsal surface is rather markedly flat in Protosilvanus, Monanus (Monanops) himalayicus sp.nov. and more or less convex in Ahasverus, Silvanolomus, Psammoecus. Most of the genera can be recognised by their general facies.

D. Head :

1. Antenna - The antenna is 11-jointed and inserted under projection of frons in Silvaninae, insertion is rather dorsal in Psammoecinae. Antennal joints are usually moniliform in Silvaninae

and filiform and rather elongated in Psammoecinae and Cryptamorphinae. In Silvanopsis and Monanus concinnulus joints are short. Usually apical three joints form a distinct antennal club in Silvaninae which is not distinguishable in Psammoecinae and Cryptamorphinae. Within Silvaninae there are differences in the degree and development of the antennal club. The apical joint of the club is usually transverse or as wide as long. In some species the apical joint is more robust and more strongly elongated as found in Airaphilus serricollis, A. abnormis and Monanus (Monanops) himalayicus sp.nov. In some species namely, Ahasverus advena, Silvanopsis grouvelli sp.nov., S. nepalensis sp. nov. the basal joint of the club (joint 9) is markedly narrower than the middle one (joint 10).

2. Eyes and Temples - The eyes are usually uniform throughout the family; large, round and coarsely faceted. In Cryptamorphia infans, Psammoecus complexus sp.nov. the eyes are somewhat conical.

The temples are usually little developed and extended slightly laterally. In the genera Protosilvanus, Silvanoides these are prominent, extended laterally slightly beyond the margins of eyes and distinct platform-like. Usually the temples are about as long as one or two eye facets and are much shorter than the eyes. In some species namely, Oryzaephilus surinamensis, Silvanoprus longicollis, S. palnicus sp.nov. the temples are well-developed,

long and more or less as long as the eyes. The proportion of the lengths of eye and temple is used in separating two closely related species O. surinamensis and O. mercator. The length of temple in relation to length of eye facet is also used in differentiating the species Silvanus lewisi and Silvanus bidentatus. The comparison of temple with eye facets are often a useful character for separating a few closely related species.

3. Fronto-clypeal suture - This suture is well-marked in the subfamilies Psammoecinae and Cryptamorphinae and absent in Silvaninae. It is one of the prominent characters by which the former two subfamilies can be easily separated from the latter one.

4. Transverse impressed line on vertex - This line on the posterior side of vertex behind eyes is very conspicuous in the genera Silvanus, Silvanoprus, Protosilvanus etc. and indistinct in the genera Oryzaephilus, Monanus (Monanops) etc. This is a useful character and seen when the specimen is studied by making slide preparation.

5. Neck - Usually the neck is more or less constricted and almost uniform throughout the family.

6. Gular sutures - The gular sutures are widely separated and uniform throughout the family.

7. Tentorium - The tentorium is composed of two longitudinal tentorial arms which are usually connected by a transverse bridge near middle as in Silvanus, Silvanoprus, Silvanopsis, Monanus. Rarely, as in Protosilvanus this transverse connection is absent. Lateral extensions from the longitudinal arms are found only in Oryzaephilus.

8. Mouthparts :

Mandible - Each mandible is usually with three apical teeth and well-developed mola. The dorsal side of the basal half is hollowed out as dorsal mandibular cavity in the genera Airaphilus, Psammoecus and Cryptamorpha. This mandibular cavity is usually vestigial in Silvaninae, whereas well-developed in Psammoecinae and Cryptamorphinae.

Maxilla - The lacinia is long, narrow and fringed with fine setae and apical spine absent; rarely, in Airaphilus has a distinct apical spine. First segment of the maxillary palpus is small, other three segments are variable length and shape. The apical segment is usually fusiform, rarely securiform as in Psammoecinae. Unlike other Silvaninae the apical segment is shorter than segment 2 in Protosilvanus. The palpi are often pubescent and rarely glabrous as in, Silvanopsis. Securiform apical segment separates the subfamily Psammoecinae from Silvaninae and Cryptamorphinae.

Labium - The first segment of the labial palpus is small and other two segments are variable length and shape. The apical segment is usually fusiform and sometimes securiform as in Psammoecinae; segment 2 is usually about as wide as apical one in Silvaninae and narrower in Psammoecinae, rounded and much wider than apical one in Cryptamorphinae. In all Silvaninae the apical segment is usually largest, except in Protosilvanus, where the apical segment is shorter than segment 2. The palpi are often pubescent but rarely glabrous as in Silvanopsis. The shape and size of segments are of taxonomic importance especially, in separating the subfamilies, and also used for separating the genus Protosilvanus from other related genera.

Labrum - This is transverse, with front margin usually rounded and fringed with setae and almost uniform throughout the family.

E. Prothorax : The shape of the prothorax as a whole is the most important single external character by which majority of the genera and species may be recognised. The development of spines at the front angles, the degree of curvature of lateral margin, the presence and absence or shape of lateral teeth, convexity of pronotum and shape and proportions of the prothorax are usually very useful characters for separating the species.

1. Shape and proportions of prothorax - The shape of the prothorax ranges from elongated to rather transverse. The term 'almost quadrate', 'transverse' and 'elongated' prothorax has been widely used in description and key to the genera, which is a useful character.

2. Structure of anterior spine - The prothoracic anterior spine formed by a prolongation of front angle is characteristic of the genera Silvanus, Silvanoprus, Protosilvanus and Silvanoides. In the genera Cathartus and Ahasverus it is broadly rounded. The shape, degree of development and the angle formed at the origin with the lateral margin of prothorax provide useful characters in identification of the species of these genera.

3. Lateral margins - The shape of the lateral margin has the greatest effect on the general appearance of prothorax. It may be slightly wavy as in Silvanus, Silvanoprus and Protosilvanus; rather rounded in Ahasverus and Cryptamorpha abnormis sp.nov. or somewhat parallel-sided in Cathartus. The lateral margins in Silvanus, Silvanoprus and Protosilvanus etc. are finely denticulate or serrated, whereas in others with number of large teeth. The shape and number of teeth varies. The genera Oryzaephilus, Silvanopsis and Silvanolomus possess six large teeth, whereas Airaphilus bears eight to fifteen

teeth and Monanus with eight to eleven teeth. The lateral teeth of Oryzaepphilus and Silvanolomus are usually acute and somewhat pointed, whereas in Silvanopsis these are broadly pointed or appear undulated, the lateral teeth of Airaphilus and Monanus are slightly smaller. The subfamily Silvaninae has been divided into two major divisions based on the presence or absence of lateral teeth and number of teeth. Lateral teeth of Psammoecus are variable number and form.

4. Depression on pronotal disc - There are shallow lateral depressions on either sides of the middle line in the genera Silvanus, Silvanoprus and Protosilvanus, whereas in Oryzaepphilus the pronotum is demarcated by a median and a pair of lateral longitudinal carinae and a well-marked longitudinal depression or groove on either sides of median carina. The presence of two longitudinal grooves and carinae on pronotum separates Oryzaepphilus from all other genera of Silvaninae. This depressions are less defined and variable in a few genera. This character has sometimes used as an additional character in the key. The pronotum of Cryptamorpha abnormis sp.nov. with a well-marked median longitudinal depression separates this species from other members of the genus Cryptamorpha.

5. Puncturation - The puncturation on pronotum is usually dense and coarse. Puncturation of pronotum has been compared with that of head and sometimes with that of pronotum of other species. This character has been used for separating the species Monanus concinnulus from M. longicornis and Psammoecus delicatus from P. complexus sp.nov.

6. Sternum and coxal cavities - The sterno-pleural suture may be extended to anterior margin as in Airaphilus; to front angle or spine as in Silvanus, Silvanoides, Silvanolomus; or extending to lateral margin as in Protosilvanus, Cathartus, Psammoecus, Cryptamorpha. The coxae may be widely separated as in Protosilvanus; or narrowly separated as in Silvanus, Silvanoprus and Silvanopsis; or contiguous as in Silvanolomus, Psammoecus and Cryptamorpha. These two characters have been used in the key to the genera and seem to be very useful characters.

F. Elytra :

1. Shape - The normal shape of the elytra is elongated, somewhat parallel-sided and more or less convex. In some genera the elytra are less elongated and somewhat oval as in Ahasverus, Silvanolomus and Psammoecus, while in others they are longer and more parallel-sided as in Silvanus, Protosilvanus,

Cathartus and Monanus (Monanops). In Protosilvanus and Monanus (Monanops) the dorsal surface is markedly flattened. The general shape of the elytra is occasionally sufficiently distinct to distinguish a genus. The majority show only small differences which can not be defined by measurements.

2. Puncturation - The punctures on the elytra are arranged in regular longitudinal rows. Normally in Silvaninae the number of rows is nine and in Psammoecus the number is ten. The scutellary striole is present on either side of the scutellum in Cryptamorpha. Width of each puncture is often compared with the width of interstices between the rows. In some cases, particularly in the genera Psammoecus and Cryptamorpha this character has often been used for separating a few species.

3. Interstices - The interstices are usually costate and sometimes carinate as in Protosilvanus and Oryzaephilus. These are usually alternately wider and narrower.

4. Pubescence - The pubescence are usually short and semierect and which are comparatively longer in Airaphilus and Psammoecus. A few species of Psammoecus possess double pubescence along lateral margins.

5. Epipleura - The recurved part of the elytron beneath the body at lateral side is called 'epipleuron'. This is moderately wide near shoulder and decreases gradually in width till it disappears at apex or little before apex. The epipleura are less variable within the family.

6. Scutellum - This is usually transverse, somewhat pentagonal in the genera of Silvaninae and Cryptamorphae, and rather triangular in Psammoecus.

G. Wing : Wing venation in Silvaninae and Psammoecinae is uniform; venation is reduced, usually with a single anal vein, radial cell but without subcubital fleck. In Cryptamorpha the wing is with three anal veins but without radial cell.

H. Meso-metathorax : The mesosternum is short and transverse, sternal fitting between mesocoxae is usually in a straight line in Silvaninae which is more or less emerginated or sinuated in Psammoecinae and Cryptamorphae. The lateral borders of the mesosternal process are usually more or less notched in the posterior half, which are straight or normal in case of Oryzaephilus and Silvanopsis nepalensis sp.nov.

The metasternum is more or less transverse and usually with a median longitudinal impressed line of variable length. Mesocoxal lines are usually absent, except in Ahasverus.

The mesocoxal cavities are broadly opened outwardly and mesepimera always reach the coxal cavities. The hind coxal cavities are strongly transverse and oval. The degree of separation of middle and hind coxae are of importance in the generic level.

The metendosternite is Y-shaped consisting of a broadly elongated furcal stalk, and a pair of lateral arms of furca or appophyses and which are forked at tip. The anterior tendons of metendosternite are usually obscured which are well-developed in Cryptomorpha.

I. Legs : The legs are generally moderately long. Three pairs of legs are usually similar to each other in their shape and structure.

1. Coxae - The front and middle coxae are nearly rounded and hind coxae are transverse and oval. Front and middle trochantins are hidden.

2. Trochanters - The trochanters are always short and simple. The shape of the trochanter is usually subtapezoidal with a rounded proximal margin. In Oryzaephilus, Silvanus bidentatus, S. curvispinus the hind trochanters, and in Cryptomorpha abnormis sp.nov. the middle trochanters are produced into a short spinous projection in male and thus, indicate the sexual differences.

3. Femora - The femora are almost uniform throughout the family, usually elongate and more or less cylindrical and swollen towards middle. In Silvanoides male ventral side of hind femora are ridged and in Silvanoprus cephalotes front and middle femora are armed with a short spine in both sexes.

4. Tibiae - The tibiae^{are} ~~is~~ slender, elongated and more or less thickened at apex. The apex of tibia is usually with two normal minute spurs which are indistinct in Oryzaephilus.

5. Tarsi - The tarsal formula of the Silvanidae is always 5-5-5 in both sexes. The segment 1 is elongated, segments 2 and 3 subequal, these segments may be simple or lobed, segment 4 distinctly shorter than other segments, apical segment is elongated and cylindrical and bears a pair of claws at its apex. The structure of tarsi is very variable, which may be of following types: (a) simple as in Silvanus, Protosilvanus, Silvanoides, Oryzaephilus; (b) segment 3 lobed as in Silvanoprus, Ahasverus, Cathartus, Silvanolomus; (c) segments 2 and 3 lobed as in Monanus; (d) segments 1 to 3 lobed as in Psammoecus; (e) segments 1 and 2 lobed and segment 3 bilobed as in Cryptamorpha. The shape of the tarsi is thus of great importance and used in the key for several times to separate major divisions of the family and subfamilies.

J. Abdomen :

1. Ventriles - Abdomen is composed of five visible sternites or ventrites. Each ventrite of abdomen is freely articulated and movable; the first ventrite is longer than each one of the four succeeding ventrites; the fifth ventrite is generally semicircular or subconical in its outline, with peculiarly notched at its posterior border in Cryptamorpha abnormis sp.nov.

2. Intercoxal process and femoral lines of ventrite 1 - The apical margin of the intercoxal process may be almost straight as in Silvanolomus, Oryzaepphilus, and Airaphilus, or broadly pointed as in Silvanus, Silvanoprus, Protosilvanus and Psammoecus. This character is of value in the generic level. The femoral line is always represented on the first ventrite behind each hind coxal cavity. The femoral line may be narrowly or widely separated from the hind coxal cavity, it may be closed as in Silvanus, Silvanoprus, Oryzaepphilus, Psammoecus and Cryptamorpha or opened as in Ahasverus and Silvanoides. This feature in few instances is useful in the generic level and it separates two closely related species of Airaphilus (A. abnormis and A. serricollis)

3. Spiracles - There are seven pairs of spiracles, first six pairs lying on pleural sclerites and seventh pair on the edge of tergite 7.

4. Male genitalia - The aedeagus is uninverted Cucujoid-type and uniform throughout the family and its general structure is rather similar throughout the family. Aedeagus is composed of the following parts : (a) median lobe proper is broadly elongated, dorso-ventrally compressed chitinous structure, median sturt single and usually spatulate

at apex, (b) tegmen consists of a basal piece and a pair of parameres, the parameres bear one to many setae at their apex or margins. The structures of aedeagus in Silvanidae especially, tip of median lobe and parameres seem to be species-specific and which are very useful characters for determination of species.

5. Female genitalia - The female genital tube or ovipositor is rather less variable. The general structure of this organ is composed of a pair of paraprocts, a pair of valvifers, a pair of coxites, a pair of long styli attached on outer margin of apex of coxites.

LARVA

General appearance - The full grown larvae of Silvanidae are usually elongated, somewhat flattened, slightly narrowed in front and behind and more or less sparsely and rather characteristically setose, and sometimes with well-developed paired urogomphi on the posterior end of ninth abdominal tergite.

A. Head Capsule : The head capsule is subglobular and broader than long.

Shape of frontal suture - The frons is demarcated by the frontal suture. The frontal suture is Cucujoid-type and almost similar throughout the family and rarely indistinct.

Antenna - The antenna is usually moderately long, joint 1 slightly elongated, joint 2 markedly long, joint 3 may be minute (*Silvaninae*) or well-developed (*Psammoecinae* and *Cryptamorphinae*). The sensory appendage is usually present and minute. Antennal joint 2 is somewhat parallel-sided in Protosilvanus, Silvanoprus and Cathartus, whereas distinctly broadened towards apex in Oryzaephilus and Airaphilus.

Ocelli - Five or six ocelli are present behind antenna and their arrangement are variable.

Arrangement of setae - The arrangement and length of setae on dorsal side of head are variable.

Mandible - The mandible is with three apical teeth and their inner margins sometimes dentate. The mola is well-developed and covered with distinct curved oblique rows of asperites. Protheca is simple, somewhat triangular and apically pointed.

Maxilla - The maxillary mala is falciform, with a dorsal row of long setae along inner margin and with one to three apical spines. The number of setae on inner margin of dorsal side of mala varies from six (Airaphilus) to thirteen (Cryptamorpha), in Oryzaephilus these setae are present in two rows-six and four, often on ventral side there are one to three setae. The maxillary palpus is 3-segmented, segment 1 is markedly transverse, segments 2 and 3 are distinctly elongated,

segment 3 is slightly narrowed at apex and with fine sensorial projections at the tip; ratio of length of palpal segments is a useful character.

Labium - The labium is narrowed anteriorly. The palpi are 2-segmented, apical segment is usually narrower than segment 1.

B. Thorax :

Thoracic segments and arrangement of setae on pronotum - The segments of thorax are more or less transverse; dorsal surface of each segment bears sparse, simple and pointed setae- characteristic for each type and illustration with figure is provided. Rarely, the dorsal surface of each segment is with a transverse brownish pigmented area (Oryzaephilus and Airaphilus).

C. Abdomen :

Structure of abdominal segments - The abdomen consists of ten segments, of which nine segments are easily visible from above. The breadth of first three or four abdominal segments are more or less equal as the thoracic segments, then slightly narrowed, seventh to ninth segments are progressively narrower. The dorsal surface is rarely with transverse brownish pigmented area. The tergite of ninth segment is small; rarely with long narrow, pointed unscle-rotized urogomphi (Cryptamorpha); its sternite forms a conical pygopod-like structure and the tenth segment is represented by

a sclerite attached to the apex of pygopod-like projection.

Arrangement of setae - The type and arrangement of setae on abdominal segments are important and characteristic for each type. The characteristic appearance of individual forms are illustrated with figures.

D. Spiracles : All spiracles are annular and lying on body surface.

E. Legs : The legs are well-developed, moderately long and coxae are moderately widely separated. The claws often bear two tarsangular setae lying side by side (Oryzaeophilus) or one above the other (Airaphilus, Psammoecus, Cryptamorpha), tarsangular setae may be one (Silvanoprus, Cathartus, Ahasverus) or absent (Protosilvanus).

DISTINCTION OF SILVANIDAE FROM THE FAMILY CUCUJIDAE.

- a) Ridges and grooves of head of adult. Unlike Cucujidae the vertex of head of Silvanidae is devoid of median epicranial ridge or suture.
- b) Antennae of adult. Antennae of Silvanidae are usually distinctly clubbed, but in Cucujidae the club is either weak or indistinguishable.
- c) Genal process of head. In Silvanidae the genal process is normal, whereas in Cucujidae it is usually well-developed.
- d) Mouthparts of adult. In Silvanidae the dorsal side of mandible is often with a large cavity opening dorsally and protected by a dorsal tubercle, or sometimes cavity is reduced to a vestige and without dorsal tubercle; in Cucujidae the dorsal cavity is pit-like. In Silvanidae the apical segments of maxillary and labial palpi are sometimes securiform but in Cucujidae never securiform.
- e) Prothorax of adult. In Silvanidae pronotum is always devoid of lateral and median ridges, front coxal cavities are closed behind externally and trochantins are hidden. Cucujidae often have the lateral and median ridges on pronotum, coxal cavities are widely or narrowly opened or closed behind, and trochantins are either hidden or partly exposed in a narrow slit.
- f) Scutellary striole of elytra. Scutellary striae of elytra are sometimes present in Silvanidae but absent in Cucujidae.

g) Tarsi of adult. The tarsal formula of Silvanidae is always 5-5-5 in both sexes, with segments 1 to 3 are either simple or weakly or strongly lobed below, length of segment 1 is variable and segment 4 is smallest. In Cucujidae tarsal formula is variable and may be 5-5-4 in male, segments are simple, segment 1 is smallest and segments 2 to 4 are more or less equal or progressively shorter in length.

h) Larval epicranial suture. The heads of Silvanidae larvae are always devoid of epicranial suture which is sometimes present in Cucujidae.

i) Larval abdominal segment 9. In Silvanidae tergite 9 is small and rarely with long unsclerotized urogomphi, its sternite forms a conical pygopod-like prolongation. In Cucujidae segment 9 is short but with large dark pigmented and chitinized urogomphi, and without any such pygopod-like structure.

j) Larval spiracles. In Silvanidae all spiracles are annular and usually lying on body surface. In Cucujidae spiracles are lying often on short projections, thoracic ones are usually bicameral and abdominal ones are either annular or bicameral.

DEFINITION OF THE FAMILY SILVANIDAE

ADULT CHARACTERS

General appearance small (1.36-4.47 mm), usually parallel-sided and somewhat flattened, elytral puncturation arranged in rows and often sculptured.

Head : Usually slightly elongated, sometimes transverse, usually with neck constrictions, without stridulatory files, usually with a transverse line on vertex, rarely with fronto-clypeal suture, often with a pair of lateral longitudinal grooves near inner sides of eyes, antennal insertions hidden or exposed but never distinctly dorsal. Gular sutures widely separated; anterior part of gular region without longitudinal grooves, rarely with a transverse groove (Cryptamorpha); genal process normal. Tentorium simple, with two long tentorial arms and often connected by a narrow transverse bridge near middle, sometimes with lateral process from tentorial arms. Antenna 11-jointed, scape often large and elongated, club usually distinct, sometimes indistinguishable. Mandible with two or three apical teeth, mola well-developed, on dorsal side sometimes with a large cavity opening dorsally and protected by a dorsal tubercle, sometimes cavity reduced to a vestige and without dorsal tubercle. Maxilla with distinct lacinia and galea, lacinia narrow and usually without apical spine but fringed with fine

hairs, galea broad and its apex densely hairy, palpi with apical segment rarely securiform. Labium with mentum transverse; palpi with apical segment rarely securiform or strongly transverse, or distinctly smaller than segment 2. Labrum transverse, its apical margin more or less rounded.

Prothorax : Usually elongated, often side margins serrated and sometimes with distinct teeth, pronotum without prebasal impressions, prosternum rarely with a pair of pit-like cavities (Cryptomorpha), front coxae usually closely situated, trochantins hidden; cavities somewhat rounded and externally closed behind, and internally usually opened.

Meso-metathorax : Mesocoxae often closely situated or contiguous, sternal fitting between mesocoxae usually in a straight line or sometimes with a narrow projection from metasternum, mesocoxae broadly opened outwardly, mesepimera extending upto cavities, sometimes pit-like cavities present on anterior and posterior part of metasternum. Metendosternite often reduced and without lateral plates, sometimes well-developed.

Elytra and wing : Elytra punctured in regular rows and usually with nine rows of punctures, rarely with a scutellary striole (Cryptomorpha), and epipleura usually complete. Wing usually with single anal vein and rarely with three (Cryptomorpha), usually with radial cell, without r-m cross vein, without anal cell and subcubital fleck.

Legs : With trochanters short and simple, femora swollen towards middle, tibiae slightly broadened at apex and usually with two apical spurs, tarsal formula 5-5-5 in both sexes, segments 1 to 3 usually simple or slightly lobed, rarely strongly lobed below; length of segment 1 variable, segment 4 smallest, segment 5 elongated, claws simple.

Abdomen : Usually completely covered by elytra, all ventrites freely articulated, ventrite 1 longest and ventrites 2 to 5 more or less equal in length, ventrite 1 usually with femoral lines, intercoxal process variable; 7 pairs of spiracles, first 6 pairs lying on pleural sclerites and 7th pair on the edge of tergite 7. Aedeagus uninverted Cucujoid-type, median lobe broadly elongated and with a median sturt and articulated parameres well-developed. Ovipositor well-developed with separate paraprocts, valvifers, coxites, and styli attached at apex of coxites.

LARVAL CHARACTERS :

General appearance long, narrow, more or less parallel-sided and often somewhat flattened, with moderately long antennae and legs moderately long and coxae moderately widely separated.

Head : Moderately to strongly transverse, with more or less distinct Cucujoid-type of frontal suture, without endocarina and metopic suture. Antennal joint 1 elongated, joint 2 markedly long, joint 3 minute or moderately long and sensory appendage minute.

Hypostomal rods often distinct and diverging posteriorly. Ocelli five or six on each side of head. Mandible with three apical teeth, their inner margin sometimes dentate, mola well-developed with distinct curved oblique rows of asperites, a tuft of hairs present at the base and apex of inner margin of mola, often with a row of hairs along the basal margin; protheca simple, narrow, pointed, chitinized apically and translucent in basal half and ventral crushing tubercle usually distinct. Maxillary mala falciform and with one to three apical spines, a dorsal row of setae present along its margin, a rounded process often present on inner margin of stipes, groups of dorsal denticles usually present on palpiger, palpiger usually well-developed; palpi with segment 1 markedly transverse, segments 2 and 3 distinctly elongated and more or less equal; cardo forming a sharp angle with stipes, maxillary articulating area well-developed and oval. Hypopharynx well-developed and hypopharyngeal bracon distinct. Labial palpi 2-segmented, segment 1 transverse and apical segment narrower and slightly elongated.

Thorax and abdomen : Dorsal surface devoid of tubercles or granules; setae sparse, simple and usually pointed. Width of thoracic and first three to four abdominal segments more or less equal, first abdominal segment slightly shorter than segment 2, segments 7 to 9 progressively narrower, tergite 9 small and

rarely with well-developed unsclerotized urogomphi, sternite 9 forming a conical pygopod-like prolongation of which segment 10 forming a small apical part.

Spiracles and legs : All spiracles annular and lying on body surface. Legs sometimes long, coxae small, claws simple and often with two tarsangular setae lying side by side or one above other.

KEY TO THE SUBFAMILIES OF SILVANIDAE

1. Antenna short, scape rather small and club more or less distinct; head without fronto-clypeal suture, antennal insertions hidden under projection of frons; mandible usually with vestigeal cavity and dorsal tubercle absent; dorsal side of head without longitudinal grooves or striae between eyes; tarsi simple or slightly lobed; elytra with nine rows of strial punctures. Silvaninae

Antenna long and slender, scape large and club not distinguishable; head with fronto-clypeal suture, antennal insertions somewhat dorso-lateral and exposed; mandible with well-developed cavities and dorsal tubercles; head with a pair of longitudinal grooves or striae between eyes; tarsi strongly lobed below; elytra with ten rows of strial punctures.2

2. Apical segments of labial and maxillary palpi securiform or strongly transverse; head without curved transverse groove on anterior part of gular region; elytra devoid of scutellary striole. Psammoecinae

Apical segments of labial and maxillary palpi elongated and more or less fusiform; head with a distinct curved transverse groove on anterior part of gular region; elytra with distinct scutellary striole.
..... Cryptamorphae

KEY TO THE GENERA OF SILVANIDAE FROM INDIA

1. Head without fronto-clypeal suture and devoid of longitudinal grooves or striae, antennal insertions hidden under projection of frons, antenna with more or less distinct club; each elytron with 9 rows of strial punctures.2

Head with distinct fronto-clypeal suture and a pair of longitudinal grooves or striae present on vertex (Figs. 205,236), antennal insertions somewhat exposed, antenna with club not distinguishable; each elytron with 10 rows of strial punctures.12

2. Lateral margin of prothorax finely serrated and without large teeth or denticles (Figs.21,53).3

Lateral margin of prothorax with more or less large teeth or denticles (Figs.127,163,193).8

3. Anterior spine of prothorax moderately large and its apex broadly rounded, lateral margin of prothorax and elytra not wavy (Figs.107,122).4

Anterior spine of prothorax small to large and its apex more or less pointed, lateral margin of prothorax and elytra more or less wavy (Figs. 21,88).5

4. Prothorax transverse, lateral margin outwardly curved, anterior angles produced and callosity-like, sterno-pleural suture of prothorax extending to anterior angle; antennal joint 9 distinctly narrower than joint 10; elytra ovoid (Fig. 107); femoral lines on ventrite 1 open (Fig. 108). ..
..... Ahasversus Gozis

Prothorax elongated, almost parallel-sided, anterior angles slightly produced laterally and not forming any callosity-like structure, sterno-pleural suture of prothorax extending to lateral margin; antennal joint 9 slightly narrower than joint 10; elytra parallel-sided (Fig. 122); femoral lines on ventrite 1 closed (Fig. 123).
..... Cathartus Reiche

5. Species markedly flattend; sterno-pleural suture of prothorax extending to lateral margin, front coxae widely separated (Fig.94); apical segments of maxillary and labial palpi shorter than segment 2 (Figs.101,102); antennal joints 9 and 10 usually bear apical spines; 7th elytral interstice more or less carinate Protosilvanus Grouvelle

Species moderately flattened; sterno-pleural suture of prothorax extending to anterior spine, front coxae less widely separated (Fig.37); apical segments of maxillary and labial palpi longest (Figs.44,45); antennal joints 9 and 10 devoid of spines; elytral interstices not carinate...
6

6. Apex of anterior spines of prothorax lying beneath front margin of prothorax; antennal joints 4 to 8 about as broad as long (Fig.85); femoral lines on ventrite 1 opened (Fig.86); dorsal surface of head and prothorax rather sparsely punctured and somewhat shiny; apex of paramere with more than one long seta. Silvanoides Halstead

Apex of anterior spines of prothorax almost in a same level or above front margin of prothorax; antennal joints 4-8 elongated (Figs.21,59); femoral lines on ventrite 1 closed (Fig.35); dorsal surface of head and prothorax with dense and coarse punctures and rather dull; apex of paramere with one long seta.7

7. Tarsal segment 3 strongly lobed below (Fig.68)....
 Silvanoprus Reitter

Tarsi simple (Fig.39)..... Silvanus Latreille

8. Lateral margin of prothorax with 6 distinct teeth or denticles (Figs.1,140).9
- Lateral margin of prothorax with atleast 8 teeth or denticles (Figs.160,190).11
9. Pronotum with three distinct longitudinal carinae; lateral margin of mesosternal process simple and not notched (Fig.6)Oryzaephilus Ganglbauer
- Pronotum devoid of longitudinal carinae; lateral margin of mesosternal process usually notched (Figs.129,147).10
10. Antenna short, antennal joint 9 slightly wider than joint 8 and distinctly narrower than joint 10 and club somewhat 2-jointed; tarsal segment 3 slightly lobed below (Fig.146).....
- Silvanopsis Grouvelle
- Antenna moderately long, antennal joint 9 distinctly wider than joint 8 and slightly narrower than joint 10 and club clearly 3-jointed; tarsal segment 3 strongly lobed below (Fig.128)
- Silvanolomus Reitter

11. Pubescence on dorsal surface long and distinct; lateral margin of prothorax with 8 to 15 denticles and each denticle with a posteriorly projected long seta; apical margin of clypeus more or less rounded (Figs.188,190); tarsal segment 3 only strongly lobed below (Fig.191); mandible with 2 apical teeth and a well-developed dorsal cavity (Fig.199); species usually dark brown. Airaphilus Redtenbacher

Pubescence on dorsal surface short and fine; lateral margin of prothorax with 8 to 11 denticles and each denticle with an anteriorly directed short seta; apical margin of clypeus almost straight (Figs.157,160); tarsal segments 2 and 3 strongly lobed below (Fig.158); mandible with 3 apical teeth and dorsal cavity poorly developed (Fig.170); species usually yellowish brown to reddish brown.

..... Monanus Sharp

12. Apical segments of labial and maxillary palpi securiform or strongly transverse; elytra devoid of scutellary striole and ovoid; head without curved transverse groove on anterior part of gular region; sternal fitting between mesocoxae with a narrow short projection from metasternum (Fig.223); tarsal segment 3 lobed below (Fig.219).

..... Psammoecus Latreille

Apical segments of labial and maxillary palpi elongated and more or less fusiform; elytra with distinct scutellary striole and more or less parallel-sided; head with a distinct curved transverse groove on anterior part of gular region; sternal fitting between mesocoxae in a slightly curved line (Fig.251); tarsal segment 3 bilobed (Fig.247).
..... Cryptamorpha Wollaston

Subfamily SILVANINAE

Genus Silvanus Latreille

Silvanus Latreille, 1804, Histoire Naturelle, générale et particulière, des crustacés et des insectes. 11 : 158; Latreille, 1807, Genera Crustaceorum et Insectorum 3 : 19; Ganglbauer, 1899, Die Käfer Von Mitteleuropa 3 : 581; Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 332-340; Halstead, 1973, Bull. Br. Mus. nat. Hist.(Ent.) 29 (2) : 41,47; Pal and Sengupta, 1977, Oriental Ins. 11(2) : 270-271.

Leptus Duftschmidt, 1823, Fauna Austriae 3 : 156.

Type-species : Silvanus unidentata (Olivier)

The genus Silvanus Latreille is comprised of minute and flat beetles ranging from 2.00 to 3.50 mm in length. These

beetles primarily live under bark of trees, found also in mouldy stored food products. Halstead (1973) reported that twelve species are associated with stored food products. Silvanus is widely distributed to all Zoogeographical regions. This genus also occurs abundantly all over India, of which the species S. lewisi Reitter is the most common and widely distributed.

Silvanus is one of the large genus of the subfamily Silvaninae of the family Silvanidae. This genus was proposed by Latreille (1804) for the species Ips unidentata Olivier, later in 1807 he described the genus. Subsequently several unrelated species were described under this genus by various workers. Ganglbauer (1899) first revised the genus Silvanus. Grouvelle (1912) erected four subgenera namely, Microsilvanus, Parasilvanus, Protosilvanus and Cathartosilvanus under this genus. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed fiftyfive species under Silvanus including three species namely, S. bidentatus (Fabricius), S. lateritius Reitter and S. lewisi Reitter from India. Halstead (1973) while revising the genus Silvanus pointed out that in Junk's "Coleopterorum Catalogus" Hetschko has erroneously included twentyone species. He also established three more new genera namely, Calpus, Pensus and Silvanoides, and given generic status to Grouvelle's subgenera Cathartosilvanus, Parasilvanus

and Protosilvanus and merged the subgenus Microsilvanus with Silvanus. Halstead recognised seventeen valid species, of which five species are recorded from India namely, S. lewisi, S. bidentatus, S. recticollis Reitter, S. difficilis Halstead and S. rossi Halstead and transferred the Indian species S. lateritius to the genus Protosilvanus Grouvelle. Pal and Sengupta (1977) added five more new species from India. In the present study two new species are described.

Definition :

General appearance (Fig.21) elongated, moderately depressed, usually reddish brown to blackish brown.

Head (Fig.36) elongated, front margin of clypeus almost straight, eyes moderately large and coarsely faceted, temple often flattened beneath eye, transverse impressed line on vertex behind eyes present, tentorium with two long tentorial arms and a transverse bridge near middle. Antenna moderately long and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, joints 2(pedicel)-8 subequal and narrower than scape, club loose and 3-jointed. Mandible (Fig.43) elongated, with 3 apical teeth, mola well-developed and a trace of dorsal mandibular cavity present near base. Maxilla (Fig.44) with lacinia narrow, elongated and without apical spine; galea short and broad and its apex densely hairy; palpi fringed with few setae, palpi

with segment 2 slightly longer than segment 3, apical segment longest and fusiform. Labium (Fig.45) with mentum triangular, palpi with apical segment longest and fusiform. Labrum (Fig.46) with apical margin slightly rounded.

Prothorax (Fig.37) usually longer than broad, front angle with a prominent spine, side margins finely serrated, pronotum with a median disc usually demarcated by shallow lateral depressions, prosternal process broad at apex and its apical margin straight, front coxae moderately widely separated, coxal cavities rounded, cavities broadly closed behind externally and internally, sterno-pleural sutures extending to front angles.

Meso-metathorax (Fig.39): Mesocoxae narrowly separated, cavities broadly opened outwardly, lateral margin of mesosternal process notched at middle, sternal fitting between mesocoxae almost in a straight line. Metasternum about as broad as long, median impressed line on metasternum extends anteriorly almost upto apex, hind coxae more widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig.42) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat parallel-sided, usually slightly sinuate across anterior one-third, each elytron (Fig.41) with 9 rows

of strial punctures, without scutellary striole, single and double rows of pubescence on alternate interstices, epipleura narrow and complete upto apex.

Legs (Fig.38) moderately long, trochanters short and simple, femora usually swollen towards middle, tibiae not broadened at apex and with two apical spurs, tarsal formula 5-5-5 in both sexes, tarsi simple, tarsal segment 1 long, segments 2 and 3 shorter and subequal, segment 4 shortest, claws simple.

Abdomen (Fig.40) elongated, ventrite 1 longest, intercoxal process broad and its apical margin broadly pointed, femoral lines closed. Aedeagus (Fig.48) with median lobe broad; median sturt single, elongated and its apex spatulate; parameres well-developed, slender, elongated and its apex bilobed. Ovipositor (Fig.47) with well-developed paraprocts, valvifers, coxites and long styli attached on outer margin of apex of coxites.

Habitat : So far recorded under bark, rarely in haystack.

Distribution : All Zoogeographical regions.

KEY TO THE SPECIES OF SILVANUS FROM INDIA

1. Temple not distinctly flattened beneath eye to form a platform, eyes small with fewer facets; anterior spine of prothorax directed more towards front and its tip markedly blunt (Fig.25).
..... recticollis Reitter
Temple distinctly flattened beneath eye to form a platform, eyes moderately or markedly large and with many facets; anterior spine of prothorax directed slightly outwards and its tip more or less pointed.2
2. Temple markedly short and represented by a thin platform, length of temple shorter than the width of one eye facet and its outer apical angle pointed (Figs.21,22, 24). 3
Temple distinct and thick, length of temple longer than the width of one eye facet and its outer apical angle somewhat broad.(Figs.23,26).5
3. Prothorax broad and short, prothorax hardly longer than broad excluding anterior spines (1.00:0.98), anterior one-third of lateral margin of prothorax not sinuate before formation of anterior spine (Fig.22).
..... imitatus Pal and Sengupta

Prothorax distinctly elongated, prothorax distinctly longer than broad excluding anterior spines (1.00:0.84 to 0.88), anterior one-third of lateral margin of prothorax sinuate before formation of anterior spine (Figs.21,24).4

4. Anterior spine of prothorax moderately large and about as long as half of length of eye (Fig.21); aedeagus with outer apical lobe of each paramere bears two setae and of which the outer one shorter (Fig.48). lewisi Reitter

Anterior spine of prothorax short and as long as one-third of length of eye (Fig.24); aedeagus with outer apical lobe of each paramere bears two setae and of which outer one longer (Fig.49). indicus sp.nov.

5. Inner margin of anterior spine of prothorax distinctly curved outwardly (Fig.23). rossi Halstead

Innder margin of anterior spine of prothorax usually almost straight6

6. Prothorax hardly longer than broad (1.08:1.00), prothorax very little longer excluding anterior spines (1.15 : 1.00) and slightly convergent posteriorly behind middle; antennal joint 9 about as long as broad (Fig.27)

..... difficilis Halstead

Prothorax longer than broad (1.10 to 1.30:1.00) and distinctly elongated excluding anterior spines (1.20 to 1.33:1.00), prothorax distinctly convergent posteriorly behind middle; antennal joint 9 distinctly transverse (Figs.26,28) or if not, outer margin of anterior spine of prothorax curved somewhat inwardly and its tip projected in front (Fig.34).7

7. Anterior spine originates rather abruptly from lateral margin of prothorax, and meeting point of outer margin of anterior spine and lateral margin of prothorax forms obtuse angle (Fig.28).
. gibbus Pal and Sengupta

Anterior spine originates not abruptly from lateral margin of prothorax, meeting point of outer margin of anterior spine and lateral margin of prothorax not forms an angle but distinctly concave (Figs.26, 29,31).8

8. Outer margin of anterior spine of prothorax curved inwardly and its tip projected somewhat inwardly and towards front, prothorax somewhat elliptical excluding anterior spines; antennal joint 9 elongated (Fig.34). curvispinus Pal and Sengupta

Outer margin of anterior spine of prothorax straight and directed more outwardly, prothorax not elliptical excluding anterior spines and distinctly narrowed posteriorly; antennal joint 9 distinctly transverse (Figs. 26,29,33).9

9. Eyes distinctly shorter than half of length of head, distance between two eyes on ventral side of head more than two times wider than length of each eye; anterior spine of prothorax short, narrow and its tip pointed; posterior one-third of elytra distinctly narrowed towards apex (Fig.26), hind trochanter of male with a distinct spine. bidentatus (Fabricius)

Eyes larger and about half as long as head, distance between two eyes on ventral side of head less than 1.5 times of length of each eye; anterior spine of prothorax short or long but distinctly broader and less pointed; posterior one-third of elytra slightly narrowed towards apex (Figs.29,31); hind trochanter of male devoid of any spine10

10. Anterior spine of prothorax short and about one-third of length of each eye (Fig.33).....
..... andamanicus sp.nov.

Anterior spine of prothorax distinctly longer and about half as long as eye or longer (Figs.29,31). 11

11. Anterior spine of prothorax large, distinctly longer than half of length of each eye, anterior spine slightly narrow and its tip somewhat pointed, lateral margin of prothorax sinuate before posterior angle to form a short spinous projection; antennal joint 7 not longer than joint 6 (Fig.31); hind femora widest before middle (Fig.32); colour blackish brown
..... nigrans Pal and Sengupta

Anterior spine of prothorax moderately large and about half of length of each eye, anterior spine comparatively broader than above and its tip blunt, lateral margin of prothorax not or little sinuate before posterior angle and without spinous projection; antennal joint 7 slightly longer and broader than joint 6 (Fig.29); hind femora widest at middle (Fig.30); colour reddish brown. ruficorpus Pal and Sengupta

1. Silvanus lewisi Reitter

Silvanus lewisi Reitter, 1876, Col. Hefte 15 : 76; Grouvelle, 1908. Annls Soc. ent. Fr. 77 : 491; Halstead, 1973, Bull. Br. Mus. nat. Hist. (Ent.) 29(2) : 53; Pal and Sengupta, 1977, Oriental Ins. 11(2) : 272-273. (Type-loc. : Japan).

Silvanus (Silvanus) lewisi Reitter : Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 338.

Reitter (1876) described this species from Japan, Grouvelle (1908) first time recorded this species in India from Nilgiri Hills. Halstead (1973) reported it from Sendhara (Madhya Pradesh), Cinchona, Anaimalai Hills, Coimbatore (Tamil Nadu), Dohnavar, Kanara, Mysore (Karnataka). He recorded this species from various stored food products and dunnage, at light, under bark of tree stumps. S. lewisi is a rather distinct species and can be easily distinguished from other Indian species of Silvanus in having large eyes, temple shorter than one eye facet and with pointed outer apical angle; prothorax elongated and slightly convergent posteriorly, with anterior spine about half as long as eye and its tip pointed; aedeagus (Fig. 48) with apex of each paramere bilobed, outer apical lobe with two setae of which the outer one is comparatively shorter.

General appearance (Fig. 21) elongated, moderately depressed, uniformly yellowish to reddish brown; covered with short, semi-erect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and about half as long as head, length of temple shorter than length of one eye facet, temple extended laterally beneath eye and its outer apical angle pointed, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and slightly narrower, joint 3 slight shorter and narrower than pedicel, joints 4 and 5 equal and slightly shorter than joint 3, joint 6 shorter than joint 5, joint 7 longer than joint 6, joint 8 slightly shorter than joint 7, joints 9 and 10 transverse and joint 11 about as broad as long. Prothorax convex, elongated, width across anterior spines greater than across middle (1.13-1.20:1.00); anterior spines originate rather gradually from sides, moderately large and about half as long as each eye and its tip pointed; lateral margin of prothorax curved and with few small denticles, lateral depressions on pronotal disc slightly marked, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large and setae projected posteriorly. Puncturation on ventral side finer than on dorsal side. Aedeagus (Fig.48) with

apical projection of median lobe short; apex of each paramere bilobed, inner lobe long with a long seta, and outer lobe short with two short setae, of which the inner one comparatively longer.

Measurements : Total length 2.08-2.47 mm, width of head across eyes 0.44-0.48 mm, length of antenna 0.67-0.87 mm, width of prothorax across middle 0.44-0.48 mm, length of elytra 1.25-1.44 mm and width across middle 0.63-0.70 mm.

Materials examined : 34 ex. INDIA: ASSAM, Phulbari, 4 ex., 24.xi.1974, T. Sengupta, under bark of Shorea robusta; 1 ex., 24.xi.1974, T. Sengupta, under bark of Bombax sp.; MEGHALAYA, Dainadubi Reserve Forest, Garo Hills, 3 ex., 18.xi.1974, T. Sengupta, under bark of fallen Shorea robusta tree; WEST BENGAL, Sukna, 1 ex., 5.v.1976, T.K. Pal, under bark; Calcutta (Ultandanga and Chetla), 2 ex., 16.iii.1975, T.K. Pal, under bark; 3 ex., 12 & 20.iv.1975, T.K. Pal, under bark of Bombax sp.; UTTAR PRADESH, Dehra Dun, Lakshibag, 2 ex., 10.vi.1975, T. Sengupta, under bark; Dehra Dun, Jhajra, 1 ex., 18.viii.1926, F. Ent., ex. Shorea robusta; KERALA, Walayar Forest, 1 ex., 1.xii.1971, T. Sengupta, under bark; ANDAMAN Is., S. Andaman, Chatham, 8 ex., 5.xii.1928, under bark of Sterculia campanulata (3 ex.), ex. Terminalia bialata (4 ex.), ex. Shorea robusta (1 ex).

Distribution : INDIA: Assam, Meghalaya, West Bengal, Uttar Pradesh, Tamil Nadu, Karnataka, Kerala, Andaman Is.; SRI LANKA; VIETNAM; TAIWAN; JAPAN; MALAYSIA; SINGAPORE; INDONESIA; PHILIPPINES; NEW GUINEA; SOLOMON Is.; AUSTRALIA; CONGO; GHANA.

2. Silvanus imitatus Pal and Sengupta

Silvanus imitatus Pal and Sengupta, 1977, Oriental
Ins. 11(2): 273

(Type-loc. : Assam:India).

This species is near S. lewisi but can be easily separated by its prothorax comparatively broader, excluding anterior spines the prothorax hardly longer than broad (1.00: 0.98), anterior one-third of lateral margin of prothorax not sinuate before formation of anterior spine, puncturation on head and pronotum slightly coarser and lateral margins of elytra more distinctly wavy at middle.

General appearance (Fig.22) elongated, moderately depressed, uniformly reddish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye about half as long as head, length of temple shorter than length of one eye facet, temple extended laterally

beneath eye and its outer apical angle pointed, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape but slightly narrower, joint 3 slightly shorter and narrower than pedicel, joints 4 and 5 equal and shorter than joint 3, joint 6 shorter than joint 5, joints 7 and 8 equal and slightly shorter than joints 6, joints 9 and 10 transverse and joint 11 elongated. Prothorax convex, almost equal in length and breadth, width across anterior spines greater than width across middle (1.10:1.00); anterior spines originate rather gradually from sides, moderately large and its length slightly less than half of length of each eye and its tip pointed; lateral margin of prothorax curved and with few small denticles, lateral depressions on pronotal disc slightly marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large and setae projected posteriorly. Puncturation on ventral side finer than on dorsal side.

Measurements of holotype : Total length 2.41 mm, width of head across eyes 0.52 mm, length of antenna 0.80 mm, width

of prothorax across middle 0.54 mm, length of elytra 1.50 mm and width across middle 0.75 mm.

Material examined : Holotype, INDIA:ASSAM, Phulbari, 24.xi.1974, T. Sengupta, under bark of log (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Assam.

3. Silvanus indicus sp.nov.

General appearance of this species closely resembles Silvanus lewisi Reitter and S. difficilis Halstead but can be easily differentiated from the former by its anterior spine of prothorax shorter and about one-third of length of eye; aedeagus with outer lobe of paramere bears two setae and unlike lewisi the outer seta is longer than the inner one, apical projection of the median lobe slightly less tapered. It may be distinguished from the latter species by its temple shorter than the width of one eye facet and its outer apical angle pointed, anterior spine of prothorax slightly shorter, lateral margin of prothorax not sinuate before formation of anterior spine; aedeagus of this species with lateral margin of median lobe not wavy near middle, outer lobe of paramere distinctly shorter than inner one and bears two setae of which the outer one is longer.

General appearance (Fig.24) elongated, moderately depressed, uniformly reddish brown and covered with short, semierect, golden pubescence.

Head: Exposed part of head wider than long, eyes large, length of eye slightly less than half of length of head, eyes coarsely faceted, length of temple shorter than width of one eye facet, temple extended laterally beneath eye and its outer apical angle pointed, puncturation of vertex coarse and dense and that of near anterior margin of clypeus finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape but slightly narrower, joint 3 about as long as pedicel and slightly narrower, joints 4 and 5 almost equal and slightly shorter than joint 3, joint 6 slightly shorter than joint 5, joint 7 about as long as joint 6 and slightly wider, joint 8 shorter than joint 7, joint 9 and 11 about as long as broad and joint 10 transverse. Prothorax slightly elongated, width across anterior spines greater than width across middle (1.12 : 1.00); anterior spines originate rather gradually from sides, short and its length about one-third of length of an eye and its tip somewhat pointed; lateral margin curved and with few small denticles, lateral depressions on pronotal disc slightly marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate,

rows of punctures on elytra deep and large and setae projected posteriorly. Puncturation on ventral side finer than on dorsal side, Aedeagus (Fig.49) with median lobe slightly broader behind middle and its apical projection short; apex of each paramere bilobed, inner lobe longer and with a long seta and outer lobe with two shorter setae.

Measurements of holotype : Total length 2.26 mm, width of head across eyes 0.45 mm, length of antenna 0.86 mm, width of prothorax across middle 0.47 mm, length of elytra 1.33 mm and width across middle 0.66 mm.

Holotype ♂ INDIA : BIHAR; Hazaribagh, 26.iii.1931, F. Economist, ex. Boswellia serrata (under bark). Aedeagus dissected and mounted on cover slip and pinned with the holotype. (in Forest Research Institute, Dehra Dun); Paratypes 2 ex., KERALA, Calicut ('Madras' in label), Perry's Timber Depot, 31.v.1941, B.M. Bhatia, Crawling about between planks (1 Paratype in Zoological Survey of India, Calcutta and 1 Paratype in Forest Research Institute, Dehra Dun); Paratypes 3 ex., KERALA, Trivandrum, 21.xi.1957, C.N.O., on stored wood (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Bihar, Kerala.

4. Silvanus rossi Halstead

Silvanus rossi Halstead, 1973, Bull. Br. Mus. nat. Hist. (Ent.) 29(2) : 54; Pal and Sengupta, 1977, Oriental Ins. 11(2) : 274-275. (Type-loc : India, Thailand, New Guinea).

Halstead recorded this species in India from W. Almorah Divn., Kumaun : Uttar Pradesh. General appearance of this species is apparently similar to S. lewisi and can be separated from the latter species in having temple of head about as long as one eye facet and its outer apical angle blunt, eyes slightly smaller, pedicel slightly longer than antennal scape, inner margin of anterior spine of prothorax slightly curved, scutellum about as broad as long, lateral margin of elytra more wavy.

General appearance (Fig.23) elongated, moderately depressed, uniformly reddish brown and covered with short, semierect golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye slightly shorter than half of length of head, temple slightly longer than one eye facet, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae short and

projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel slightly longer and narrower than scape, joint 3 shorter than pedicel, joint 4 shorter than joint 3, joint 5 longer than joint 4, joint 6 shorter than joint 5, joint 7 longer than joint 6, joint 8 shorter than joint 7, joints 9 and 10 transverse and joint 11 about as long as broad. Prothorax convex, elongated and slightly narrowed posteriorly, width across anterior spines greater than across middle (1.00 : 0.92); anterior spines moderately large, originate gradually from lateral sides, its length about half as long as each eye, inner margin of anterior spine curved outwardly; lateral margin curved and with few small denticles, lateral depressions on pronotum slightly marked near base. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, slightly transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large. Puncturation on ventral side finer than on dorsal side.

Measurements : Total length 2.54 mm, width of head across eyes 0.52 mm, length of antenna 0.88 mm, width of prothorax across middle 0.55 mm, length of elytra 1.55 mm and width across middle 0.73 mm.

Material examined : 1 ex. INDIA : HIMACHAL PRADESH, Solan, Happy Valley, 17.vi.1975, T. Sengupta, under bark of Pine log.

Distribution : INDIA : Uttar Pradesh, Himachal Pradesh; THAILAND; NEW GUINEA.

5. Silvanus difficilis Halstead

Silvanus difficilis Halstead, 1973, Bull. Br. Mus. nat. Hist. (Ent.) 29(2) : 73; Pal and Sengupta, 1977, Oriental Ins. 11(2) : 279-280. (Type-loc. : Malaya, India, Sri Lanka, Vietnam, Taiwan, Singapore, Sumatra, Java, Christmas Is., Sarwak, Borneo, Philippines, Moluccas, New Guinea, I. Delcas, Solomon Is., Samoan Is., Australia, West Africa, New Ireland).

Halstead (1973) described this species and mentioned that in this species there are two distinct forms namely, 'Normal form' and 'New Guinea form'. The 'Normal form' differs from the 'New Guinea form' by its short temple, and wider and shorter prothorax. Halstead recorded this species ('Normal form') in India as follows: Cinchona, Anaimalai Hills : Tamil Nadu; Malabar coast, Mahe: Kerala; Kanara : Karnataka; W. Almorah Divn., Kumaun, Kheri Forest : Uttar Pradesh. The specimen studied here is a 'Normal form' of S. difficilis.

General appearance (Fig.27) elongated, moderately depressed, uniformly yellowish brown and covered with short, semi-erect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye slightly shorter than half of length of head, temple about as long as 1.5 eye facet, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 slightly shorter and narrower than scape, joints 4 and 5 equal and slightly shorter than joint 3, joint 6 slightly shorter than joint 5, joint 7 slightly broader than joint 6, joint 8 slightly shorter than joint 7, joint 9 about as long as broad, joint 10 slightly transverse and joint 11 slightly elongated. Prothorax convex, elongated, width across anterior spines greater than across middle (1.06 : 1.00); anterior spines originate less abruptly from sides, moderately large and its length slightly less than half of length of each eye and its tip less pointed; lateral margin of prothorax curved and with few small denticles, lateral depressions on pronotal disc slightly marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large,

transverse and pubescent. Elytra slightly less than two times as long as broad, widest near middle, lateral margin slightly wavy and explanate, rows of punctures on elytra deep and large and setae projected posteriorly, puncturation on ventral side finer than on dorsal side.

Measurements : Total length 2.20 mm, width of head across eyes 0.47 mm, length of antenna 0.85 mm, width of prothorax across middle 0.48 mm, length of elytra 1.38 mm. and width across middle 0.70 mm.

Material examined : 1 ex. INDIA : TAMIL NADU, Madumalai Reserve Forest, 7.xii.1971, T. Sengupta, under bark of log.

Distribution : 'Normal form'. INDIA : Tamil Nadu, Kerala, Karnataka, Uttar Pradesh; SRI LANKA; VIETNAM; TAIWAN; MALAYSIA; SINGAPORE; INDONESIA, PHILIPPINES; MOLUCCAS; NEW GUINEA; I. DELCAS (Off N. Coast of New Britain); SOLOMON Is.; SAMOAN Is.; AUSTRALIA; WEST AFRICA.

'New Guinea form'. NEW GUINEA; NEW IRELAND; AUSTRALIA.

6. Silvanus recticollis Reitter

Silvanus recticollis Reitter, 1876, Col. Hefte 15 : 61;
Halstead, 1973, Bull. Br. Mus. nat. Hist. (Ent.)
29(2) : 55; Pal and Sengupta, 1977, Oriental Ins.
11(2) : 274-275. (Type-loc. : Japan).

Silvanus reflexus Reitter, 1879, Verh. zool-bot. Ges. Wien
29 : 85.

Silvanus vitulus Grouvelle, 1882, Annali Mus. civ. Stor.
nat. Giacomo Doria 32 : 294.

Silvanus (Microsilvanus) vitulus Grouvelle : Grouvelle,
1912, Annls Soc. ent. Fr. 81 : 332.

Silvanus (Microsilvanus) pumilus Grouvelle, 1912, Annls
Soc. ent. Fr. 81 : 332.

Silvanus (Microsilvanus) minimus Grouvelle, 1912, Annls
Soc. ent. Fr. 81 : 334.

Reitter (1876) described this species from Japan; Halstead (1973) redescribed this species and mentioned several synonyms. This species is rather shorter (1.61-1.82 mm) than S. lewisi (2.08-2.50 mm) and can be easily distinguished from other species in having characteristic shape of head and prothorax (Fig.25), eyes small, temple long and not distinctly flattened beneath eye to form a platform; prothorax almost quadrate, anterior spine broad and projected forward and its tip distinctly blunt.

General appearance (Fig.25) elongated, moderately depressed, uniformly yellowish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes small and length of eye shorter than one-third of length of head,

temple about half as long as eye or slightly shorter and its outer margin rounded, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel shorter and narrower than scape, joint 3 slightly shorter than pedicel, joints 4 and 5 shorter than joint 3, joints 6-8 shorter than joint 5, joint 7 slightly wider than joints 6 and 8, joints 9 and 10 transverse and joint 11 about as long as broad. Prothorax convex, slightly elongated and apparently quadrate, width across anterior spines almost equal or slightly greater than across middle; anterior spines moderately large, about as long as eye or shorter, projected more forward and its tip exclusively blunt; lateral margins rather parallel-sided and slightly narrowed posteriorly, margins slightly explanate and with few small denticles, lateral depressions on pronotal disc indistinct. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra shorter than twice as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large. Puncturation on ventral side finer than on dorsal side and rather shiny.

Measurements : Total length 1.61-1.82 mm, width of head across eyes 0.25-0.36 mm, length of antenna 0.61-0.66 mm, width of prothorax across middle 0.39-0.44 mm, length of elytra 0.95-1.07 mm and width across middle 0.52-0.55 mm.

Materials examined : 6 ex. INDIA : WEST BENGAL, Calcutta, 5 ex., May-June 1914, F.H.G., at light; Howrah district, Sankrail, 1 ex., 13.i.1976, T.K. Pal, haystack.

5 examples present in the collection of Zoological Survey of India, labelled as Silvanus pumilus Grouvelle have been identified as Silvanus recticollis.

Distribution : INDIA : West Bengal; THAILAND; VIETNAM; LAOS; SULAWESI; JAPAN; TAIWAN (RYUKYU Is.); MAURITANIA; CONGO; ZAIRE; RHODESIA.

7. Silvanus bidentatus (Fabricius)

Dermestes 2 dentatus Fabricius, 1792a, Entomologiae

Systematicae Emendate et Auctae 1(1) : 233

(Type-loc. : Germany).

Colydium sulcatum Fabricius, 1792b, Entomologiae

Systematicae Emendate et Auctae 1(2) : 555.

Silvanus bidentatus (Fabricius): Sturm, 1826, Katalog meiner Insekten Sammlung 1. Käfer : 196; Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 490; Halstead, 1973, Bull. Br. Mus. nat. Hist. (Ent.) 29(2) : 68.

Silvanus affinis Reitter, 1876, Col. Hafte 15 : 58.

Silvanus bidentatus var. affinis Reitter, 1880, Verh. zool.-bot. Ges. Wien 29 : 509.

Silvanus (Silvanus) bidentatus (Fabricius): Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 338.

Grouvelle (1908) recorded this species for the first time in India from Nilgiri Hills. Halstead (1973) gave a detailed description of this species and mentioned several synonyms. S. bidentatus can be easily recognised by its length of temple being about as long as two eye facets and flattened beneath eye, outer apical angle of temple broad, eyes moderately large and distance between two eyes on ventral side of head more than two times wider than length of each eye, anterior spine of prothorax rather short, its tip pointed and directed more towards lateral side, and lateral depressions on pronotal disc well-marked, hind trochanter of male with a short spine.

General appearance (Fig.26) elongated, moderately depressed, uniformly reddish brown and covered with short, semi-erect golden pubescence.

Head : Exposed part of head wider than long, eyes moderately large and about one-third as long as head, length of temple about as long as 2.5 eye facets, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae short and projected towards middle line; antenna moderately long and slender, scape moderately large, pedicel and joint 3 slightly shorter and narrower than scape, joints 4 and 5 equal and shorter than joint 3, joint 6 shorter than joint 5, joint 7 wider than joint 6,

joint 8 slightly shorter than joint 7, joints 9-11 more or less transverse. Prothorax convex, elongated, width across anterior spines greater than width across middle (1.02-1.06: 1.00); anterior spines originate rather gradually from sides, moderately large and slightly shorter or longer than half of length of eye, projected more outwardly and its tip rather pointed; lateral margin curved and with few small denticles, lateral depressions on pronotal disc rather well-marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, widest in anterior half, lateral margins wavy and explanate, rows of punctures on elytra deep and large, setae projected posteriorly. Puncturation on ventral side finer than on dorsal side, hind trochanter in male with short spinous projection.

Measurements : Total length 2.55-2.85 mm, width of head across eyes 0.52-0.57 mm, length of antenna 0.95-1.05 mm, width of prothorax across middle 0.52-0.58 mm, length of elytra 1.54-1.70 mm and width across middle 0.69-0.77 mm.

Materials examined : 10 ex. EUROPE, 1 ex. (Z.S.I. Reg. No. 747); ITALY : PIEMONTE, Novara, Passo, Colma, 900 m.
11
9 ex., iv.71., Rossa.

Distribution : INDIA : Tamil Nadu; THAILAND; BRITAIN; RUSSIA; ITALY; U.S.A.

8. Silvanus gibbus Pal and Sengupta

Silvanus gibbus Pal and Sengupta, 1977, Oriental Ins.

11(2):275 (Type-loc.: West Bengal, Assam,
Meghalaya: India).

This species is related to S. difficilis Halstead but can be easily separated by its anterior spines of prothorax originate more abruptly from the lateral sides, puncturation on vertex of head and pronotum coarser, lateral depressions on pronotal disc rather well-marked, antennal club comparatively broader. This species also shows some similarity with S. robustus Halstead in appearance but can be separated from the latter species by following characters : i) the apical projection of median lobe of aedeagus short and blunt, ii) hind trochanter of male devoid of any tubercle, iii) ridge on anterior margin of hind femora absent.

General appearance (Fig.28) elongated, moderately depressed, uniformly reddish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and about half as long as head, length of temple about as long as two eye facets, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of

clypeus finer, setae projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and slightly narrower, joint 3 slightly shorter and narrower than pedicel, joints 4 and 5 equal and slightly shorter than joints 3, joint 6 shorter than joint 5, joint 7 slightly longer and broader than joint 6, joint 8 slightly elongated and broader than joint 7, joint 10 slightly more transverse than joint 9, joint 11 slightly elongated. Prothorax convex, elongated and narrowed posteriorly, width across middle almost equal to width across anterior spines (1.00:1.02-1.06); anterior spines moderately large and about half as long as eye or slightly shorter, its tip slightly blunt, anterior spines originate abruptly from lateral sides and form rather obtuse angles; lateral margin curved and with few small denticles, lateral depressions on pronotal disc usually rather well-marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large, interstices alternately wider and narrower, setae projected posteriorly. Puncturation on ventral side finer than on dorsal side. Aedeagus (Fig.50) with median lobe broad posteriorly; apex of each paramere bilobed, inner lobe with a long seta and outer lobe with two short setae.

Measurements : Total length 2.50-2.73 mm, width of head across eyes 0.51-0.55 mm, length of antenna 0.89-1.02 mm, width of prothorax across middle 0.51-0.58 mm, length of elytra 1.39-1.58 mm and width across middle 0.70-0.74 mm.

Materials examined : 13 ex. Holotype and Paratype 4 ex., INDIA:WEST BENGAL, Calcutta, 20.iv.1975, T.K. Pal, under bark of Bombax sp.; Paratype 1 ex., ASSAM, Kaziranga, Panbari, 15.xi.1974, T. Sengupta, under bark of Shorea robusta; Paratype, 1 ex., MEGHALAYA, Dainadubi Reserve Forest, 18.xi.1974, T. Sengupta, under bark of Shorea robusta (in Zoological Survey of India, Calcutta); WEST BENGAL, Darjeeling District, Sukna, 5 ex., 5.v.1976, T.K. Pal, under bark of Shorea robusta; MAHARASTRA, Belgaum, Nagargalli, 1 ex., 18.xi.1929. B.M. Bhatia, ex. Odina woodier.

Distribution : INDIA : West Bengal, Assam, Meghalaya, Maharashtra.

9. Silvanus ruficarpus Pal and Sengupta

Silvanus ruficarpus Pal and Sengupta, 1977, Oriental Ins.

11(2): 276 (Type-loc.: Assam: India).

This species is related to S. gibbus but can be separated by its prothorax excluding anterior spines distinctly longer (1.33:1.00), anterior spines of prothorax originate not abruptly from lateral sides, and femora of hind leg widest at middle (Fig.30).

General appearance (Fig.29) elongated, moderately depressed, uniformly reddish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye about half as long as head, temple as long as two eye facets, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae short and projected towards middle line; antenna moderately long and slender, scape moderately large, pedicel about as long as scape and narrower, joint 3 slightly shorter than pedicel, joints 4 and 5 equal and shorter than joint 3, joint 6 shorter than joint 5, joint 7 slightly longer and wider than joint 6, joint 8 slightly shorter than joint 7, joints 9 and 10 transverse and joint 11 elongated. Prothorax convex, elongated and narrowed posteriorly, width across anterior spines greater than width across middle (1.00:0.90); anterior spines moderately large, originate gradually from lateral sides, its length about half as long as eye and its tip somewhat blunt; lateral margin curved with few small denticles, lateral depressions on pronotal disc rather well-marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent.

Elytra about two times as long as board, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large. Ventral side shiny, puncturation finer than that of dorsal side. Aedeagus (Fig.51) with median lobe broad and its apical projection short and blunt; outer apical lobe of each paramere long and with a long seta, and inner short lobe with two short setae.

Measurements : Total length 2.55-2.82 mm, width of head across eyes 0.50-0.58 mm, length of antenna 0.91-1.00 mm, width of prothorax across middle 0.49-0.54 mm, length of elytra 1.48-1.66 mm, and width across middle 0.70-0.80 mm.

Materials examined : 6 ex. Holotype, INDIA: ASSAM, Kaziranga, Panbari, 15.xi.1974, T. Sengupta, under bark of Bombax sp. (in Zoological Survey of India, Calcutta); UTTAR PRADESH, Almorah 1600 m., 5 ex., 17.x.1976, T. Sengupta, under bark of Pine log.

10. Silvanus nigrans Pal and Sengupta

Silvanus nigrans Pal and Sengupta, 1977, Oriental Ins.

11(2):277 (Type-loc.: West Bengal : India).

General appearance of this species somewhat similar to Silvanus bidentatus (Fabricius) but can be separated by its anterior spine of prothorax longer, its apex not sharply pointed and less outwardly projected; eyes large and distance between

two eyes on ventral side distinctly shorter than in S. bidentatus. This species also shows some resemblances with S. ruficorpus Pal and Sengupta but can be separated by its anterior spine of prothorax longer, narrower and more acute at apex; unlike ruficorpus lateral margin of prothorax sinuate before posterior angle and form a small spinous projection, hind femora widest before middle (Fig.32), antennal joint 7 not longer than joint 6, species uniformly blackish brown.

General appearance (Fig. 31) elongated, moderately, depressed, uniformly blackish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye slightly less than half of length of head, length of temple about as long as two eye facets, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and narrower, joint 3 shorter than pedicel, joints 4 and 5 equal and shorter than joint 3, joint 6 and 7 equal and shorter than joint 5, joint 7 slightly wider than joint 6, joint 8 shorter than joint 7, joints 9 and 10 transverse and joint 11 elongated. Prothorax convex, elongated and narrowed posteriorly, width

across anterior spines greater than width across middle (1.00: 0.90); anterior spines large, originate gradually from lateral sides, its length slightly longer than half of length of each eye and its tip slightly pointed; lateral margin curved with few small denticles, lateral depressions on pronotal disc rather well-marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected posteriorly. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large, setae projected posteriorly. Puncturation on ventral side finer than on dorsal side and rather shiny.

Measurements of holotype : Total length 2.57 mm, width of head across eyes 0.51 mm, length of antenna 0.94 mm, width of prothorax across middle 0.43 mm, length of elytra 1.50 mm and width across middle 0.73 mm.

Material examined : Holotype, INDIA : WEST BENGAL, Darjeeling district, Tistabazar, 18.iv.1971, T. Sengupta, under bark of log (in Zoological Survey of India, Calcutta).

Distribution : INDIA : West Bengal (Darjeeling district).

11. Silvanus andamanicus sp.nov.

This species resembles very much in appearance with another Indian species Silvanus ruficarpus but can be differentiated by the anterior spine of prothorax shorter and about

one-third of length of an eye, excluding anterior spines prothorax slightly more broader (1.27:1.00) than that of S. ruficarpus (1.33:1.00), aedeagus of this species unlike ruficarpus with median lobe truncated near apex, apex of parameres more closer and its inner shorter lobe with one seta.

General appearance (Fig.33) elongated, moderately depressed, uniformly reddish brown and covered with short, semierect golden pubescence.

Head : Exposed part of head wider than long, eyes large, length of eye about half as long as head, length of temple about as long as two eye facets, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and narrower, joint 3 slightly shorter and narrower than pedicel, joints 4 and 5 almost equal and shorter than joint 3, joint 6 shorter than joint 5, joint 7 slightly longer and wider than joint 6, joint 8 shorter than joint 7, joints 9 and 10 transverse and joint 11 about as long as broad. Prothorax convex, elongated and narrowed posteriorly, width across anterior spines greater than the width across middle (1.12:1.00); anterior spines short and originate gradually

from lateral sides, its length about one-third of length of an eye; lateral margin curved with few small denticles, lateral depressions on pronotal disc rather well-marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large and setae projected posteriorly. Puncturation on ventral side finer than on dorsal side. Aedeagus (Fig.52) with median lobe broad posteriorly and somewhat truncated near apex; apex of parameres very close, apex of each paramere bilobed, inner lobe short with single short seta.

Measurements of holotype : Total length 2.38 mm, width of head across eyes 0.33 mm, length of antenna 0.88 mm, width of prothorax across middle 0.51 mm, length of elytra 1.32 mm and width across middle 0.63 mm.

Holotype ♂, INDIA: Middle Andaman, 8.xii.1928, B.M. Bhatia, ex. Dipterocarpus turbinatus. Aedeagus dissected and mounted on cover slip and pinned with the holotype (in Forest Research Institute, Dehra Dun).

Distribution : INDIA : Andaman Is.

12. Silvanus curvispinus Pal and Sengupta

Silvanus curvispinus Pal and Sengupta, 1977, Oriental Ins.

11(2) : 278-279 (Type-loc.: Assam: India).

This is a distinct species, nearest to the species S. gibbus but can be easily separated by its prothorax excluding the anterior spines somewhat elliptical, outer margin of anterior spine of prothorax curved inwardly, lateral depressions on pronotal disc absent, puncturation on pronotum coarser, antennal joint 9 elongated and hind trochanter in male with a spine.

General appearance (Fig. 34) elongated, moderately depressed, uniformly reddish brown and covered with short, semierect golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye slightly less than half of length of head, length of temple about as long as two eye facets, temple extended laterally beneath eye and its outer apical angle broad, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel as long as scape and narrower, joints 3-5 equal and slightly shorter than pedicel, joint 6 shorter than joint 5, joint 7 as long as joint 6 and slightly wider, joint 8 shorter than joint 7, joints 9 and 11 slightly elongated and joint 10 slightly transverse. Prothorax convex,

elongated, excluding anterior spines somewhat elliptical, width across anterior spines almost equal to width across middle (1.00: 0.99); anterior spines moderately large and originate gradually from lateral sides, its length about half as long as each eye, outer margin of anterior spine curved and projected in front and its tip blunt; lateral margin evenly curved and with few small denticles, lateral depressions on pronotal disc absent. Puncturation on pronotum coarse and dense and slightly coarser than that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra slightly more than two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large, setae projected posteriorly. Puncturation on ventral side finer than on dorsal side and shiny, hind trochanter with a spine in male.

Measurements of holotype : Total length 3.01 mm, width of head across eyes 0.43 mm, length of antenna 1.08 mm, width of prothorax across middle 0.58 mm, length of elytra 1.53 mm and width across middle 0.73 mm.

Material examined : Holotype, INDIA : ASSAM, Kaziranga, Panbari, 15.xi.1974, T. Sengupta, under bark of Bombax sp. (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Assam.

Genus Silvanoprus Reitter

Silvanoprus Reitter, 1911, Fauna Germanica 3 : 45,46;

Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 341.

Type-species : Silvanoprus fagi (Guérin-Méneville)

Silvanoprus is a fairly large genus erected by Reitter (1911) for the species Silvanus fagi (Guérin-Méneville). Subsequently he and Grouvelle added several species to this genus. Grouvelle (1912) recognised thirteen species namely, fagi (Guérin-Méneville), grouvellei (Reitter), angusticollis (Reitter), parallelcollis (Reitter), feai (Grouvelle), javanicus (Grouvelle), insidiosus Grouvelle, scuticollis (Walker), orientalis (Grouvelle), longicollis Reitter, tenuicollis (Grouvelle), cephalotes (Reitter) and inermis (Reitter) under the genus Silvanoprus. Hetschko (1930) in Junk's 'Coleopterorum Catalogus' listed twelve species and synonymised S. grouvellei (Reitter) with S. fagi (Guérin-Méneville). Halstead (1973) transferred three species of Silvanus to Silvanoprus, which are Silvanus birmanicus Grouvelle, Silvanus frater Grouvelle and Silvanus porrectus Walker. So far, three species namely, S. scuticollis (Walker), S. cephalotes (Reitter) and S. longicollis (Reitter) are known from India. Representatives of this genus are commonly found in haystack and vegetable garbage, also recorded from under side of bark, stored rice, lac and sometimes attracted to light. Silvanoprus is closely related to

Silvanus Latreille and their facies similar, but can be separated in having third tarsal segment lobed below.

In the present study 600 examples have been studied, which are collected by author and other members of Coleoptera Section, Zoological Survey of India from foot hills of Himalaya, gangetic West Bengal, Chhotanagpur plateau, Nilgiri Hills etc. S. angusticollis (Reitter) is recorded for the first time from India, four species are described as new to science and a species which will be described by D.G.H. Halstead is also included, and larva of S. angusticollis is described for the first time (see p. 275).

Definition :

General appearance (Fig.53) elongated, rather narrowed and parallel-sided, moderately depressed, usually yellowish brown or reddish brown and rarely blackish brown.

Head (Fig. 65) elongated, front margin of clypeus almost straight, eyes moderately large and coarsely faceted, temple often flattened beneath eye, vertex with a transverse impressed line behind eyes, tentorium simple with two longitudinal arms connected by a narrow bridge near middle. Antenna moderately long and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, pedicel and joint 3 usually about as long as scape and narrower, joints 4-8

usually slightly shorter than preceding joints, club loose and 3-jointed. Mandible (Fig.72) with 3 apical teeth, mola well-developed and a trace of dorsal mandibular cavity present near base. Maxilla (Fig. 73) with lacinia and galea rather short, lacinia narrow and elongated and without apical spine, galea broad and its apex densely hairy; palpi with segment 2 longer than segment 3, apical segment longest and fusiform. Labium (Fig. 74) with mentum transversely triangular, palpi with apical segment longest and fusiform. Labrum (Fig. 75) transverse and its apical margin rounded.

Prothorax (Fig. 66) usually elongated and rarely transverse, front angle with a spine which more or less prominent and projected forward, lateral margins finely denticulate and usually slightly sinuate across anterior one-third, prosternal process broad and its apical margin almost straight, front coxae moderately widely separated. Coxal cavities round, cavities broadly closed behind.

Meso-metathorax (Fig. 68): Mesocoxae closely situated, cavities broadly opened outwardly, mesosternal process broad at base and notched at middle, sternal fitting between mesocoxae almost in a straight line. Metasternum transverse, median impressed line extends anteriorly near apex of mesosternal process, hind coxae more widely separated than mesocoxae. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 71) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat parallel-sided, usually slightly sinuate near middle, each elytron (Fig. 70) with 9 rows of strial punctures, without scutellary striole, single and double rows of pubescence on alternate interstices, epipleura narrow and complete upto apex.

Legs (Fig. 67) moderately long, trochanters short and simple, femora swollen towards middle, tibiae slightly broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, segments 1 and 2 simple segment 1 longer than segment 2, segment 3 strongly lobed below, segment 4 shortest and claws simple.

Abdomen (Fig. 69) elongated, ventrite 1 longer than other ventrites, ventrites 2-5 subequal, intercoxal process of ventrite 1 broad at base and narrowed and slightly pointed at apex; femoral lines closed and usually narrowly separated from posterior margin of hind coxal cavity, and rarely widely separated as in S. longicollis. Aedeagus (Fig. 77) with median lobe rather short and broad and slightly tapered posteriorly, median sturt elongated and spatulate at apex; tegmen with a pair of well-developed, slender and elongated parameres, and its apex usually bifid and fringed with a few setae. Ovipositor (Fig. 76) with well-developed paraprocts, valvifers, coxites and long styli attached on outer margin of apex of coxites.

Habitat : Habitat of this genus was not known. In the present study the representatives of this genus have been collected chiefly from haystack and leaf garbage.

Distribution : Europe, Africa, Madagascar, Cameroon Is., South Asia, West Indies, Guyana. From India this genus was recorded only from Calcutta : West Bengal, Nilgiri Hills : Tamil Nadu and Assam; in the present study the genus Silvanoprus has been recorded from various parts of India, details of distribution mentioned under descriptions of species.

Remarks : Grouvelle (1912) divided Silvanoprus into two groups on the basis of extension of sterno-pleural suture. In the first group he included the species S. fagi, S. grouvellei, S. angusticollis, S. parallellocollis, S. feae, S. javanicus and S. insidiosus, where the sterno-pleural suture reaches the lateral margin of prothorax near anterior spine. In the second group he included the species S. scuticollis, S. orientalis, S. longicollis, S. tenuicollis, S. cephalotes and S. inermis, where the sterno-pleural suture reaches the anterior margin of prothorax. Indian species S. scuticollis and S. cephalotes fall in the second group, other Indian species fall in the first group. Unlike other species, first tarsal segment of S. scuticollis is markedly long and longer than segments 2 and 3 together, and prothorax broader than long and its shape different.

KEY TO THE SPECIES OF SILVANOPRUS FROM INDIA

1. Prothorax broader than long, width of prothorax across anterior spines more than 1.5 times broader than width across posterior angles, prothorax distinctly narrowed posteriorly, lateral margins almost straight, shape of prothorax somewhat triangular (Fig. 53). ...
..... scuticollis (Walker)

Prothorax longer than broad, width of prothorax across anterior spines less than 1.25 times broader than width across posterior angles, prothorax slightly narrowed posteriorly behind middle, lateral margins distinctly curved, shapes of prothorax different ...
.....2

2. Temple of head moderately long and not inflattened beneath eye, about as long as two to three eye facets and inwardly notched (Fig.54). indicus sp.nov.
Temple of head very short or long and distinctly inflattened beneath eye, either short thin and outer apical angle pointed or long and outer apical margin rounded.....
..... 3

3. Temple of head short, length of temple about as long as one or two eye facets and its outer apical angle somewhat pointed; puncturation of head and prothorax reticulate-type, coarse and dense. 4

Temple of head long, length of temple about as long as eye or longer than eye and its outer apical margin rounded; puncturation of head and prothorax ocellate-type, coarse and somewhat globular.....7

4. Front and middle femora with a distinct spine near middle; lateral margins of prothorax more or less uniformly curved outwardly; anterior spine of prothorax small and projected in front and its length about one-fourth or shorter than length of one eye (Fig.55). cephalotes (Reitter)

Front and middle femora devoid of any spine; lateral margins of prothorax distinctly wavy and sinuate across anterior one-third; anterior spine of prothorax larger, about half as long as eye and projected somewhat outwardly.5

5. Anterior spine of prothorax markedly long and extending distinctly beyond front margin of prothorax, lateral margin of prothorax slightly sinuate at origin of anterior spine (Fig.59).prolixicornis sp.nov.

Anterior spine of prothorax comparatively shorter and not extending beyond front margin of prothorax, lateral margin of prothorax distinctly sinuate at origin of anterior spine (Figs.56,58).6

6. Anterior spine of prothorax narrow and slender and about twice as long as broad, outer margin of anterior spine straight and spine projected more towards lateral side, posterior margin of pronotum distinct (Fig.56). ... angusticollis (Reitter)

Anterior spine of prothorax broad and about as broad as long, outer margin of anterior spine slightly curved and spine projected more towards front, posterior margin of pronotum indistinct near middle (Fig.58).

..... nepalensis sp.nov.

7. Antennal scape markedly large and about twice as long as broad, antennal joints 9 and 10 distinctly elongated, temple slightly longer than length of eye; prothorax across anterior spine about as wide as across middle, anterior spine situated distinctly beneath level of anterior margin, outer margin of anterior spine slightly curved inwardly and lateral margin of prothorax markedly sinuate across anterior one-fourth (Fig.63); aedeagus (Fig.84) with apex of median lobe broad, apex of each paramere abruptly broadened.
..... distinguendus sp.nov.(Halstead MS.name)

Antennal scape more or less large and maximum 1.5 times as long as broad, antennal joint 9 about as broad as long or slightly elongated and joint 10 about as broad as long, temple slightly shorter or about as long as eye; prothorax widest across anterior spine, anterior spine situated at level of anterior margin, outer margin of anterior spine either straight or slightly curved outwardly and lateral margin of prothorax slightly sinuate across anterior one-fourth (Figs.60,61,62); aedeagus (Figs.82,83) with apex of median lobe broadly pointed, apex of each paramere gradually narrowed.8

8. Antennal scape large and robust and joints 2-8 markedly narrower than scape; puncturation on pronotum coarse and uniform throughout, anterior spine projected forward and its tip somewhat pointed (Fig. 60); each paramere with only single long apical seta (Fig.82). longicollis (Reitter)

Antennal scape moderately large and joints 2-8 slightly narrower than scape; puncturation on pronotum slightly coarser towards posterior half than towards anterior half, anterior spine projected somewhat outwardly and its tip less pointed (Fig.62); each paramere with a short pre-apical seta in addition to one long apical seta (Fig.83).
..... palnicus sp.nov.

13. Silvanoprus scuticollis (Walker)

Silvanus scuticollis Walker, 1859, Ann. Mag. nat. Hist.

(3) 3 : 53; Grouvelle, 1908, Annls. Soc. ent. Fr.

77 : 491.(Type-loc.: Sri Lanka).

Silvanus triangulus Reitter, 1876, Col. Hefte 15 : 60.

Silvanoprus scuticollis (Walker) : Grouvelle, 1912,

Annls Soc. ent. Fr. 81 : 342.

Grouvelle (1908) first recorded this species from India (Calcutta) and synonymised the species Silvanus triangulus Reitter with this species. This is a common and widespread species in India and available from North to South India almost throughout where surveys were made. S. scuticollis is distinct because of its transverse and characteristic shape of prothorax.

General appearance (Fig.53) elongated, moderately depressed, yellow or reddish brown; covered with short, semierect golden pubescence.

Head: Exposed part of head wider than long, eyes large and coarsely faceted and slightly shorter than half of length of head; temple short, equal or slightly longer than width of one eye facet, its outer apical angle slightly pointed; puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and

slender, scape moderately large, pedicel and joint 3 slightly shorter and narrower than scape, joints 4-8 subequal and shorter than joint 3, joints 9 and 10 transverse and joint 11 about as long as broad. Prothorax wider than long, distinctly narrowed posteriorly, widest across anterior spines and distinctly wider than head across eyes; anterior spine large, about two-third of length of an eye and projected forward; lateral margins almost straight and diverging in front, finely denticulate; lateral depressions on pronotum slightly developed, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra less than two times as long as broad, widest near middle, lateral margins wavy and slightly explanate, rows of punctures deep and large, interstices narrower than width of each puncture, setae projected posteriorly. Puncturation on ventral side finer than on vertex of head and pronotum. Aedeagus (Fig.77) with median lobe slightly tapered at apex, each paramere with a pair of apical setae: one long and other short.

Measurements : Total length 2.17-2.55 mm, width of head across eyes 0.50-0.58 mm, length of antenna 0.89-1.00 mm, width of prothorax across middle 0.48-0.55 mm, length of elytra 1.26-1.35 mm and width across middle 0.67-0.85 mm.

Materials examined : 146 ex. INDIA : ASSAM, Mikir hills, 2 ex., 14.xi.1974, T. Sengupta, from bunch of dead leaves of forest; Phulbari, 3 ex., 24.xi.1974, T. Sengupta, leaf garbage; Kaziranga, 75 m., 1 ex., 1976, Wittmer & Baroni; SIKKIM, Rangpo, 450 m, 10 ex., 10.iv.1976, T.K. Pal, haystack; WEST BENGAL, Jalpaiguri district, Dhupguri, 3 ex., 14.iv.1971, T. Sengupta, garbage with hays; same locality, 1 ex., 15.iv. 1971, T. Sengupta, sweeping bushes; Darjeeling district, Sukna, 1 ex., 5.v.1976, T.K. Pal, haystack; Nadia district, Suravis- than, 2 ex., 28.vii.1974, D.N. Biswas, new haystack; 24 Par- ganas district, Sagar Island, 10 ex., 24.iii.1975, T.K. Pal, haystack; Kakdwip, 30 ex., 25.iii.1975, T.K. Pal, haystack; Diamond Harbour, 15 ex., 25.iii.1975, T.K. Pal, haystack; Howrah district, Sankrail, 35 ex., 30.iii.1975-10.iii.1976, T.K. Pal, haystack; BIHAR, Chaibasa, 2 ex., 8.iii.1971, T. Sengupta, haystack; same locality, 1 ex., 11.xi.1970, T. Sengupta; Chaibasa, Kaswargaria, 1 ex., 8.iii.1971, T. Sengupta, haystack; Namkum, 2 ex., 6.xi.1971, T. Sengupta, lac; UTTAR PRADESH, Pantnagar, 2 ex., 24.iii.1972, T. Sengupta, haystack; Gorakhpur, 2 ex., 24.ix.1974, T. Sengupta, haystack; same locality, 16 ex., 25.x.1973, T. Sengupta, haystack; Nainital district, Dhikala, 5 ex., 24.x.1976, at light; Dehra Dun, New forest, 1 ex., 18.x.1944, F. Ent., on dry grass; TAMIL NADU, Coimbatore, 1 ex., 29.iii.1977, T. Sengupta, haystack.

Distribution : INDIA : Assam, Sikkim, West Bengal, Bihar, Uttar Pradesh, Tamil Nadu; SRI LANKA; MALAYSIA; INDONESIA (Sumatra); JAPAN; EAST AFRICA; MADAGASCAR; FRANCE; GUYANA; WEST INDIES.

14. Silvanoprus indicus sp.nov.

This species is near S. angusticollis (Reitter) but can be distinguished by its temple of head longer, not inflattened beneath eye and its outer apical margin broad; anterior spine of prothorax usually smaller and less pointed at apex; aedeagus with its median lobe distinctly elongated, narrowed posteriorly and rather blunt at apex.

General appearance (Fig.54) elongated, moderately depressed, yellowish to reddish brown; covered with short, semi-erect golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly less than half of length of head, temple moderately long and about as long as 2.5 eye facets, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel slightly shorter and narrower than scape, joints 3-7 subequal, joint 8 shorter than joint 7, joint 9 slightly elongated, joint 10 slightly

transverse and joint 11 about as long as broad. Prothorax elongated, moderately convex, slightly narrowed posteriorly, anterior margin slightly rounded; anterior spine short, originates gradually from lateral side and its apex somewhat broadly pointed; lateral margins curved and sinuate at extremities, lateral depressions on pronotal disc slightly marked, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest behind middle, lateral margins wavy and explanate, rows of punctures deep and large, interstices narrower than width of each puncture. On ventral side puncturation slightly finer than on dorsal side. Aedeagus (Fig.78) with median lobe broadly elongated, parameres bilobed at apex, outer lobe of each paramere with one long seta and inner lobe with two short setae.

Measurements of holotype : Total length 2.30 mm, width of head across eyes 0.50 mm, length of antenna 1.08 mm, width of prothorax across middle 0.37 mm, length of elytra 1.42 mm and width across middle 0.70 mm.

Holotype ♂, INDIA: ASSAM, Mikir Hills, 14.xi.1975, T. Sengupta, bunch of dried leaves of forest. Aedeagus dissected and mounted on cover slip and pinned with the holotype; Paratypes 10 ex., same data as holotype; Paratypes 3 ex., MEGHALAYA, Tura, 23.xi.1974,

T. Sengupta, under dry cut grass; Paratypes 29 ex., SIKKIM, Rangpo, 450 m, 19.iv.1976, A.R. Bhaumik, haystack (all in Zoological Survey of India, Calcutta); Paratypes 5 ex., BHUTAN : Samchi, 3000 m, 7-11.iv.1972, Nat. Hist. Museum Basel-Bhutan Expedition 1972 (3 Paratypes in Nat. Hist. Museum, Basel and 2 Paratypes in Zoological Survey of India, Calcutta).

Distribution : INDIA : Assam, Meghalaya, Sikkim; BHUTAN.

15. Silvanoprus cephalotes (Reitter)

Silvanus cephalotes Reitter, 1876, Col. Hefte 15 : 62;
Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 492. (Type-
loc.: Japan).

Silvanus longicollis : Grouvelle (nec. Reitter), 1908,
Annls Soc. ent. Fr. 77 : 492.

Silvanoprus longicollis : Grouvelle (nec. Reitter), 1912,
Annls Soc. ent. Fr. 81 : 342.

Silvanoprus cephalotes (Reitter) : Grouvelle, 1912,
Annls Soc. ent. Fr. 81 : 342.

Grouvelle (1908) first recorded this species from India (from Nilgiri hills as longicollis) and subsequently, he in 1912 transferred it to Silvanoprus. The present redescription is based on two examples determined by Dr. D.G.H. Halstead.

Grouvelle (1908) recorded Silvanus longicollis from India and the characters given by him is very similar to the specimens determined as cephalotes by Halstead. Therefore, S. longicollis (Reitter) from India determined by Grouvelle well might be a member of cephalotes. This species can be distinguished by its short temple, lateral margins of prothorax slightly rounded and anterior spine of prothorax very small.

General appearance (Fig.55) elongated, moderately depressed, yellowish or reddish brown; covered with short, semi-erect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly less than half of length of head, temple about as long as width of an eye facet and its outer apical angle slightly pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long, scape moderately large, pedicel and joint 3 about as long as scape, joints 4-8 subequal and shorter than joint 3, joint 9 about as long as broad, joints 10 and 11 slightly transverse. Prothorax convex, elongated, widest near middle; anterior spine small, about one-fourth or shorter than length of an eye and projected forward; lateral margins curved outwardly and slightly sinuate near anterior one-fourth, finely denticulate; lateral depressions on pronotum slightly developed, puncturation on pronotum coarse and

dense and similar to that of vertex of head, setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures deep and large, interstices narrower than width of each puncture, setae projected posteriorly. Punctuation on ventral side of head and prothorax almost similar to that of dorsal side, that of meso-metathorax and abdomen slightly finer. Aedeagus (Fig.79) with median lobe slightly tapered at apex, each paramere with a pair of setae : one long and other short.

Measurements : Total length 2.20-2.42 mm, width of head across eyes 0.30-0.51 mm, length of antenna 0.80-1.05 mm, width of prothorax across middle 0.41-0.48 mm, length of elytra 1.29-1.55 mm and width across middle 0.63-0.70 mm.

Materials examined : 288 ex. INDIA: MEGHALAYA, Shillong, 5 ex., 27.iv.1976, T. Sengupta, haystack; Tura, 3 ex., 25.xi.1974, T. Sengupta, under dry cut grass; ASSAM, Mikir hills, 11 ex., 14.xi.1974, T. Sengupta, from bunch of dried leaves of forest; Kaziranga, 4 ex., 14.xi.1974, T. Sengupta, garbage with hays; Phulbari, 1 ex., 24.xi.1974, T. Sengupta, leaf garbage; SIKKIM, Rangpo, 450 m, 11 ex., 10.iv.1976, T.K. Pal, haystack; WEST BENGAL, Jalpaiguri district, Birpara 1 ex., viii.1974, A.K. Datta, at light; Burdwan district, Burdwan,

5 ex., 10.vii.1976, T.K. Pal, haystack; 24 Parganas district, Sagar Island, 30 ex., 24.iii.1975, T.K. Pal, haystack; Kakdwip, 22 ex., 25.iii.1975, T.K. Pal, haystack; Diamond harbour 50 ex., 25.iii.1975, T.K. Pal, haystack; Howrah district, Sankrail, 80 ex., 30.iii.1975, -10.iii.1976, T.K. Pal, haystack; BIHAR, Ranchi, 3 ex., 5.vi.1975, T.K. Pal, haystack; Chaibasa, 1 ex., 28.xii.1970, T. Sengupta, haystack; same locality, 3 ex., 19. x.1975, T. Sengupta, haystack; DELHI, 15 ex., 12.v.1972, T. Sengupta, haystack of Jower; UTTAR PRADESH, Pantnagar, 2 ex., 24.iii.1972, T. Sengupta, haystack; Gorakhpur, 1 ex., 25.x.1973, T. Sengupta, haystack; Anandnagar, 25 km from Lachmipur, 2 ex., 9.x.1976, T. Sengupta, haystack; Nainital district, Dhikala, 12 ex., 24.x.1976, T. Sengupta, at light; KARNATAKA, Bangalore, 15 ex., 10.xii.1971, T. Sengupta, haystack; TAMIL NADU, Coimbatore, 420 m, 1 ex., ii.1970, T.R.S. Nathan; NEPAL : Katmandu, 5 ex., 28.iii.1972, T. Sengupta, haystack; Daman, 3 ex., 30. iii.1972, T. Sengupta, under heaps of dead grass; BHUTAN : Samchi, 300 m, 2 ex., 7-11.v.1972, Nat. Hist. Mus. Basel-Bhutan Expedition, 1972.

Distribution : INDIA: Meghalaya, Assam, Sikkim, West Bengal, Bihar, Delhi, Uttar Pradesh, Karnataka, Tamil Nadu; BHUTAN; NEPAL; SRI LANKA; INDONESIA (Java); JAPAN; CHINA.

This is also a common and widespread species of Indian Silvanoprus and has been recorded from North to South India almost throughout where surveys were made.

16. Silvanoprus angusticollis (Reitter)

Silvanus angusticollis Reitter, 1876, Col. Hefte 15 :
59 (Type-loc. : Japan).

Silvanoprus angusticollis (Reitter): Grouvelle, 1912,
Annls Soc. ent. Fr. 81 : 341.

Reitter (1911) described this species from Japan. Grouvelle (1912) transferred it to Silvanoprus. So far this species is recorded only from Japan. In the present study it is being recorded for the first time from India. This species can be easily differentiated from the former species by its prothorax with anterior spines larger and lateral margins distinctly sinuate near anterior one-third.

General appearance (Fig.56) elongated, moderately depressed, reddish brown to blackish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly less than half of length of head, length of temple shorter than one eye facet and its outer apical angle pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and narrower, joint 3 slightly shorter than pedicel, joints 4-8

subequal and shorter than joint 3, joints 9 and 11 about as long as broad and joint 10 slightly transverse. Prothorax convex, elongated, widest across anterior spines and slightly narrowed posteriorly behind middle; anterior spine originates gradually from side, moderately large, slightly shorter than half of length of each eye, projected anteriorly and slightly outwardly and its tip somewhat pointed; lateral margins curved, indistinctly sinuate near anterior one-third and slightly sinuate near posterior angles, finely denticulate; lateral depressions on pronotum slightly developed, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures deep and large, interstices narrower than width of each puncture, setae projected posteriorly. Puncturation on ventral side slightly finer than on vertex of head and pronotum. Aedeagus (Fig.81) with median lobe distinctly acuminate at apex; apex of each paramere bilobed and lobes are almost equally long, inner lobe with a long seta and outer lobe with two shorter setae.

Measurements : Total length 2.55-4.01 mm, width of head across eyes 0.50-0.55 mm, length of antenna 1.08-1.17 mm, width of prothorax across middle 0.48-0.58 mm, length of elytra 1.52-1.85 mm and width across middle 0.73-0.91 mm.

Remarks : 3 examples from Shillong : Meghalaya have been examined which have the lateral margins of prothorax more sinuate near origin of anterior spines and apex of anterior spine more distinctly pointed (Fig. 57)

Materials examined : 68 ex. INDIA : MEGHALAYA, Shillong, 3 ex., 29.xi.1974, T. Sengupta, leaf garbage, SIKKIM, Gangtok, 1704 m, 2 ex., 24.iv.1976, T.K. Pal, under bark of Schima wallichii; same locality, 14 ex., 24.iv.1976, T.K. Pal, garbage of Cryptomaria leaf; Pakyang, 29 ex., 27.iv.1976, T.K. Pal, under bark; WEST BENGAL, Kalimpong, 1219 m, 2 ex., 17.iv.1971, T. Sengupta, haystack; UTTAR PRADESH, Kosi, 1 ex., 18.x.1976, T. Sengupta, haystack; KASHMIR, Dachigam Sanctuary, 14 ex., 1.vi.1972, T. Sengupta, haystack; TAMIL NADU, Oote, 1 ex., 3.xii.1971, T. Sengupta, under bark of fallen log; BHUTAN : 21 km O Wangdi Phodr., 1700-2000 m, 1 ex., Nat. Hist. Mus. Basel-Bhutan Expedition, 1972; NEPAL : Dandapakhar, 1700 m, 1 ex., 7.vi.1976, Wittmer & Baroni.

Distribution : INDIA : Meghalaya, Sikkim, West Bengal (Darjeeling dist.), Uttar Pradesh, Kashmir, Tamil Nadu; BHUTAN; NEPAL; JAPAN.

17. Silvanoprus prolixicornis sp.nov.

This species is near Silvanoprus angusticollis (Reitter) but can be differentiated by its anterior spine of prothorax being more broadly elongated and lateral margins of prothorax

less sinuate near anterior one-third, joints of antennal club less transverse and puncturation on head and pronotum slightly coarser; aedeagus with its median lobe less tapered at apex and each paramere with its inner lobe distinctly elongated.

General appearance (Fig. 59) elongated, moderately depressed yellowish brown; covered with short, semierect golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye shorter than half of length of head, temple about as long as one eye facet and its outer apical angle somewhat pointed, lateral margins of head rather elevated above antennal insertions, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and slightly narrower, joint 3 slightly shorter and narrower than pedicel, joints 4-8 subequal and slightly shorter than joint 3, joint 9 about as long as broad and joints 10 and 11 slightly transverse. Prothorax slightly elongated, convex and slightly narrowed posteriorly, widest across anterior spines, anterior margin slightly curved outwardly, anterior margin slightly lower than tips of anterior spines, anterior spine moderately large and its tip somewhat pointed; lateral margins almost straight

and slightly sinuate on either sides of middle, finely denticulate; lateral depressions on pronotal disc slightly developed, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, lateral margins slightly wavy, rows of punctures deep and large, interstices narrower than width of each puncture, setae short and projected posteriorly. Puncturation on ventral side finer than on vertex and pronotum. Aedeagus (Fig. 80) with median lobe broadly elongated and slightly acuminate at apex; apex of each paramere bilobed, inner lobe elongated with a long seta, outer shorter lobe with a short seta and an additional seta above outer lobe.

Measurements of holotype : Total length 2.70 mm, width of head across eyes 0.52 mm, length of antenna 1.15 mm, width of prothorax across middle 0.55 mm, length of elytra 1.65 mm and width across middle 0.82 mm.

Holotype ♂, INDIA : UTTAR PRADESH, Almorah, Airadeo, 11.vii.1937, J.C.M. Gardner, ex. Alnus nitidus. Aedeagus dissected and mounted on cover slip and pinned with the holotype (in Forest Research Institute, Dehra Dun).

Distribution : INDIA : Uttar Pradesh.

18. Silvanoprus nepalensis sp.nov.

General appearance of this species is somewhat similar to S. angusticollis (Reitter) but can be readily separated by its prothorax being more elongated, meeting point of outer margin of anterior spine and lateral margin of prothorax distinctly sinuate, outer margin of anterior spine curved and its tip more distinctly pointed, posterior margin of pronotum not distinct near middle.

General appearance (Fig.58) elongated, moderately depressed, blackish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly less than half of length of head, length of temple shorter than one eye facet and its outer apical angle pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and narrower, joint 3 slightly shorter and narrower than pedicel, joints 4-8 subequal and shorter than joint 3, joints 9 and 11 about as long as broad and joint 10 transverse. Prothorax convex, elongated, widest across anterior spines and slightly narrowed posteriorly; anterior spines originate less abruptly from sides, moderately

large and half as long as eye, broad at base, projected outwardly and its tip pointed, outer margin of anterior spine slightly curved inward; lateral margins curved, distinctly sinuate near anterior one-third, finely denticulate; posterior margin of pronotum inconspicuous near middle, lateral depressions on pronotum slightly marked, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures deep and large, interstices narrower than width of each puncture, setae projected posteriorly. Puncturation on ventral side finer than on vertex and pronotum.

Measurements of holotype : Total length 2.39 mm, width of head across eyes 0.47 mm, length of antenna 1.02 mm, width of prothorax across middle 0.44 mm, length of elytra 1.47 mm and width across middle 0.75 mm.

Holotype 1 ex., NEPAL : Katmandu, 28.iii.1972, T. Sengupta haystack (in Zoological Survey of India, Calcutta).

Distribution : NEPAL.

19. Silvanoprus longicollis (Reitter)

Silvanus longicollis Reitter, 1876, Col. Hefte 15 : 60

(Type-loc. : Sri Lanka).

Silvanus longicollis Grouvelle (auct. not Reitter), 1908,

Annls Soc. ent. Fr. 77 : 491, 492.

Silvanoprus longicollis Grouvelle (auct. not Reitter), 1912,

Annls Soc. ent. Fr. 81 : 341.

Silvanoprus javanicus (Grouvelle) : Grouvelle, 1912,

Annls Soc. ent. Fr. 81 : 341, Syn.nov.

Reitter (1876) described this species from Sri Lanka.

Grouvelle (1912) recorded this species from India (Assam). The present redescription along with synonyms is based on one example determined by Dr. D.G.H. Halstead and valuable comments given by him. Grouvelle (1912) recorded Silvanoprus javanicus from India (Assam) and the characters of javanicus is very similar to the specimen determined by Dr. Halstead as S. longicollis. This species is characterised by its long temple, large antennal scape, and ocellate punctures on head and prothorax.

General appearance (Fig.60) elongated, moderately depressed, yellowish to blackish brown; covered with short, semi-erect, golden pubescence.

Head : Exposed part of head wider than long, eyes rather small and coarsely faceted, temple long, length of temple slightly shorter than length of eye and its outer margin rounded;

puncturation on vertex coarse, ocellate and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and slender, scape large; joints 2-8 subequal, shorter and markedly narrower than scape; joints 9-11 about as broad as long. Prothorax convex, elongated, widest across anterior spines, almost parallel-sided; anterior spine small, shorter than half of length of eye and projected forward; lateral margins almost straight to slightly wavy and finely denticulate, posterior margin of pronotum usually confluent with rim of foramen, lateral depressions on pronotum slightly developed; puncturation on pronotum coarse, ocellate and similarly dense as on vertex of head. Scutellum moderately large and transverse. Elytra more than twice as long as broad, widest near middle, side margins wavy and slightly explanate, rows of punctures deep and large, interstices slightly narrower than width of each puncture. On ventral side puncturation finer than on vertex and pronotum. Aedeagus (Fig.82) with median lobe slightly tapered at apex, each paramere with a long apical seta.

Measurements : Total length 2.17-2.38 mm, width of head across eyes 0.39-0.44 mm, length of antenna 0.92-0.94 mm, width of prothorax across middle 0.39-0.45 mm, length of elytra 1.29-1.41 mm. and width across middle 0.57-0.68 mm.

Remarks : 1 example from Dainadubi Reserve Forest, Assam has been examined which has its prothorax proportionately broader and its side margins slightly wavy (Fig.61).

Materials examined : 44 ex. INDIA : MEGHALAYA, Garo hills, Dainadubi Reserve Forest, 9 ex., 18.xi.1974, T. Sengupta, leaf garbage; Sarengina, Dainadubi, 3 ex., 19.xi.1974, T. Sengupta, dead cut grass garbage with hays; Tura, 2 ex., 23.xi.1974, T. Sengupta, under dry cut grass; WEST BENGAL, Jalpaiguri district, Dhupguri, 2 ex., 14.iv.1971, T. Sengupta, leaf litter; Howrah district, Sankrail, 20 ex., 30.iii.1975-10.iii.1976, T.K. Pal, haystack; UTTAR PRADESH, Gorakhpur, 2 ex., 15.viii.1973, T. Sengupta, fodler garbage; Nainital district, Dhikala, 5 ex., 25.x.1976, T. Sengupta, under bark of Shorea robusta and Mallotus philippensis, TAMIL NADU, Coimbatore, 420 m, 1 ex., ii. 1970, T.R.S. Nathan.

Distribution : INDIA : Meghalaya, Assam, West Bengal, Uttar Pradesh, Tamil Nadu; SRI LANKA; MALAYSIA; INDONESIA (Java); CHINA; JAPAN; MADAGASCAR; EAST AFRICA.

20. Silvanoprus distinguendus sp.nov. (Halstead MS.name)

This species is closely related to Silvanoprus longicollis (Reitter) but can be easily separated by its antennal scape about two times as long as broad, antennal joints 9 and 10 distinctly elongated, temple slightly longer than length of eye, anterior spines of prothorax situated beneath the level of anterior margin of prothorax and lateral margins of prothorax distinctly sinuate across anterior one-fourth; aedeagus with its apical projection of median lobe broad and blunt, apex of each paramere abruptly

broadened and with one long and two shorter apical setae.

Dr. D.G.H. Halstead has earlier examined two examples of this species from Palni Hills : Tamil Nadu, and he will describe the species elsewhere.

General appearance (Fig.63) elongated, moderately depressed, yellowish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes rather short and coarsely faceted; temple long, slightly longer than length of eye and its outer margin slightly rounded, puncturation on vertex coarse, ocellate and moderately dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and slender, scape large and about two times as long as broad; joints 2-8 narrower, subequal and shorter than scape; joints 9 and 10 distinctly and joint 11 slightly elongated. Prothorax convex, elongated and almost parallel-sided, width across anterior spines almost equal to width across middle; anterior spine small, about half as long as eye and projected upward; anterior spine situated beneath level of anterior margin and its outer margin curved inwardly; lateral margins slightly wavy distinctly sinuate across anterior one-fourth, finely denticulate; posterior margin of pronotum slightly separated from rim of foramen, lateral depressions on pronotum indistinct; puncturation near front margin of

pronotum finer than on vertex of head and on remaining part coarse, ocellate and similar to that of vertex of head.

Scutellum moderately large and transverse. Elytra about two times as long as broad, widest near middle, side margins wavy and slightly explanate, rows of punctures deep and large, interstices narrower than width of each puncture. On ventral side puncturation finer than on vertex of head and pronotum, hind trochanter with a short spinous projection in male.

Aedeagus (Fig.84) with apical projection of median lobe broad and blunt, paramere abruptly broadened at apex, each paramere with one long and two shorter apical setae.

Measurements : Total length 2.63-2.68 mm, width of head across eyes 0.44-0.48 mm, length of antenna 1.36-1.38 mm, width of prothorax across middle 0.42-0.44 mm, length of elytra 1.41-1.51 mm and width across middle 0.73-0.76 mm.

Materials examined : SRI LANKA : North Central, Medawachchiya, 2 ex., 6.ii.1970, Mussard Besuchet Löbl.

Distribution : INDIA : Tamil Nadu; SRI LANKA.

21. Silvanoprus palnicus sp.nov.

This species is closely related to S. longicollis (Reitter) but can be separated by its antennal scape narrower and other joints comparatively broader; prothorax with its side margins

distinctly wavy, anterior spine projected somewhat outwardly and its apex less pointed, puncturation towards posterior side slightly coarser than towards anterior side.

General appearance (Fig.62) elongated, moderately depressed and yellowish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes rather short and coarsely faceted, temple long and slightly shorter than length of eye and its outer margin rounded; puncturation on vertex coarse, ocellate and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and slender, scape moderately large; joints 2-8 narrower, subequal and shorter than scape; joint 9 elongated, joint 10 slightly transverse and joint 11 about as broad as long. Prothorax convex, elongated, widest across anterior spines; anterior spine small, about half as long as eye, projected somewhat outwardly and its tip less pointed; lateral margins slightly wavy, sinuate near origin of anterior spines, finely denticulate; posterior margin of pronotum confluent with rim of foramen, lateral depressions on pronotum slightly marked; puncturation on pronotum coarse, ocellate and dense and similar to that of head near anterior margin, and puncturation towards posterior side slightly coarser. Scutellum moderately large and transverse. Elytra more than twice as long as broad, widest near middle, side margins

wavy and explanate, rows of punctures deep and large, interstices slightly narrower than width of each puncture. Puncturation on ventral side of head and prothorax almost similar as on dorsal side and on remaining parts finer. Aedeagus (Fig.83) with apex of median lobe slightly tapered at apex; parameres long and slender, each paramere with a short pre-apical seta in addition to one long apical seta.

Measurements of holotype : Total length 2.54 mm, width of head across eyes 0.41 mm, length of antenna 1.02 mm, width of prothorax across middle 0.39 mm, length of elytra 1.32 mm and width across middle 0.57 mm.

Holotype ♂, INDIA : TAMIL NADU, Palni hills, 13-15.ix.22 Kemp. Aedeagus dissected and mounted on cover slip and pinned with the holotype; Paratype 1 ex., data same as holotype (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Tamil Nadu.

Genus Silvanoides Halstead

Silvanoides Halstead, 1973, Bull. Br. Mus. nat. Hist. (Ent.)
29(2) : 87.

Type-species : Silvanoides cribricollis (Grouvelle)

Halstead (1973) established the genus Silvanoides and described two species from Philippine Is., New Guinea and

Solomon Is. Silvanoides is closely related to Silvanus Latreille but can be separated by following characters: antennal joints 4-8 about as long as broad to slightly transverse, anterior spines of prothorax situated beneath the level of anterior margin of prothorax, ventrite 1 with femoral lines opened, aedeagus with apex of paramere bilobed and with two long setae on one lobe and few short setae on other lobe. Silvanoides is subcorticulous in habitat. In the present study this genus is recorded for the first time from India and Silvanoides cheesmanae Halstead is synonymised with Silvanoides cribricollis (Grouvelle) comb.nov.

Definition :

General appearance (Fig.85) elongated, moderately depressed, slightly shiny and usually reddish brown.

Head slightly elongated, front margin of clypeus almost straight, eyes large and coarsely faceted, temple flattened beneath eye and shelf-like, transverse impressed line on vertex behind eyes indistinctly visible. Antenna rather short and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, pedicel and joint 3 almost as long as scape and narrower; joints 4-8 shorter, subequal, transverse or about as broad as long; club loose and 3-jointed. Mandible with 3 apical teeth. Maxillary palpi with segment 2 slightly longer than segment 3, apical segment longest and

fusiform. Labial palpi with apical segment longest and fusiform.

Prothorax elongated, front angle with a prominent spine beneath anterior margin, side margins finely serrated, pronotum with a median disc demarcated by shallow lateral depressions, front coxae moderately widely separated, coxal cavities broadly closed behind externally, prosternal process broad at apex, sterno-pleural suture extending to front angle.

Meso-metathorax : Mesocoxae moderately widely separated, cavities broadly opened outwardly, mesosternal process notched at middle, sternal fitting between mesocoxae almost in a straight line, median impressed line on metasternum extends anteriorly almost upto apex of mesosternal process, hind coxae more widely separated than mesocoxae.

Elytra somewhat parallel-sided, each elytron with 9 rows of strial punctures, without scutellary striole, interstices pubescent, epipleura narrow and complete upto apex.

Legs moderately long, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex; tarsal formula 5-5-5, tarsi simple, segment 1 long, segments 2 and 3 shorter and subequal, segment 4 shortest, claws simple. Sexual dimorphism - in male hind trochanter with a small spinous projection and hind femur with a ridge on ventral side.

Abdomen elongated, ventrite 1 longest, intercoxal process broad and broadly pointed at apex, femoral lines opened, ventrites

2-5 shorter and subequal. Aedeagus (Fig.87) with median lobe broad and slightly tapered at apex, median sturt elongated and its apex spatulate; parameres well-developed, slender, elongated, apex usually broad and bilobed and with two long setae on one lobe and few short setae on other lobe.

Habitat : Under bark.

Distribution : Oriental. India, Indonesia, Philippines, New Guinea and Solomon Is.

22. Silvanoides cribricollis (Grouvelle) comb.nov. (Halstead MS.)

Silvanus cribricollis Grouvelle, 1897, Annali Mus. civ.

Stor. nat. Giacomo Doria 38 : 397 (Type-loc.: Engano, Sumatra).

Neosilvanus cribricollis (Grouvelle) : Grouvelle, 1912,

Annls Soc. ent. Fr. 81 : 324.

Silvanoides cheesmanae Halstead, 1973, Bull. Br. Mus. nat.

Hist. (Ent.) 29(2) : 87; syn.nov. (Halstead MS.)

Grouvelle (1897) described this species from Engano, Sumatra and later in 1912 he transferred it to Neosilvanus Grouvelle. The present description is based on two examples determined by Dr. D. G.H. Halstead. In a personal communication he commented that there is considerable variation in the form of the apex of the median lobe and the development of the process of parameres. He also mentioned that my specimens are absolutely identical with a cribricollis paratype and proposed the present synonymies.

General appearance (Fig.85) elongated, moderately depressed, rather shiny, reddish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and about half as long as head, temple slightly shorter than width of one eye facet and sloped downward, puncturation on vertex fine and sparse and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna short and slender, scape moderately large, pedicel slightly shorter and narrower than scape, joint 3 slightly narrower than pedicel, joints 4 and 5 shorter than joint 3; joints 6-8 slightly shorter than joint 5, about as broad as long and of which joint 8 slightly transverse; joints 9 and 10 distinctly transverse and joint 11 slightly less so. Prothorax elongated, convex, width across anterior spines slightly greater than across eyes (2.05:1.99), anterior spine situated beneath level of anterior margin and its tip somewhat pointed, posterior margin of anterior spine distinctly curved upward; lateral margins uniformly curved and slightly sinuate near posterior angles, with a few small denticles; lateral depressions on pronotal disc rather well-marked, puncturation on lateral sides of pronotum coarse and dense and fine near middle, setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, almost parallel-sided and lateral margins very slightly wavy, rows of punctures deep and large, interstices narrower than

width of each puncture, setae short and projected posteriorly. Puncturation on ventral side fine and almost similar as on vertex of head. Aedeagus (Fig.87) with apex of median lobe slightly projected and its lateral margins uniformly curved, outer apical lobe of each paramere with two long setae and inner lobe with two short setae.

Measurements : Total length 2.64 mm, width of head across eyes 0.58 mm, length of antenna 1.14 mm, width of prothorax across middle 0.58 mm, length of elytra 1.58 mm and width across middle 0.78 mm (n=1).

Material examined : 2 ex. INDIA : MEGHALAYA, Songsak, 1 ♂ and 1 ♀, 20.xi.1974, T. Sengupta, under bark of dead fallen tree.

Distribution : INDIA : Meghalaya; INDONESIA (Sumatra); PHILIPPINES; NEW GUINEA; SOLOMON Is.

Genus Protosilvanus Grouvelle

Silvanus (Protosilvanus) Grouvelle, 1912, Annls Soc. ent.

Fr. 81 : 336.

Protosilvanus Grouvelle : Halstead, 1973, Bull. Br. Mus. nat. Hist. (Ent.) 29(2) : 89.

Type-species : Protosilvanus lateritius (Reitter)

Grouvelle (1912) erected the subgenus Protosilvanus under the genus Silvanus Latreille and placed the species S. lateritius Reitter, S. inaequalis Grouvelle, S. granosus Grouvelle and S. carinatus Grouvelle under this subgenus. Halstead (1973) while revising the genus Silvanus gave the generic status to Grouvelle's subgenus Protosilvanus and designated S. lateritius Reitter as the type-species of the genus. He also described one more species, P. fasciatus from Fiji. So far, five species have been described under this genus, of which only P. lateritius (Reitter) is recorded from India. Halstead (1973) noted that these beetles occur principally under bark of trees, and he also found that P. lateritius associated with stored products were imported to Britain. This genus can be recognised by its elongated flat body, anterior margin of prothorax sloped at sides to form anterior spines, 7th elytral interstice more or less carinate, and antennal joints 9 and 10 usually with apical spines on lateral sides. Protosilvanus is distributed to

Oriental region and found abundantly all over India, and of which P. lateritius is the most common species. In the present study three species are described, of which two are new to science, and larva of P. lateritius is described for the first time (see p.277).

Definition :

General appearance (Fig.88) elongated, flat, usually yellowish brown to reddish brown.

Head (Fig. 93) transverse, front margin of clypeus straight, eyes moderately large and coarsely faceted, temple flattened beneath eye and shelf-like, transverse impressed line on vertex behind eyes distinct, tentorium simple with two long tentorial arms. Antenna moderately long and slender, antennal insertions hidden under prejection of frons, 11-jointed, scape broadly elongated, joints 2-8 subequal, club loose and 3-jointed. Mandible (Fig.100) elongated, with 3 apical teeth, mola well-developed, a trace of dorsal mandibular cavity near base present. Maxilla (Fig.101) with lacinia narrow and elongated and without apical spines, galea short and broad and its apex densely hairy; palpi with segment 2 longest, segment 3 short, apical segment longer than segment 3 and narrowed at apex. Labium (Fig. 102) with mentum somewhat triangular and transverse, palpi with segment 2 longest and

apical segment short. Labrum (Fig.103) transverse with apical margin slightly rounded.

Prothorax (Fig.94) elongated, lateral margins finely denticulate, front angle with a spine usually beneath anterior margin, pronotum flat, front coxae widely separated, coxal cavities almost round, cavities broadly closed behind externally and internally, prosternal process broad at apex, sternopleural suture extending to lateral margin.

Meso-metathorax (Fig.96): Mesocoxae widely separated and slightly closer than front coxae, cavities broadly opened outwardly, lateral margins of mesosternal process notched near middle, sternal fitting between mesocoxae almost in a straight line. Metasternum about as broad as long, median impressed line extending anteriorly near middle, hind coxae separated slightly wider than mesocoxae. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig.99) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra parellel-sided, each elytron (Fig.98) with 9 rows of strial punctures, without scutellary striole, alternate interstices with single and double rows of pubescence, epipleura narrow and complete almost upto apex.

Legs (Fig.95) moderately long and slender, trochanters short and simple, hind trochanter with a spine in male, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, tarsi simple, tarsal segment 1 long, segments 2 and 3 shorter than segment 1, segment 4 smallest, claws simple.

Abdomen (Fig.97) elongated, ventrite 1 longest, intercoxal process broad and its apex broadly pointed, femoral lines closed, ventrites 2-5 subequal. Aedeagus (Fig.105) with median lobe broad, median sturt elongated and somewhat broader at apex; parameres well-developed, slender, with a few long setae at apex. Ovipositor (Fig.104) with well-developed paraprocts, valvifers, coxites and styli attached on outer margin of apex of coxites.

Habitat : Usually found under bark and also collected from bush, grass and leaf litter.

Distribution : India, Nepal, Bangladesh, Sri Lanka, Burma, Malaysia, Indoneisa, Singapore, Taiwan, Thailand, Japan, China, Philippines, New Caledonia, Moluccas, Solomon Is., Fiji Is.

KEY TO THE SPECIES OF PROTOSILVANUS FROM INDIA

1. Antennal joints 9 and 10 without apical spines (Fig.91),
median impressed line on metasternum extends anteriorly
upto apex of metasternum, species small (2.35 to
2.40 mm). minutus sp.nov.
Antennal joints 9 and 10 with apical spines (Fig.88),
median impressed line on metasternum extends anteriorly
slightly beyond middle, species larger (2.94 to
4.64 mm).2
2. Prothorax widest across anterior spines, anterior spine
prominent (Fig.88). lateritius (Reitter)
Prothorax widest near middle, anterior spine less pro-
minent. (Fig.90). dehradunus sp.nov.

23. Protosilvanus lateritius (Reitter)

Silvanus lateritius Reitter, 1878, Verh. zool.-bot. Ges.
Wien 28 : 194; Grouvelle, 1908, Annls Soc. ent. Fr.
77 : 490. (Type-loc. : Sri Lanka).

Silvanus (Protosilvanus) lateritius Reitter : Grouvelle,
1912, Annls Soc. ent. Fr. 81 : 336.

Protosilvanus lateritius (Reitter) : Halstead, 1973, Bull.
Br. Mus. nat. Hist. (Ent.) 29(2) : 96.

This is the most widely distributed species of Protosilvanus
and found under bark of various trees. Reitter (1878b) described

this species from Sri Lanka. Grouvelle (1908) recorded this species in India from Western Dekhan, Nilgiri Hills and Andaman Is. Halstead (1973) recorded this species from Nepal and Bangladesh. In the present study this species has been recorded from following states of India : Arunachal Pradesh, Meghalaya, Assam, West Bengal, Bihar, Uttar Pradesh, Himachal Pradesh, Kerala, Tamil Nadu and Andaman Is.

General appearance (Fig. 88) elongated, flat, yellowish brown to blackish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes moderately large, length of eye about half of length of head, length of temple shorter than width of one eye facet and its outer apical angle pointed; puncturation on vertex coarse, dense and that of towards anterior margin of clypeus slightly finer; setae projected towards middle line. Antenna moderately long and slender, scape moderately large, joints 2-7 subequal and slightly narrower than scape, joint 8 smallest, joints 9 and 11 about as broad as long and joint 10 transverse, apical spines present on joints 9 and 10. Prothorax flat, elongated, anterior margin slightly sinuate near middle, anterior spines distinct and usually well-developed; lateral margins finely serrated, curved and usually slightly sinuate near posterior angles; lateral

depressions on pronotal disc more or less well-marked; puncturation on pronotum coarse, dense and almost similar to that of vertex of head; setae projected towards middle line. Scutellum moderately large and transverse. Elytra more than two times as long as broad, almost parallel-sided, lateral margins slightly wavy, punctures deep and large, interstice 7 strongly carinate and extending slightly more than anterior three-fourth. On ventral side puncturation finer than on dorsal side. Aedeagus (Fig.105) with median lobe tapered at apex; each paramere with a few apical setae, of which posterior three setae longer than others, median sturt long and slightly broader at apex.

Measurements : Total length 2.94-4.64 mm, width of head across eyes 0.62-0.83 mm, length of antenna 1.00-1.44 mm, width of prothorax near middle 0.61-0.88 mm, length of elytra 1.80-2.50 mm and width across middle 0.74-0.94 mm.

Materials examined : 557 ex. INDIA : ARUNACHAL PRADESH, Paporijo, 4 ex., 26.x.1966; Nalero Lohi, 518 m, 4 ex., 4.xii.69 J.M. Julka & party; Kalek, 1158 m, Abor Exped., 2 ex., 29.xii.11, Kemp, under bark; Rotung, 426 m, Abor Exped. 6 ex., 28.xii, 11 & 2.i.12, Kemp, under bark; Above Panji, 1219 m, Abor Exped., 2 ex., 16.i.12. Kemp, under bark; MEGHALAYA, Dainadubi Reserve Forest, Garo hills, 8 ex., 18.xi.1974, T. Sengupta, under bark of Shorea robusta; Songsak Reserve Forest, 8 ex., 21.xi.1974, T. Sengupta,

under bark of Shorea robusta and Cinnamo mura; ASSAM, Sadiya, Abor Exped., 4 ex., 26.xi.11, under bark; Kaxiranga, Panbari, 3 ex., 14.xi.1974, T. Sengupta, under bark of Shorea robusta; Rajabhtkhawa Forest, 3 ex., 11.xi.1974, T. Sengupta, under bark of Gamelina arboria, Amoora wallichii and Artocarpus chaplasi; WEST BENGAL, Jalpaiguri dist., Hasimara, 20 ex., 2.xii.1974, T. Sengupta, under bark of cut logs of Lagerstroemia perviflora; Dhupguri, 4 ex., 14-15.iv. 1971, T. Sengupta, Sweeping bush, and leaf litter; Gayerkata, 8 ex., 15.ii.1974, A. Datta, under bark of Terminalia belerica; Darjeeling dist., Sukna, 4 ex., 22.iv.1971, T. Sengupta under bark; 5 ex., 5.v.1976, T.K. Pal, under bark; Calcutta (Ultadanga & Chetla) 350 ex., iii.1975 to viii.1975, T.K. Pal under bark of Bombax sp., Tamerindus indica, Mangosa sp. Sirish, Harul and several unknown logs; Howrah dist., Rajganj, 2 ex. 13.x.1974, T.K. Pal, under bark; Burdwan dist., Burdwan, 5 ex., 10.vii.1976, T.K. Pal, under bark; BIHAR, Chaibasa, 35 ex., 19.x.1964, 15.x.1971, 29 & 31.xii.1971, 25.x.1974, T. Sengupta, under bark of Mangosa sp., dead standing and fallen tree and old logs, on living grass etc.; UTTAR PRADESH, Gorakhpur, 2 ex., 15.iv.1973, R. Lyall; 8 ex., 24.ix.1974, T. Sengupta, under bark of Bombax sp. ; Dehra Dun, Lakshibag, 10 + 20 ex., 10.vi.1975, T. Sengupta, under bark of Jhingan tree and under bark of unknown log respectively; Dehra Dun, Natwarabag, 2+9 ex., 1.vii.1975, T. Sengupta, on fungusy bark of Shorea robusta and under bark of Raani log; HIMACHAL PRADESH,

Nahan Renuka, 932 m, 10 ex., 17.vi.1975, T. Sengupta, under bark of dead branch of fig tree; KERALA, Walayar forest, 5 ex., 1.xii.1971, T. Sengupta, under bark; TAMIL NADU, Madumalai Reserve Forest, 10 ex., 7.xii.1971, T. Sengupta, under bark; ANDAMAN Is., Port Blair, 4 ex., 15.ii-15.iii.15, Kemp.

Distribution : So far this species is recorded only from South India and Andaman Is. and in the present study this has been recorded almost throughout India.

24. Protosilvanus dehradunus sp.nov.

This species is closely related to Protosilvanus lateritius (Reitter) but can be differentiated by its prothorax being widest across middle, anterior spine not prominent.

General appearance (Fig.90) elongated, moderately depressed, reddish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes moderately large, length of eye slightly less than half of length of head, length of temple shorter than width of one eye facet and its outer apical angle pointed; puncturation on vertex coarse, dense and that of towards anterior margin of clypeus slightly finer; setae projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 about as long as scape and slightly narrower, joint 4 slightly shorter than joint 3,

joint 5 slightly longer and wider than joint 4, joint 6 slightly shorter than joint 5 and more or less equal to joint 4, joint 7 longer and wider than joint 6, joint 8 shorter and narrower than joint 7, joints 9 and 11 about as long as broad and joint 10 transverse, apical spines present on joints 9 and 10. Prothorax flat, elongated and narrowed posteriorly, anterior margin slightly sinuate near middle, anterior spine small and not prominent; lateral margins finely serrated, curved and slightly sinuate before posterior angles; lateral depressions on pronotal disc rather well-marked; puncturation on pronotum coarse, dense and slightly coarser than on vertex of head; setae projected towards middle line. Scutellum moderately large and transverse. Elytra more than two times as long as broad, almost parallel-sided, lateral margins slightly wavy near middle, punctures deep and large, interstices 3 and 5 slightly raised and interstice 7 strongly carinate and extending almost upto anterior three-fourth. On ventral side puncturation finer than on dorsal side.

Measurements of holotype : Total length 3.76 mm, width of head across eyes 0.73 mm, length of antenna 1.27 mm, width of prothorax near middle 0.80 mm, length of elytra 2.14 mm and width across middle 0.88 mm.

Holotype ♀, INDIA: UTTAR PRADESH, Dehra Dun, Lakshibag, 10.vi.1975, T. Sengupta, under bark of Jhingan tree (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Uttar Pradesh.

25. Protosilvanus minutus sp.nov.

This species can be easily distinguished from P. lateritius and P. dehradunus by its antennal joints 9 and 10 devoid of apical spines, median impressed line on metasternum extending upto apex of metasternum, 7th elytral interstice less carinate and shorter in length. The aedeagus of this species also differs from lateritius by its median lobe more pointed at apex and apex of paramere broader and with two short setae and six long setae.

General appearance (Fig.91) elongated, flat, reddish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes moderately large, length of eye about half as long as head, length of temple shorter than width of one eye facet and its outer apical angle acute, puncturation on vertex coarse, dense and that of towards anterior margin of clypeus slightly finer; setae projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel about as long as scape and slightly narrower, joint 3 slightly shorter and narrower than pedicel, joint 4 shorter than joint 3, joint 5 slightly longer than joint 4, joint 6 shorter than joint 5 and equal to joint 4, joint 7 slightly longer and wider than joint 6, joint 8 slightly shorter and narrower than joint 7, joints 9 and 10 clearly transverse and devoid of any spine, joint 11 about as long as broad. Prothorax flat, elongated, slightly narrowed posteriorly and almost similar

to P. lateritius; anterior spine small and its tip slightly pointed; lateral margins finely serrated, curved and slightly sinuate near posterior angles; lateral depressions on pronotal disc slightly marked; puncturation on pronotum coarse, dense and similar to that of vertex of head; setae projected towards middle line.

Scutellum moderately large, transverse. Elytra more than two times as long as broad, almost parallel-sided and lateral margins slightly wavy near middle, punctures deep and large, interstices alternately wider and narrower, 7th interstice slightly raised than other interstices and prominent upto anterior three-fourth. On ventral side puncturation finer than on dorsal side. Aedeagus (Fig. 106) with median lobe broadly elongated and tapered at apex, apex of each paramere slightly broader and with two short and six long apical setae.

Measurements of holotype : Total length 2.35 mm, width of head across eyes 0.52 mm, length of antenna 0.76 mm, width of prothorax near middle 0.50 mm, length of elytra 1.41 mm and width across middle 0.58 mm.

Holotype ♂, INDIA: WEST BENGAL, Darjeeling dist., Rangpo, 450 m, 21.4.1976, T.K. Pal, under bark of Ailanthus grandis. Aedeagus dissected and mounted on cover slip and pinned with the holotype; Paratypes 3 ex., data same as holotype (in Zoological Survey of India, Calcutta).

Distribution : INDIA : West Bengal (Darjeeling district).

Remark : 1 ♀ collected from West Bengal : Ultadanga by author, under bark of Sirish log has been studied and observed the following differences :- anterior margin of prothorax curved at extremities and continues to form the anterior spines, meeting point of anterior margin of prothorax and that of anterior spine not sharply demarcated (Fig. 92).

Genus Ahasverus Gozis

Ahasverus Gozis, 1881, Annls Soc. ent. Fr. (6) 1 Bull.

p. CXXVII; Reitter, 1911, Fauna Germanica 3 : 45;

Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 372-385.

Cathartus (Ahasverus) Gozis : Reitter, 1882, Dt. ent. Z.

26 : 296; Ganglbauer, 1899, Die Käfer Von Mitteleuropa

3 : 587; Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 492.

Type-species : Ahasverus advena (Waltl)

The genus Ahasverus was erected by Gozis (1881) for the species Cathartus advena (Waltl). Reitter (1882), Ganglbauer (1899) and Grouvelle (1908) considered it as a subgenus of Cathartus Reiche. Reitter (1911) re-established its generic status. This genus seems to be more diversely represented in temperate climate and often found in mouldy stored foods. Stebbing (1914) recorded this species in India from Madhya Pradesh,

Maharashtra and Tamil Nadu. Imms and Chatterjee (1915) also recorded this species from India. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed eleven species under this genus namely, advena (Waltl) (Cosmopolitan), cryptophagoides (Reitter) (U.S.A.), delauneyi (Grouvelle) (Guadeloupe), excisus (Reitter) (West Indies, India, Guatemala, Germany, Natherland), humeralis (Grouvelle) (Guadeloupe, St. Thomas, U.S.A.), longulus Blatchl. (U.S.A.), nausibioides Grouvelle (French Guyana), opaculus (Leconte) (U.S.A. and Mexico), plagiatus Grouvelle (Antillen), rectus (Leconte) (U.S.A.), subopacus Grouvelle (Brazil, Bahia). The species A. excisus (Reitter) listed in the Junk's "Coleopterorum Catalogus" from East Indies, but Dr. Halstead has informed the author in a personal communication that this is a West Indian species, not East Indies as mentioned in the catalogue. In the present study the detailed distribution of Ahasverus advena in Indian and the description of its larva is given (see p.279)

Ahasverus is closely related to the genus Cathartus Reiche but can be easily separated by the following characters :

AHASVERUS	CATHARTUS
1. Prothorax transverse, lateral margins curved outwardly, anterior angles produced and callosity-like, sterno-pleural sutures terminate in anterior angles	1. Prothorax elongated, almost parallel-sided, anterior angles slightly produced laterally, sterno-pleural sutures terminate in lateral margins

AHASVERUS	CATHARTUS
2. Antennal joint 9 distinctly narrower than joint 10	2. Antennal joint 9 slightly narrower than joint 10
3. Elytra ovoid	3. Elytra parallel-sided
4. Femoral lines on ventrite 1 opened.	4. Femoral lines on ventrite 1 closed.

Definition :

General appearance (Fig.107) elongated, moderately flattened, usually yellowish brown.

Head (Fig. 109) slightly transverse, front margin of clypeus almost straight, eyes moderately large and coarsely faceted, temple short and flattened beneath eye, transverse impressed line on vertex behind eyes absent, tentorium as seen in figure. Antenna short and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, joints 2-8 subequal and narrower than scape, club 3-jointed. Mandible (Fig.116) elongated with 3 apical teeth, mola well-developed, a trace of dorsal mandibular cavity present near base. Maxilla (Fig.117) with lacinia narrow and elongated and without apical spine, galea short and broad and its apex densely hairy; palpi with segments 2 and 3 nearly equal, apical segment longest and fusiform. Labium (Fig. 118) with mentum somewhat triangular and transverse, palpi with apical segment longest and slightly narrowed towards apex. Labrum (Fig. 119) with apical margin rounded.

Prothorax (Fig. 110) transverse, lateral margins finely serrated, front angle projected and forming a callosity-like structure, pronotum slightly convex, front coxae narrowly separated, coxal cavities almost rounded, cavities broadly closed behind externally and internally, prosternal process broad at apex and its apical margin almost straight, sterno-pleural suture extending to front angle.

Meso-metathorax (Fig. 112) : Mesocoxae narrowly separated, cavities broadly opened outwardly, lateral margins of mesosternal process notched near apex, sternal fitting between mesocoxae almost in a straight line. Metasternum transverse, median impressed line extends anteriorly upto apex of mesosternal process, hind coxae widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig.115) with trace of single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat ovoid, each elytron (Fig.114) with 9 rows of strial punctures, without scutellary striole, alternate interstices with 2 and 3 rows of setae.

Legs (Fig. 111) moderately long and slender, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, tarsal segments 1-3 short and subequal, segment 3 strongly lobed below, segment 4 shortest, claws simple.

Abdomen (Fig.113) elongated, ventrite 1 longest, intercoxal process of ventrite 1 broad and broadly pointed at apex, femoral lines opened, ventrites 2-5 shorter and subequal. Aedeagus (Fig.120) with median lobe broad, median sturt elongated and broad at apex; parameres well-developed, slender, broadened near middle and narrowed at apex, and with a long apical seta. Ovipositor (Fig.121) with well-developed paraprocts, valvifers, coxites and styli attached on outer margin of apex of coxites.

Habitat : It has been recorded from stored grains and cereal products, copra, spices, cocoa, ground nuts, other oil seeds and their products, tobacco, herbs, roots and haystack. In India Ahasverus advena has been recorded in lac, teak leaf, Shorea robusta seeds, ship biscuits, stored rice and plum.

Distribution : Diversely represented in temperate climate, the species A. advena is cosmopolitan.

26. Ahasverus advena (Waltl)

Cryptophagus advena Waltl, 1832, Faunas 1 : 169 (Type-loc. : 'America-Australi').

Cathartus advena (Waltl) : Waltl, 1834, Silberm. Rev.

Ent. 2 : 256.

Silvanus advena (Waltl) : Erichson, 1846, Naturg. Ins.

Deutschl. 3 : 339; Wollaston, 1854, Insecta Maderensia :

168; Casey, 1884, Trans. Am. ent. Soc. 11 : 72.

Cryptophagus guerinii Allibert, 1847, Rev. Zool. 10 : 12.

Cryptophagus angustatus Lucas, 1846, Explor. Alger. : 221.

Cryptophagus ? striatus Rouget, 1876, Annls Soc. ent. Fr.

(5) 6 Bull. p. CCVII.

Ahasverus advena (Waltl) : Gozis, 1881, Annls Soc. ent.

Fr. (6) 1 Bull. p. CXXVII; Reitter, 1911, Fauna

Germanica 3 : 47; Grouvelle, 1912, Annls Soc. ent.

Fr. 81 : 381.

Cathartus (Ahasverus) advena (Waltl) : Ganglbauer, 1899,

Die Kafer Von Mitteleuropa 3 : 588; Grouvelle, 1908,

Annls Soc. ent. Fr. 77 : 492.

Waltl (1832) described this species under Cryptophagus Herbst. Woodroffe (1962) noted that though it is originally an American species but it has been distributed by commerce to most of tropical and warm-temperate regions of the World. Corbett, Yusope and Hassan (1937) noted that this species is a mould feeder rather than a direct destroyer of stored food stuffs. Stebbing (1914) mentioned that this species makes gall in teak leaf and cause defoliation, and he recorded this species from Madhya Pradesh, Maharashtra and Tamil Nadu. Imms and Chatterjee (1915) mentioned that A. advena attacks lac insect in India.

General appearance (Fig. 107) elongated, moderately depressed, yellowish to reddish brown, somewhat shiny; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes moderately large, length of eye about one-third of length of head, length of temple shorter than width of one eye facet and its outer apical angle pointed, puncturation on vertex fine and dense and that of towards anterior margin of clypeus slightly finer, setae projected towards middle line. Antenna rather short and slender, considerably shorter than length of head and prothorax together (1.00 : 1.25), scape moderately large, pedicel about as long as scape and slightly narrower, joint 3 slightly shorter and narrower than pedicel, joints 4-8 shorter and subequal, joint 9 slightly transverse and distinctly narrower than joint 10, joint 11 slightly transverse and slightly narrower than joint 10. Prothorax transverse and convex; anterior angle prominent, produced slightly towards lateral side and its tip broadly rounded; lateral margins uniformly arched and finely serrated, pronotum narrowly bordered, puncturation on pronotum fine and dense and similar to that of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra elongated and somewhat ovoid, lateral

margins slightly explanate and not wavy, rows of punctures slightly deep and moderately large, pubescence denser than on head and pronotum and projected posteriorly. Puncturation on ventral side similar to that of dorsal side. Aedeagus (Fig. 120) with parameres broadened across anterior two-third and narrowed posteriorly, each paramere with a long and a short apical setae.

Measurements : Total length 1.36-2.23 mm, width of head across eyes 0.47-0.52 mm, length of antenna 0.58-0.72 mm, width of prothorax across middle 0.55-0.67 mm, length of elytra 1.11-1.41 mm and width across middle 0.66-0.83 mm.

Materials examined : 76 ex. INDIA : WEST BENGAL, Calcutta, 11 ex., 31.vii.1965, P.K. Ghosh, from copra consignment; 1 ex., 24.viii.1977, Mazumdar, Shorea robusta seed brought from Bankura; BIHAR, Chaibasa, 50 ex., 15.i.1978, T. Sengupta, plum; KERALA, Vellyani, 3 ex., 18.ix.1959, C.N.O., stored rice; 2 ex., 3.ix.1960, C.N. Oomen, stored rice; EUROPE, 9 ex.

Distribution : Cosmopolitan. So far in India this species is recorded from Madhya Pradesh, Maharashtra and Tamil Nadu. In the present study it has been recorded from West Bengal, Bihar and Kerala.

Genus Cathartus Reiche

Cathartus Reiche, 1854, Annls Soc. ent. Fr. (3) 2 : 74;

Redtenbacher, 1858, Fauna Austriaca - Die Kafer :

346; Ganglbauer, 1899, Die Käfer Von Mitteleuropa

3 : 587; Sharp, 1899, Biologia Centrali-Americana,

Col. 2 : 558; Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 492; Reitter, 1911, Fauna Germanica 3 : 45.

Type-species : Cathartus quadricollis (Guérin-Méneville)

Cathartus is a small genus erected by Reiche (1854) for his species Cathartus cassiae and referred to the family Colydiidae. Redtenbacher (1858) transferred it to the family Cucujidae. Sharp (1899) dealt it under the subfamily Silvaninae of the family Cucujidae, Ganglbauer (1899) and Grouvelle (1908) under the tribe Silvanini (Silvaninae:Cucujidae), Reitter (1911) under Silvanini (Cucujinae:Cucujidae). Hetschko (1930) in Junk's 'Coleopterorum Catalogus' listed four species namely, quadricollis (Guérin-Méneville) (Cosmopolitan), annectens Sharp (Hondurus), cairnsensis Blackburn (Australia), and rugosus Grouvelle (New Guinea). In the present study the larva of Cathartus sp. is described for the first time (see p. 282).

Definition :

General appearance (Fig.122) elongated, moderately depressed, yellowish brown and slightly shiny.

Head elongated, front margin of clypeus almost straight, eyes large and coarsely faceted, temple not flattened beneath eye, transverse impressed line on vertex behind eyes indistinct. Antenna rather short and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, pedicel and joint 3 slightly shorter and narrower than scape; joints 4-8 shorter, subequal, elongated to slightly transverse; club loose and 3-jointed. Maxillary palpi with segment 2 slightly longer than segment 3, apical segment longest and fusiform. Labial palpi with apical segment longest and fusiform.

Prothorax elongated, front angles moderately broadly rounded and lying beneath front margin, side margins finely serrated, pronotum bordered, front coxae moderately widely separated, coxal cavities broadly closed behind externally, prosternal process broad at apex, sterno-pleural suture extending to lateral margin.

Meso-metathorax : Mesocoxae moderately widely separated, mesosternal process notched in posterior half, sternal fitting between mesocoxae almost in a straight line, metasternum transverse, median impressed line on metasternum extends anteriorly upto one-sixth of its length, hind coxae more widely separated than mesocoxae.

Elytra parallel-sided, each elytron with 9 rows of strial punctures, without scutellary striole, interstices pubescent, epipleura narrow and complete upto apex.

Legs moderately long, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex; tarsal formula 5-5-5, segments 1-3 subequal and segment 3 strongly lobed below, segment 4 shortest, claws simple.

Abdomen elongated, ventrite 1 longest, intercoxal process broad and broadly pointed at apex, femoral lines closed, ventrites 2-5 shorter and subequal.

Distribution : Cosmopolitan, but more diversely represented in temperate climate.

27. Cathartus quadricollis (Guérin-Ménéville)

Silvanus quadricollis Guérin-Ménéville, 1829-44,

Iconographie du Règne Animal : 198; Casey, 1884,
Trans. Am. ent. Soc. 11 : 72. (Type-loc.: North America).

Cathartus quadricollis (Guérin-Ménéville) Ganglbauer, 1899, Die Käfer Von Mitteleuropa 3 : 587; Reitter, 1911, Fauna Germanica 3 : 47.

Cathartus cassiae Reiche, 1854, Annls Soc. ent. Fr. (3) 2 : 78.

Silvanus gemellatus Jaculine du Val, 1857, in Ramon de la Sagra Hist. de l'île de Cuba 7 : 104, 250.

Guérin-Ménéville (1829-44) described this species from North America (in Zimmerman collection). Ganglbauer (1899)

mentioned several synonyms. Hetschko (1930) mentioned it as a cosmopolitan species.

General appearance (Fig.122) elongated, moderately depressed, uniformly reddish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, temple short and not shelf-like beneath eye, puncturation on vertex fine and dense and that of near anterior margin of clypeus slightly more finer, setae projected towards middle line, two lateral depressions present on vertex above antennal insertions. Antenna short and slender, scape moderately large, pedicel slightly shorter and narrower than scape, joint 3 about as long as pedicel and slightly narrower, joints 4-7 shorter and subequal and about as broad as long, joint 8 slightly wider than joint 7, joints 9-11 transverse. Prothorax convex, elongated, almost parallel-sided and sides finely serrated, margin of prothorax finely bordered, front angles slightly prominent and its apex rounded; puncturation on pronotum coarse, dense and similar to that of vertex of head; setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, almost parallel-sided, lateral margins slightly explanate, rows of punctures

moderately large, setae projected posteriorly. On ventral side puncturation finer than on dorsal side.

Measurements : Total length 2.73 mm, width of head across eyes 0.55 mm, length of antenna 0.67 mm, width of prothorax across middle 0.64 mm, length of elytra 1.58 mm and width across middle 0.73 mm.

Material examined : 1 ex. EUROPE (Z.S.I. Reg. No. 746)
11

Distribution : Cosmopolitan.

Genus Silvanolomus Reitter

Silvanolomus Reitter, 1912, Wien. ent. Ztg. 31 : 286;

Grouvelle, 1912, Annl's Soc. ent. Fr. 81 : 385.

Silvanopsis Reitter (Sensu not Grouvelle), 1911, Fauna Germanica 3 : 44.

Type-species : Silvanolomus denticollis (Reitter)

Reitter 1911 erected this genus based on two species namely, Silvanus denticollis Reitter and Silvanus pullus Reitter and named it as 'Silvanopsis'. Since this name was preoccupied by a genus established by Grouvelle, he (1912) proposed the new name 'Silvanolomus' for this genus. Silvanolomus is a small genus and comprised of minute beetles ranging from 1.61 to 1.94 mm in length. The representatives of this genus can be recognised by its elongated and somewhat flat body;

prothorax transverse, with six lateral teeth and devoid of longitudinal carinae on pronotum; antennal club 3-jointed, elytra somewhat ovoid, and apical margin of intercoxal process of ventrite 1 almost straight. This genus seems to be more diversely represented in the tropical climate. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed three species namely, crenicollis (Grouvelle) (Australia), denticollis (Reitter) (Sri Lanka, Sumatra, Borneo) and pullus (Reitter) (West Africa, Morocco, Kilimanjaro). In the present study this genus is recorded from India with two species, of which one is new to science.

Definition :

General appearance (Fig.124) elongated, moderately flattened and yellowish to blackish brown.

Head (Fig.126) transverse, front margin of clypeus almost straight, eyes moderately large and coarsely faceted, temple inflattened beneath eye and short shelf-like, transverse impressed line on vertex behind eyes absent, tentorium with two long tentorial arms and a transverse bridge near middle. Antenna moderately long and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, pedicel and joint 3 about as long as scape and narrower, joints 4-8 subequal and shorter, club loose and

3-jointed. Mandible (Fig.133) with 3 apical teeth, mola well-developed, a trace of dorsal mandibular cavity present near base. Maxilla (Fig. 134) with lacinia narrow, elongated and without apical spine, galea short and broad and its apex densely hairy; palpi with segments 2 and 3 almost equally long, apical segment longest and fusiform. Labium (Fig.135) with mentum triangular and transverse, palpi with apical segment longest and fusiform. Labrum (Fig. 136) with apical margin slightly concave.

Prothorax (Fig.127) slightly transverse, side margin with six large teeth, front coxae contiguous, coxal cavities almost round, cavities broadly closed behind externally as well as internally, prosternal process broad at apex and its apical margin straight, sterno-pleural suture extending to anterior tooth.

Meso-metathorax (Fig. 129): Mesocoxae contiguous, cavities broadly opened outwardly, mesosternal process notched near apex, sternal fitting between mesocoxae almost in a straight line, metasternum transverse, median impressed line on metasternum extends anteriorly near middle, hind coxae widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 132) with trace of single anal vein, without anal cell and subcubital fleck, with

radial cell. Elytra somewhat ovoid, each elytron (Fig. 131) with 9 rows of stria punctures, without scutellary striole, alternate interstices with single and double rows of pubescence, epipleura narrow and complete upto apex.

Legs (Fig.128) moderately long, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, segment 1 elongated, segments 2 and 3 shorter and subequal, segment 3 strongly lobed below, segment 4 shortest, claws simple.

Abdomen (Fig. 130) elongated, ventrite 1 longest, intercoxal process broad at base and its apical margin almost straight, femoral lines closed, ventrites 2-5 subequal. Aedeagus (Fig. 138) with median lobe broadly elongated, median sturt elongated and its apex spatulate; parameres well-developed, slender elongated and with few short apical setae. Ovipositor (Fig. 137) with well-developed paraprocts, valvifers, coxites and styli attached on outer margin of apex of coxites.

Habitat : In India this genus is recorded from flower and crops.

Distribution : India, Sri Lanka, Indonesia, West Africa, Morocco, Kilimanjaro, Australia.

KEY TO THE SPECIES OF SILVANOLOMUS FROM INDIA

1. Aedeagus with parameres widest near middle, each paramere with two long apical and a group of short setae near middle (Fig. 138). denticollis (Reitter)
Aedeagus with parameres widest near apex, each paramere with only four apical setae (Fig. 139).
..... meghalayensis sp.nov.

28. Silvanolomus denticollis (Reitter)

Silvanus denticollis Reitter, 1876, Col. Hefte 15 : 56;
Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 491. (Type-
loc. : Sri Lanka).

Silvanopsis denticollis (Reitter) : Reitter, 1911, Fauna
Germanica 3 : 44, nota.

Silvanolomus denticollis (Reitter) : Reitter, 1912,
Wien. ent. Ztg. 31 : 286; Grouvelle, 1912, Annls
Soc. ent. Fr. 81 : 331.

Reitter (1876) described this species from Sri Lanka and later Grouvelle (1908) recorded it from Sumatra and Borneo. This species is hitherto unrecorded from India and in the present study this species has been recorded in India from West Bengal, Bihar, Madhya Pradesh and Tamil Nadu. The present identification is based on one example sent to author by Dr. D.G.H. Halstead.

General appearance (Fig. 124) elongated, moderately depressed, prothorax with six large teeth on lateral side, blackish or yellowish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye about half as long as head, length of temple shorter than length of one eye facet and its outer apical angle slightly pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel slightly shorter and narrower than scape, joint 3 about as long as pedicel and slightly narrower; joints 4-8 shorter than joint 3, subequal and elongated; joints 9-11 more or less transverse. Prothorax slightly wider than long, convex, slightly wider than head across eyes (1.12:1.00), anterior margin almost straight; lateral margin with six short, broad and slightly pointed teeth; puncturation on pronotum coarse, dense and similar to that of vertex of head; setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra less than two times as long as broad, lateral margins slightly wavy, rows of punctures moderately large and deep, interstices strongly pubescent and setae projected posteriorly. On ventral side puncturation finer than on dorsal side, median impressed line on metasternum extends anteriorly slightly beyond

middle. Aedeagus (Fig. 138) with parameres elongated and widest near middle, each paramere with two long apical setae and a group of shorter setae near middle, median sturt broad at apex and its apical margin slightly curved inwardly.

Measurements : Total length 1.61-1.94 mm, width of head across eyes 0.39-0.45 mm, length of antenna 0.60-0.64 mm, width of prothorax across middle 0.41-0.50 mm, length of elytra 1.02-1.26 mm and width across middle 0.58-0.72 mm.

Materials examined : 45 ex., INDIA : WEST BENGAL, Nadia dist., Badkulla, 21 ex., 6.iii.1977, T.K. Pal, dried flower of Dahlia ; BIHAR, Chaibasa, 17 ex., 29.xii.1970, T. Sengupta, Bajra (Crop); KARNATAKA, Coorg, Fraserpet, F.R.I. Sandal Insect Survey, 1 ex., 7.vi.31, plot 3; TAMIL NADU, Mahaballipuram, 6 ex., 25.iii.1977, T. Sengupta, Cashew flower.

Distribution : INDIA : West Bengal, Bihar, Karnataka, Tamil Nadu; SRI LANKA; INDONESIA (Sumatra and Borneo).

29. Silvanolomus meghalayensis sp.nov.

This species is closely related to S. denticollis (Reitter) but can be separated by its aedeagus with parameres widest near apex and each paramere with four apical setae, and puncturation on metasternum and ventrites slightly finer.

General appearance same as S. denticollis; elongated, moderately depressed, prothorax with six large teeth on lateral side, uniformly blackish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye about half as long as head, length of temple shorter than length of one eye facet and its outer apical angle slightly pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel slightly shorter and narrower than scape, joint 3 about as long as pedicel and slightly narrower; joints 4-8 shorter than joint 3, subequal and slightly elongated; joints 9-11 more or less transverse. Prothorax slightly wider than long, convex, slightly wider than head across eyes (1.05:1.00), anterior margin almost straight; lateral margin with six short, broad and slightly pointed teeth; puncturation on pronotum coarse, dense and similar to that of vertex of head; setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra less than two times as long as broad, lateral margins slightly wavy, rows of punctures moderately large and deep, interstices strongly pubescent and setae projected posteriorly. On ventral side puncturation finer than on dorsal side, median impressed

line on metasternum extends anteriorly upto middle. Aedeagus (Fig. 139) with parameres elongated widest near apex and each paramere with four setae at apex; median sturt broad at apex and its apical margin curved outwardly.

Measurements of holotype : Total length 1.62 mm, width of head across eyes 0.39 mm, length of antenna 0.60 mm, width of prothorax across middle 0.41 mm, length of elytra 1.02 mm and width across middle 0.58 mm.

Holotype ♂, INDIA : MEGHALAYA, Sarengina, Dainadubi, 19.xi.1974, T. Sengupta, flower of Boga medulla. Aedeagus dissected and mounted on cover slip and pinned with the holotype; Paratypes 11 ex., data same as holotype (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Meghalaya.

Genus Silvanopsis Grouvelle

Silvanopsis Grouvelle, 1892, Annls Soc. ent. Fr. 61 : 285.

Type-species : Silvanopsis simoni Grouvelle.

Silvanopsis is a small genus and comprised of minute beetles ranging from 2.61-3.08 mm in length. This genus was established by Grouvelle in 1892 based on two species namely, Silvanopsis simonis Grouvelle and Silvanopsis raffrayi Grouvelle

Legs (Fig. 146) moderately long and slender, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, tarsal segments 1-3 subequal and segment 3 slightly lobed below, segment 4 shortest, claws simple.

Abdomen (Fig. 148) elongated, ventrite 1 longest, intercoxal process broad and broadly pointed at apex, femoral lines closed, ventrites 2-5 subequal. Aedeagus (Fig. 155) with median lobe broad and narrowed towards apex, median sturt elongated and bifid at apex; parameres well-developed, slender and with a few setae. Ovipositor (Fig. 156) with well-developed paraprocts, valvifers, coxites and styli attached on outer margin of apex coxites.

Habitat : Chiefly found in brood lac; also in crop, cotton ('Toola'), bush etc.

Distribution : India, Nepal, Philippines, Singapore.

KEY TO THE SPECIES OF SILVANOPSIS FROM INDIA

- Antennal club 3-jointed and joint 9 slightly narrower than joint 10; pronotum distinctly bordered (Fig. 140); lateral margins of mesosternal process notched (Fig. 141) grouvelli sp.nov.
- Antennal club distinctly 2-jointed; pronotum not bordered (Fig. 142); lateral margins of mesosternal process devoid of any notch (Fig. 143). ... nepalensis sp.nov.

from Philippines (Manilla) and Singapore respectively. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed these two species under this genus. Representatives of this genus are found chiefly in brood lac and also noted in crop (Bajra) and bush. Imms and Chatterjee (1915) reported that the larvae of one species is a common enemy of lac insect (Kerrea lacca). In the present study two species are described as new to science.

Definition :

General appearance (Fig.140) elongated, moderately flattened, usually reddish brown to blackish brown.

Head (Fig. 144) transverse, front margin of clypeus usually almost straight, eyes moderately large and coarsely faceted, temple flattened beneath eye and shelf-like, transverse impressed line on vertex behind eyes present, tentorium with two long tentorial arms and a transverse bridge near middle. Antenna short and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, joints 2-9 subequal and narrower than scape, club loose and indistinctly 3-jointed or 2-jointed. Mandible (Fig. 151) elongated, with 3 apical teeth, mola well-developed, a trace of dorsal mandibular cavity present near base. Maxilla (Fig. 152) with lacinia narrow and elongated and without apical spines, galea short and broad and its apex densely hairy; palpi with segments 2 and 3 almost

equal, apical segment longest and fusiform. Labium (Fig. 153) with mentum somewhat triangular and transverse, palpi with apical segment longest and fusiform. Labrum (Fig. 154) with apical margin slightly concave.

Prothorax (Fig. 145) almost quadrate or slightly elongated, lateral margin undulated and forming six broad teeth, pronotum slightly convex, front coxae moderately widely separated, coxal cavities slightly elongated, cavities broadly closed behind externally and opened internally, prosternal process broad at apex and its apical margin almost straight, sterno-pleural suture extending to anterior tooth.

Meso-metathorax (Fig. 147) : Mesocoxae almost contiguous, cavities broadly opened outwardly, lateral margins of mesosternal process usually notched at middle, sternal fitting between mesocoxae almost in a straight line. Metasternum transverse, median impressed line on metasternum extends anteriorly near apex of mesosternal process, hind coxae widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 150) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat parallel-sided, each elytron (Fig. 149) with 9 rows of strial punctures, without scutellary striole, alternate interstices with single and double rows of pubescence, epipleura narrow and complete upto apex.

30. Silvanopsis grouvelli sp.nov.

Imms and Chatterjee (1915) mentioned that Silvanus iyeri Grouvelle is an enemy of lac insect. Mahdihassan (1955) recorded a different variety, Silvanus iyeri var. mysorensis from Mysore (Karnataka). It is an unpublished species and moreover, it is not a member of Silvanus Latreille but Silvanopsis Grouvelle. The author has examined several examples of this species including two examples (from Assam) determined by Grouvelle as Silvanopsis iyeri Grouvelle present in the collection of Zoological Survey of India. Moreover, Dr. D.G.H. Halstead in a personal communication confirmed the author that Grouvelle did not publish the description of this species, and there are 'types' of this species present in the 'Paris Museum'. Henceforth, the species is described here and the name is given in honour of A. Grouvelle, who originally discovered and determined the species.

General appearance (Fig. 140) elongated, moderately depressed, reddish brown to blackish brown; covered with short, semierect, golden pubescence.

Head: Exposed part of head wider than long, eyes moderately large and slightly shorter than one-third of length of head, temple about as long as one eye facet and its outer apical angle slightly pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and

projected towards middle line. Antenna short and slender, scape moderately large, pedicel and joint 3 slightly shorter and narrower than scape, joints 4-7 shorter than joint 3 and about as long as broad, joint 8 elongated and slightly longer than joint 7, joint 9 wider than joint 8 and about as long as broad, joints 10 and 11 transverse. Prothorax convex, slightly elongated and almost parallel-sided; anterior tooth moderately large, broad and projected outwardly; lateral margin with six broad and blunt teeth including anterior tooth, margin of pronotum finely bordered; puncturation on pronotum coarse, dense and similar to that of vertex of head; setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra less than two times as long as broad, widest near middle, lateral margins wavy and slightly explanate, apex of elytra slightly notched, alternate interstices slightly raised and depressed, setae projected posteriorly. On ventral side puncturation finer than on dorsal side. Aedeagus (Fig. 155) with apical projection of median lobe elongated and pointed at apex, each paramere with a long apical seta and four shorter setae on inner margin near apex.

Measurements of holotype : Total length 2.61 mm, width of head across eyes 0.52 mm, length of antenna 0.63 mm, width of prothorax across anterior teeth 0.64 mm, length of elytra 1.58 mm and width across middle 0.85 mm.

Holotype ♂, INDIA : BIHAR, Namkum, 6.i.1971, T. Sengupta, lac. Aedeagus dissected and mounted on slide. Paratypes 6 ex., data same as holotype; Paratype 1 ex., Locality, date and collector same as holotype, bush of grass; Paratype 1 ex., Chaibasa, Putida hills, 29.xii.1970, T. Sengupta, bajra (crop); Paratype 1 ex., ASSAM, Silchar, Cachar, 1911, from 'Toola'; Paratypes 2 ex., Locality ?, 10.xi.10, brood out of lac (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Bihar, Assam, Karnataka.

31. Silvanopsis nepalensis sp.nov.

This is a distinct species and can be readily separated from the former one by its antennal club distinctly 2-jointed and pronotum not bordered.

General appearance (Fig. 142) elongated, moderately depressed, blackish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes moderately large and about one-third of length of head, temple about as long as one eye facet and its outer apical angle pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna short and slender, scape moderately large, pedicel and joint 3 shorter and narrower

than scape; joints 4-8 short, subequal and about as broad as long; joint 9 slightly wider than joint 8 and transverse, joints 10 and 11 distinctly transverse of which joint 10 slightly wider than joint 11. Prothorax convex, about as broad as long and almost parallel-sided; anterior tooth moderately large, broad and outwardly projected; lateral margin with six broad and blunt teeth including anterior one, margin of pronotum not bordered; puncturation on pronotum coarse, dense and similar to that of vertex of head; setae projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra less than two times as long as broad, rather parallel-sided, widest near middle, lateral margins wavy and slightly explanate, apex of elytra slightly notched, alternate interstices slightly raised, setae projected posteriorly. On ventral side puncturation finer than on dorsal side.

Measurements of holotype : Total length 3.08 mm, width of head across eyes 0.61 mm, width of prothorax across anterior teeth 0.76 mm, length of elytra 1.77 mm and width across middle 1.02 mm.

Holotype ♀, NEPAL : Pokhara, 820 m, 15-18.vi.1976, W. Wittmer & C. Baroni Urbani (in Nat. Hist. Mus., Basel).

Distribution : NEPAL.

Remark : Unlike other Silvanopsis the above mentioned species has distinct 2-jointed antennal club, lateral margins of pronotum not bordered and lateral margins of mesosternal process not notched. No attempt has been made to erect a new genus for this species as the species is represented by only single female.

Genus Oryzaephilus Ganglbauer

Silvanus (Oryzaephilus) Ganglbauer, 1899, Die Käfer Von Mitteleuropa 3 : 584.

Oryzaephilus Ganglbauer : Reitter, 1911, Fauna Germanica 3 : 45; Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 318.

Type-species : Oryzaephilus surinamensis (L.)

The representatives of this genus can be recognised by its elongated and somewhat flat body, ranging from 2.50 to 3.50 mm in length, elongated prothorax with three longitudinal carinae on pronotum and with six lateral teeth. Ganglbauer (1899) erected the subgenus Oryzaephilus under the genus Silvanus Latreille for the species S. surinamensis (L.) and S. mercator Fauvel. Reitter (1911) gave generic status to Ganglbauer's subgenus Oryzaephilus. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed eight species under this genus, of which only O. gossypii (Chittenden) is recorded from India. In the present study four species are dealt with, of which two are new and the larva of O. mercator is described (see p. 284).

Definition :

General appearance (Fig. 1) elongated, moderately depressed, pronotum with three distinct longitudinal carinae and six lateral teeth, usually reddish brown to blackish brown.

Head (Fig.3) elongated, front margin of clypeus almost straight, eyes small to large and coarsely faceted, temple flattened beneath eye and shelf-like, transverse impressed line on vertex behind eyes absent, tentorium as seen in figure. Antenna moderately long and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, pedicel and joint 3 usually about as long as scape and slightly narrower, joints 4-8 shorter and subequal, club loose and 3-jointed. Mandible (Fig. 10) elongated with 3 apical teeth, mola well-developed, a trace of dorsal mandibular cavity present near base. Maxilla (Fig. 11) with lacinia narrow, elongated and without apical spines; galea short and broad and its apex densely hairy; palpi with segments 2 and 3 almost equal, apical segment longest and fusiform. Labium (Fig. 12) with mentum somewhat triangular and transverse, palpi with apical segment longest and fusiform. Labrum (Fig. 13) transverse and its apical margin rounded

Prothorax (Fig. 4) elongated, lateral margin with six distinct teeth, pronotum with a discal area demarcated by a median and lateral longitudinal carinae and lateral longitudinal grooves on either sides of median carina. Front coxae almost contiguous, coxal cavities almost round, cavities broadly closed behind externally and internally, prosternal process broad at apex and its apical margin straight, sterno-pleural suture extending to anterior tooth.

Meso-metathorax (Fig. 6) : Mesocoxae almost contiguous, cavities broadly opened outwardly, lateral margins of mesosternal process simple, sternal fitting between mesocoxae almost in a straight line. Metasternum slightly transverse, median impressed line extends anteriorly near middle, hind coxae widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 9) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat parallel-sided, side margins usually slightly wavy, each elytron (Fig. 7) with 9 rows of striae punctures, without scutellary striole, interstices pubescent, epipleura narrow and complete upto apex.

Legs (Fig. 5) moderately long and slender, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex, tibiae devoid of any distinguishable apical spur; tarsal formula 5-5-5 in both sexes, tarsi simple, tarsal segment 1 elongated, segments 2 and 3 equal and slightly shorter than segment 1, segment 4 shortest, claws simple. In male hind trochanter with a spinous projection and hind femur with a distinct spine on posterior side at middle.

Abdomen (Fig. 8) elongated, ventrite 1 longer than ventrites 2-5, intercoxal process broad and its apical margin almost straight, femoral lines closed, ventrites 2-5 subequal. Aedeagus (Fig. 14) with median lobe broad, median sturt elongated and

its apex spatulate; parameres well-developed, slender and elongated, fringed with a few long setae and many short setae. Ovipositor (Fig. 15) with well-developed paraprocts, valvifers, coxites and styli attached on outer margin of apex of coxites.

Habitat : Stored food products, dried seeds and also attracted at light.

Distribution : All Zoogeographical regions.

KEY TO THE SPECIES OF ORYZAEPHILUS FROM INDIA

1. Length of temple of head about as long as 2 to 2.5 eye facets, length of eye about 3 to 4 times the length of temple 2
Length of temple of head about as long as 3.5 to 4 eye facets, length of eye usually less than twice the length of temple. 3
2. Antennal joints 6 and 7 about as long as broad, prothorax elongated (1.10 to 1.14 : 1.00), lateral margins of frons and longitudinal carinae on pronotum normally elevated. mercator (Fauvel)
Antennal joints 6 and 7 distinctly elongated, prothorax more elongated (1.21 : 1.00), lateral margins of frons and longitudinal carinae on pronotum strongly and more markedly elevated. elevatus sp.nov.

3. Antennal joints 6 to 8 about as long as broad, aedeagus with parameres fringed with long apical and outer marginal setae (Fig. 19). surinamensis (L.)
Antennal joints 6 to 8 elongated, aedeagus with parameres fringed with a few long and forked setae only at apex (Fig. 20). genalis sp.nov.

32. Oryzaephilus surinamensis (Linnaeus)

Dermestes surinamensis Linnaeus, 1767, Systema Naturae ed.

12 : 565 (Type-loc. : Surinam, Dutch Guinea).

Tenebrio surinamensis (L.) : De Geer, 1775, Mémoires pour Servir a l'histoire des insectes 5 : 54.

Anobium frumentarium Fabricius, 1775, Systema Entomologiae 1 : 62.

Ips frumentaria Olivier, 1790, Entomologie, ou histoire naturelle des insectes 2 (18) : 10.

Colyidium frumentarium (F.) : Fabricius, 1792, Entomologiae Systemeticae emendate et auctae 1(2) : 496.

Dermestes sexdentatus Fabricius, 1792, Entomologiae Systemeticae emendate et auctae 1(2) : 232.

Lyctus sexdentatus (F.) : Kugelann, 1794, Neustes Mag. Liebhaber Ent. 1 : 566.

Colyidium sexdentatum Paykull, 1880, Fauna Suecica. Insecta 3 : 313.

Silvanus sexdentatus (F.) : Gyllenhal, 1813, Insecta Suecica 1(3) : 406.

Silvanus surinamensis (L.) : Stephens, 1830, Illustration of British Entomology. Mandibulata 3 : 104.

Silvanus (Oryzaephilus) surinamensis (L.) : Ganglbauer, 1899, Die Käfer Von Mitteleuropa 3 : 584.

Oryzaephilus surinamensis (L.) : Reitter, 1911, Fauna Germanica 3 : 46.

General appearance (Fig. 16) elongated, moderately flattened, reddish brown to blackish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head about as wide as long, eyes small to moderately large, length of eye about one-fourth of length of head, length of temple about as long as 3.5 to 4 eye facets and about as long as eye or slightly shorter than it, lateral margin of frons slightly elevated, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 slightly shorter and narrower than scape, joints 4-8 subequal and about as broad as long, joints 9 and 10 transverse and joint 11 about as long as broad or slightly transverse. Prothorax elongated,

convex, anterior margin outwardly curved with slight indentation at middle, lateral margin with anterior tooth more acute than other teeth, pronotal disc with lateral longitudinal carinae convergent towards extremities than in middle, longitudinal grooves on either sides of median carina rather well-marked, puncturation on pronotum coarse and dense and similar to that of vertex of head. Scutellum moderately large, transverse and pubescent. Elytra slightly more than two times as long as broad, lateral margins wavy and explanate, rows of punctures on elytra moderately large; interstices 3,5 and 7 slightly carinate; setae projected posteriorly. On ventral side puncturation of head and prothorax almost similar to that of dorsal side, of meso-metathorax and abdomen slightly finer. Aedeagus (Fig. 19) with parameres long and slender, each paramere fringed with numerous short setae and a few long setae on outer margin and apex.

Measurements : Total length 2.75-3.50 mm, width of head across eyes 0.55-0.68 mm, length of antenna 0.81-1.06 mm, width of prothorax across middle 0.61-0.75 mm, length of elytra 1.60-1.95 mm and width across middle 0.79-0.96 mm.

Materials examined : 70 ex. INDIA : WEST BENGAL, Calcutta, 2 ex., 19.ix.09, C.A.P., dried walnut; 8 ex., June 1888, W.M. Duncan, Ship biscuits; 1 ex., 5.ii.1892, E.C. Cotes, date fruit;

36 ex., 7.iv.1971, T. Sengupta, Rice; 7 ex., 6.vii.1972, T. Sengupta, Rice; 4 ex., 30.v.1953, T.G. Vazirani; 5 ex., 24.viii.1977, Mazumdar, Shorea robusta seed brought from Bankura; BIHAR, Chaibasa, 2 ex., 11.xi. 1970, T. Sengupta, Rice; Ranchi, 1 ex., W.H. Irvine; UTTAR PRADESH, Dehra Dun, 1 ex., 10.vi.1971, A. Sing; Dehra Dun, New Forest, 2 ex., 27.ii.1928, N.C. Chatterjee; TAMIL NADU, Madras, 1 ex., Sorghum Seed.

Distribution : Cosmopolitan. In India this species is recorded from West Bengal, Bihar, Uttar Pradesh and Tamil Nadu.

33. Oryzaephilus mercator (Fauvel)

Silvanus mercator Fauvel, 1889, Rev. Ent. Caen. 8 : 132, nota; Reitter, 1890, Wien. ent. Ztg. 9 : 255. (Type-loc. : France, Africa, New Caledonia).

Oryzaephilus mercator (Fauvel) : Reitter, 1911, Fauna Germanica 3 : 46; Slow, 1958, Bull. ent. Res. 49 : 27

Oryzaephilus surinamensis var. mercator (Fauvel) :

Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 318, 319.

Silvanus gossypii Chittenden, 1897, U.S. Dept. Agric. Div. Ent. : 13.

This species is closely related to O. surinamensis but can be easily separated by using ratio of eye and temple lengths. Moreover, its aedeagus with each paramere fringed with numerous small setae and a few long setae only at apex.

General appearance (Fig. 1) elongated, moderately depressed, reddish brown to blackish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye about one-third of length of head, length of temple about as long as 2 to 2.5 eye facets or about one-third as long as eye, lateral margin of frons slightly elevated, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 about as long as scape and slightly narrower, joints 4-7 about as wide as long and shorter than joint 3, joint 8 slightly transverse, joints 9 and 10 distinctly transverse and joint 11 about as wide as long or slightly transverse. Prothorax elongated, convex, anterior margin outwardly curved and sometimes with slight indentation at middle, anterior tooth more acute than other lateral teeth which are more or less pointed, pronotal disc with lateral longitudinal carinae slightly convergent at extremities, longitudinal grooves on either sides of median carina well-marked, puncturation on pronotum coarse and dense and similar to that of vertex of head. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, lateral margins wavy and explanate, rows

of punctures moderately large; interstices 3,5 and 7 slightly carinate; setae projected posteriorly. On ventral side puncturation of head and prothorax almost similar to that of dorsal side, and of meso-metathorax and abdomen slightly finer. Aedeagus (Fig. 14) with parameres elongated, slightly broader across posterior half, each paramere fringed with numerous small setae and a few long setae only at apex.

Measurements : Total length 3.00-3.50 mm, width of head across eyes 0.41-0.54 mm, length of antenna 0.82-1.01 mm, width of prothorax across middle 0.68-0.80 mm, length of elytra 1.70-2.50 mm and width across middle 0.84-1.02 mm.

Materials examined : 162 ex. INDIA : WEST BENGAL, Calcutta 2 ex., 16.xi.1971, T. Sengupta, Wheat; 1 ex., 6.xii.1974, T. Sengupta, Corn flake; 49 ex., 10.iv.1974, T. Sengupta, Cashew nut; BIHAR, Chaibasa, 1 ex., 30.x.1964, T. Sengupta, Wheat; 2 ex., 11.xi.1970, T. Sengupta, Rice; RAJASTHAN, Ajmer, 2 ex., 1969, S.M. Datta, Ground nut; MAHARASTRA, Bombay, 5 ex., 1974; and 100 ex., from culture on Cashew nut maintained by T.K. Pal.

Distribution : Cosmopolitan. This species is particularly widespread in Africa, Asia, North and South America, Australia and in some European countries. In India this species is recorded from West Bengal, Bihar, Rajasthan, Maharashtra.

Remark : Grouvelle (1912) mentioned that surinamensis and mercator are two extremes of the same species. Later

several authors including Slow (1958) established that these are two distinct species and the male genitalia are different, and ratio between eye and temple lengths significantly different. Slow also noted that cross breeding of these two species produced no offspring. Study of Pal and Sengupta (unpublished) based on meristic characters agrees with the view of Slow (1958).

34. Oryzaephilus elevatus sp.nov.

This species is near O. mercator in having similar type of general appearance and temple of head, but can be separated by its antennal joints 5-7 being distinctly elongated and joints 9 and 10 less strongly transverse, prothorax narrower and more elongated (1.21 : 1.00) than O. mercator (1.14 : 1.00), head with lateral margins of frons and carinae on pronotum more strongly elevated; elytral interstices 2,4 and 6 slightly carinate.

General appearance (Fig. 17) elongated, moderately depressed, blackish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head about as long as broad, eyes large and length of eye slightly longer than one-third length of head, length of temple about as long as 2.5 eye facets or one-fourth length of eye, lateral margin of frons strongly elevated, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae

short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel slightly shorter and narrower than scape, joint 3 about as long as pedicel and slightly narrower; joints 4-7 elongated, subequal and shorter than joint 3; joint 8 slightly transverse and slightly shorter than joint 7, joint 10 slightly more transverse than joints 9 and 11. Prothorax elongated and rather parallel-sided, convex, anterior margin outwardly curved; lateral margin of prothorax with anterior tooth largest and pointed at apex, other teeth subequal and less pointed; longitudinal carinae on pronotal disc strongly elevated and longitudinal grooves on either sides of median carina more well-marked, carinae convergent towards extremities, puncturation on pronotum coarse and dense and similar to that of vertex of head. Scutellum moderately large and transverse. Elytra more than two times as long as broad, lateral margins wavy and not explanate, rows of punctures moderately large; interstices 2,4 and 6 raised and extending almost upto apex; apex of elytra forked, setae projected posteriorly. On ventral side puncturation finer than on dorsal side.

Measurements of holotype : Total length 2.89 mm, width of head across eyes 0.55 mm, length of antenna 0.95 mm, width of prothorax across middle 0.61 mm, length of elytra 1.95 mm and width across middle 0.85 mm.

Holotype ♀, INDIA : TAMIL NADU, Tope, 1524, foot of Palni Hills, 22-23, x. 22, S. Kemp, at light (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Tamil Nadu.

35. Oryzaephilus genalis sp.nov.

This species is closely related to O. surinamensis (L.) but can be separated by its antennal joints 6 to 8 being elongated, head with lateral sides of frons slightly more elevated, aedeagus (Fig. 20) with its median lobe slightly longer, paramere slender and with a few long setae only near apex and which are forked.

General appearance (Fig. 18) elongated, moderately depressed, blackish brown and covered with short, semierect, golden pubescence.

Head : Exposed part of head about as long as broad, eyes moderately large and length of eye about as long as one-third of length of head, length of temple about as long as 4 eye facets or slightly longer than half of length of eye, lateral margin of frons strongly elevated, two shallow depressions on frons present above antennal insertions, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large,

pedicel about as long as scape and slightly narrower, joint 3 slightly shorter and narrower than pedicel; joints 4-7 almost equal, elongated and slightly shorter than joint 3; joint 8 elongated and slightly shorter than joint 7, joints 9 and 10 slightly transverse and joint 11 about as long as broad.

Prothorax elongated, convex, anterior margin outwardly curved and almost straight near middle; anterior tooth larger than other lateral teeth and rather pointed at apex, teeth 2-5 less pointed, posterior tooth more obtuse; longitudinal carinae on pronotal disc normally elevated and longitudinal grooves well-marked as in surinamensis and mercator, lateral carinae convergent more towards front; puncturation on pronotum coarse and dense and similar to that of vertex of head. Scutellum moderately large and transverse. Elytra more than two times as long as broad, lateral margins wavy and not explanate, rows of punctures moderately large; interstices 2,4 and 6 slightly carinate and prominent upto anterior two-third; elytral apex slightly forked, setae projected posteriorly. On ventral side puncturation finer than on dorsal side. Aedeagus (Fig.20) with median lobe broadly elongated, each paramere with a few long apical setae which are forked at apex.

Measurements of holotype : Total length 2.55 mm, width of head across eyes 0.47 mm, length of antenna 0.98 mm, width of prothorax across middle 0.55 mm, length of elytra 1.67 mm and width across middle 0.74 mm.

Holotype ♂, INDIA : ORISSA, Keonjhar, Baigonpal Forest, 30.iii.1973, S.K. Gupta and party, at light. Aedeagus dissected and mounted on slide; Paratypes 40 ex., data same as holotype (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Orissa.

Genus Monanus Sharp

Monanus Sharp, 1879, Trans. ent. Soc. London 2 : 85;

Sharp and Scott, 1913, Fauna Hawaii 3 : 429;

Grouvelle, 1912, Annls Soc. ent. Fr. 81 : 344.

Emporius Ganglbauer, 1899, Die Käfer Von Mitteleuropa

3 : 429; Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 489.

Type-species : Monanus crenatus Sharp

This genus was established by Sharp (1879) for his species Monanus crenatus from Hawaii Is. and placed the genus between Psammoecus Latreille and Telephanus Erichson. Ganglbauer (1899) described Emporius for the species Silvanus signatus Frauenfeld and he attributed this genus to the sub-family Silvaninae under the family Cucujidae. Reitter (1911) referred Emporius to the tribe Psammoecini. Sharp and Scott (1913) synonymised Emporius with Monanus. Grouvelle (1912) dealt Monanus finally in the tribe Silvanini and subdivided the genus

into two subgenera Monanus and Monanops. Hetschko (1930) catalogued twentyone species under Monanus, of which only M. longicornis (Grouvelle) is recorded from South India (Malabar) and M. concinnulus (Walker) listed as cosmopolitan. This genus is predominant in Oriental region and also recorded from Australia, United States, and Hawaii Is. In the present study M. concinnulus is found to be the most common species and recorded almost throughout in India.

Subgenus Monanus (s.str.)

Monanus (Monanus) Grouvelle, 1912, Annls Soc. ent. Fr.

81 : 352.

Definition :

General appearance (Fig. 157) elongated, moderately depressed, yellowish to reddish brown and sometimes with black spots on elytra.

Head (Fig. 162) about as long as broad, front margin of clypeus almost straight, eyes moderately large and coarsely faceted, temple flattened beneath eye and shelf-like, transverse impressed line on vertex behind eyes absent, tentorium with two long tentorial arms connected by a transverse bridge. Antenna moderately long and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated,

joints 2-8 subequal and smaller, club loose and 3-jointed. Mandible elongated, right mandible (Fig. 170) with 3 apical teeth and left mandible (Fig. 169) with an additional blunt tooth beneath apical teeth. Maxilla (Fig. 171) with lacinia narrow and elongated and without apical spine; galea elongated, broad and its apex densely hairy; palpi with segments 2 and 3 almost equal, apical segment longest and fusiform. Labium (Fig. 172) with mentum somewhat triangular and transverse, apical segment of palpi slightly longer than segment 2 and fusiform. Labrum (Fig. 173) with apical margin slightly curved inwardly.

Prothorax (Fig. 163) about as long as broad, lateral margins denticulate, front coxae contiguous, cavities broadly closed behind externally as well as internally, prosternal process broad at apex and its apical margin almost straight, sterno-pleural suture extending to anterior denticle.

Meso-metathorax (Fig. 165) : Mesocoxae contiguous, cavities broadly opened outwardly, lateral margins of mesosternal process notched near posterior two-third, sternal fitting between mesocoxae almost in a straight line. Metasternum transverse, median impressed line extends anteriorly near apex of mesosternal process, hind coxae widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 168) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat ovoid, each elytron (Fig. 167) with 9 rows of strial punctures, without scutellary striole, alternate interstices with single and double rows of pubescence, epipleura narrow and complete up to apex.

Legs (Fig. 164) moderately long, trochanters simple and slightly broadly elongated, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, tarsal segment 1 elongated, segments 2 and 3 strongly lobed below, segment 4 shortest, claws simple.

Abdomen (Fig. 166) elongated, ventrite 1 longest, intercoxal process broad and its apex slightly rounded, femoral lines closed, ventrites 2-5 subequal. Aedeagus (Fig. 174) with median lobe broad, median sturt elongated and its apex spatulate; parameres well-developed, slender and elongated and with a few setae at apex. Ovipositor (Fig. 175) with well-developed paraprocts, valvifers, coxites, and styli attached on outer margin of apex of coxites.

Habitat : Haystack and vegetable garbage.

Distribution : India, Sri Lanka, Indonesia, Malaysia, Singapore, Philippines, Seychelles, Japan, Australia, New Guinea, United States, Hawaii Is.

KEY TO THE SPECIES OF MONANUS (S.STR.) FROM INDIA

1. Elytra with a transverse black spot near middle; antenna moderately long, shorter than length of head and prothorax together; pubescence short.

..... concinnulus (Walker)

Black spot on elytra absent; antenna long, longer than length of head and prothorax together and extends upto half of length of body; pubescence long. ...

..... longicornis (Grouvelle)

36. Monanus (Monanus) concinnulus (Walker)

Monotoma concinnulus Walker, 1858, Ann. Mag. nat. Hist.

(3) 2 : 207 (Type-loc. : Sri Lanka).

Silvanus signatus Frauenfeld, 1867, Verh. zool.-bot. Ges.

Wien 17 : 438.

Cryptomorpha fasciatus Wollaston, 1874, Entomologist's

mon. Mag. 10 : 169; Waterhouse, 1876, Entomologist's

mon. Mag. 13 : 122.

Cathartus fascipennis Reitter, 1876, Col. Hefte 15 : 129.

Emporius signatus (Frauenfeld): Ganglbauer, 1899, Die Käfer

von Mitteleuropa 3 : 586; Reitter, 1911, Fauna

Germanica 3 : 48.

Emporius concinnulus (Walker): Grouvelle, 1908, Annls Soc.

ent. Fr. 77 : 489.

Monanus (Monanus) concinnulus (Walker) : Grouvelle, 1912,

Annls Soc. ent. Fr. 81 : 371.

This species so far remains unrecorded from India.

M. concinnulus is one of the most common species of Indian Silvanidae. This is a fast-moving species and distinct transverse black median spot on elytra is the most conspicuous character for recognising this species in the field.

General appearance (Fig. 157) elongated, moderately depressed, rather shiny, yellowish brown to reddish brown and usually with black markings on elytra; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, eyes shorter than one-third of length of head, temple about as long as 1.5 eye facets and its outer apical angle slightly pointed, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer, setae short and projected towards middle line. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 about as long as scape and slightly narrower, joints 4-8 subequal and shorter than joint 3, joint 9 about as long as broad, joint 10 slightly transverse and joint 11 slightly elongated. Prothorax about as long as broad, convex, anterior margin outwardly curved, lateral margin with ten small and blunt denticles and each denticle bears an anteriorly directed seta, puncturation on pronotum coarse and dense and similar to that of vertex of head. Scutellum moderately large, transverse

and pubescent. Elytra slightly less than two times as long as broad, lateral margins almost uniformly curved, a transverse black spot near middle and that extends towards apex along suture, rows of punctures large, setae projected posteriorly. On ventral side puncturation finer than on dorsal side. Aedeagus (Fig. 174) with parameres elongated, each paramere with an apical long and two short setae.

Measurements : Total length 1.60-2.35 mm, width of head across eyes 0.35-0.47 mm, length of antenna 0.58-0.76 mm, width of prothorax across middle 0.38-0.54 mm, length of elytra 1.05-1.46 mm and width across middle 0.55-0.76 mm.

Materials examined : 438 ex. INDIA : ASSAM, Phulbari, 6 ex., 24.xi.1974, T. Sengupta, leaf garbage; WEST BENGAL, Darjeeling dist. Sukna, 5 ex., 5.v.1976, T.K. Pal, haystack; Calcutta, 1 ex., 6.viii.1950, A.P. Kapur, at light; 1 ex., 1.xi.1974, T.K. Pal, at day light; 24 Parganas dist. Sagar Island, 50 ex., 24.iii.1975, T.K. Pal, haystack; Diamond Harbour, 100 ex., 25.iii.1975, T.K. Pal, haystack; Howrah dist. Sankrail, 250 ex., iii.1975-x.1975, T.K. Pal, haystack; Howrah dist. Ranihat, 2 ex., 11.v.1975, T.K. Pal, haystack; BIHAR, Chaibasa, 5 ex., 19.x.1977, T. Sengupta, haystack; UTTAR PRADESH, Pantnagar, 2 ex., 24.iii.1972, T. Sengupta, haystack; Anandnagar, 25 Km from Lachmipur, 3 ex., 9.x.1976, T. Sengupta, haystack; DELHI, 2 ex., 12.v.1972, T. Sengupta, haystack of Jower; TAMIL NADU, Anaimalai hills, 550 m, 1 ex., 17.xi.1972, Besuchet Löbl Mussard; KARNATAKA, Bangalore, 10 ex., 10.xii.1972, T. Sengupta, haystack.

Distribution : INDIA : Assam, West Bengal, Bihar, Uttar Pradesh, Delhi, Tamil Nadu and Karnataka. Outside India this species has a wide distribution and recorded from both the Old and New World.

37. Monanus longicornis (Grouvelle)

Silvanus longicornis Grouvelle, 1892, Annls Soc. ent. Fr.

61 : 285 (Type-loc. : Singapore, Philippines).

Emporius longicornis (Grouvelle) : Grouvelle, 1902,

Annls Soc. ent. Fr. 71 : 484; Grouvelle, 1908,

Annls Soc. ent. Fr. 77 : 489.

Monanus (Monanus) longicornis (Grouvelle) : Grouvelle,

1912, Annls Soc. ent. Fr. 81 : 371.

Grouvelle (1908) recorded this species from South India (Malabar). This species is near to M. concinnulus (Walker) but can be distinguished by its elytra without any black spot, antenna long and longer than length of head and prothorax together, elytra parallel-sided, lateral margin of prothorax with eight small denticles, puncturation of head and prothorax coarser, and pubescence long.

General appearance (Fig. 159) elongated, moderately depressed, rather shiny, reddish brown; covered with rather long, semierect golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, eyes about half as long as head, temple about as long as one eye facet and its outer apical angle somewhat broad, puncturation on vertex coarse and moderately dense and that of towards anterior margin of clypeus slightly finer, setae long and projected towards middle line. Antenna rather long and slender, scape moderately large, pedicel and joint 3 about as long as scape and slightly narrower, joints 4-8 subequal and shorter than joint 3, joint 9 about as long as broad, joint 10 slightly transverse, joint 11 slightly elongated.

Prothorax about as broad as long, convex, anterior margin outwardly curved, maximum width in anterior half and slightly narrowed posteriorly, lateral margin curved with eight small denticles and each denticle bears an anteriorly directed seta, puncturation on pronotum coarse and moderately dense and similar to that of vertex of head. Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, almost parallel-sided, rows of punctures large. On ventral side puncturation finer than on dorsal side.

Measurements : Total length 2.02 mm, width of head across eyes 0.55 mm, length of antenna 0.88 mm, width of prothorax across middle 0.55 mm, length of elytra 1.29 mm and width across middle 0.69 mm.

Material examined 1 ex., Locality and other data not given (brought from Mus. Nat. Hist. Nat., Paris on loan)

Distribution : INDIA : Kerala (Malabar); SINGAPORE; PHILIPPINES; INDONESIA.

Subgenus Monanops Grouvelle

Monanus (Monanops) Grouvelle, 1912, Annls Soc. ent. Fr.

81 : 344.

Grouvelle (1912) included the species Monanus albertisii (Grouvelle) (New Guinea, Sumatra), M. telephanoides Grouvelle, (Sumatra), M. bouchardi Grouvelle (Sumatra), M. longipennis Grouvelle (Sumatra) and M. insolitus Grouvelle (Sumatra) under the subgenus Monanops. A study of detailed morphological characters has shown that Grouvelle's subgenera of Monanus may be given generic rank. But no attempt has been made to establish a separate genus in the present study. The chief differences of this subgenus with Monanus (s.str.) are given below :

<u>MONANUS</u>	<u>MONANOPS</u>
1. Size smaller (1.60-2.35 mm)	1. Size larger (about 3.50 mm)
2. Elytra ovoid and hardly twice as long as wide	2. Elytra parallel-sided and two and half times as long as wide
3. Prothorax distinctly narrower than elytra (1.00 : 1.38 to 1.42)	3. Prothorax slightly narrower than elytra (1.00 : 1.15)

MONANUS	MONANOPS
4. Transverse impressed line on vertex of head behind eyes absent	4. Transverse impressed line on vertex behind eyes present
5. Head and prothorax about as broad as long	5. Head and prothorax elongated
6. Sterno-pleural suture of prothorax extending to anterior denticle	6. Sterno-pleural suture of prothorax extending to lateral margin and far below anterior denticle
7. Front coxae and mesocoxae contiguous	7. Front and mesocoxae narrowly separated
8. Intercoxal process of ventrite 1 broad and broadly pointed at apex	8. Intercoxal process of ventrite 1 narrow and narrowly pointed at apex
9. Elytral epipleura extended upto apex	9. Elytral epipleura terminates before apex.

This subgenus so far remains unrecorded from India, and in the present study this is first time recorded with a new species from Darjeeling district of West Bengal.

Definition :

General appearance (Fig. 160) elongated, rather parallel-sided, flat and reddish brown.

Head (Fig. 176) elongated, front margin of clypeus almost straight, eyes moderately large and coarsely faceted, temple

flattened beneath eye and slightly shelf-like, transverse impressed line on vertex behind eyes present, tentorium with two long tentorial arms and connected by a transverse bridge. Antenna moderately long and slender, antennal insertions hidden under projection of frons, 11-jointed, scape broadly elongated, pedicel and joint 3 slightly shorter and narrower than scape, joints 4-8 shorter and subequal, club loose and 3-jointed. Mandible (Fig. 183) with 3 apical teeth, mola well-developed, no trace of dorsal mandibular cavity near base. Maxilla (Fig. 184) with lacinia narrow and elongated and without apical spine; galea short, broad and its apex densely hairy; palpi with segments 2 and 3 nearly equal, apical segment longest and fusiform. Labium (Fig. 185) with mentum somewhat triangular and transverse, palpi with segment 2 and apical segment nearly equal in length and apical segment fusiform. Labrum (Fig. 186) with apical margin slightly curved outwardly.

Prothorax (Fig. 177) elongated, lateral margins with few small denticles, front coxae narrowly separated, cavities broadly closed behind externally as well as internally, prosternal process broad at apex and its apical margin straight, sterno-pleural suture extending to lateral margin.

Meso-metathorax (Fig. 179): Mesocoxae narrowly separated, cavities rather narrowly opened outwardly, lateral margins of mesosternal process notched behind middle, sternal fitting

between mesocoxae almost in a straight line. Metasternum transverse, median impressed line extends upto anterior one fourth, Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 182) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra rather parallel-sided, each elytron (Fig. 181) with 9 rows of striae punctures, without scutellary striole, interstices pubescent, epipleura narrow and extended near apex.

Legs (Fig. 178) moderately long and slender, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5, segment 1 slightly elongated, segments 2 and 3 strongly lobed below, segment 4 shortest, claws simple.

Abdomen (Fig. 180) elongated, ventrite 1 longest, intercoxal process narrow and narrowly pointed at apex, femoral lines closed, ventrites 2-5 subequal. Aedeagus (Fig. 187) with median lobe rather short and broad and slightly tapered at apex, median sturt long and slightly spatulate at apex; parameres well-developed, slender and elongated and with long apical seta.

Habitat : In the present study the species has been collected from bamboo (Bambusa aurandaceae) leaf sheath.

Distribution : India, Indonesia (Sumatra), New Guinea.

38. Monanus (Monanops) himalayicus sp.nov.

This species is closely related to Monanus (Monanops) bouchardi Grouvelle but can be differentiated by its prothorax being widest at anterior one-third (at middle in bouchardi), puncturation of head denser and the species larger in size.

General appearance (Fig. 160) elongated, flattened, slightly shiny, uniformly reddish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye distinctly shorter than half of length of head, length of temple about as long as 2-2.5 eye facets and its outer apical angle broad, puncturation on vertex coarse and dense and that of towards anterior margin of clypeus slightly finer. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 slightly shorter and narrower than scape, joints 4-8 subequal and shorter than joint 3, joints 9 and 10 about as broad as long and joint 11 slightly elongated. Prothorax slightly elongated, widest near middle, anterior angle with a short and broad spinous projection; lateral margin rounded and slightly sinuate before posterior angle, with ten denticles; lateral depressions on pronotum slightly developed, puncturation on pronotum coarse and dense and similar to that of

vertex of head, setae short and projected towards middle line. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, rather parallel-sided, lateral margins wavy and slightly explanate, rows of punctures moderately large, interstices about as broad as width of each puncture. On ventral side puncturation sparser than on vertex and pronotum. Aedeagus (Fig. 187) with median lobe slightly tapered at apex, each paramere with a long apical seta and a shorter seta above apex.

Measurements of holotype : Total length 3.47 mm, width of head across eyes 0.58 mm, length of antenna 1.02 mm, width of prothorax across middle 0.70 mm, length of elytra 2.23 mm and width across middle 0.92 mm.

Holotype 1 ex. and Paratypes 6 ex., INDIA : WEST BENGAL, Darjeeling dist., Rambh, 6.i.1974, Srivastava and Maity, Bambusa aurandaceae leaf sheath. One Paratype mounted on slide. (in Zoological Survey of India, Calcutta).

Distribution : INDIA : West Bengal (Darjeeling district).

Genus Airaphilus Redtenbacher

Airaphilus Redtenbacher, 1858, Fauna Austriaca-Die Kafer
: 999; Ganglbauer, 1899, Die Kafer von Mitteleuropa
3 : 578; Grouvelle, 1908, Annls Soc. ent. Fr. 77 :
488; Reitter, 1911, Fauna Germanica 3 : 33, 45.
Type-species : Airaphilus elongatus (Gyllenhal)

This genus was established by Redtenbacher (1858) for the species Silvanus elongatus Gyllenhal. Ganglbauer (1899) placed it under the subfamily Silvaninae : Cucujidae, Grouvelle (1908) under the tribe Silvanini : Silvaninae : Cucujidae and Reitter (1911) followed Grouvelle. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed thirty species under this genus, of which A. abnormis Grouvelle, A. serricollis Reitter and A. andrewesi Grouvelle are recorded from India. So far these species of Airaphilus are recorded from Southern and Eastern India. Hitherto no records of habitats are known. In the present study A. andrewesi has been synonymised with A. serricollis, habitats of above mentioned species are given and larva of Airaphilus serricollis is described for the first time (see p. 286).

Definition :

General appearance (Fig. 190) elongated, moderately depressed, deep brown and strongly pubescent.

Head (Fig. 192) elongated or about as broad as long, front margin of clypeus slightly rounded, eyes small to large and coarsely faceted, temple flattened beneath eye to form shelf which partly covers eye, transverse impressed line on vertex behind eyes absent, tentorium with two long tentorial arms connected by a transverse bridge. Antenna moderately long and slender, antennal insertions hidden under projection of frons, 11-jointed, scape moderately large and broadly elongated, joints 2-8 shorter and subequal, club loose and 3-jointed. Mandible (Fig. 199) elongated with 2 apical teeth, mola well-developed, a large mandibular cavity present near base which opened dorsally. Maxilla (Fig. 200) with lacinia narrow, elongated and with one apical spine and few setae; galea broadly elongated and its apex densely hairy; palpi with segments 2 and 3 almost equal, apical segment longest and fusiform. Labium (Fig. 201) with mentum transverse, palpi with apical segment longest and fusiform. Labrum (Fig. 202) transverse with apical margin rounded.

Prothorax (Fig. 193) transverse or elongated, lateral margins with few distinct denticles or teeth, front coxae contiguous, coxal cavities slightly elongated, cavities closed behind externally and opened internally, prosternal process broad at apex and its apical margin almost straight, sternopleural suture extending to anterior margin.

Meso-metathorax (Fig. 195): Mesocoxae contiguous, cavities broadly opened outwardly, lateral margins of mesosternal process slightly notched near apex, sternal fitting between mesocoxae almost in a straight line. Metasternum transverse, median impressed line extends anteriorly about one-third of its length, hind coxae widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 198) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat parallel-sided to ovoid, each elytron (Fig.197) with 9 rows of striae punctures, without scutellary striole, punctures and interstices pubescent; epipleura narrow, complete and extending almost upto apex.

Legs (Fig. 194) moderately long, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, tarsal segment 1 elongated, segment 2 shorter than segment 1, segment 3 strongly lobed below, segment 4 shortest and claws simple.

Abdomen (Fig. 196) elongated, ventrite 1 longest, intercoxal process broad and its apical margin almost straight, femoral lines opened or closed, ventrites 2-5 subequal. Aedeagus (Fig. 203) with median lobe broad, median sturt

elongated and its apex spatulate; parameres well-developed, slender, elongated and with two apical setae. Ovipositor (Fig. 204) with well-developed paraprocts, valvifers, coxites and styli attached on outer margin of apex of coxites.

Habitat : Haystack.

Distribution : Diversely represented in Europe, with a few species to Africa and Orient.

KEY TO THE SPECIES OF AIRAPHILUS FROM INDIA

1. Prothorax elongated; exposed part of head about as broad as long, eyes large, anterior part of head long and rather narrowed; elytra rather parallel-sided, more than two times as long as broad (2.31 : 1.00)(Fig.188); femoral lines on ventrite 1 closed (Fig.189).

..... abnormis Grouvelle

Prothorax transverse, exposed part of head distinctly transverse, eyes small, anterior part of head short and slightly narrowed; elytra somewhat ovoid, shorter than two times as long as broad (1.78:1.00)(Fig.190); femoral lines on ventrite 1 opened (Fig. 196). serricollis Reitter

39. Airaphilus serricollis Reitter

Airaphilus serricollis Reitter, 1878, Stettin. ent. Ztg.

39 : 319 (Type-loc. : India).

Airaphilus andrewesi Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 493; syn.nov.

This species was described by Reitter (1878a), where he mentioned India as the type-locality but he did not mention any specific locality of collection. So far this species is recorded from Nilgiri Hills : Tamil Nadu. In the present study the author has collected several examples from Howrah and Hooghly districts of West Bengal.

General appearance (Fig.190) elongated, moderately depressed, uniformly deep brown, covered with moderately long and semierect setae.

Head : Exposed part of head wider than long, anterior part of head in front of antennal insertions short and slightly narrowed, front margin of clypeus curved outwardly, eyes small and coarsely faceted, length of eye shorter than one-third of length of head, temple indistinctly visible, two longitudinal depressions well-marked in front of eyes; puncturation on vertex coarse, dense and that of frons and clypeus finer; setae projected posteriorly. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 shorter

and narrower than scape, joints 4 and 5 shorter than joint 3, joint 6 shorter than joint 5, joint 7 slightly wider than joint 6, joint 8 slightly shorter and narrower than joint 7 and transverse, joints 9 and 10 transverse and joint 11 elongated. Prothorax transverse, widest slightly above middle, convex, anterior margin slightly curved; lateral margin outwardly curved and with 10 to 11 denticles, each denticle with a long and posteriorly directed seta and the anterior most denticle with an additional anteriorly directed seta; puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected posteriorly. Scutellum moderately large, transverse and pubescent. Elytra less than two times as long as broad, more or less ovoid, widest in posterior half, rows of punctures deep and large, setae projected posteriorly. On ventral side puncturation slightly finer than on dorsal side, femoral lines on ventrite 1 opened. Aedeagus (Fig. 203) with apical projection of median lobe broad, parameres long and narrowed towards apex, each paramere with two apical long and few short setae.

Measurements : Total length 2.33-2.37 mm, width of head across eyes 0.38-0.39 mm, length of antenna 0.87-0.88 mm, width of prothorax across middle 0.64 mm, length of elytra 1.54-1.55 mm and width across middle 0.86-0.87 mm.

Materials examined : 34 ex. INDIA : WEST BENGAL, Howrah dist., Sankrail, 32 ex., 2.x.1975 and 7.x.1975, T.K. Pal, haystack; Hooghly dist., Chuchura, 1 ex., 25.ii.1977, T.K. Pal, haystack; Dum Dum, Gopalpur, 1 ex., 14.vi.1974, T. Sengupta, haystack.

Distribution : INDIA : West Bengal, Tamil Nadu.

Remark : Grouvelle (1908) described A. andrewesi from Nilgiri Hills (S. India) but he did not mention any key or differences with its closely related species A. serricollis Reitter. Dr. E. Ratti has informed the author in a personal communication that the cotype of A. andrewesi possess 8 to 10 teeth on lateral margin of prothorax and A. serricollis possess 11 to 13 teeth. 32 examples from Sankrail : Howrah district (West Bengal) are intermediate form of these two species. In the present study the author has examined a long series of 32 examples of Airaphilus sp. and found that the lateral teeth of prothorax vary from 10 to 11. Moreover, in another communication Dr. D.G.H. Halstead who compared these materials with A. andrewesi present in the British Museum (Nat.Hist.) has commented that these are not similar to A. andrewesi Grouvelle and well might be A. serricollis Reitter. Therefore, A. andrewesi Grouvelle mentioned as a junior synonym of A. serricollis Reitter as commented by E. Ratti.

40. Airaphilus abnormis Grouvelle

Airaphilus abnormis Grouvelle, 1912, Annls Soc. ent. Fr.

81 : 326, 330 (Type-loc. : 'Bengal' : India).

Airaphilus depressus Grouvelle (nec.Reitter), 1908,

Annls. Soc. ent. Fr. 77 : 492.

Grouvelle (1908) recorded two examples of Airaphilus depressus Reitter from Bengal and later in 1912 he described these examples as a new species, A. abnormis. One example present in the collection of Zoological Survey of India (Reg.No. 484)¹⁶ labelled as Airaphilus depressus Reitter has been examined and identified as A. abnormis Grouvelle.

General appearance (Fig. 188) elongated, moderately depressed, uniformly blackish brown, covered with moderately long and semi-erect setae.

Head : Exposed part of head about as broad as long, anterior part of head rather narrowed, eyes large and length of eye slightly shorter than half of length of head, temple indistinct, visible, lateral margin of head elevated in front; puncturation on vertex coarse, dense and that of frons and clypeus finer, clypeus slightly shiny; setae projected posteriorly. Antenna moderately long and slender, scape moderately large, pedicel and joint 3 shorter and narrower than scape, joints 4-6 shorter than joint 3 and subequal, joints 7 and 8 shorter than 6 and

subequal, joints 9 and 10 about as long as broad and joint 11 distinctly elongated. Prothorax elongated, widest across middle, anterior margin curved outwardly; lateral margin uniformly curved outwardly and with 15 denticles, each denticle with a long posteriorly directed seta; puncturation on pronotum coarse and dense and similar to that of vertex of head, setae projected posteriorly. Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, somewhat parallel-sided, slightly wider and more convex in posterior half, apex rounded, rows of punctures deep and large, setae projected posteriorly. On ventral side puncturation of head and prothorax almost similar to that of dorsal side, and of meso-metathorax finer; femoral lines on ventrite 1 closed (Fig. 189).

Measurements : Total length 3.47 mm, width of head across eyes 0.52 mm, length of antenna 1.17 mm, width of prothorax across middle 0.69 mm, length of elytra 2.13 mm and width across middle 0.92 mm.

Materials examined : 2 ex. INDIA : MAHARASTRA, Karla, 1 ex., 16.vii.1967, Gy. Topal, singled material; BIHAR ('Bengal' in label), Madhupur, 1 ex., 5.x.09, C. Paiva. (Z.S.I. Reg. No. 484) .
16

Distribution : INDIA : West Bengal, Bihar, Maharashtra.

Subfamily PSAMMOECINAE

Genus Psammoecus Latreille

Psammoechus Latreille, 1829, in Cuv. Règne Anim. ed. 2,
5 : 135; Boudier, 1834, Annls Soc. ent. Fr. 3 : 368,
t. 7, f. C.

Psammoecus Latreille : Erichson, 1846, Naturgeschichte der
Insekten Deutschlands 3 : 329, 333; Reitter, 1885-86,
Franscisque Guillebeau : Tableaux Analytiques Determiner
europeins 1 : 9; 1911, Fauna Germanica 3 : 47,48;
Ganglbauer, 1899, Die Käfer Von Mitteleuropa 3 : 590;
Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 474.
Type-species : Psammoecus bipunctatus (F.)

Psammoecus is a large genus comprised of minute beetles ranging from 2.13 to 3.35 mm in length. This genus was erected by Latreille (1829) for the species Dermestes bipunctatus (Fabricius). He arranged the genus in the family 'Eupodes' and placed at the end of the tribe 'Sagrides'. Boudier (1834) characterized the genus Psammoecus. Erichson (1846) placed this genus under the tribe Brontini of the family Cucujidae. Reitter (1885-86) erected the tribe Psammoecini under the family Cucujidae based on this genus. Ganglbauer (1899) and Grouvelle (1908) dealt Psammoecus under the tribe Psammoecini (Silvaninae: Cucujidae) and Reitter (1911) referred to the tribe Psammoecini (Cucujinae:Cucujidae). Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed seventythree species under this genus, of which P. andrewesi Grouvelle (Nilgiri Hills), P. bellus Grouvelle (Madura:Tamil Nadu), P. graciosus Grouvelle (Nilgiri Hills), P. decoratus Grouvelle (Madura : Tamil Nadu), P. harmandi

Grouvelle (India), P. impressicollis Grouvelle (Nilgiri Hills), P. lepidus Grouvelle (Madura: Tamil Nadu), P. nitidus Grouvelle (Kanara : Karnataka) and P. incommodus (Walker) are recorded from India. The representatives of Psammoecus predominantly occur in the Oriental region including India. In the present study 208 examples have been studied, which are collected mostly by the author and staff of Coleoptera Section, Zoological Survey of India, and provided by different Museums of the World as loan. These above examples were collected mainly from Himalaya and its foot hills, gangetic West Bengal, Chhotanagpur plateau, South India including Nilgiri Hills. Fifteen species are dealt with here, of which five species are discovered as new to science; two species namely, P. delicatus Grouvelle and P. simoni Grouvelle are recorded for the first time from India. P. bellus Grouvelle is synonymised with P. nitidus Grouvelle, and larva of P. bipunctatus (F.) is described which is taken from the unpublished work of Sengupta and Crowson (see p. 288).

Definition :

General appearance (Fig.218) elongated, slightly ovoid, moderately convex, usually yellowish brown or reddish brown and rarely blackish brown, sometimes black spots on elytra and few joints of antenna blackish.

Head (Fig. 220) transverse, fronto-clypeal suture distinct, front margin of clypeus slightly rounded, eyes usually large and coarsely faceted, temple may or may not extended beneath eye, transverse impressed line on vertex behind eyes present, two lateral longitudinal striae on vertex originated near bases of antennae present. Tentorium as seen in figure. Antenna moderately long and slender, antennal insertions partly hidden under projection of frons, scape large and broadly elongated, joints 2-11 shorter and subequal, joint 11 somewhat acuminate at apex. Mandible (Fig. 227) about as broad as long, right mandible with 3 apical teeth and a blunt tooth beneath apical teeth, and left mandible with 3 apical teeth, mola well-developed, a large basal mandibular cavity present and opened dorsally. Maxilla (Fig. 228) with lacinia narrow and elongated and without apical spines, galea short and broad and its apex densely hairy; palpi with segment 2 larger than segment 3, apical segment largest and securiform. Labium (Fig. 229) with mentum somewhat quadrate, palpi with segment 2 short and broad, apical segment longer than segment 2 and its apex broadly rounded. Labrum (Fig. 230) transverse with apical margin slightly concave.

Prothorax (Fig. 221) usually transverse, usually with few more or less large denticles on lateral sides, front coxae contiguous, coxal cavities slightly elongated, cavities closed behind externally and internally, prosternal process broad at apex and its apical margin sinuate, sterno-pleural suture extending to lateral margin.

Meso-metathorax (Fig. 223) : Mesocoxae contiguous, cavities opened outwardly, lateral margins of mesosternal process slightly constricted across posterior two-third, sternal fitting between mesocoxae with a single knob, Metasternum transverse, median impressed line indistinct, hind coxae widely separated. Metendosternite simple and represented by two appophyses.

Wing and Elytra : Wing (Fig. 226) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra somewhat ovoid, side margins almost uniformly rounded, each elytron (Fig. 225) with 10 rows of striae punctures, sometimes with a row of large glandular punctures along lateral margin, without scutellary striole, epipleura narrowed and extended slightly before apex.

Legs (Fig. 222) moderately long and slender, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex and with a circlet of apical spurs; tarsal formula 5-5-5 in both sexes, tarsal segments 1-3 elongated and lobed below, segment 4 shortest and claws simple.

Abdomen (Fig. 224) slightly elongated, ventrite 1 longest, intercoxal process broad and its apical margin broadly pointed, femoral lines indistinct, ventrites 2-5 subequal. Aedeagus (Fig. 232) with median lobe broad and narrowed towards apex, median sturt long and its apex somewhat broadened; parameres

well-developed, elongated, more or less slender, with a few long apical and many short setae. Ovipositor (Fig.231) with well-developed paraprocts, valvifers, coxites and long styli attached on outer margin of apex of coxites.

Habitat : Found usually in haystack and vegetable garbage.

Distribution : Chiefly oriental.

KEY TO THE SPECIES OF PSAMMOECUS FROM INDIA

1. Elytra distinctly narrowed behind middle and sub-acuminate at apex; antenna unicolourous.
..... 2
Elytra narrowed behind middle and rounded at apex, apical few joints of antenna blackish or darker than basal segments. 3
2. Blackish linear, longitudinal spots present on each elytron; head across eyes distinctly narrower than prothorax across anterior margin (1.00:1.42); lateral margins of prothorax and elytra distinctly explanate, six large glandular punctures along lateral margin of elytra (Fig. 205).
..... andrewesi Grouvelle

One small, rounded blackish spot on each elytron in posterior half; head across eyes about as wide as prothorax across anterior margin (1.00:1.009); lateral margin of prothorax not explanate and that of elytra finely explanate, thirteen large glandular punctures along lateral margin of elytra (Fig. 206) khasia sp.nov.

3. Teeth on lateral margin of prothorax minute, indistinct, either broader than long or about as broad as long (Fig. 207).4

Teeth on lateral margin of prothorax partly long, distinct and longer than broad (Figs.210,218). 6

4. None of antennal joints blackish, joints 7-10 slightly more reddish than other joints; three transverse blackish spots on elytra which interconnected by longitudinal sutural spot; no depression on lateral sides of pronotum, lateral margins of prothorax more or less abruptly narrowed behind middle (Fig.207). decoratus Grouvelle

Atleast two joints of antenna blackish; no transverse blackish spots on elytra; lateral sides of pronotum more or less depressed, lateral margins of prothorax gradually narrowed behind middle (Figs.208,209). 5

5. Apical part of antennal joint 7 and joints 8-10 blackish; head and prothorax blackish and elytra reddish brown; lateral margin of prothorax slightly wavy and sinuate before posterior angle. lepidus Grouvelle

Antennal joints 9 and 10 blackish; head, prothorax and elytra yellowish brown; lateral margin of prothorax not wavy and slightly rounded. harmandi Grouvelle

6. Antennal joints 10 and 11 yellowish white; prothorax markedly transverse, pronotum strongly depressed in front of prothoracic base and lateral margin widely explanate; teeth on lateral margin of prothorax narrow, markedly long and a few of them about four times as long as broad (Fig.210).7

Antennal joint 10 more or less blackish and joint 11 yellowish white; prothorax not markedly transverse as above (Figs.212,218), pronotum not strongly depressed in front of prothoracic base and lateral margin not widely explanate; teeth on lateral margin of prothorax variable, not markedly long and maximum three times as long as broad. 8

7. Eyes large and about half as long head, all antennal joints distinctly elongated, scape at least three times longer than wide; scape, pedicel, apical half of antennal joint 6 and joints 7-9 blackish; apex of prothoracic teeth somewhat blunt; elytral interstices about as wide as width of each puncture, lateral margin of elytra without any large glandular puncture; body covered with short, fine pubescence. ...
 delicatus Grouvelle

Eyes smaller and about one-third as long as head, antennal scape to joint 8 and joint 11 more or less elongated, joints 9 and 10 slightly transverse, scape about two times as long as wide; scape and pedicel yellowish, apical part of joint 7 and joints 8 and 9 blackish; apex of long prothoracic teeth pointed; elytral interstices narrower than width of each puncture, seven large glandular punctures along lateral margin of elytra; body covered with long, semierect and dense pubescence.
 complexus sp.nov.

8. Antennal joints 9 and 10 more or less blackish.
 9
 Atleast antennal joints 7-10 blackish.11

9. Elytra with a transverse blackish spot near apex and two rounded spots near middle, rounded spots with its extensions connected with transverse spots, two spots near humeral angles (Fig.212). wittmeri sp.nov.
Elytra without any transverse blackish spot. 10
10. Antennal joints 9 and 10 slightly darker than preceding joints and not distinctly blackish, joint 10 slightly elongated; eyes large and slightly shorter than half as long as head; a rounded indistinct blackish spot on each elytron near middle, interstices on each elytron at least as wide as each puncture in anterior half and wider than each puncture in posterior half; no depression on lateral sides of pronotum; species yellowish brown. ...bhutanicus sp.nov.
Antennal joints 9 and 10 distinctly blackish, joint 10 transverse; eyes small and about one-third of length of head; a somewhat transverse distinct blackish spot on each elytron near middle and with extension along suture, interstices on each elytron distinctly narrower than width of each puncture; lateral sides of pronotum slightly depressed; species yellowish brown to dark brown.
..... trilochana sp.nov.
11. Two transverse spots on elytra connected by longitudinal sutural spots and two small spots near humeral angles; antennal joints 7-10 distinctly and joint 6 slightly blackish (Fig. 215). simoni Grouvelle

Transverse spot on elytra absent, if present only near apex and prothorax with small teeth (Fig.216); antennal joints 7-10 blackish and apical part of joint 6 also blackish in cases.12

12. A transverse blackish spot on elytra at apical part; teeth on lateral margin of prothorax small, subequal and hardly elongated; no transverse or lateral depression on pronotum (Fig.216). gratiosus Grouvelle

No transverse blackish spot on elytra; teeth on lateral margin of prothorax subequal, partly long and at least twice as long as wide; a transverse depression on pronotum in front of prothoracic base and lateral depressions on pronotum sometimes present.13

13. Lateral margin of pronotum widely explanate (Fig.217). ..
..... nitidus Grouvelle

Lateral margin of pronotum not explanate (Fig.218). 14

14. Longitudinal sutural spot on elytra absent, prothorax markedly transverse (1.00:1.80) and transverse depression on pronotum in front of prothoracic base prominent, few teeth on lateral margin of prothorax longer than twice of its width. impressicollis Grouvelle

Longitudinal sutural spot on elytra present, prothorax less transverse (1.00:1.54-1.60) and transverse depression on pronotum in front of prothoracic base indistinct, teeth on lateral margin of prothorax hardly twice wider than long. trimaculatus Motschulsky

41. Psammoecus andrewesi Grouvelle

Psammoecus andrewesi Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 476 (Type-loc. : Nilgiri Hills : India).

This is a distinct species and can be recognised by its elytra distinctly narrowed behind middle and subacuminate at apex, antenna unicolourous, blackish linear longitudinal spots on each elytron, head across eyes distinctly narrower than prothorax across anterior margin (1.00:1.42), lateral margins of prothorax and elytra distinctly explanate, six large glandular punctures along lateral margin of elytra.

General appearance (Fig. 205) elongated, oval, moderately convex, yellowish brown, blackish linear spots on elytra, antenna unicolourous, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes moderately large and coarsely faceted, length of eye shorter than half of length of head, temple short and not inflattened beneath eye, longitudinal striae on vertex well-marked and connected by a transverse stria posteriorly; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and about one and half times as long as broad; joints 2-10 shorter, subequal and more or less elongated; joint 11 elongated and acuminate at apex.

Prothorax transverse, convex, width across anterior margin wider than head across eyes, anterior margin rounded and slightly sinuate on either sides, maximum width across anterior one-third and slightly narrowed posteriorly, lateral sides rather explanate, lateral margin rounded and with few moderately large and distinct teeth, anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae on pronotal disc projected forward and on lateral sides directed outwardly. Scutellum subtriangular, transverse, more or less smooth. Elytra more than one and half times as long as broad, ovoid and widest beyond middle and subacuminate at apex, rows of punctures deep and large, interstices slightly narrower than width of each puncture in anterior half, rather broad and well-marked longitudinal depression along lateral margin, six large glandular punctures along lateral margin, lateral margin serrated in anterior half; setae moderately long and projected posteriorly, lateral margin with longer and almost erect setae; blackish linear longitudinal spots on each elytron and a longitudinal sutural spot near apex present.

Measurements : Total length 2.60-3.35 mm, width of head across eyes 0.66-0.73 mm, length of antenna 1.17-1.46 mm, width of prothorax across middle 0.75-0.92 mm, length of elytra 1.76-2.13 mm and width across middle 1.11-1.36 mm.

Materials examined : 3 ex. INDIA : MEGHALAYA, Garo Hills, 1 ex., 19.v.1976, W. Wittmer & C. Baroni; TAMIL NADU, Nilgiri, 71 km E. Coonoor, 1350 m, 1 ex., 19.xi.1972, Besuchet Löbl Mussard; NEPAL : Kathmandu, Gokaruaban, 1 ex., 12.vi.1976, W. Wittmer & C. Baroni.

Distribution : INDIA : Meghalaya, Tamil Nadu; NEPAL. So far this species is known from Tamil Nadu: India; in the present study it is first time recorded from Meghalaya, and Nepal.

42. Psammoecus khasia sp.nov.

This species is near P. andrewesi Grouvelle and can be separated by its elytra devoid of linear longitudinal spots but with two small rounded black spots in the posterior half, head across eyes about as wide as prothorax across anterior margin, lateral margin of prothorax not explanate and that of elytra finely explanate and with thirteen large glandular punctures.

General appearance (Fig. 206) elongated, oval, moderately convex, slightly shiny, reddish brown, blackish spots on elytra, antenna unicolourous, body covered with long and semierect pubescence.

Head : Exposed part of head wider than long, eyes moderately large and coarsely faceted, length of eye about one-third of length of head, temple short and not inflattened beneath eye, longitudinal striae on vertex long and well-marked and connected by a transverse stria posteriorly; puncturation on vertex coarse and dense, punctures slightly elongated, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape moderately large and shorter than two times as long as broad; joints 2-8 shorter, subequal and elongated; joints 9-11 slightly wider of which joints 9 and 10 about as long as broad and joint 11 elongated and acuminate at apex. Prothorax transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded, maximum width near middle, lateral margin slightly rounded and with nine small teeth, teeth about as broad as long, anterior and posterior angles obtuse; puncturation on pronotum coarse and dense, punctures somewhat rounded; setae on pronotal disc projected towards middle line and on lateral sides projected outwardly. Scutellum subtriangular, clearly transverse and more or less smooth. Elytra more than one and half times as long as broad, ovoid and widest near middle, narrowed behind middle and subacuminate at apex, rows of punctures large, interstices narrower than width of each puncture, lateral margin slightly explanate and with thirteen large glandular punctures, setae long and projected posteriorly, lateral margin with longer and almost erect setae, one rounded blackish spot on each elytron in

posterior half.

Measurements of holotype : Total length 2.55 mm, width of head across eyes 0.75 mm, length of antenna 1.17 mm, width of prothorax across middle 0.88 mm, length of elytra 1.76 mm and width across middle 1.10 mm.

Holotype 1 ex., INDIA : ASSAM, Kaziranga, Mikir Hills, 14.xi.1974, T. Sengupta, white flower of Medula tree (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Assam.

43. Psammoecus decoratus Grouvelle

Psammoecus decoratus Grouvelle, 1919, Mém. Ent. 2 : 29

(Type-loc. : Madura : India).

This species can be recognised by none of its antennal joints is blackish but joints 7-10 slightly more reddish than other joints, prothorax slightly transverse and uniformly convex, lateral margin of prothorax with few minute and indistinct teeth, three transverse blackish spots on elytra, transverse spots connected by longitudinal sutural spot and lateral longitudinal spots leaving two somewhat rounded unpigmented area on each elytron.

General appearance (Fig.207) elongated, oval, moderately convex, slightly shiny, reddish brown, blackish spots on elytra

and antennal joints 7-10 more reddish than other joints, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about half as long as head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex short and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and slightly longer than two times as long as broad; joints 2-7 shorter, subequal and elongated; joints 8-10 slightly wider than preceding joints, joint 8 about as long as broad and joints 9 and 10 slightly transverse, joint 11 elongated and acuminate at apex, scape-joint 6 reddish brown, joints 7-10 more reddish than preceding joints, joint 11 yellowish.

Prothorax slightly transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded, maximum width near middle, lateral margins more or less parallel-sided and somewhat abruptly narrowed behind anterior two-third and slightly sinuate near posterior angle, lateral margin with six more or less visible teeth, teeth minute and broader than long, anterior and posterior angles obtuse, puncturation on pronotum coarse, dense and slightly coarser than that of vertex of head; setae on pronotal disc projected towards middle line and on lateral sides projected outwardly. Scutellum subtriangular,

slightly transverse and smooth. Elytra more than one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large and rounded, interstices about as wide as width of each puncture in anterior half and narrower posteriorly, setae moderately long and projected posteriorly, lateral margins with long and almost erect setae, three transverse blackish bands on elytra: one anterior, one middle and another near apex, bands connected along sutures by longitudinal sutural band and along lateral sides by lateral bands, transverse and longitudinal bands encircle two more or less rounded unpigmented area on each elytron.

Measurements of the 'Type' : Total length 3.00 mm, width of head across eyes 0.76 mm, length of antenna 1.50 mm, width of prothorax across middle 0.82 mm, length of elytra 1.85 mm and width across middle 1.17 mm.

Material examined : 1 ex. 'Type', INDIA : Tamil Nadu, Madura dist., Shembagnaur, 'Samboangau' mentioned in the label (in Mus. Nat. Hist. Nat., Paris).

Distribution : INDIA : Tamil Nadu.

44. Psammoecus lepidus Grouvelle

Psammoecus lepidus Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 483, 488 (Type-loc. : Shembagnaur, Madura district : India).

This species is closely related to P. harmandi Grouvelle but can be separated by its apical part of antennal joint 7 and joints 8-10 blackish, head and prothorax blackish and elytra reddish brown, lateral margin of prothorax slightly wavy and sinuate before posterior angle.

General appearance (Fig.208) elongated, oval, moderately convex, slightly shiny, head and prothorax usually blackish brown and elytra yellowish brown, blackish spots on elytra and antennal joints 8-10 and apical part of joint 7 blackish, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about one-third as long as head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex long and well-marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and about thrice as long as wide; joints 2-7 shorter, subequal and elongated; joints 8-10 slightly wider of which joint 8 slightly elongated, joint 9 about as long as broad and joint 10 slightly transverse, joint 11 elongated and acuminate at apex, scape-joint 7 yellowish brown, joints 8-10 and apical part of joint 7 blackish, joint 11 yellowish. Prothorax about as long as broad or slightly transverse, convex, width across anterior margin

slightly wider than head across eyes, anterior margin rounded, maximum width near anterior margin and narrowed posteriorly, lateral margin rounded and slightly sinuate before posterior angle; teeth on lateral margin of prothorax minute, indistinct and usually broader than long; anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and slightly coarser than that of vertex of head, setae on pronotal disc projected towards middle line and on lateral margins projected outwardly. Scutellum subtriangular, about as broad as long and more or less smooth. Elytra slightly more than one and half times as long as broad, ovoid and widest near middle, rows of punctures large, interstices narrower than width of each puncture, setae moderately long and projected posteriorly, lateral margin with long and almost erect setae; a more or less rounded blackish spot on each elytron in posterior half, a longitudinal sutural spot more or less marked and narrowed posteriorly, rounded spot sometimes connected with the longitudinal spots by its extension. Aedeagus (Fig. 234) with median lobe broad, and abruptly narrowed and rather broadly pointed at apex, parameres long and slender, each paramere with a few apical long setae and few short setae on its surface.

Measurements : Total length 2.26-2.85 mm, width of head across eyes 0.61-0.69 mm, length of antenna 1.23-1.39 mm, width of prothorax across middle 0.64-0.76 mm, length of elytra 1.47-1.97 mm and width across middle 1.00-1.25 mm.

Materials examined : 81 ex. 'Type', 1 ex., INDIA : TAMIL NADU, Madura, Shembagnaur (in Mus. Nat. Hist. Nat., Paris); UTTAR PRADESH, Bhowali, 35 km from Kathgodam, 1736 m, 1 ex. 14.x.1976, T. Sengupta, Crysanthemam sp. (flower); Chambal, 1 ex. 19.x.1976, T. Sengupta haystack; KERALA, Cardamon H., Multapaltipres Munnar, 1700 m, 1 ex., 24.xi.1972, Besuchet Löbl Mussard; TAMIL NADU, Palni H., Berijam Lake; 2150 m, 56 ex., 14.xi.1972, Besuchet Löbl Mussard; Kodaikanal, 2100 m, 14 ex., Besuchet Löbl Mussard; 10 km N.-O Kodaikanal, 2150 m, 6 ex., 15.xi.1972, Besuchet Löbl Mussard; BHUTAN, Chimakothi, 1900-2300 m, 1 ex., 22.v., Nat. Hist. Mus. Basel-Bhutan Expedition 1972.

Distribution : INDIA : Uttar Pradesh, Kerala, Tamil Nadu; BHUTAN. So far this species is recorded from Tamil Nadu; in the present study this is first time recorded from Kerala, Uttar Pradesh; and Bhutan.

45. Psammoecus harmandi Grouvelle

Psammoecus harmandi Grouvelle, 1912, Bull. Mus. Paris 28:
413 (Type-loc. : ^{darjeeling,} India).

This species can be recognised by its teeth on lateral margin of prothorax minute and indistinct, lateral sides of the prothorax more or less depressed and its lateral margins slightly rounded and narrowed behind middle, antennal joints 9 and 10 blackish.

General appearance (Fig. 209) elongated, oval, moderately convex, slightly shiny, yellowish to reddish brown, blackish spots on elytra and antennal joints 9 and 10 blackish, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye shorter than half of length of head, temple slightly long and slightly inflated beneath eye, longitudinal striae on vertex moderately long and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape moderately large and about two times as long as broad, pedicel short and elongated, joints 3-7 longer than pedicel and subequal; joints 8-11 slightly wider than joints 7 of which joint 8 slightly elongated, joint 9 about as broad as long, joint 10 slightly transverse and joint 11 slightly acuminate at apex; joints 9 and 10 blackish. Prothorax transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded, lateral margin slightly rounded and with six minute teeth, anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and almost similar to that of vertex of head, setae on pronotal disc projected towards middle line and on lateral sides projected outwardly. Scutellum subtriangular, transverse and more or less smooth.

Elytra about one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large and rounded, interstices narrower than width of each puncture, with moderately long and almost erect setae, a more or less rounded blackish spot on each elytron near middle and a somewhat rounded blackish sutural spot behind former spots. Aedeagus (Fig.235) with median lobe broad, gradually narrowed and slightly constricted above apex; parameres rather short, broadly elongated, each paramere with a few short setae on its surface and two long setae near apex, small glandular punctations on surface of parameres.

Measurements : Total length 2.85-3.08 mm, width of head across eyes 0.36-0.41 mm, length of antenna 1.41-1.55 mm, width of prothorax across middle 0.67-0.83 mm, length of elytra 1.83-2.02 mm and width across middle 1.17-1.33 mm.

Materials examined : 3 ex. INDIA : WEST BENGAL, Darjeeling dist., Jhepi, 37 km from Ghoombhanjang, 1 ex., 3.v.1976, T.K. Pal, under garbage of Cryptomaria leaves; SIKKIM, Gangtok, 1 ex., 25.iv.1976, T.K. Pal, under garbage of Cryptomaria leaves; NEPAL, Kathmandu 1 ex., 29.iii.1972, T. Sengupta, haystack.

Distribution : INDIA : West Bengal (Darjeeling District), Sikkim; NEPAL.

46. Psammoecus delicatus Grouvelle

Psammoecus delicatus Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 477, 487 (Type-loc. : Sri Lanka).

This species can be recognised by its prothorax markedly transverse, pronotum strongly depressed in front of prothoracic base and its lateral sides widely explanate; teeth on lateral margin of prothorax narrow, markedly long and a few of them about four times as long as broad; antennal joints distinctly elongated, scape at least three times longer than wide; antennal scape and pedicel, apical part of joint 6 and joints 7-9 blackish, and joints 10 and 11 yellowish white.

General appearance (Fig. 210) elongated, oval, moderately convex, slightly shiny, yellowish to reddish brown, blackish spots on elytra; antennal scape and pedicel, apical part of joint 6 and joints 7-9 blackish.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye shorter than half of length of head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex moderately long and well-marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and about thrice as long as wide, pedicel short

and elongated, joints 3-7 longer than pedicel and subequal, joints 8-11 slightly wider than joint 7 and elongated of which joint 11 acuminate at apex; scape, pedicel, apical part of joint 6 and joints 7-9 blackish. Prothorax transverse, convex, across anterior margin about as wide as head across eyes, anterior margin wavy; lateral margin outwardly curved and with nine teeth of variable size, teeth gradually being longer from anterior towards posterior side and attain its maximum length above penultimate teeth, longest tooth about four times as long as wide and all teeth somewhat blunt at apex; anterior and posterior angles obtuse, lateral margin of pronotum widely explanate and transverse prebasal impression prominent, puncturation on pronotum coarse and dense and slightly coarser than that of vertex of head, setae on pronotal disc scanty. Scutellum subtriangular, transverse and more or less smooth. Elytra more than one and half times as long as broad, ovoid and widest near middle, rows of punctures large and rounded, interstices about as wide as width of each puncture, setae moderately long and projected posteriorly, lateral margin with long and almost erect setae; two transverse blackish bands on elytra - one in anterior half and another at apex, bands connected along suture by longitudinal sutural band.

Measurements : Total length 2.41-2.57 mm, width of head across eyes 0.54-0.60 mm, length of antenna 1.38-1.44 mm, width of prothorax across middle (excluding lateral teeth) 0.58-0.66 mm, length of elytra 1.41-1.67 mm and width across middle 0.97-1.05 mm.

Materials examined : 3 ex. INDIA : KERALA, Cardamom H., Valara fall, 450-500 m, 1 ex., 25.xi.1972, Besuchet Löbl Mussard; SRI LANKA (Central); Kandy, 600 m, 1 ex., 15.i.1970, Mussard Besuchet Löbl; 1 ex. (particular locality not given), i. 1965, R. Mussard.

Distribution : INDIA : Kerala; SRI LANKA.

So far this species has only been recorded from Sri Lanka, in the present study this is first time recorded from South India.

47. Psammoecus complexus sp.nov.

This species is closely related to P. delicatus Grouvelle but can be separated by its eyes smaller and about one-third as long as head, antennal scape to joint 8 and joint 11 more or less elongated, and joints 9 and 10 slightly transverse; antennal scape and pedicel not blackish, apical part of antennal joint 7 and joints 8 and 9 blackish; apex of prothoracic teeth pointed, elytral interstices narrower than width of each puncture and seven large glandular punctures along lateral margin; body covered with long, semierect and dense pubescence.

General appearance (Fig. 211) elongated, oval, moderately convex, reddish brown, blackish spots on elytra and antennal joints 8 and 9 slightly blackish, body covered with long and

semierect pubescence.

Head : Exposed part of head wider than long, eyes moderately large and coarsely faceted, length of eye shorter than one-third of length of head, temple slightly long and slightly inflattened beneath eye, longitudinal striae on vertex long and well-marked, puncturation on vertex coarse and dense, puncturation on clypeus slightly finer, setae moderately long and projected forward. Antenna long and slender, scape moderately large and about two times as long as broad, pedicel short and slightly elongated; joints 3-7 longer than pedicel, subequal and elongated; joint 8 shorter than joint 7 and slightly elongated, joints 9 and 10 slightly transverse, and joint 11 elongated and acuminate at apex, apical part of joint 7 and joints 8 and 9 blackish. Prothorax transverse, convex, across anterior margin wider than head across eyes, anterior margin wavy and with few small denticles; lateral margin outwardly curved and with four teeth of variable size, anterior three teeth markedly long, about as long as three times as long as wide and somewhat pointed, longest tooth about four times as long as wide; lateral margin of pronotum explanate and transverse prebasal impression somewhat prominent, puncturation on pronotum coarse and dense and slightly coarser than that of vertex of head, setae on pronotal disc projected forward and on lateral sides and teeth projected outwardly.

Scutellum subtriangular, transverse and more or less smooth. Elytra shorter than one and half times as long as broad, ovoid and widest near middle, rows of punctures large and rounded, seven large glandular punctures along lateral margin, interstices narrower than width of each puncture, with moderately long and almost erect setae intermingled with long setae, two somewhat transverse blackish spots on each elytron and connected by a sutural spot.

Measurements of holotype : Total length 2.50 mm, width of head across eyes 0.64 mm, length of antenna 1.44 mm, width of prothorax across middle (excluding teeth) 0.76 mm, length of elytra 1.61 mm and width across middle 1.11 mm.

Holotype 1 ex., INDIA : WEST BENGAL, Darjeeling district, 3 km S. of Ghum, 12.iv.1967, Gy. Topal, Sifted mosses, (in Termesztudományi Museum, Budapest).

Distribution : INDIA : West Bengal (Darjeeling district).

48. Psammoecus wittmeri sp.nov.

This species is near P. graciosus Grouvelle but can be separated by its antennal joints 9 and 10 being black, eyes shorter, and characteristic spots of elytra (Fig.212).

General appearance (Fig. 212) elongated, oval, moderately convex, slightly shiny, reddish brown with blackish spots on

elytra and antennal joints 9 and 10 blackish, dorsal surface covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about one-third of length of head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex moderately long; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and slightly longer than two times of its width; joints 2-7 short, subequal and elongated; joints 8-11 slightly wider of which joints 8 and 9 slightly elongated and joint 10 about as long as broad, joint 11 elongated and acuminate at apex; joints 1-8 reddish brown, joints 9 and 10 blackish, joint 11 yellowish. Prothorax convex, slightly transverse and narrowed posteriorly, slightly depressed on lateral sides, across anterior margin wider than head across eyes, anterior margin rounded and with two small teeth on either sides, lateral margins almost straight and with five more or less small teeth, anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and slightly coarser than that of vertex of head. Scutellum subtriangular, transverse and smooth. Elytra about one and half times as long as broad, ovoid and widest near middle, rows of punctures deep and large, interstices about as wide as width of each puncture, two somewhat rounded black spots present

near middle and their extensions meet along suture, posterior to above spots a transverse spot present, two indistinct blackish spots near humeral angles.

Measurements of holotype : Total length 2.94 mm, width of head across eyes 0.75 mm, length of antenna 1.61 mm, width of prothorax across middle 0.73 mm, length of elytra 1.91 mm and width across middle 1.17 mm.

Holotype ♀, INDIA : WEST BENGAL, Darjeeling dist., Lebong, 1800-1900 m, 11.v.1975, W. Wittmer. (in Nat. Hist. Mus., Basel).

Distribution : INDIA : West Bengal (Darjeeling district).

49. Psammoecus bhutanicus sp.nov.

This species is closely related to P. trilochana sp.nov. but can be distinguished by its eyes distinctly larger and slightly shorter than half of length of head, antennal joints 9 and 10 not distinctly blackish but slightly darker than the preceding joints, rounded blackish spots on elytra indistinct, lateral sides of pronotum without any depression and interstices on elytra comparatively wider.

General appearance (Fig. 213) rather elongated, oval, moderately convex, slightly shiny, yellowish brown, faint blackish spots on elytra and antennal joints 9 and 10 darker than preceding joints, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly shorter than half of length of head, temple moderately long and slightly inflated beneath eye, longitudinal striae on vertex short and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth; pubescence scanty and projected forward. Antenna long and slender, scape moderately large and about two times as long as broad; joints 2-6 shorter, subequal and elongated; joints 7-11 slightly wider than joint 6 and more or less elongated, joint 11 acuminate at apex. Prothorax transverse, convex, across anterior margin about as wide as head across eyes, anterior margin slightly rounded and slightly sinuate at sides; lateral margin outwardly curved and with six teeth of which third, fourth and fifth from anterior side distinctly longer and somewhat blunt; anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and slightly coarser than that of vertex of head, pubescence on pronotal disc scanty. Scutellum subtriangular, transverse and more or less smooth. Elytra slightly longer than one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large and rounded, interstices about as wide as width of each puncture in anterior half and wider than each puncture in posterior half, with moderately long and semierect setae, a more or less rounded faint blackish spot on each elytron near middle.

Measurements of holotype : Total length 2.79 mm, width of head across eyes 0.69 mm, length of antenna 1.44 mm, width of prothorax across middle 0.70 mm, length of elytra 1.85 mm and width across middle 1.23 mm.

Holotype 1 ex., BHUTAN : Phuntsholing, 21.i.1969, S.K. Mitra (in Zoological Survey of India, Calcutta).

Distribution : BHUTAN.

50. Psammoecus trilochana sp.nov.

This species comes close to P. graciosus Grouvelle but can be distinguished from the latter species by its antennal joints 9 and 10 blackish but joints 7 and 8 not blackish, eyes shorter, prothorax less transverse and its lateral margin slightly sinuate before posterior angle, transverse blackish spot at the apex of elytra absent.

General appearance (Fig. 214) elongated, oval, moderately convex, slightly shiny, yellowish brown to blackish brown, blackish spots on elytra and antennal joints 9 and 10 blackish, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly longer than one-third of length of head, temple moderately long and slightly

inflattened beneath eye, longitudinal striae on vertex moderately long and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape moderately large and slightly longer than two times as long as broad, pedicel short and slightly elongated, joints 3-7 longer than pedicel and subequal; joints 8-11 slightly wider than joint 7 of which joints 8 and 9 slightly elongated and joint 10 about as broad as long, joints 11 elongated and acuminate at apex. Prothorax about as broad as long, convex, across anterior margin about as wide as head across eyes, anterior margin rounded and with few small denticles, lateral margin outwardly curved and slightly sinuate at posterior half, lateral margin with six moderately large teeth, teeth about as broad as long and somewhat blunt, anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and almost similar to that of vertex of head, setae on pronotal disc projected towards middle line and on lateral sides projected outwardly. Scutellum subtriangular, transverse and more or less smooth. Elytra slightly shorter than one and half times as long as broad, ovoid and widest near middle, rows of punctures large and round, interstices narrower than width of each puncture, setae moderately long and projected posteriorly, lateral margins with long and almost erect setae, a somewhat oblique blackish spot on each elytron near middle and with extension along suture.

Aedeagus (Fig.233) with median lobe broad and rather pointed at apex; parameres long and slender, each paramere with two long apical setae and numerous short setae along its inner margin and on surface.

Measurements of holotype : Total length 2.79 mm, width of head across eyes 0.70 mm, length of antenna 1.63 mm, width of prothorax across middle 0.73 mm, length of elytra 1.75 mm and width across middle 1.10 mm.

Holotype ♂, NEPAL : Daman, 31.iii.1972, T. Sengupta, under cut long grass. Aedeagus dissected and mounted on cover slip and pinned with the holotype. Paratypes 12 ex., data same as holotype; Paratypes 3 ex., INDIA : HIMACHAL PRADESH, Simla, Mashobra, 2149 m, 25.vi.1975, T. Sengupta, beat of grass hanging on hills (in Zoological Survey of India, Calcutta).

Distribution : INDIA : Himachal Pradesh; NEPAL.

51. Psammoecus simoni Grouvelle

Psammoecus simonis Grouvelle, 1892, Annls Soc. ent. Fr.

61 : 488 (Type-loc. : Philippines).

Psammoecus simoni Grouvelle : Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 476, 488.

This is a distinct species and can be recognised by its two characteristic transverse spots on elytra and two small rounded spots near humeral angles, and transverse spots

interconnected by longitudinal sutural spot.

General appearance (Fig. 215) elongated, oval, moderately convex, slightly shiny, yellowish brown with two transverse blackish spots on elytra, antennal joint 6 slightly and joints 7-10 distinctly blackish, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly shorter than half of length of head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex moderately long and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and about two times as long as broad, joints 2-6 shorter and subequal; joints 7-11 slightly wider of which joint 7 slightly elongated, joint 8 about as broad as long, and joints 9 and 10 slightly transverse, joint 11 elongated and acuminate at apex; antennal joints 7-10 distinctly blackish. Prothorax transverse, convex, and narrowed posteriorly behind middle, across anterior margin slightly wider than head across eyes, anterior margin rounded, maximum width across fourth teeth from anterior side; lateral margin curved and with five more or less distinct teeth, third to fifth teeth from anterior side longer than others, maximum length of a tooth longer than its width and its apex somewhat blunt; transverse depression on pronotum in

front of prothoracic base slightly marked, anterior and posterior angles obtuse. Scutellum subtriangular, slightly transverse and more or less smooth. Elytra about one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large and rounded, interstices usually about as wide as width of each puncture, setae moderately long and projected posteriorly; two distinct transverse blackish spots near middle and apex, two smaller spots near humeral angles, transverse spots connected by longitudinal sutural spots.

Measurements : Total length 2.13-2.58 mm, width of head across eyes 0.66-0.67 mm, length of antenna 1.20-1.32 mm, width of prothorax across middle 0.67-0.69 mm, length of elytra 1.47-1.64 mm and width across middle 1.05-1.10 mm.

Materials examined : 4 ex. INDIA : WEST BENGAL, Calcutta, 1 ex., 30.xi.1971, T. Sengupta, under dead Pista plant beside a pond; 24 Parganas dist., S. Salt Lake, 1 ex., 17.i.1967, Gy. Topal, netted at dusk; SRI LANKA (Central): Mahaweli Ganga, à 7 miles de Kandy, 450 m, 1 ex., 15.i.1970; Weligma, 1 ex., 1899, W. Horn.

Distribution : INDIA : West Bengal; SRI LANKA ; MALAYSIA (Malacca); INDONESIA (Sumatra); PHILIPPINES; SEYCHELIES IS.; MADAGASCAR.

52. Psammoecus graciosus Grouvelle

Psammoecus graciosus Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 484, 488 (Type-loc.: Nilgiri Hills : India).

This species can be recognised by its antennal joints 7-10 blackish, teeth on lateral margin of prothorax short and hardly elongated; elytra with two rounded blackish spots near middle, a longitudinal sutural spot in posterior half and a transverse spot at apex.

General appearance (Fig. 216) elongated, oval, moderately convex, slightly shiny, reddish brown, head and prothorax slightly darker, blackish spots on elytra and antennal joints 7-10 blackish, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about half as long as head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex short and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and slightly longer than two times as long as broad; joints 2-6 shorter, subequal and elongated, joints 7-10 slightly wider of which joints 7 and 8 slightly elongated and joints 9 and 10 slightly transverse, joint 11 elongated and acuminate at apex, scape-joint 6 reddish brown, joints 7-10 blackish and joint 11 yellowish. Prothorax transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded and slightly sinuate on either sides, maximum width in anterior half and narrowed posteriorly; lateral margin rounded and with six

distinct teeth, teeth small and some of them hardly longer than broad and their apex somewhat blunt; anterior and posterior angles obtuse; puncturation on pronotum coarse, dense and slightly coarser than that of vertex of head; setae on pronotal disc projected towards middle line. Scutellum subtriangular and about as broad as long and more or less smooth. Elytra more than one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large, interstices about as wide as width of each puncture, setae moderately long and projected posteriorly; three blackish spots - first spot more or less rounded on each elytron near middle, second spot slightly posterior to first spot and along suture, and third spot transverse and at apex.

Measurements of the 'type' : Total length 2.82 mm, width of head across eyes 0.60 mm, length of antenna 1.35 mm, width of prothorax across middle 0.64 mm, length of elytra 1.58 mm and width across middle 1.08 mm.

Material examined : 1 ex. 'Type', INDIA : TAMIL NADU, Nilgiri Hills, Andrewes (in Mus. Nat. Hist. Nat., Paris).

53. Psammoecus nitidus Grouvelle

Psammoecus nitidus Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 479, 487 (Type-loc. : Kanara : India).

Psammoecus bellus Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 485, 488 (Type-loc. : Chambagnor, Madura :
India) ; syn. nov.

This species can be recognised by its prothorax distinctly transverse and widely explanate at lateral sides, lateral margin with six distinct teeth, teeth partly long and more than twice longer than wide, antennal joints 7-10 blackish, elytra with a rounded spot on each elytron near middle and with a longitudinal sutural spot posterior to the rounded spots.

General appearance (Fig. 217) elongated, oval, moderately convex, slightly shiny, reddish brown, blackish spots on elytra and apical part^{of} antennal joint 6 and joints 7-10 blackish, pubescence scanty.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about half as long as head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex short and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth. Antenna long and slender, scape large and about twice as long as broad; joints 2-6 shorter, subequal and elongated; joints 7-10 slightly wider of which joints 7-9 slightly elongated and joint 10 about as broad as long, joint 11 elongated and acuminate at apex, scape-joint 6 reddish brown, joint 7-10 and apical part of joint 6 blackish, and joint 11 reddish brown. Prothorax transverse,

convex, across anterior margin about as wide as head across eyes, anterior margin rounded and slightly sinuate on either sides of middle, maximum width across fourth teeth from anterior side and then narrowed posteriorly; lateral margin rounded and with six distinct teeth of which third, fourth and fifth from anterior side distinctly longer and their apex somewhat blunt, maximum length of a tooth slightly longer than twice of its width; anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and slightly coarser than on vertex of head. Scutellum subtriangular, about as long as broad and more or less smooth. Elytra about one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large, interstices about as wide as width of each puncture, one more or less rounded spot on each elytron near middle and a longitudinal sutural spot slightly posterior to above spots present.

Measurements of the 'Type' : Total length 2.67 mm, width of head across eyes 0.67 mm, length of antenna 1.48 mm, width of prothorax across middle 0.79 mm, length of elytra 1.64 mm and width across middle 1.13 mm.

Materials examined : 2 ex. 'Type' of Psammoecus nitidus Grouvelle, 1 ex., INDIA : KARNATAKA ('Kanara' in the label); 'Type' of Psammoecus bellus Grouvelle, 1 ex., INDIA : TAMIL NADU, Madura, 'Chambagnor' (in Mus. Nat. Hist. Nat., Paris).

Remark : The author has compared the 'type' of P. bellus Grouvelle with that of P. nitidus Grouvelle and found no characteristic morphological differences between them. The author has therefore, synonymised P. bellus with P. nitidus.

54. Psammoecus impressicollis Grouvelle

Psammoecus impressicollis Grouvelle, 1908 Annls Soc. ent.

Fr. 77 : 480, 487 (Type-loc. : Nilgiri Hills : India).

This species is closely related to P. trimaculatus Motschulsky but can be separated by the absence of longitudinal sutural spot on elytra, prothorax more transverse and transverse depression near posterior margin of pronotum distinct.

General appearance elongated, oval, moderately convex, slightly shiny, reddish brown, blackish spots on elytra and antennal joints 7-10 blackish, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly shorter than half of length of head, temple short and slightly inflattened beneath eye, longitudinal striae on vertex long and well-marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape large and about twice as long as broad; joints 2-5 shorter, subequal and elongated; joints 6-10 slightly wider of which joint 6 slightly

elongated, joint 7 about as broad as long, joints 8-10 more or less transverse; joint 11 elongated and acuminate at apex, scape-joint 6 reddish brown, joints 7-10 and apical part of joint 6 blackish, joint 11 reddish brown. Prothorax transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded, maximum width across fourth teeth from anterior end and then narrowed posteriorly; lateral margin more or less rounded and with six distinct teeth, of which third, fourth and fifth from anterior side distinctly longer and their apex somewhat blunt, maximum length of a tooth longer than twice of its width; anterior and posterior angles obtuse, transverse depression on pronotum in front of prothoracic base well-marked, setae on pronotal disc projected towards middle line. Scutellum subtriangular, about as broad as long and more or less smooth. Elytra shorter than one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large, interstices wider than width of each puncture, setae moderately long and projected posteriorly, a more or less rounded spot on each elytron near middle.

Measurements : Total length 2.93 mm, width of head across eyes 0.74 mm, length of antenna 1.45 mm, width of prothorax across middle 0.90 mm, length of elytra 1.89 mm and width across middle 1.33 mm.

Material examined : 1 ex. 'Type', INDIA : TAMIL NADU, Nilgiri Hills (in Mus. Nat. Hist. Nat., Paris).

Distribution : INDIA : Tamil Nadu.

55. Psammoecus trimaculatus Motschulsky

Psammoecus trimaculatus Motschulsky, 1858, Etud. Ent. 7 :
45; Waterhouse, 1876, Entomologist's mon. Mag. 13 :
124; Reitter, 1879, Verh. zool-bot. Ges. Wien 29 :
509; Grouvelle, 1906, Annls Soc. ent. Fr. 75 : 125;
Grouvelle, 1908, Annls Soc. ent. Fr. 77 : 476. (Type-
loc. : Sri Lanka).

? Cucujus incommodus Walker, 1859, Ann. Mag. nat. Hist. (3)
3 : 53.

Telephanus cruciger Waterhouse, 1876, Entomologist's mon.
Mag. 13 : 125.

Motschulsky (1858) described this species from Sri Lanka. Grouvelle (1908) synonymised the species ? Cucujus incommodus Walker and Telephanus cruciger Waterhouse with this species. This is a common and most widely distributed species of Indian Psammoecus.

General appearance (Fig. 218) elongated, oval moderately convex, slightly shiny, yellowish brown to reddish brown, blackish spots on elytra and antennal joints 7-10 blackish, body covered with moderately long and semierect pubescence.

Head : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye slightly shorter than half of length of head, temple short and slightly inflattened beneath

eye, longitudinal striae on vertex moderately long and slightly marked; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projected forward. Antenna long and slender, scape moderately large and shorter than two times as long as broad; joints 2-6 shorter than scape, subequal and elongated; joints 7-11 slightly wider than joint 6 of which joint 7 slightly elongated, joint 8 about as broad as long, joints 9 and 10 slightly transverse, joint 11 elongated and acuminate at apex. Prothorax transverse, convex, across anterior margin narrower than head across eyes, anterior margin rounded, maximum width near middle; lateral margin outwardly curved and with six or seven teeth of variable length, longest teeth in the posterior half, slightly longer than broad and somewhat blunt at apex; anterior and posterior angles obtuse, puncturation on pronotum coarse and dense and slightly coarser than that of vertex of head, setae on pronotal disc projected forward and on lateral sides projected outwardly. Scutellum subtriangular, transverse and more or less smooth. Elytra shorter than one and half times as long as broad, ovoid and widest near middle, rows of punctures moderately large and rounded, interstices usually slightly wider than width of each puncture and sometimes about as wide as width of each puncture, setae moderately long and projected posteriorly, a more or less rounded blackish spot on each elytron in posterior half and a longitudinal sutural spot behind rounded spots, rounded spots.

sometimes connected with the sutural spot by its extensions. Aedeagus (Fig. 232) with median lobe long, gradually narrowed and pointed at apex; parameres long and slender, each paramere with a long apical seta and few short setae along its inner margin, a few short and rather dense setae also at its broad base.

Measurements : Total length 2.23-2.94 mm, width of head across eyes 0.64-0.73 mm, length of antenna 1.38-1.44 mm, width of prothorax across middle 0.64-0.79 mm, length of elytra 1.47-1.88 mm and width across middle 1.00-1.32 mm.

Materials examined : 89 ex. INDIA : ASSAM, Kaziranga, 1 ex., 14.xi.1974, T. Sengupta, garbage with hays; Phulbari, 1 ex., 24.xi.1974, T. Sengupta, leaf garbage; MEGHALAYA, Tura, 2 ex., 23.xi.1974, T. Sengupta, under dry cut grass; Shillong, 1 ex., 29.xi.1974, T. Sengupta, leaf garbage; 1 ex., 27.iv.1971, T. Sengupta, haystack; WEST BENGAL, Howrah district, Sankrail, 2 ex., 14.ii.1976, T.K. Pal, haystack; Sarda, 1 ex., H.G. Champion; BIHAR, Chaibasa, 2 ex., 8.i.1971, T. Sengupta, under dead grass; 1 ex., 19.x.1976, T. Sengupta, haystack; ORISSA, Daitari district, Jajpur-Keonihar, 1 ex., 27.xi.1967, beaten material; Bhubaneswar town, 1 ex., 11.xi.1967, Gy. Topal, singled material; UTTAR PRADESH, Anandnagar, 25 km from Lachmipur, 3 ex., 9.x.1976, T. Sengupta, haystack; Natanwa, 24 km from Lachmipur, 1 ex., 11.x.1976, T. Sengupta, by beating bush; Kosi, 4 ex., 18.x.1976, T. Sengupta,

haystack; Pantnagar, 2 ex., 21.iii.1971, T. Sengupta, haystack;
JAMMU & KASHMIR, Jammu 1 ex., 25.v.1972, T. Sengupta, haystack;
DELHI, 4 ex., 12.v.1972, T. Sengupta, hays of Jower; KARNATAKA,
North Coorg, Fraserpet, 1 ex., xii.30, N.C. Chatterjee; Bangalore,
50 ex., 10.xii.1971, T. Sengupta, under stack of hay of Rai Crop
(Mustard); TAMIL NADU, Madras, 1 ex., 29.xi.1971, T. Sengupta,
leaf garbage; Coimbatore, 440 m, 2 ex., 22.xi.1972, Besuchet Löbl
Mussard; Trichinopoly, 1 ex.; KERALA, Cardamon Hill, Vallara Fall,
950 m, 1 ex., 4.xi.1972; BHUTAN, Chimakothi, 1900-2300 m, 1 ex.,
Nat. Hist. Museum Basel-Bhutan Expedition 1972; Changra, 18 km
S. Tongsa, 1900 m, 1 ex., Nat. Hist. Museum Basel-Bhutan Expedition
1972; Kamjee, 850 m, 1 ex., Nat. Hist. Museum Basel-Bhutan Expedi-
tion 1972; NEPAL : Kathmandu, 1371 m, 7 ex., 28.iii.1972; Daman
2316 m, 1 ex., 29.iii.1972, T. Sengupta, dead grass.

Distribution : INDIA : Assam, Meghalaya, West Bengal,
Bihar, Orissa, Uttar Pradesh, Jammu & Kashmir, Delhi, Karnataka,
Tamil Nadu, Kerala; NEPAL; BHUTAN; SRI LANKA; BURMA; MALAYSIA;
JAPAN; MADAGASCAR.

Subfamily CRYPTAMORPHINAE

Genus Cryptamorpha Wollaston

Cryptamorpha Wollaston, 1854, Insecta Maderensia : 156;
Reitter, 1879, Verh. zool.-bot. Ges. Wien 29 : 80;
Casey, 1884, Trans. Am. ent. Soc. 11 : 104; Ganglbauer,
1899, Die Käfer Von Mitteleuropa 3 : 589; Grouvelle
1908, Annl's Soc. ent. Fr. 77 : 474.

Pseudophanus Leconte, 1859, Proc. Acad. Philadelphia : 84.

Parabrontes Redtenbacher, 1867, Reise Novara Zool. 2 : 40.

Type-species : Cryptamorpha desjardinsi (Guerin-Meneville).

Cryptamorpha is fairly a large genus and comprises minute to moderately large beetles ranging from 2.33 to 4.47 mm in length. Wollaston (1854) erected this genus for his species Cryptamorpha musae and placed it between the genera Psammoecus Latreille and Dendrophagus Schonherr. Casey (1884) erected a separate tribe Cryptamorphini under the subfamily Telephaninae for this genus. Ganglbauer (1899) transferred the genus Cryptamorpha to the tribe Psammoecini under the subfamily Silvaninae. Wollaston (1854) and Casey (1884) described its tarsal formula 5-5-4 in male and 5-5-5 in female, but the genus has 5-5-5 tarsal formula in both the sexes. Grouvelle (1908) synonymised Pseudophanus Leconte and Parabrontes Redtenbacher with Cryptamorpha. Hetschko (1930) in Junk's "Coleopterorum Catalogus" listed twentyfour species under this genus, of which

two species are recorded from India, and C. desjardinsi (Guérin-Méneville) described as cosmopolitan. In the present study four species are described as new to science, and the larva of C. brevicornis (White) is described which is taken from the unpublished work of Sengupta and Crowson (see p. 290)

Definition :

General appearance (Fig. 236) elongated, moderately depressed, usually yellowish to reddish brown and pubescent.

Head (Fig. 248) slightly transverse, fronto-clypeal suture distinct, front margin of clypeus slightly rounded, eyes usually large and coarsely faceted, temple slightly flattened beneath eye, transverse impressed line on vertex behind eyes absent, two longitudinal grooves present on lateral sides and often united. posteriorly, additional longitudinal impressed lines originating from lateral grooves and extended posteriorly to outer margin, anterior part of gular region with a transverse groove; tentorium simple, with two long tentorial arms and a transverse bridge near middle; gular sutures well-separated. Antenna moderately long and slender, antennal insertions partly hidden under projection of frons, 11-jointed, scape moderately large and broadly elongated, joints 2-11 shorter and subequal, joint 11 somewhat pointed at apex. Mandible elongated, right mandible (Fig. 256) with 3 and left mandible (Fig. 255) with 2 apical teeth, mola well-developed, a large basal mandibular

cavity present. Maxilla (Fig. 257) with lacinia narrow, elongated and without apical spines; galea short and broad and its apex densely hairy; palpi with segments 2 and 3 almost equal, apical segment longest and fusiform. Labium (Fig. 258) with mentum somewhat triangular and its length and breadth almost equal; palpi with segment 2 large and somewhat rounded, apical segment narrower than segment 2 and fusiform. Labrum (Fig. 259) transverse and its apical margin rounded.

Prothorax (Fig. 249) elongated to transverse, front coxae contiguous, coxal cavities slightly elongated, cavities closed behind externally and opened internally, prosternal process broad at apex and its apical margin sinuate, sterno-pleural suture extending to lateral margin.

Meso-metathorax (Fig. 251) : Mesocoxae contiguous, cavities broadly opened outwardly, lateral margin of mesosternal process notched behind middle, sternal fitting between mesocoxae in a slight curved lined. Metasternum slightly transverse, median impressed line absent. Metendosternite represented by two appophyses and two anterior tendons.

Wing and Elytra : Wing (Fig. 254) with three anal vein; without radial cell, anal cell and subcubital fleck. Elytra somewhat parallel-sided, each elytron (Fig. 253) with ten rows of strial punctures, with scutellary striole, interstices pubescent, epipleura slightly developed and extending upto posterior one-third.

Legs (Fig. 250) long and slender, trochanters short and simple, femora swollen towards middle, tibiae not broadened at apex and with two apical spurs; tarsal formula 5-5-5 in both sexes, tarsal segment 1 long and slightly lobed below, segment 2 longer than segment 1, segment 3 bilobed, segment 4 shortest, claws simple.

Abdomen (Fig. 252) elongated, ventrite 1 longest, intercoxal process narrow and its apical margin slightly rounded, femoral lines almost a marginal striae of hind coxae, ventrites 2 to 5 subequal. Aedeagus (Fig. 261) with median lobe broad, median sturt elongated and spatulate at apex, parameres slender and elongated and with few setae near apex. Ovipositor (Fig. 260) with well-developed paraprocts, valvifers, coxites, and long styli attached on outer margin of apex of coxites.

Habitat : In India the representatives of this genus have been collected from haystacks and flowers.

Distribution : India, Nepal, China, Japan, Australia, New Zealand, New Caledonia, Chile.

KEY TO THE SPECIES OF CRYPTAMORPHA FROM INDIA.

1. Longitudinal grooves of head not unite on posterior side of vertex (Figs. 236,240). 2
- Longitudinal grooves of head unite on posterior side of vertex and forming a U-shaped structure (Fig. 237). 3

2. Longitudinal grooves of head diverging posteriorly, eyes large and not projected; lateral margin of prothorax with few denticles (Fig.240); puncturation of head and pronotum fine and moderately dense.
 desjardini (Guérin-Ménéville)

Longitudinal grooves of head converge posteriorly and directed towards middle line, eyes smaller and projected; lateral margin of prothorax smooth (Fig.236); puncturation of head and pronotum coarse and denser,infans Grouvelle

3. Prothorax distinctly transverse and pronotal disc with a distinct median longitudinal depression; lateral margin of elytra distinctly wavy; middle tibia explanate like a flank and its posterior margin toothed, middle trochanter with a spine in male (Fig.238); apex of ventrite 5 notched at middle (Fig.239); antennal joints 9-11 slightly narrower than joints 4-8
 abnormis sp.nov.

Prothorax elongated or slightly transverse and uniformly convex; lateral margin of elytra not distinctly wavy; tibiae not flanked, middle trochanter devoid of spine in male; apex of ventrite 5 uniformly rounded; antennal joints 9-11 usually slightly wider than joints 4-8. ...
 4

4. Lateral margins of prothorax widest across middle, uniformly curved and not sinuate near posterior angle (Fig.245); species uniformly deep reddish brown. sculptifrons Reitter
- Lateral margins of prothorax widest near anterior margin, slightly wavy and sinuate near posterior angle; species yellowish and usually with black markings on elytra (Figs.241,243).5
5. Puncturation of head inconspicuous and sparse; elytral interstices distinctly narrower than width of each puncture; hind trochanter of male devoid of spine. kaszabi sp.nov.
- Puncturation of head prominent, moderately coarse and dense; width of elytral interstices equal or slightly wider than width of each puncture; hind trochanter of male with a spine.6
6. Prothorax elongated (1.12:1.00); antenna comparatively shorter and ratio of lengths of body and antenna 2.09:1.00; median lobe of aedeagus bifid at apex (Fig.242); elytral interstices about as wide as width of each puncture. nepalensis sp.nov.
- Prothorax slightly transverse (0.97:1.00); antenna longer and ratio of lengths of body and antenna 1.72:1.00; median lobe of aedeagus not bifid at apex (Fig.263); elytral interstices slightly wider than width of each puncture. bhutanensis sp.nov.

56. Cryptamorpha desjardinsi (Guérin-Méneville)

Psammoecus Desjardinisi Guérin-Méneville, 1829-44,

l'Iconographie du Règne Animal. : 196; Waterhouse,
1876, Entomologist's mon. Mag. 13 : 122. (Type-loc.:
Mauritius).

Cryptamorpha musae Wollaston, 1854, Insecta Maderensia:
157; Reitter, Verh. zool.-bot. Ges. Wien 29 : 81.

Pseudophanus signata Leconte, 1859, Proc. Acad. Philad.
: 85.

Telephanus fasciata Redtenbacher, 1867, Reise Novara,
Zool. 2 : 41.

Cryptamorpha Desjardinsi (Guérin-Méneville) : Casey,
1884, Trans. Am. ent. Soc. 11 : 104; Grouvelle,
1908, Annls Soc. ent. Fr. 77 : 474.

Guérin-Méneville (1829-44) described this species under Psammoecus Latreille. Casey (1884) transferred it to Cryptamorpha and synonymised Cryptamorpha musae Wollaston with this species. Grouvelle (1908) synonymised Pseudophanus signata Leconte and Telephanus fasciata Redtenbacher with this species. This cosmopolitan species can easily be recognised by its lateral margin of prothorax with a few denticles, longitudinal grooves on head diverging posteriorly.

General appearance (Fig.240) elongated, moderately depressed, rather shiny, yellowish brown to reddish brown, with black spots on elytra, last three joints of antenna darker, dorsal surface covered with short pubescence.

Head : Exposed part of head wider than long, eyes large, length of eye shorter than half of length of head, temple short and about one-third of length of eye, longitudinal grooves sinuate and diverging posteriorly, additional longitudinal impressed lines absent; puncturation on vertex fine and sparse and that of towards lateral sides slightly denser, puncturation on clypeus fine and sparse; setae on vertex projected towards middle line and that of clypeus projected anteriorly. Antenna moderately long and slender, scape moderately large, pedicel shorter and narrower than scape; joints 3-7 subequal and longer than pedicel, of which joint 7 slightly wider; joints 8-10 slightly wider than joint 7, joint 11 longer than joint 10 and slightly acuminate at apex.

Prothorax elongated, convex, widest near middle, lateral margins curved outwardly and with a few small denticles, denticles bear outwardly directed setae, a shallow median transverse depression near posterior margin, puncturation on pronotum fine and moderately dense and similar to that of lateral sides of vertex of head, setae projected towards middle line. Scutellum moderately large, transverse, with fine and sparse punctures and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins slightly wavy and not explanate, scutellary striole short

and consists of 6-10 punctures, rows of punctures deep and moderately large, interstices distinctly wider than rows of punctures, interstices 1-3 of equal width and 4-10 alternately wider and narrower, setae short and projected posteriorly, a characteristic black transverse spot in posterior half and an oblong spot in anterior half of each elytron. On ventral side puncturation slightly coarser but similarly sparse as on pronotum, a median longitudinal area on metasternum and ventrites impunctate.

Measurements : Total length 4.01-4.05 mm, width of head across eyes 0.48 mm, length of antenna 1.64-1.70 mm, width of prothorax across middle 0.50-0.52 mm, length of elytra 2.38-2.52 mm and width across middle 1.11-1.14 mm.

Materials examined : 2 ex. EUROPE, 1 ex.; NEW ZEALAND, 1 ex., 1877.

Distribution : Cosmopolitan.

57. Cryptamorpha infans Grouvelle

Cryptamorpha infans Grouvelle, Annls Soc. ent. Fr.

77 : 474 (Type-loc. : Madura : India).

This is a distinct species, can be easily separated from other Indian species of Cryptamorpha by its longitudinal grooves on vertex of head converge posteriorly but not united,

eyes projected and puncturation on vertex and pronotum coarse and dense. In the present study 38 examples have been studied which are collected from haystack, flowering bush and under bark in Tamil Nadu.

General appearance (Fig.236) elongated, moderately depressed; yellowish to reddish brown with head, prothorax and apical three joints of antenna more blackish; and covered with long, moderately dense and semierect golden pubescence.

Head : Exposed part of head wider than long; eyes moderately large, prominent and projected, length of eye about one-third of length of head; longitudinal grooves not united on posterior side of vertex, additional longitudinal impressed lines distinct, puncturation on vertex coarse and dense and that of clypeus finer and sparser, setae long and projected anteriorly. Antenna long and slender, scape moderately large, pedicel shorter and narrower than scape, joints 3-8 subequal and longer than pedicel; joints 9-11 slightly wider than joint 8, of which joints 9 and 11 elongated and joint 10 about as wide as long, joint 11 slightly acuminate at apex; joints 9-11 and apical part of joint 8 slightly blackish.

Prothorax about as broad as long or slightly transverse, convex, widest near anterior margin and slightly narrowed in posterior half, lateral margins curved, puncturation on pronotum coarse and dense and similar to that of vertex of head, setae

long and projected towards middle line. Scutellum moderately large, transverse, with moderately large punctures and without pubescence. Elytra less than two times as long as broad, widest in posterior half, lateral margins of elytra slightly wavy and not explanate; three transverse blackish spots usually distinct of which, anterior one broadest and extends from base to near middle of elytra; scutellary striole short and consists of 6 to 9 punctures, rows of punctures deep and large, interstices distinctly narrower than width of each puncture, setae projected posteriorly. On ventral side puncturation of head to meso-metathorax coarse and slightly less denser than that of vertex and pronotum, puncturation on ventrites finer. Aedeagus (Fig.261) with apex of median lobe unilobed, parameres short and each paramere with one long apical seta.

Measurements : Total length 2.33-2.69 mm, width of head across eyes 0.51-0.59 mm, length of antenna 1.26-1.35 mm, width of prothorax across middle 0.52-0.58 mm, length of elytra 1.47-1.73 mm and width across middle 0.88-0.94 mm.

Materials examined : 38 ex. INDIA : TAMIL NADU, Oote, 3 ex., 31.xii.1972, T. Sengupta, under bark of fallen tree; 3 ex., 6.xii.1971, T. Sengupta, dry hays; 1 ex., 6.xii.1971, T. Sengupta, spiny flowering bush; 22 ex., 4.iv.1977, T. Sengupta, grass beside lake; Palni Hills, Kodaikanal, 2200 m, 5 ex., vii. 22, S. Kemp; 3 ex., 12.xi.1972, Besuchet Löbl Mussard; Palni Hills, Berijam Lake, 2150 m, 1 ex., 14.xi.1972, Besuchet Löbl Mussard.

Distribution : INDIA : Tamil Nadu.

58. Cryptamorpha abnormis sp.nov.

This is a distinct species and can be differentiated from any other Indian species of Cryptamorpha by its prothorax being distinctly transverse (1.00:1.14) and median longitudinal depression on pronotum distinct, vertex of head impunctate, apical three joints of antenna slightly narrower than joint 8, punctures of elytra progressively smaller towards posterior half, posterior side of middle tibia explanate like a flank and its margin toothed (Fig. 238), middle trochanter of male with a spine, apex of ventrite 5 broadly notched (Fig.239).

General appearance (Fig.237) elongated, moderately depressed, reddish brown; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large, length of eye slightly longer than one-third of length of head, longitudinal grooves not distinctly unite on posterior side of vertex but an impression of a tendency to unite, additional longitudinal impressed lines distinct, vertex and clypeus impunctate, clypeus shiny and setae projected anteriorly, vertex devoid of any pubescence. Antenna moderately long and slender, scape moderately large, pedicel shorter and narrower than scape, joint 3 slightly longer than pedicel; joints 4-8 subequal, slightly longer and wider than joint 3; joints 9-11 slightly

narrower than joint 8, joint 11 slightly acuminate at apex. Prothorax transverse, convex, widest near middle, anterior margin almost straight with slightly sinuate near middle, lateral margins curved outwardly, pronotum with wide median longitudinal depression, depression comparatively more wider towards extremities, transverse impressed line near base of pronotum less distinct, puncturation on pronotum coarse and moderately dense and towards lateral sides sparser, setae short and scanty. Scutellum moderately large, transverse, impunctate and with a few setae. Elytra slightly longer than two times as long as broad, lateral margins wavy and not explanate, widest in posterior half, scutellary striole short and consists of 8 punctures, rows of punctures deep and large towards anterior side, punctures gradually smaller towards posterior side behind middle, interstices wider than rows of punctures; two longitudinal blackish bands along lateral sides and unite posteriorly, transverse extensions arise from lateral bands behind middle, and a longitudinal extension from apex to more than posterior one-third of elytra along suture. Ventral side shiny; puncturation slightly sparser than that of pronotum, and that of ventrites 2-5 finer. Legs with posterior side of middle tibia explanate like a flank and its margin toothed, middle trochanter of male with a spine. Apex of ventrite 5 widely notched.

Measurements of holotype : Total length 4.47 mm, width of head across eyes 0.88 mm, length of antenna 2.50 mm, width of prothorax across middle 1.14 mm, length of elytra 2.86 mm and width across middle 1.41 mm.

Holotype ♂, INDIA : WEST BENGAL, Darjeeling dist.,
Sinchal, 26.iv.18, S. Kemp (in Zoological Survey of India,
Calcutta).

Distribution : INDIA : West Bengal (Darjeeling district).

59. Cryptamorpha sculptifrons Reitter

Cryptamorpha sculptifrons Reitter, 1889, Wien. ent.

Ztg. 8 : 320; Grouvelle, 1908, Annls Soc. ent. Fr.

77 : 474. (Type-loc. : Japan).

Cryptamorpha sculptifrons var. punctifrons Grouvelle,

1908, Annls Soc. ent. Fr. 77 : 474.

Cryptamorpha sculptifrons var. opacifrons Grouvelle,

1908, Annls Soc. ent. Fr. 77 : 474.

Reitter (1889) described this species from Japan.
Grouvelle (1908) recorded this species from Darjeeling and
subdivided into two varieties namely, punctifrons (Darjeeling)
and opacifrons (Sikkim and Yunnan) and noted that the former
variety is narrower than Japanese C. sculptifrons and the latter
variety differs by its prothorax being almost parallel-sided
and frons subopaque. He also mentioned that the Japanese
C. sculptifrons differs from both the varieties by its pedicel
being distinctly shorter than antennal joint 3. The examples
studied here collected from Darjeeling and Bhutan are similar
to Grouvelle's variety punctifrons.

General appearance (Fig.245) elongated, moderately depressed, uniformly reddish brown; covered with short, semi-erect, golden pubescence.

Head : Exposed part of head wider than long, eyes large, length of eye shorter than half of length of head, longitudinal grooves united on posterior side and U-shaped, additional longitudinal impressed lines rather indistinct; puncturation on vertex minute, rather indistinct and sparse, clypeus impunctate and shiny; setae on vertex projected towards middle line and that of clypeus projected anteriorly. Antenna long and slender, scape moderately large, pedicel shorter and narrower than scape; joints 3-11 subequal and longer than pedicel, of which joints 9-11 slightly wider and joint 11 slightly acuminate at apex. Prothorax elongated, convex, widest near middle, lateral margins curved outwardly, a transverse impressed line on pronotum present near posterior margin, puncturation on pronotum coarse and dense, setae short and projected towards middle line. Scutellum moderately large, transverse, with fine and sparse punctures and pubescent. Elytra less than two times as long as broad, widest behind middle, lateral margins slightly wavy and not explanate, scutellary striole short and consists of 7 punctures, rows of punctures deep and large, interstices about as wide as width of each puncture, setae short and projected posteriorly. On ventral side puncturation similar as on pronotum and that of ventrites 3-5 finer. Aedeagus (Fig.262)

with apex of median lobe broadly pointed; parameres long and slender, each paramere with two setae near apex and a few setae near base.

Measurements : Total length 3.62 mm, width of head across eyes 0.44 mm, length of antenna 2.00 mm, width of prothorax across middle 0.77 mm, length of elytra 2.29 mm and width across middle 1.35 mm (n=1).

Materials examined : 3 ex. INDIA : WEST BENGAL, Darjeeling, 2080 m, 1 ex., 22.iv.-14.v.15. F.H. Gravely; Darjeeling dist., Lebong, 1800-1900 m, 1 ex., 11.v.1975, W. Wittmer; BHUTAN : 21 km O Wangdi Phodr., 1700-2000 m, 1 ex., Nat. Hist. Museum Basel - Bhutan Expedition, 1972.

Distribution : INDIA : West Bengal (Darjeeling district), Sikkim; BHUTAN; JAPAN; CHINA.

60. Cryptamorpha nepalensis sp.nov.

This species is closely related to C. sculptifrons Reitter but can be separated by its prothorax widest near anterior margin and lateral margins distinctly sinuate before posterior angle, transverse impressed line across base of pronotum indistinct, species smaller (3.00 mm), antenna shorter and ratio of the length of body and antenna greater (2.09:1.00) than in sculptifrons (1.81:1.00), pedicel about as long as antennal joint 3, species yellowish brown, and puncturation on vertex of head slightly coarser.

General appearance (Fig. 241) elongated, moderately depressed, uniformly yellowish brown with apical three joints of antenna darker and two faint blackish spots on elytra; covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large, length of eye about one-third of length of head, longitudinal grooves unite on posterior side of vertex and U-shaped, additional longitudinal impressed lines well-marked, puncturation on vertex moderately coarse and moderately dense, clypeus finely punctate and shiny, setae projected anteriorly. Antenna long and slender, scape moderately large, pedicel shorter and narrower than scape, joint 3 slightly longer than pedicel, joints 4-8 subequal and slightly longer than joint 3, joints 9-11 slightly wider than joint 8, joint 11 slightly acuminate at apex.

Prothorax elongated, convex, widest ⁱⁿ anterior half, lateral margins curved and sinuate posteriorly behind middle, transverse impressed line on pronotum across base indistinct, puncturation on pronotum coarse and dense, setae short and projected towards middle line. Scutellum moderately large, transverse, with fine and sparse punctures and pubescent. Elytra more than two times as long as broad, almost parallel-sided and slightly wider near anterior margin, lateral margins slightly wavy and not explanate, scutellary striole short and consists of 8 punctures, rows of punctures deep and large, interstices about as wide as width of

each puncture, setae short and projected posteriorly, two lateral blackish spots slightly distinct. On ventral side puncturation slightly finer and sparser than that of pronotum, portion of metasternum on either sides of middle line impunctate. Legs simple, hind trochanter of male with a spine. Aedeagus (Fig.242) with apex of median lobe bifid.

Measurements of holotype : Total length 3.00 mm, width of head across eyes 0.58 mm, length of antenna 1.44 mm, width of prothorax across middle 0.58 mm, length of elytra 1.94 mm and width across middle 0.94 mm.

Holotype ♂, NEPAL : Daman, 31.iii.1972, T. Sengupta, flower of a big tree. Aedeagus dissected and mounted on cover slip and pinned with the holotype (in Zoological Survey of India, Calcutta).

Distribution : NEPAL.

61. Cryptamorpha kaszabi sp.nov.

This species is closely related to C. nepalensis sp.nov. but can be distinguished by its hind trochanter of male devoid of any spine, elytral interstices markedly narrower than rows of punctures, aedeagus (Fig. 244) with apex of median lobe not bifid, antenna longer, and ratio of lengths of body and antenna lesser (1.56-1.81:1.00).

General appearance (Fig.243) elongated, moderately depressed, yellowish brown with apical three joints of antenna darker and blackish spots on elytra; covered with short, semi-erect, golden pubescence.

Head : Exposed part of head wider than long, eyes large, length of eye about one-third of length of head, longitudinal grooves unite on posterior side of vertex and U-shaped, additional longitudinal impressed lines well-marked, puncturation on vertex fine and sparse, clypeus finely punctate and shiny, setae projected anteriorly. Antenna long and slender, scape moderately large, pedicel shorter and narrower than scape, joint 3 about as long as pedicel, joints 4-8 subequal and longer than joint 3, joints 9-11 slightly wider than joint 8 and of which joint 11 slightly acuminate at apex. Prothorax slightly elongated, convex, widest in anterior half, transverse impressed line on pronotum across base indistinct, puncturation on pronotum coarse and dense, setae short and projected towards middle line. Scutellum moderately large, transverse, with fine and sparse punctures and pubescent. Elytra about two times as long as broad, almost parallel-sided and widest below middle, lateral margins slightly wavy and not explanate, scutellary striole short and consists of 9 punctures, rows of punctures deep and large, interstices distinctly narrower than width of each puncture, setae short and projected posteriorly; two blackish spots on either sides of suture in

posterior half and one median longitudinal spot along sutural line behind lateral spots, median spots sometimes extend laterally and unite with lateral spots. On ventral side puncturation slightly finer and sparser than that of pronotum, portion of metasternum on either sides of middle line impunctate. Aedeagus (Fig. 244) with apex of median lobe somewhat pointed at tip, parameres long and slender and each paramere with a few long apical setae.

Measurements of holotype : Total length 2.82 mm, width of head across eyes 0.58 mm, length of antenna 1.67 mm, width of prothorax across middle 0.57 mm, length of elytra 1.79 mm and width across middle 0.91 mm.

Holotype ♂, INDIA : MEGHALAYA, Cherapunji, Mausmai, 18.xi.1967, Gy. Topal, beaten material (Coll.No. 912). Aedeagus dissected and mounted on cover slip and pinned with the holotype; Paratypes 10 ex., data same as holotype; Paratypes 2 ex., 18.xi.1967, Gy. Topal, netting in grasses (Coll.No. 913); Paratypes 1 ex., Cherapunji, 19.xi.1967, Gy. Topal, beaten material, (Coll. No. 916). (Holotype and of the 13 Paratypes, 7 in Termesztudományi Museum, Budapest and 6 in Zoological Survey of India, Calcutta).

Distribution : INDIA : Meghalaya.

62. Cryptamorpha bhutanensis sp.nov.

This species is closely related to the new species C. nepalensis but can be separated by its prothorax being slightly transverse (0.97:1.00), antenna comparatively longer, elytral interstices slightly wider than width of each puncture, and median lobe of aedeagus not bifid at apex.

General appearance (Fig. 246) elongated, moderately depressed, yellowish brown, with a blackish spot on each elytron in posterior half; and covered with short, semierect, golden pubescence.

Head : Exposed part of head wider than long, eyes large and length of eye about one-third of length of head, longitudinal grooves united on posterior side of vertex and U-shaped, additional longitudinal lines well-marked, puncturation on vertex moderately coarse and moderately dense, clypeus finely punctate and shiny, setae projected towards middle line. Antenna long and slender, scape moderately large, pedicel and joint 3 shorter and narrower than scape, joints 4-8 subequal and slightly longer than joint 3, joints 9-11 slightly wider than joint 8, joint 11 acuminate at apex. Prothorax slightly transverse or about as broad as long, widest near anterior margin and narrowed posteriorly, lateral margins curved and sinuate posteriorly, puncturation on pronotum coarse and dense, setae short and

projected towards middle line. Scutellum moderately large, transverse, with fine and sparse punctures and pubescent. Elytra about two times as long as broad, almost parallel-sided and widest below middle, lateral margins slightly wavy and not explanate, scutellary striole consists of 9 punctures, rows of punctures deep and large, interstices slightly wider than width of each puncture, setae short and projected posteriorly, a small rounded indistinct blackish spot present on each elytron in posterior half. On ventral side puncturation slightly finer and sparser than that of pronotum, portion of metasternum on either sides of middle line impunctate. Aedeagus (Fig. 263) with apex of median lobe broadly pointed, parameres long and slender and each paramere with a few moderately long apical setae.

Measurements of holotype : Total length 3.34 mm, width of head across eyes 0.75 mm, length of antenna 1.80 mm, width of prothorax across middle 0.67 mm, length of elytra 2.05 mm and width across middle 1.04 mm.

Holotype ♂, BHUTAN : Nobding, 41 km O Wangdi Ph., 2800 m Nat. Hist. Museum Basel - Bhutan Expedition 1972. Aedeagus dissected and mounted on a plastic board and pinned with the holotype. (in Nat. Hist. Mus., Basel); Paratype ♀, Chimakothi, 22.v.1972, Nat. Hist. Museum Basel - Bhutan Expedition 1972 (in Zoological Survey of India, Calcutta).

Distribution : BHUTAN.

KEY TO THE SUBFAMILIES OF LARVAE OF SILVANIDAE

1. Urogomphi present; posterior angles of 8th abdominal sternite with setose prolongations; larva large (9.00 mm). Cryptamorphinae

Urogomphi absent; posterior angles of 8th abdominal sternite without setose prolongations; larva usually small (2.80 to 4.61 mm). 2

2. Antennal joint 3 well-developed and more or less equal in length to joint 2; dorsal surface not sclerotized. Psammoecinae

Antennal joint 3 minute and markedly shorter than joint 2; dorsal surface sclerotized.
..... Silvaninae

KEY TO THE GENERA OF KNOWN SILVANID LARVAE FROM INDIA

1. Urogomphi present; posterior angles of 8th abdominal sternite with setose prolongations (Fig. 318); larva large (9.00 mm). Cryptamorpha Wollaston
- Urogomphi absent; posterior angles of 8th abdominal sternite without setose prolongations; larva usually small (2.80 mm to 4.61 mm). 2
2. Antennal joint 3 well-developed and more or less equal in length to joint 2; dorsal surface not sclerotized. Psammoecus Latreille
- Antennal joint 3 minute and markedly shorter than joint 2; dorsal surface sclerotized. 3
3. Antenna distinctly shorter than length of head, antennal joint 2 broadened towards apex; each tergite with a transverse black pigmented area. 4
- Antenna distinctly longer than length of head, antennal joint 2 more or less parallel-sided and not broadened towards apex, tergites without transverse black pigmented area. 5
4. Posterior abdominal segments covered with a transverse band of small setae (Fig.305); arrangement of setae on dorsal side of head dense and their arrangement as figured, six ocelli on each side of head arranged in three pairs (Fig.299); maxillary mala with two apical spines (Fig.303). Airaphilus Redtenbacher

Setae on posterior abdominal segments confined mainly towards lateral sides (Fig.270); setae on dorsal side of head sparser and its arrangement different, six ocelli on each side of head and arranged in two groups : 4 and 2 (Fig.264); maxillary mala with single apical spine (Fig.267).

..... Oryzaephilus Ganglbauer

- 5. Five ocelli on each side of head, head and antennae with a few setae (Fig.278); claw without tarsangular setae (Fig.282). Protosilvanus Grouvelle

Six ocelli on each side of head, setae on head and antenna more dense (Figs. 271,285,292); claw with one (Fig.276) or two tarsangular setae (Fig. 290).6

- 6. Six ocelli arranged in two groups: 3 and 3, arrangement of setae on dorsal side of head as figured and apical joint of antenna elongated (Fig.271); maxillary mala with single apical spine (Fig.275).

..... Silvanoprus Reitter

Six ocelli arranged in two groups : 4 and 2, arrangement of setae on dorsal side of head somewhat different and apical joint of antenna either as long as broad or slightly transverse (Figs.285,292); maxillary mala with two apical spines (Figs.289,296). 7

7. Claw with single tarsangular seta (Fig.297), basal one of apical teeth of mandible bifid (Fig.294), segment 1 of labial palpi transverse (Fig.296).

..... Cathartus Reiche

Claw with two tarsangular setae lying side by side (Fig. 290), basal one of apical teeth of mandible not bifid (Fig. 287), segment 1 of labial palpi about as broad as long (Fig.289).

..... Ahasverus Gozis

Subfamily SILVANINAE

Genus Silvanoprus Reitter

Silvanoprus angusticollis (Reitter)

General body form elongated, narrow, parallel-sided, somewhat depressed, whitish soft-bodied, mouthparts yellowish.

Head transverse, side margins evenly rounded, frontal suture rather indistinct and Cucujoid-type, clypeus fused with frons, arrangement of setae on dorsal surface as seen in figure (Fig.271). Endocarina and metopic suture absent. Ocelli (Fig.271) six on each side of head, in two groups behind antenna, three in each group. Antenna rather long, three-jointed, length of joints 2:7:1, all joints elongated, joint 2 slightly broader towards apex, sensory appendage lying ventrally and shorter than joint 3. Mandible (Fig.273) with three apical teeth,

prostheca translucent at base and sharply pointed at apex; mola well-developed, chitinized, with about 16 rows of dorsal fine transverse ridges and 15-16 rows of ventral curved longitudinal asperated ridges. Maxillary mala (Fig.275) moderately sharply pointed at apex, with a strong spine at tip, at base of apical spine on outer margin with two setae, a row of about seven setae present on dorsal side of inner margin of mala, three ventral setae on inner margin towards apex, at base of mala with a group of dorsal denticles, cardo well-developed, maxillary articulating area well-defined and oval, length of palpal segments 2:6:7. Labium (Fig. 274) narrowed anteriorly, two-segmented palpi, apical segment narrower and shorter than basal one, hypopharynx well-developed, hypopharyngeal bracon present, hypopharyngeal rods and hypostomal margins distinct and diverging posteriorly.

Thorax and abdomen : Tergites with sparsely distributed simple and moderately long setae. Pro-, meso- and metathorax about equal in size, arrangement of setae on pronotum as seen in figure (Fig.272). Abdominal segments 1-3 about equal in size and shorter than metathorax and abdominal segment 4, abdominal segments 6-8 progressively slightly narrower, segment 9 with very short tergite, its sternite forming a long tubular pygopod-like projection (Fig. 277), without urogomphi, segment 10 represented by a sclerite attached at the apex of pygopod-like projection.

Spiracles and legs : All spiracles annular lying on body surface. Legs (Fig.276) narrow and moderately long, coxae small and widely separated; claw simple, rather long and with single tarsangular seta..

Measurements : Total length 2.83 mm, length of head including labrum 0.35 mm and width across middle 0.41 mm, width of prothorax across middle 0.51 mm, width of 9th abdominal segment across front margin 0.19 mm (n=1).

Materials examined : 5 ex. INDIA : SIKKIM, Gangtok, 1704 m, 24.iv.1976, T.K. Pal, under bark of Schima wallichii.

Genus Protosilvanus Grouvelle

Protosilvanus lateritius (Reitter)

General body form elongated, somewhat depressed, slightly narrowed in front and behind, head yellowish white, tergites slightly paler, mouthparts yellowish.

Head transverse, side margins evenly rounded, frontal suture rather indistinct and Cucujoid-type, clypeus fused with frons, arrangement of setae on dorsal surface as seen in figure (Fig.278). Endocarina and metopic suture absent. Ocelli (Fig.278) five on each side of head, four in a vertical row behind antenna, other one behind vertical row. Antenna (Fig.278) rather long,

three-jointed, length of joints 1:4:0.33, joints 1 and 2 elongated, sensory appendage minute. Mandible (Fig.279) with three apical teeth, protheca translucent at base with chitinized and sharply pointed apex; mola well-developed, chitinized, with 9 rows of dorsal fine transverse ridges and 14 to 15 rows of ventral curved longitudinal asperated ridges. Maxillary mala (Fig.280) moderately sharply pointed at apex, with a strong spine at tip, at base of apical spine on outer margin with two setae, a row of about twelve setae present on dorsal side of inner margin of mala, three ventral setae on inner margin towards apex, at base of mala with a group of dorsal denticles, cardo well-developed, maxillary articulating area well-defined and oval, length of palpal segments 2:4:5. Labium (Fig. 281) narrowed anteriorly, two-segmented palpi, apical segment narrower and shorter than basal one, hypopharynx well-developed, hypopharyngeal bracon present, hypopharyngeal rods and hypostomal margins distinct and diverging posteriorly.

Thorax and abdomen : Tergites with sparsely distributed simple and moderately long setae. Prothorax about as broad as head and slightly narrower than meso- and metathorax. Pro-, meso- and metanotum with an anterior and an posterior pairs of setae. First abdominal segment shorter than metathorax and second abdominal segment, abdominal segments 1-5 slightly wider, segments 6-8 progressively slightly narrower, segment 9 with

very short tergite, its sternite forming a long tubular pygopod-like projection (Fig. 283); without urogomphi, segment 10 represented by a sclerite attached at the apex of pygopod-like projection.

Spiracles and Legs : All spiracles annular lying on body surface. Legs (Fig. 282) narrow and moderately long, coxae small and widely separated; claw simple, rather long and without tarsangular seta.

Measurements : Total length 4.26 mm, length of head including labrum 0.48 mm and width across middle 0.63 mm, width of prothorax across the middle 0.61 mm, width of 9th abdominal segment across front margin 0.35 mm (n=1).

Materials examined : 277 ex. INDIA : WEST BENGAL, Calcutta (Ultadanga), 200 ex., iii.1975 to viii.1975, T.K. Pal, under bark of Bombax sp., Tamerindus indica, Albizzea indica, Harul and several unknown logs; Burdwan dist., Burdwan, 15 ex., 10.vii.1976, T.K. Pal, under bark; UTTAR PRADESH, Anandnagar, 25 km from Lachmipur, 12 ex., 8.x.1976, T. Sengupta, under bark of Shorea robusta; SIKKIM, Rangpo, 450 m, 50 ex., 22.iv.1976, under bark of Duabangha sonneretioides.

Genus Ahasverus Gozis

Ahasverus advena (Waltl)

General body form (Fig.284) elongated, narrow, parallel-sided, somewhat depressed, whitish soft-bodied, dorsal surface

of abdominal segments 6-8 with rather prominent transverse brownish pigmented area, head and mouthparts yellowish brown, dorsal surface with many short setae.

Head transverse, side margins evenly rounded, frontal suture slightly distinct and Cucujoid-type, clypeus fused with frons, arrangement of setae on dorsal side as seen in figure (Fig. 285). Endocarina and metopic suture absent. Ocelli (Fig.285) six on each side of head, in two groups behind antenna, four in upper group and two in lower group. Antenna rather long, three-jointed, length of joints 2.5:9:1, joints 1 and 2 elongated, sensory appendage lying ventrally and about as long as joint 3. Mandible (Fig. 287) with three apical teeth, prostheca translucent at base and sharply pointed at apex; mola well-developed, chitinized, with 7 rows of dorsal fine transverse ridges and 11 rows of ventral curved longitudinal asperated ridges. Maxillary mala (Fig.289) moderately sharply pointed at apex, with a strong bifid spine at apex, at base of apical spine on outer margin with one seta on dorsal side and two setae on ventral side, a row of about six setae on dorsal side of inner margin of mala, three ventral setae on inner margin towards apex, at base of mala with a group of dorsal denticles, above dorsal denticles a seta on ventral side of inner margin, cardo well-developed, maxillary articulating area well-defined and oval, length of palpal segments 2:3:4. Labium (Fig. 288) slightly narrowed anteriorly,

two-segmented palpi, apical segment narrower and shorter than basal one, hypopharynx well-developed, hypopharyngeal bracon present, hypopharyngeal rods and hypostomal margins distinct and diverging posteriorly.

Thorax and abdomen : Tergites with sparsely distributed simple and moderately long setae, prothorax slightly wider than head and about as broad as meso- and metathorax, arrangement of setae on pronotum as seen in figure (Fig.286). First abdominal segment shorter than metathorax and second abdominal segment. Abdominal segments 7 and 8 progressively narrower; segment 9 with a very short tergite, its sternite forming a long tubular pygopod-like projection (Fig.291); without urogomphi, segment 10 represented by a sclerite attached at the apex of pygopod-like projection.

Spiracles and legs : All spiracles annular, lying on body surface. Legs narrow and moderately long, coxae small and widely separated; claw simple, rather long and with two tarsangular setae lying side by side (Fig.290).

Measurements : Total length 4.04 mm, length of head including labrum 0.35 mm and width across middle 0.44 mm, width of prothorax across middle 0.52 mm, width of 9th abdominal segment across front margin 0.32 mm (n=1).

Materials examined : 68 ex. INDIA : BIHAR, Chaibasa, 8 ex., 15.i.1978, T. Sengupta, plum; ENGLAND, 60 ex., sent by Dr. D.G.H. Halstead in August 1977 from culture maintained at P.I.C.L., Slough.

Genus Cathartus Reiche

Cathartus sp.

General body form elongated, somewhat depressed, slightly narrowed in front and behind, whitish, soft-bodied.

Head transverse, side margins evenly rounded, frontal suture rather indistinct and Cucujoid-type, clypeus fused with frons, arrangement of setae on dorsal surface as seen in figure (Fig. 292). Endocarina and metopic suture absent. Ocelli (Fig. 292) six on each side of head, in two vertical rows behind antenna, three in each row and upper two ocelli situated at a slight distance with the lower ones. Antenna rather long, three-jointed, length of joints 2:9:1, joints 1 and 2 elongated, sensory appendage lying dorsally and slightly shorter than joint 3. Mandible (Fig. 294) with three apical teeth, the lower one bifid on its inner margin, prostheca translucent at base and sharply pointed at apex; mola well-developed, chitinized, with 7 rows of dorsal fine transverse ridges and 19-20 rows of ventral curved longitudinal asperated ridges. Maxillary mala (Fig. 296) moderately sharply pointed at apex, with a strong bifid spine at apex, at base of apical spine on outer margin with two setae on dorsal side and three setae on ventral side, a row of about eight setae present on dorsal side of inner margin of mala, four ventral setae on inner margin towards apex, at base of mala with a group of dorsal denticles,

cardo well-developed, maxillary articulating area well-defined and oval, length of palpal segments 2:3:4. Labium (Fig.295) slightly narrowed anteriorly, two-segmented palpi, apical segment narrower and shorter than basal one, hypopharynx well-developed, hypopharyngeal bracon present, hypopharyngeal rods and hypostomal margins distinct and diverging posteriorly.

Thorax and abdomen : Tergites with sparsely distributed simple and moderately long setae. Prothorax about as broad as head and slightly narrower than meso- and metathorax, arrangement of setae on pronotum as seen in figure (Fig.293). First abdominal segment shorter than metathorax and second abdominal segment. Abdominal segments 6-8 progressively narrower; segment 9 with very short tergite, its sternite forming a long tubular pygopod-like projection (Fig.298); without urogomphi, segment 10 represented by a sclerite attached at the apex of pygopod-like projection.

Spiracles and legs : All spiracles annular lying on body surface. Legs (Fig. 297) narrow and moderately long, coxae small and widely separated; claw simple, rather long and with single tarsangular seta.

Measurements : Total length 4.61 mm, length of head including labrum 0.38 mm and width across middle 0.41 mm, width of prothorax across middle 0.51 mm, width of 9th abdominal segment across front margin 0.19 mm (n=1).

Material examined : 1 ex., Locality not known.

Genus Oryzaephilus Ganglbauer

Oryzaephilus mercator (Fauvel)

General body form (Fig. 264) elongated, somewhat depressed, slightly narrowed in front and behind, dorsal surface of each segment with a transverse blackish pigmented area, head and mouthparts blackish, dorsal surface with many short setae.

Head transverse, side margins evenly rounded, frontal suture slightly distinct and Cucujoid-type, clypeus fused with frons, arrangement of setae on dorsal surface as seen in figure (Fig. 265). Endocarina and metopic suture absent. Ocelli (Fig. 264) six on each side of head, in two groups behind antenna, four in upper group and two in lower group situated at a distance with upper group. Antenna rather long, three-jointed, length of joints 3:7:1, joints 1 and 2 elongated, sensory appendage lying at apical part of joint 3 and slightly shorter than it. Mandible (Fig. 266) with three apical teeth, prostheca translucent at base and sharply pointed at apex; mola well-developed and chitinized, with 5 rows of dorsal fine transverse ridges and about 6 rows of ventral curved longitudinal asperated ridges. Maxillary mala (Fig. 267) moderately sharply pointed at apex, with a strong spine at apex, at base of apical spine on outer margin with two setae on ventral side, a row of about eight setae present on dorsal side of inner margin of mala and another row of four setae on dorsal side before marginal row of setae, at base of

mala with a group of dorsal denticles, cardo well-developed, maxillary articulating area well-defined and oval, length of palpal segments 2:3:5. Labium (Fig.268) narrowed anteriorly, two-segmented palpi, apical segment narrower and shorter than basal one, hypopharynx well-developed, hypopharyngeal bracon present, hypopharyngeal rods and hypostomal margins distinct and diverging posteriorly.

Thorax and abdomen : Tergites with sparsely distributed simple and moderately long setae. Pro- and mesothorax shorter than metathorax, arrangement of setae on pronotum as seen in figure (Fig. 264), transverse blackish area of thoracic tergites divided in middle line. First abdominal segment shorter than metathorax and second abdominal segment. Abdominal segments 6-8 progressively narrower; segment 9 with very short tergite, its sternite forming a tubular pygopod-like projection (Fig.270); without urogomphi, segment 10 represented by a sclerite attached at the apex of pygopod-like projection.

Spiracles and legs : All spiracles annular lying on body surface. Legs (Fig.269) narrow and long, coxae small and widely separated; claw simple, rather long, with two tarsangular setae lying side by side.

Measurements : Total length 2.87 mm, length of head including labrum 0.36 mm and width across middle 0.41 mm, width of prothorax across middle 0.44 mm, width of 9th abdominal segment across front margin 0.20 mm (n=1).

Materials examined : 151 ex. INDIA : WEST BENGAL, Calcutta, 1 ex., 16.vii.1976, T.K. Pal, rice; 150 ex., T.K. Pal, from cashewnu.

Genus Airaphilus Redtenbacher

Airaphilus serricollis Reitter

General body form elongated, somewhat depressed, slightly narrowed in front and behind, dorsal surface of each segment with a transverse blackish pigmented area, head blackish, mouthparts yellowish, dorsal surface with many short setae.

Head transverse, side margins evenly rounded, with distinct Cucujoid-type of frontal suture, clypeus fused with frons; moderately long, sparsely distributed setae arranged as seen in figure (Fig. 299). Endocarina and metopic suture absent. Ocelli (Fig. 299) six on each side of head, in three groups behind antenna, two in each group. Antenna rather long, three-jointed, length of joints 2:9:1, joints elongated, joint 2 distinctly broader towards apex, sensory appendage absent. Mandible (Fig. 301) with three apical teeth, prostheca translucent at base and sharply pointed at apex; mola well-developed, chitinized, with 9 rows of dorsal fine transverse ridges and about 9 rows of ventral curved longitudinal asperated ridges. Maxillary mala (Fig. 303) moderately sharply pointed at apex, with two strong spine at tip, at base of apical spine on outer margin with three setae- two ventral and one dorsal, a row of about six setae present on dorsal side of inner margin of mala, one ventral seta on inner margin towards apex, at base of mala with a group of dorsal denticles, cardo well-developed, maxillary articulating area well-defined and oval, length of palpal

segments 2:3:4. Labium (Fig.302) slightly narrowed anteriorly, two-segmented palpi, apical segment narrower and slightly shorter than basal one, hypopharynx well-developed, hypopharyngeal bracon present, hypopharyngeal rods and hypostomal margins distinct and diverging posteriorly.

Thorax and abdomen : Tergites with densely distributed, simple and moderately long setae. Prothorax wider than head. Pro- and mesothorax about equal in size and narrower than metathorax, arrangement of setae on pronotum as seen in figure (Fig.300). First abdominal segment shorter than metathorax and second abdominal segment. Abdominal segments 6-8 progressively narrower; segment 9 with very short tergite, its sternite forming a long tubular pygopod-like projection (Fig.305); without urgomphi, segment 10 represented by a sclerite attached at the apex of pygopod-like projection.

Spiracles and legs : All spiracles annular lying on body surface. Legs (Fig.304) narrow and moderately long, coxae small and widely separated; claw simple, rather long, with two tarsangular setae lying one beyond other.

Measurements : Total length 3.67 mm, length of head including labrum 0.47 mm and width across middle 0.50 mm, width of prothorax across middle 0.63 mm, width of 9th abdominal segment across front margin 0.23 mm (n=1).

Materials examined : 5 ex. INDIA : WEST BENGAL, Howrah dist., Sankrail, T.K. Pal, Haystack.

Subfamily PSAMMOECINAE

Genus Psammoecus Latreille

Psammoecus bipunctatus (F.)

General body form narrow-elongated, depressed, whitish, soft-bodied, with long slender legs.

Head transverse, slightly wider than prothorax, frontal suture rather indistinct and Cucujoid-type, clypeus fused with frons, labrum distinctly separated from clypeus, dorsal surface with few setae and arrangement as seen in figure (Fig.306). Ocelli six on each side of head and arranged as seen in figure (Fig.306), hypostomal rods distinguishable and diverging posteriorly. Antenna rather long, length of joints 3:6:6, all joints elongated, joint 2 broader towards apex, sensory appendage minute. Mandible (Fig. 308) with three apical teeth, middle one longest, their inner margins smooth, prostheca translucent at base with chitinized and sharply pointed at apex, mola well-developed with 8 rows of dorsal fine transverse ridges and 13 to 14 rows of ventral curved longitudinal distinct asperated ridges, inner margin of mola serrated with anterior and posterior angles projecting like large teeth. Maxillary mala (Fig. 310) falciform, with single apical spine, a dorsal row of nine setae along apical half of inner margin, three ventral setae on inner margin towards apex, at base of mala with a group of dorsal denticles extending towards outer margin of mala; palpi shorter than mala, apical segment narrowed towards apex; cardo rather large and forming an angle

with stipes, maxillary articulating area well-developed and oval. Labium (Fig.309) narrowed anteriorly, apical segment of palpi narrower and longer than basal one. Hypopharynx and hypopharyngeal bracon well-developed.

Thorax and abdomen : Tergites with sparsely distributed simple and moderately long setae. Pro-, meso- and metathorax about equal in size, arrangement of setae on pronotum as seen in figure (Fig. 307). First abdominal segment shorter than metathorax and second abdominal segment. Abdominal segments 6-8 progressively slightly narrower; segment 9 with very short tergite, its sternite forming a long tubular pygopod-like projection (Fig. 312); without urogomphi, segment 10 represented by a sclerite attached at the apex of pygopod-like projection.

Spiracles and legs : All spiracles annular and lying on body surface. Legs narrow and long, coxae small and widely separated; claw simple, rather long, with two tarsangular setae lying one beyond other (Fig.311).

Measurements : Total length 2.80 mm, width of head across middle 0.44 mm, width of prothorax across middle 0.40 mm, width of 9th abdominal segment across front margin 0.18 mm.

Material : Locality not known, in Peat washing, Wicken fir, 3.vii.1954, R.A. Crowson.

Subfamily CRYPTAMORPHINAE

Genus Cryptamorpha Wollaston

Cryptamorpha brevicornis (White)

General body form long, slightly flat, with long antennae and urogomphi, dorsal surface with many short setae.

Head transverse, with distinct Cucujoid-type of frontal suture; dorsal surface with many minute, simple setae together with moderately long and sparsely distributed setae as seen in figure (Fig. 313). Ocelli six on each side of head, a group of four lying in a square and other two ventral to them (Fig. 313). Clypeus fused with frons, labrum distinctly separated from clypeus and with a row of setae on anterior margin. Hypostomal rods moderately distinct, strongly diverging posteriorly. Antenna with all joints elongated, length of joints 1:2:2, sensory appendage minute. Mandible (Fig. 315) nearly triangular with three apical teeth, their inner margins smooth, prostheca translucent at base and chitinized and sharply pointed at apex; mola well-developed with about 24 curved longitudinal rows of ventral asperites, its apex with a tuft of hairs, a fringe of hairs also present at its postero-ventral margin, ventral crushing tubercles moderately developed. Maxillary mala (Fig. 316) fal-ciform with three sharp, narrow apical spines; a dorsal row of thirteen setae along inner margin of stipes; palpi shorter than mala, apical segment distinctly narrower and slightly shorter

than segment 2; cardo well-developed and angularly attached with stipes, maxillary articulating area well-developed and rather elongated. Labium (Fig. 316) with two-segmented palpi, apical one about double the length of basal segment; ligula projecting beyond front margin of prementum as a narrow and rounded strip. Hypopharynx well-developed with two distinct horns, hypopharyngeal bracons distinct.

Thorax and abdomen : Prothorax (Fig. 314) slightly longer than mesothorax, Pro-, meso- and metathorax almost equal in size. Abdominal segment 1 distinctly shorter than metathorax and abdominal segment 2; setae on tergites minute, simple and rather numerous, a few moderately long setae on lateral margins. Abdominal segments 7-9 progressively narrower, sternite 8 with its posterior angles bear setiferous prolongations (Fig. 318), segment 9 with tergite notably short and its sternite forming a narrow elongated tubular projection, segment 10 represented by a sclerite attached at the apex of tubular projection; urogomphi markedly long, narrow and not chitinized, each urogomphi with two conspicuous setae.

Spiracles and legs : All spiracles annular lying on body surface. Legs long and slender, coxae small and widely separated; claw simple, long, with two minute tarsangular setae lying one beyond other (Fig. 317).

Measurements : Total length 9.00 mm, width of head across middle 1.10 mm, maximum width across 4th abdominal segment 1.20 mm, width of 9th abdominal segment across front margin 0.56 mm.

Materials : NEW ZEALAND, Westland, 1.iii.1957, R.A. Crowson, under bark of a fallen tree, along with adults.

TABLE : Generic relationship by weighting similarity and dissimilarity

Characters Genera	Characters										
	Fronto-clypeal suture	Groove/striae on vertex	Antennal club	Rows of punctures on elytra	Maxillary palpi	Labial palpi	Scutellary striole	Dorsal mandibular cavity	Temple	Margin of prothorax	Transverse impressed line on head
SILVANUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	finely serrated	present
SILVANOPRUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	finely serrated	present
SILVANOIDES	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	shelf-like	finely serrated	present
PROTOSILVANUS	absent	absent	3-jointed	9	segment 2 longest	segment 2 longest	absent	trace	shelf-like	finely serrated	present
AHASVERUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	finely serrated	present
CATHARTUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	finely serrated	?
SILVANOLOMUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	with 6 distinct denticles	absent
SILVANOPSIS	absent	absent	2-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	with 6 distinct denticles	present
ORYZAEPHILUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	with 6 distinct denticles	absent
MONANUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	trace	inflattened	with 10 or 11 denticles	absent
AIRAPHILUS	absent	absent	3-jointed	9	apical segment longest	apical segment longest	absent	well developed	inflattened and partly covers eye	with 9-13 denticles	absent
PSAMMOECUS	present	present	absent	10	apical segment securiform	apical segment securiform	absent	well developed	inflattened/not inflattened	with distinct denticles	present
CRYPTAMORPHA	present	present	absent	10	apical segment longest	segment 2 longest	present	well developed	not inflattened	with/without denticles	absent

Sterno-pleural suture of prothorax	Prothorax	Intercostal process of ventrite 1	Tarsi	Shape of elytra	Dorsal carina on pronotum	Lateral margin of mesosternal process	Lateral process of tentorium	Urogomphi of larva	Antennal joint 3 of larva	Tarsangular setae of larva
meeting anterior spine	elongated	broadly pointed at apex	simple	parallel-sided	absent	notched	absent	?	?	?
meeting anterior spine/anterior margin	elongated/transverse	broadly pointed at apex	segment 3 lobed	parallel-sided	absent	notched	absent	absent	minute	1
meeting anterior spine	elongated		simple	parallel-sided	absent	notched	?	?	?	?
meeting lateral margin	elongated	broadly pointed at apex	simple	parallel-sided	absent	notched	absent	absent	minute	absent
meeting anterior spine	transverse	broadly pointed at apex	segment 3 lobed	ovoid	absent	notched	absent	absent	minute	2, side by side
meeting lateral margin	elongated		segment 3 lobed	parallel-sided	absent	notched	?	absent	minute	1
meeting anterior spine	transverse	almost straight at apex	segment 3 lobed	ovoid	absent	notched	absent	?	?	?
meeting anterior spine	elongated	broadly pointed at apex	segment 3 lobed	parallel-sided	absent	notched/simple	absent	?	?	?
meeting anterior spine	elongated	almost straight at apex	simple	parallel-sided	3 longitudinal carinae present	simple	present	absent	minute	2, side by side
meeting lateral margin/anterior denticle	quadrate/elongated	broadly/narrowly pointed at apex	segments 2 & 3 lobed	ovoid/parallel-sided	absent	notched	absent	?	?	?
meeting anterior margin	elongated/transverse	almost straight at apex	segment 3 lobed	ovoid/parallel-sided	absent	notched	absent	absent	minute	2, one beyond other
meeting lateral margin	transverse	broadly pointed at apex	segments 1-3 lobed	ovoid	absent	notched	present	absent	well-developed	2, one beyond other
meeting lateral margin	elongated/transverse	narrowly pointed at apex	segment 3 bilobed	parallel-sided	absent	notched	absent	present	well-developed	2, one beyond other

S U M M A R Y

The present work deals with the detailed taxonomic studies of the family Silvanidae of India. A brief account of the historical review has been included. A few species are economically important as they are mainly stored grain pests and cause damage to stored products of vegetable origin. The nature of damage done by these species in India is dealt in detail. The habit and habitat of the Silvanidae is dealt in detail. The silvanids are found mainly under bark, haystack, leaf garbage, flower and in stored grain. The Silvanidae seems to be more diversely represented in the tropical and subtropical climate than in temperate climate of both the Old and New World. The subfamilies Silvaninae and Psammoecinae predominantly occur in the Oriental region including India, and the subfamily Cryptamorphae mainly occur in the temperate climate and also represented in the higher altitudes in India. The geographical distribution of the family and the Indian genera is cited. The genera are studied by making slide preparation of the specimens. The methods employed especially, for collection and slide preparation of adults and larvae are given. The validity and importance of all morphological characters in the taxonomy of this group have been analysed, and the distinction of Silvanidae from the closely related family Cucujidae is given. Each genus has been redefined in the light^{of} re-evaluated characters of adults.

The Silvanidae was hitherto known from India by 9 genera comprising 30 species. The Indian genera belonging to the sub-family Silvaninae are : Silvanus Latreille, Silvanoprus Reitter, Silvanoides Halstead, Protosilvanus Grouvelle, Ahasverus Gozis, Silvanolomus Reitter, Silvanopsis Grouvelle, Oryzaepphilus Ganglbauer, Monanus Sharp and Airaphilus Redtenbacher. The sub-families Psammoecinae and Cryptamorphae are represented in India by the genera Psammoecus Latreille and Cryptamorpha Wollaston respectively. A total of 62 species are described in this study; of these, 15 species in Silvaninae, 5 species in Psammoecinae and 4 species in Cryptamorphae are new to science.

1. Genus Silvanus Latreille

This genus is characterised by its simple tarsi and well-developed prothoracic anterior spines. 12 species are dealt with here, of which 2 are new to science. S. lewisi is the most common species in India.

2. Genus Silvanoprus Reitter

This genus is closely related to Silvanus and can be distinguished by its third tarsal segment lobed below. In this treatment 9 species are dealt with, of which S. angusticollis (Reitter) is recorded for the first time from India and 5 species are new to science. S. javanicus (Grouvelle) is synonymised with S. longicollis (Reitter).

3. Genus Silvanoides Halstead

This genus is closely related to Silvanus and can be separated by the femoral lines on ventrite 1 opened and antennal joints 4-8 about as long as broad or slightly transverse. Silvanoides is so far represented by two species but unrecorded from India. This genus is reported here for the first time from India, S. cheesmanae Halstead is synonymised with S. cribricollis (Grouvelle) comb.nov.

4. Genus Protosilvanus Grouvelle

This genus is characterised by its markedly flat body and antennal joints 9 and 10 usually with apical spines. This genus was so far reported only by P. lateritius (Reitter) from India, which is the most common species of Indian silvanids found under bark. The present study includes 2 new species and the detailed distribution of P. lateritius in India.

5. Genus Ahasverus Gozis

This genus can be characterised by its transverse prothorax with callosity-like anterior spines, and femoral lines on ventrite 1 opened. Ahasverus is a small genus with a single species namely, A. advena (Waltl) is stored grain pest and cosmopolitan in distribution. In this study detailed distribution of A. advena is given.

6. Genus Cathartus Reiche

This genus can be distinguished from Ahasverus by its elongated prothorax, femoral lines on ventrite 1 closed and somewhat parallel-sided body. C. quadricollis (Guérin-Méneville) which is a stored grain pest and recorded from Bangladesh.

7. Genus Silvanolomus Reitter

This genus is characterised by its lateral margin of prothorax with six teeth, without pronotal carinae and distinct 3-jointed antennal club. Silvanolomus was unrecorded from India. In the present study S. denticollis (Reitter) is recorded for the first time from India and one new species is described.

8. Genus Silvanopsis Grouvelle

This genus is closely related to Silvanolomus and can be separated by its antennal club indistinctly 3-jointed or 2-jointed and more or less parallel-sided elytra. This genus so far remains represented by two species from Singapore and Philippines. In the present study 2 new species are described from India. Of these, S. nepalensis sp.nov. is appeared to be a new genus but no attempt has been made to erect a separate genus in this study.

9. Genus Oryzaephilus Ganglbauer

This genus is easily recognised by its lateral margin of prothorax with six teeth and well-developed pronotal carinae. The present study includes 2 new species, and distribution of 2 well-known stored grain pests namely, O. surinamensis (L.) and O. mercator (Fauvel) in India.

10. Genus Monanus Sharp

This genus can be characterised by its lateral margin of prothorax with a few denticles and tarsal segments 3 and 4 lobed below. M. concinnulus (Walker) is one of the common species of Indian Silvanidae. The subgenus Monanops Grouvelle was unrecorded from India. In the present study the subgenus Monanops is recorded for the first time from India with a new species. It was realised that Grouvelle's subgenus Monanops can be given generic rank but no attempt has been made to erect a separate genus in this study.

11. Genus Airaphilus Redtenbacher

This genus is characterised by its lateral margin of prothorax with a few denticles and which bear posteriorly directed setae, and only tarsal segment 3 lobed below. In the present study A. andrewesi Grouvelle is synonymised with A. serricollis Reitter.

12. Genus Psammoecus Latreille

This genus is easily recognised by its antennal club indistinguishable, with distinct fronto-clypeal suture and securiform maxillary and labial palpi. In the present study 15 species are dealt with, of which 5 species are new, P. bellus Grouvelle is synonymised with P. nitidus Grouvelle, and P. simoni Grouvelle and P. delicatus Grouvelle are recorded for the first time from India.

13. Genus Cryptamorpha Wollaston

This genus can be characterised by and distinguished from Psammoecus by its elytra with distinct scutellary striole, apical segment of maxillary and labial palpi elongated and rather fusiform, and tarsal segment 3 bilobed. In the present study 7 species are dealt with, of which 4 are new to science.

In the portion of larval taxonomy 8 larvae are dealt with, of which Silvanoprus angusticollis (Reitter), Protosilvanus lateritius (Reitter), Cathartus sp., Airaphilus serricollis Reitter, Psammoecus bipunctatus (F.) and Cryptamorpha brevicornis (White) are described for the first time in this study.

Finally, the generic relationship has been derived by weighting similarity and dissimilarity which is represented in tabular form.

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ILLUSTRATION OF FIGURE LETTERING

aa- maxillary articulating area	la- lacinia
ant- antenna	lb- labrum
app- appophyses of metendo- sternite	lg ₁ - front leg
as- anterior spine	lg ₂ - middle leg
av- anal vein	lg ₃ - hind leg
c ₁ - front coxa	lm- labium
c ₂ - middle coxa	lp- labial palpus
c ₃ - hind coxa	lt- lateral teeth
cd- cardo	mcl- mandibular condyle
cl- clypeus	mcv - mandibular cavity
cp- carinae on pronotum	md- mandible
ct- coxite	mda- apical teeth of mandible
cu- cubitus	mil- median impressed line
cw- claw	ml- median lobe
el- elytra	mm- maxillary mala
elp- puncturation on elytra	mn- mesonotum
els- elytral suture	mo- mola
em ₂ mesoepimeron	ms- median sturt
ep- elytral epipleura	msp- mesosternal process
es ₁ - proepisternum	mt- median tentorial process
es ₃ - met-episternum	mtm- mentum
fl- femoral line	mtn- metanotum
fm- femur	mx- maxilla
fs- frontal suture	mxp- maxillary palpus
g- gula	of- occipital foramen
ga- galea	ol- ocelli
hpb- hypopharyngeal bracon	p- paramere
hr- hypostomal rod	pg- palpiger
ic- internal closure	pn- pronotum
icp- inter coxal process	pp- paraproct
	pr- prostheca
	prt- pretentorina

psp- prosternal process

ps₁ - ^{posttentorina}

rc- radial cell

rv- radial vein

s₁- prosternum

s₂- mesosternum

s₃- metasternum

s₉- sternite of abdominal segment 9

sa- sensory appendage

sc-scape

sl - ^{stylus}

slm- scutellum

sm- furcal stalk of metendosternite

sp- spiracle

ss- sterno-pleural suture

st- stipes

t₁-t₉- tergite of abdominal segments 1-9

tb- tibia

tg- tegmen

tr- trochanter

ts- tarsangular setae

ts₁- 1st tarsal segment

ts₅- 5th tarsal segment

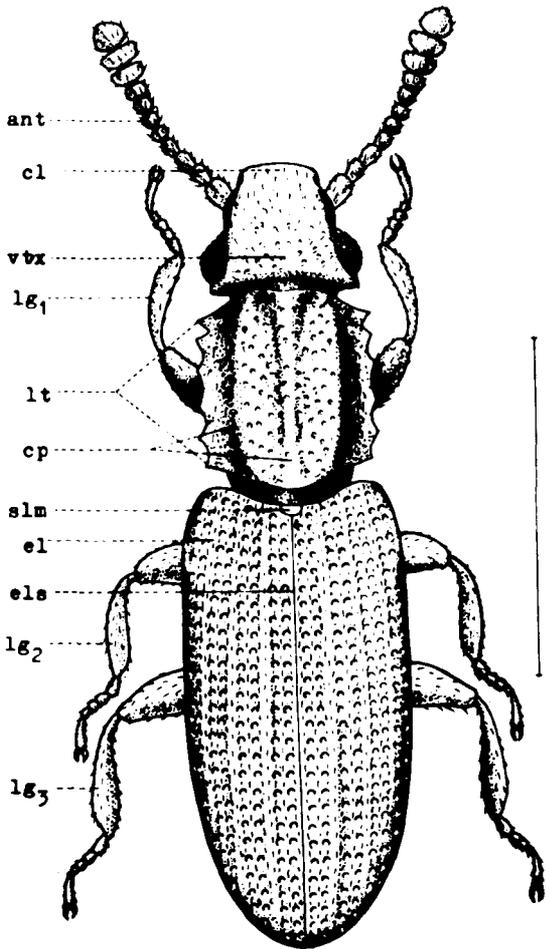
v₁-v₅- ventrites 1-5

vf- valvifer

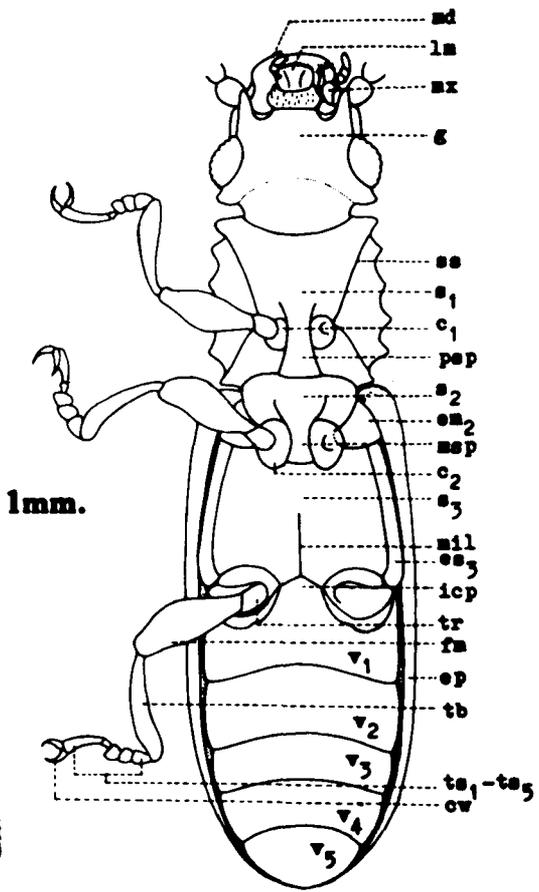
vtx- vertex

T E X T - F I G U R E S

Figs. 1-2. Oryzaepphilus mercator (Fauvel): 1, Dorsal
view; 2, Ventral view.

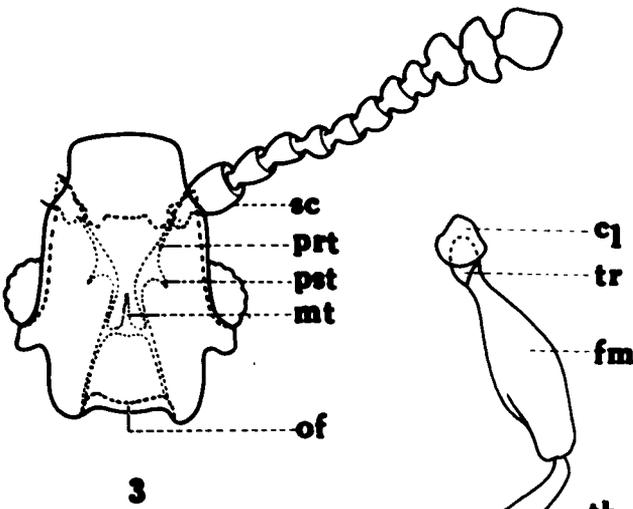


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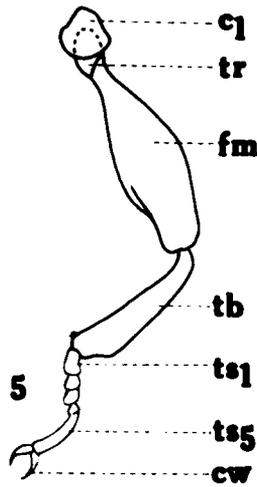


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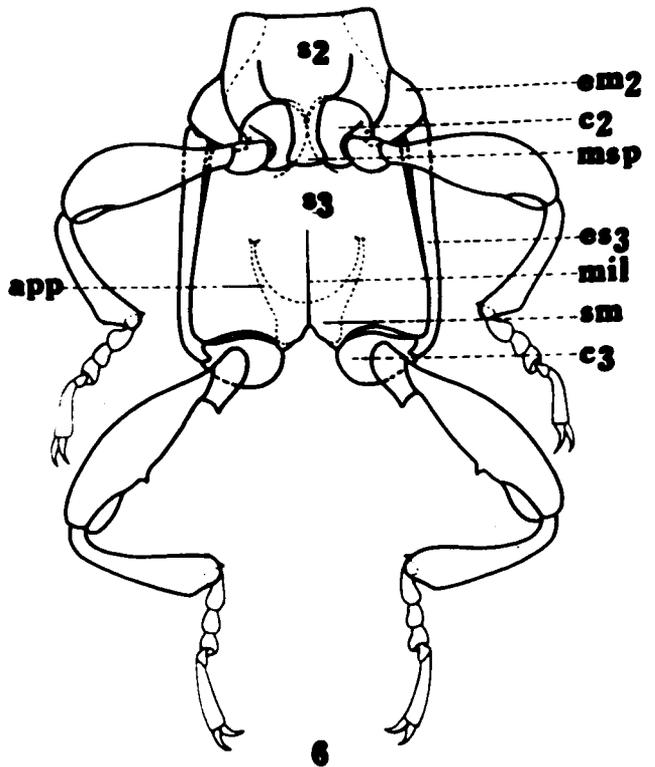
Figs.3-9. Oryzaepphilus mercator (Fauvel) : 3, Head, Dorsal view; 4, Prothorax, Ventral view; 5, Front leg; 6, Meso-metathorax, Ventral view; 7, Left elytron, Dorsal view; 8, Abdomen, Ventral view; 9, Wing.



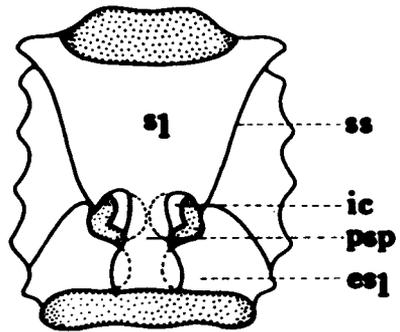
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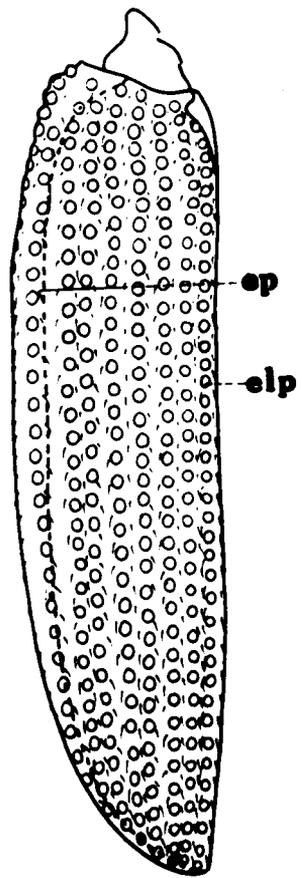
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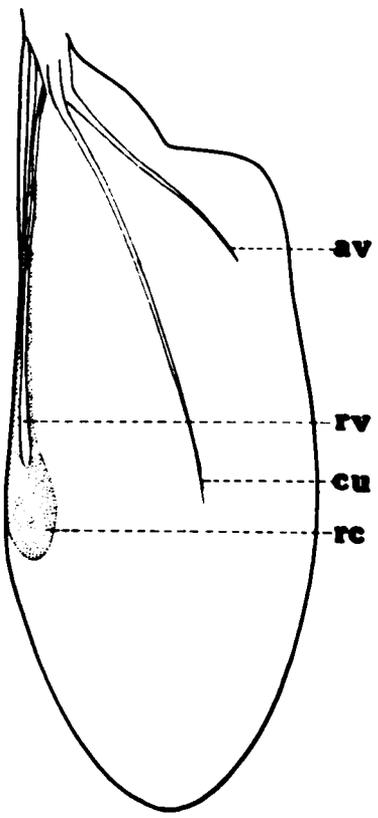
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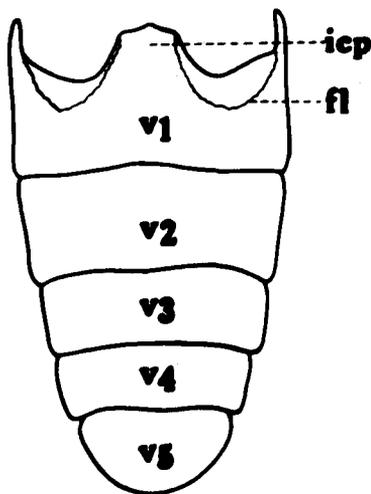
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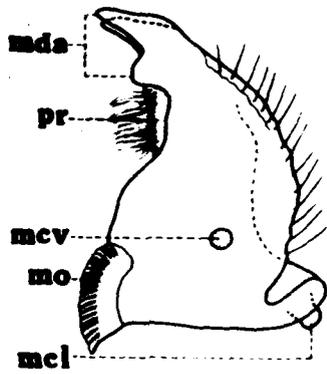


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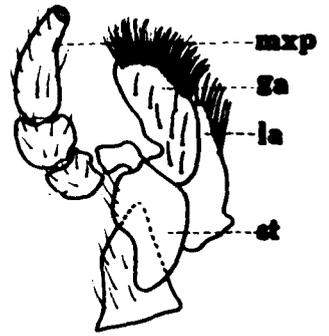


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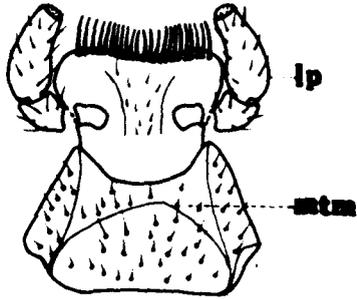
Figs.10-15. Oryzaepphilus mercator (Fauvel): 10, Right mandible, Dorsal view; 11, Maxilla; 12, Labium, Ventral view; 13, Labrum; 14, Aedeagus, Dorsal view; 15, Ovipositor.



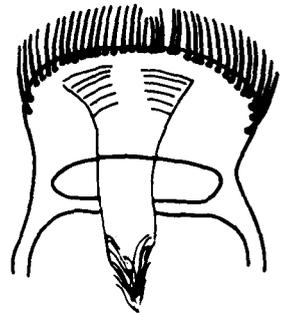
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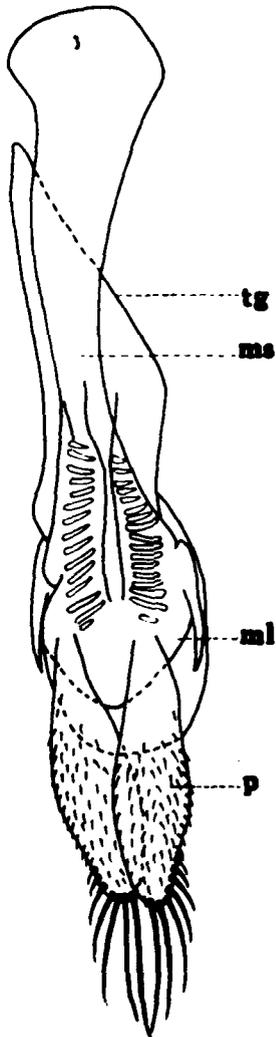
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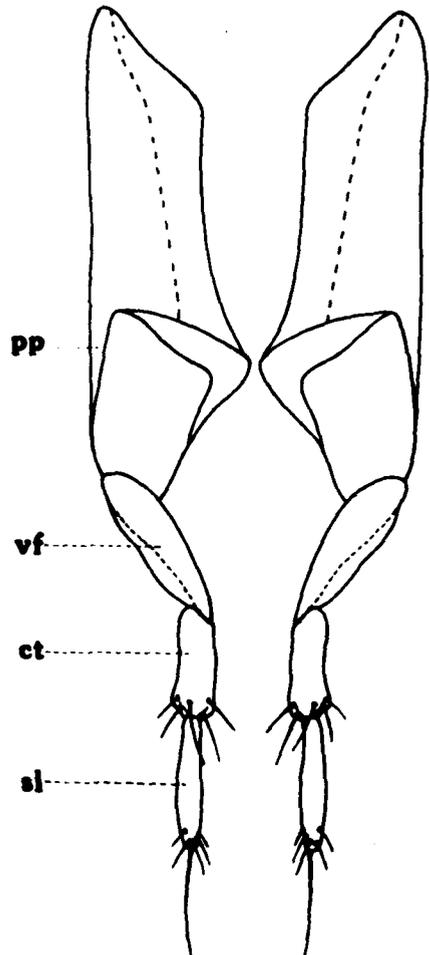
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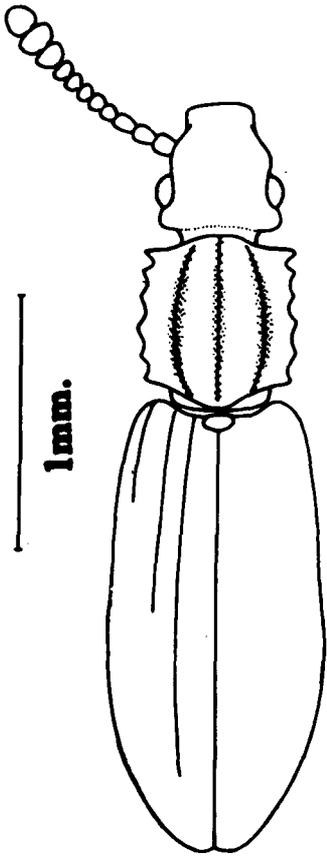


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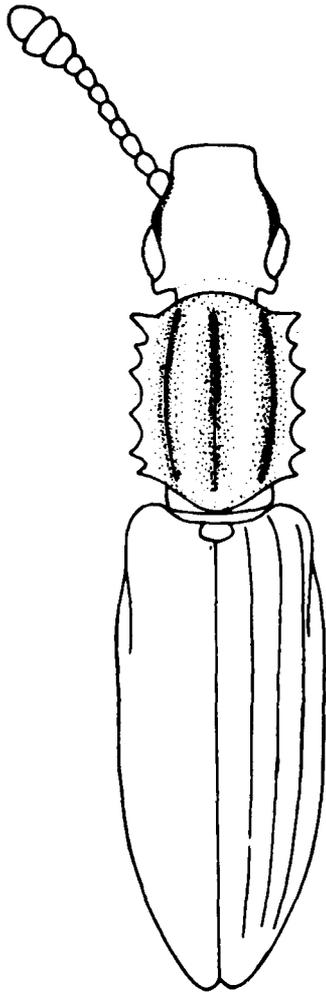


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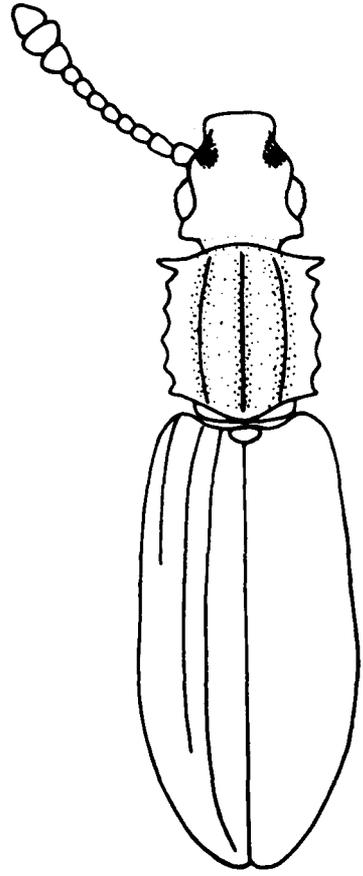
Figs.16-18. Dorsal view: 16, Oryzaephilus surinamensis(L.);
17, Oryzaephilus elevatus sp.nov.; 18, Oryzaephilus
genalis sp.nov.



16

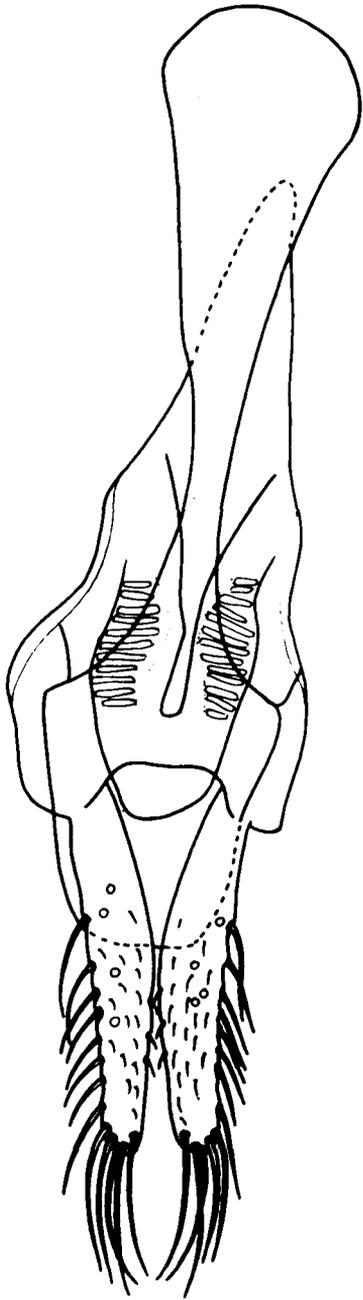


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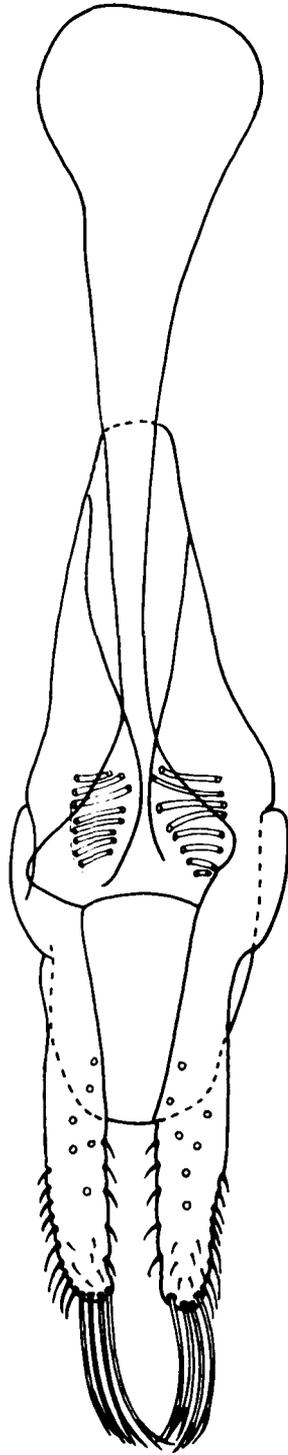


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Figs.19-20. Aedeagus, Dorsal view: 19, Oryzaephilus
surinamensis(L.); 20, Oryzaephilus
genalis sp.nov.

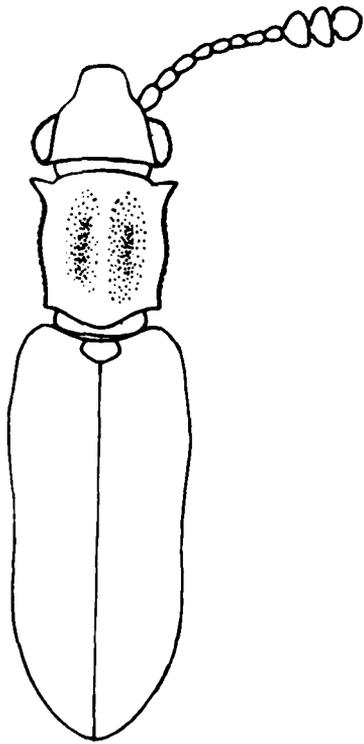


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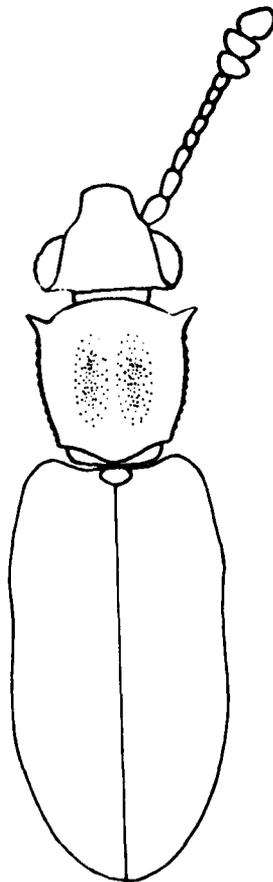


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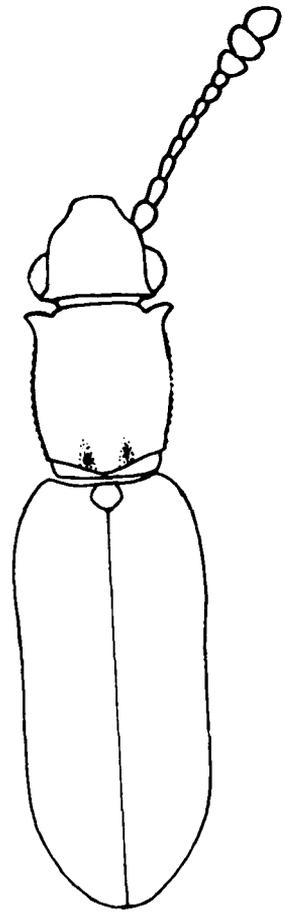
Figs.21-26. Dorsal view: 21, Silvanus lewisi Reitter;
22, Silvanus imitatus Pal and Sengupta;
23, Silvanus rossi Halstead; 24, Silvanus
indicus sp.nov.; 25, Silvanus recticollis
Reitter; 26, Silvanus bidentatus (Fabricius).



21

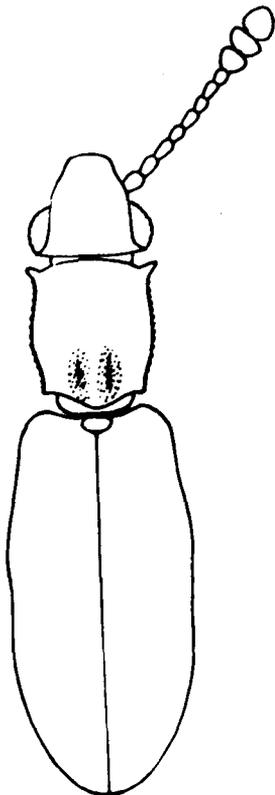


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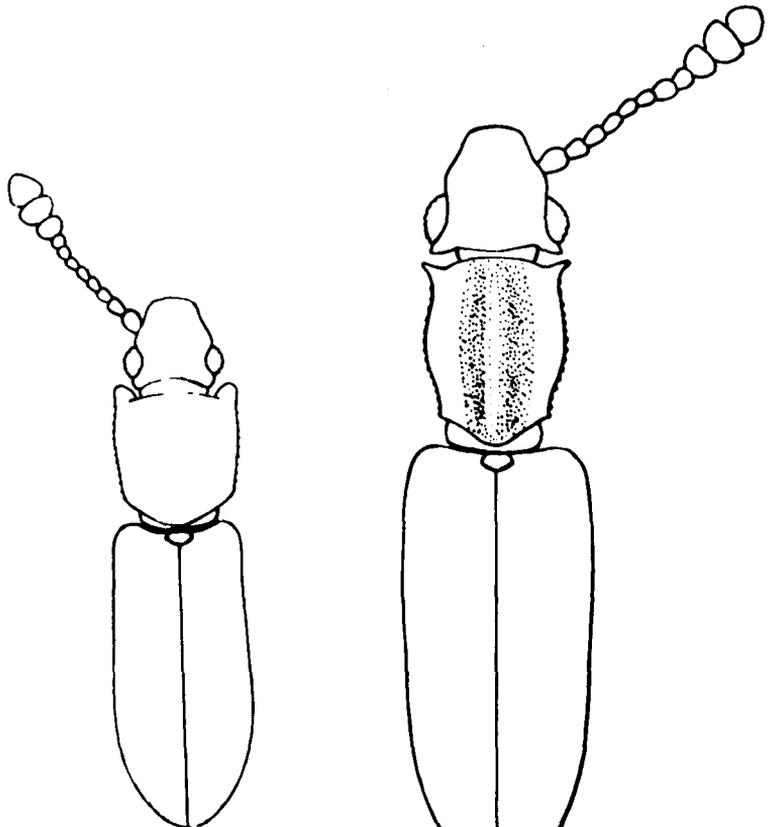


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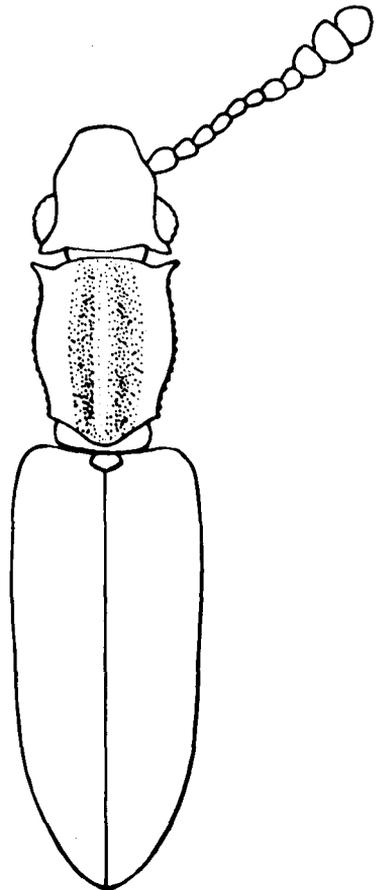
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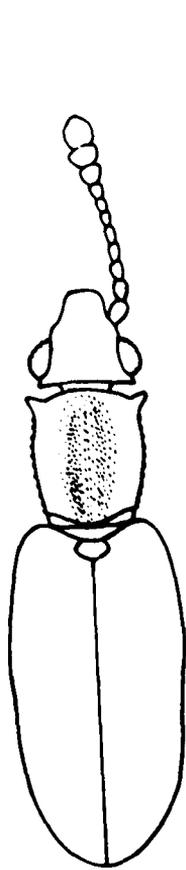


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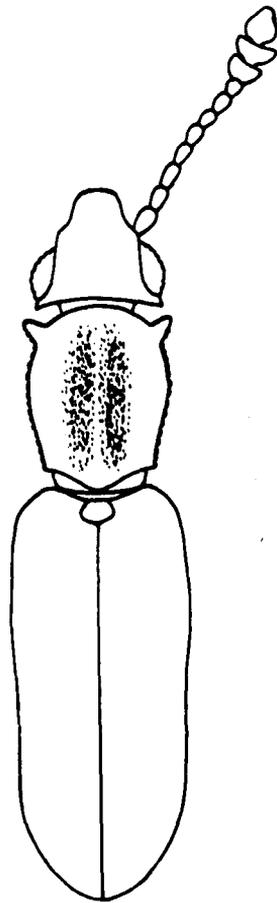


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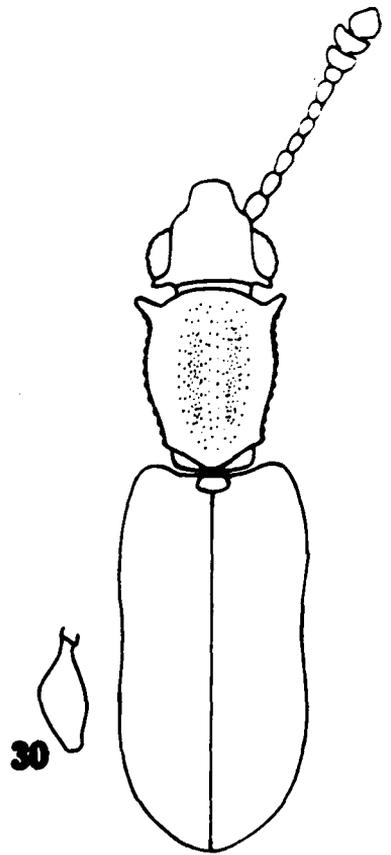
- Figs.27-34. 27, Silvanus difficilis Halstead, Dorsal view;
28, Silvanus gibbus Pal and Sengupta, Dorsal view;
29, Silvanus ruficorpus Pal and Sengupta, Dorsal view;
30, Hind femur of Silvanus ruficorpus Pal and Sengupta;
31, Silvanus nigrans Pal and Sengupta, Dorsal view;
32, Hind femur of Silvanus nigrans Pal and Sengupta;
33, Silvanus andamanicus sp.nov., Dorsal view;
34, Silvanus curvispinus Pal and Sengupta, Dorsal view.



27



28

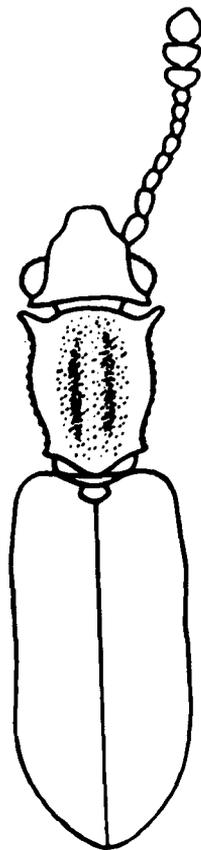


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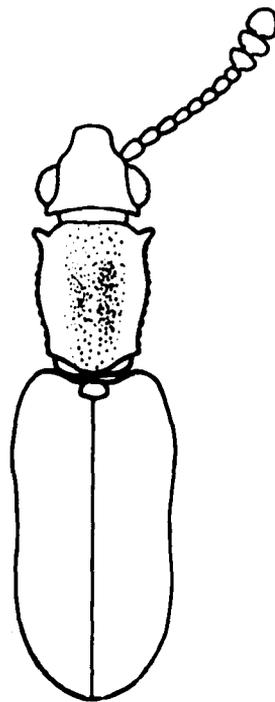
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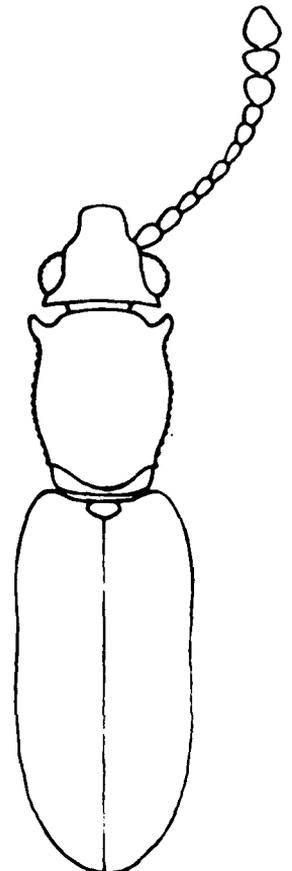
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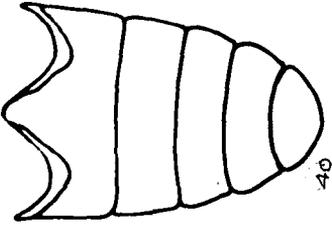
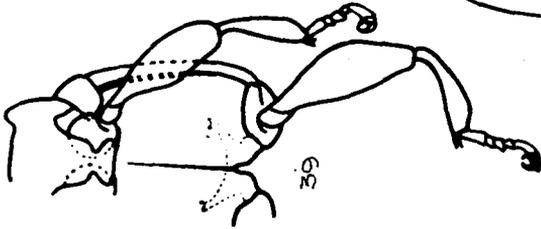
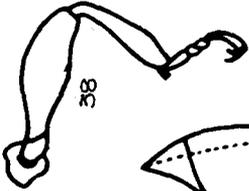
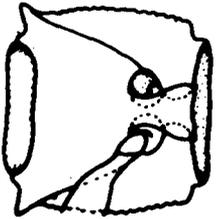
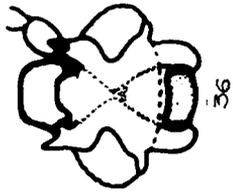
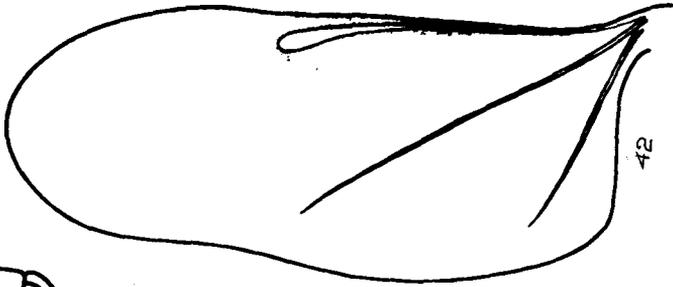
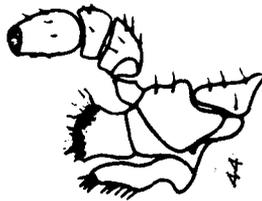
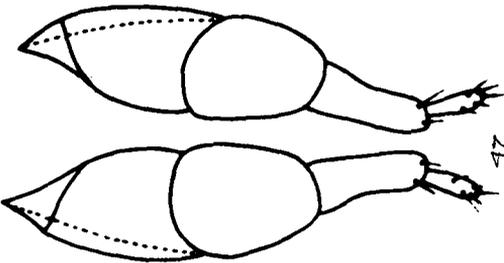
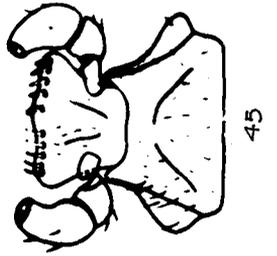
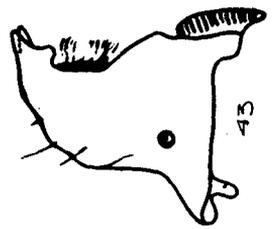
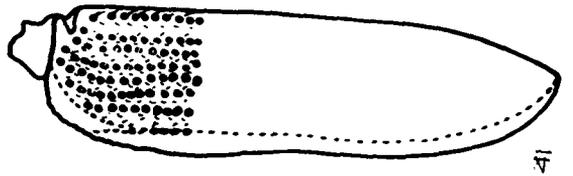
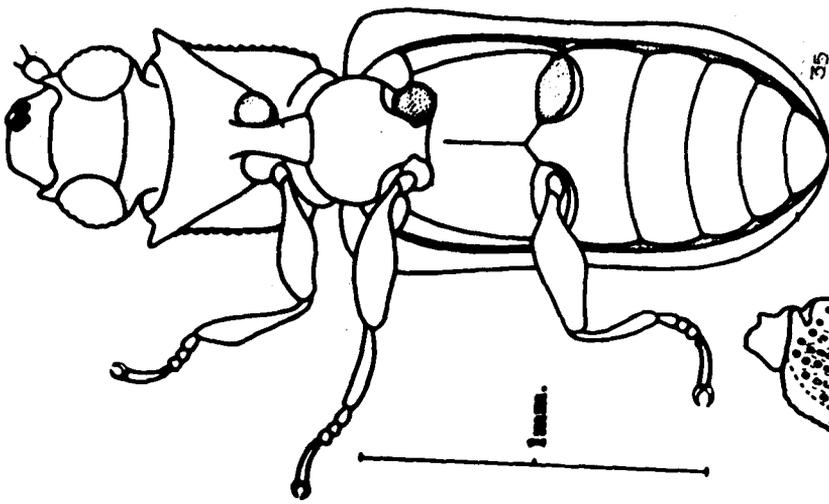


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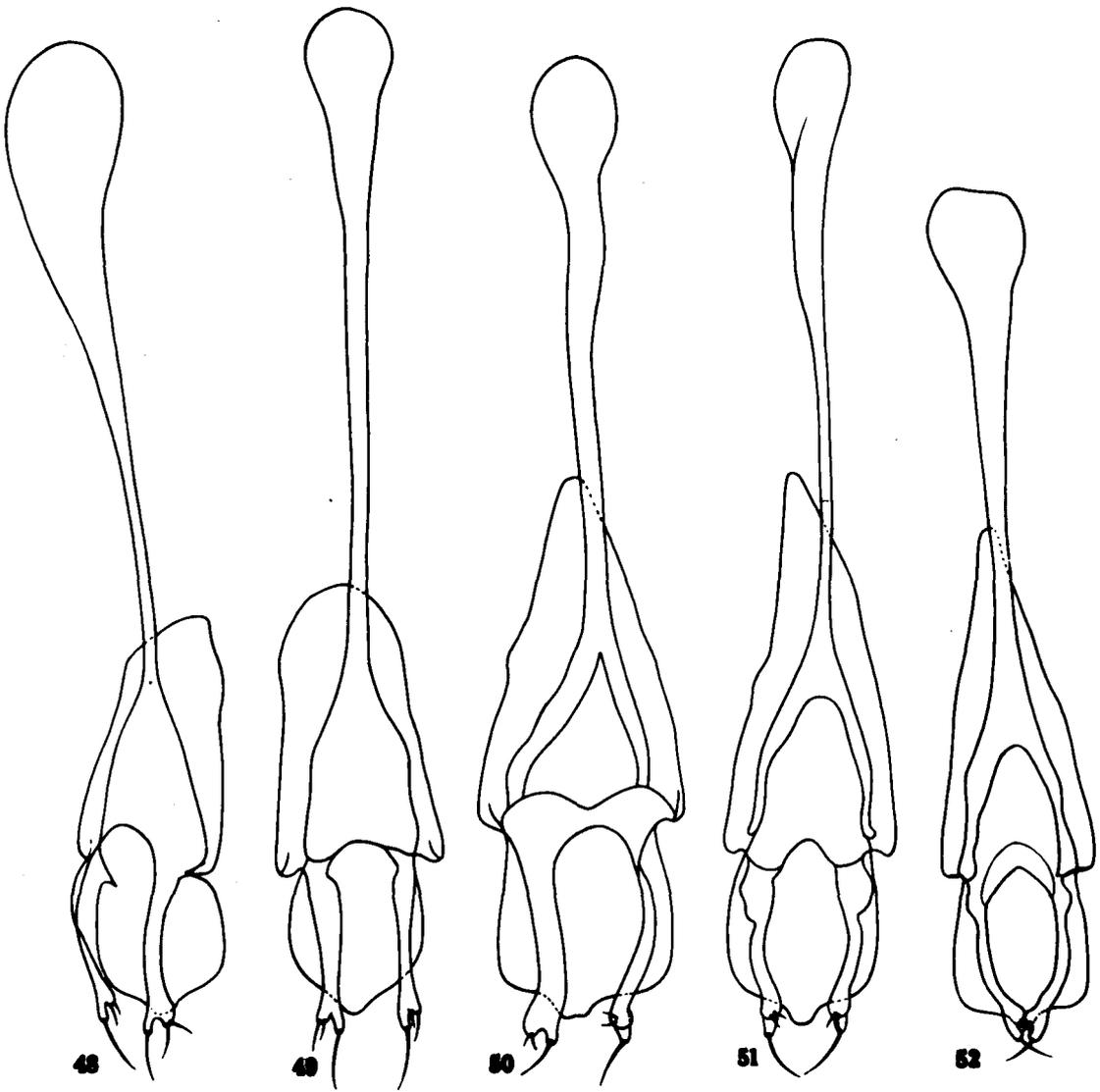


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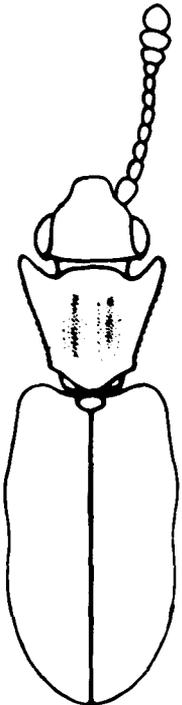
Figs.35-47. Silvanus lewisi Reitter: 35, Ventral view;
36, Head, Ventral view; 37, Prothorax,
Ventral view; 38, Front leg; 39, Meso-
metathorax, Ventral view; 40, Abdomen,
Ventral view; 41, Left elytron, Dorsal view;
42, Wing; 43, Left mandible, Dorsal view;
44, Maxilla; 45, Labium, Ventral view; 46,
Labrum; 47, Ovipositor.



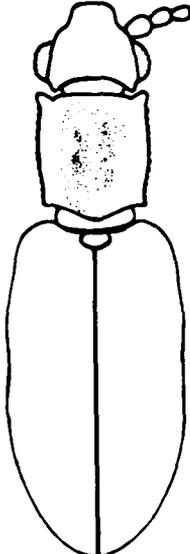
Figs.48-52. Aedeagus, Dorsal view: 48, Silvanus lewisi Reitter; 49, Silvanus indicus sp.nov.; 50, Silvanus gibbus Pal and Sengupta; 51, Silvanus ruficarpus Pal and Sengupta; 52, Silvanus andamanicus sp.nov.



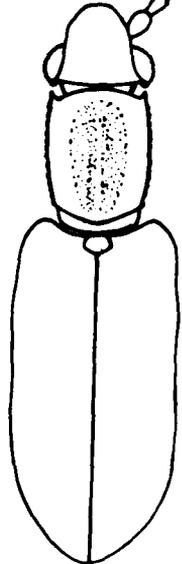
Figs.53-63. Dorsal view: 53, Silvanoprus scuticollis (Walker);
54, Silvanoprus indicus sp.nov.; 55, Silvanoprus
cephalotes (Reitter); 56, Silvanoprus angusticollis
(Reitter); 57, Head and prothorax of a variant of
Silvanoprus angusticollis (Reitter); 58, Silvanoprus
nepalensis sp.nov.; 59, Silvanoprus prolixicornis
sp.nov.; 60, Silvanoprus longicollis (Reitter);
61, Head and prothorax of a variant of Silvanoprus
longicollis (Reitter); 62, Silvanoprus palnicus sp.nov.;
63, Silvanoprus distinguendus sp.nov. (Halstead MS.name).



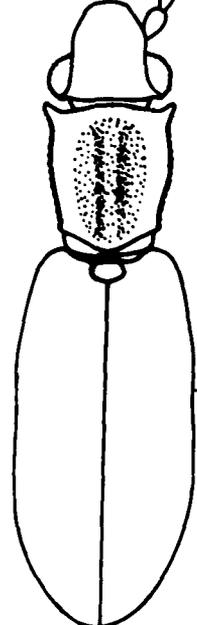
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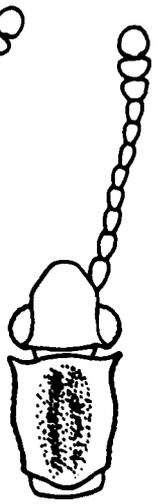
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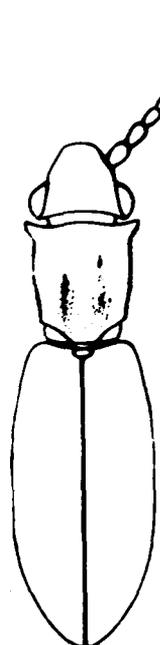


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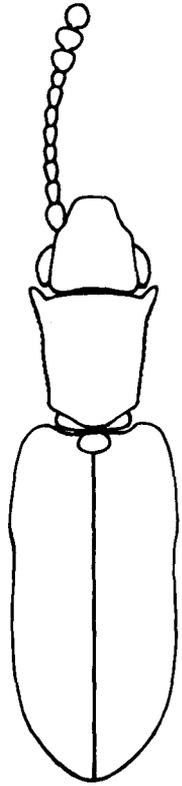


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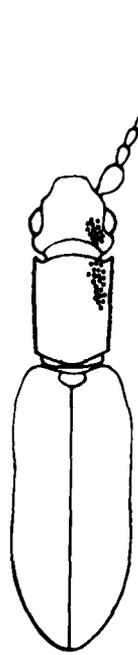
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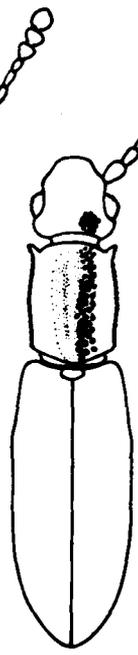
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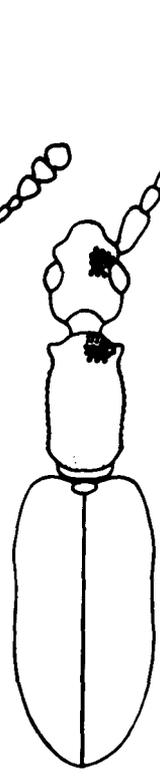
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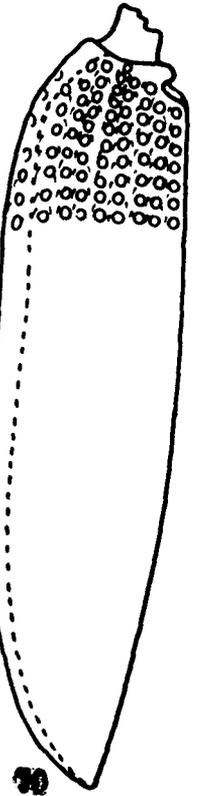
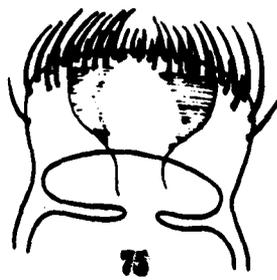
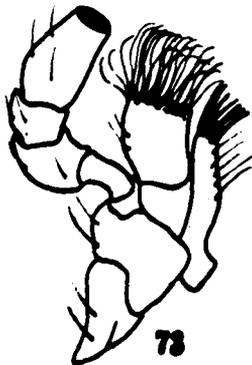
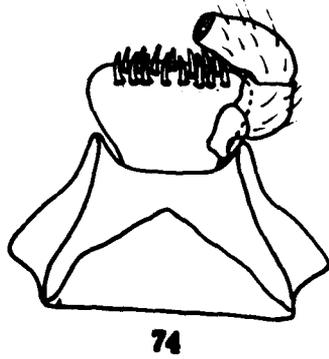
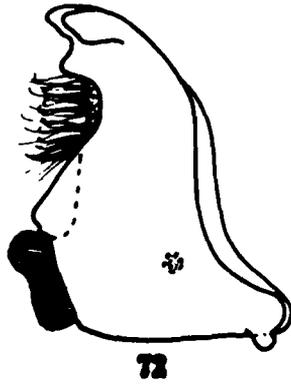
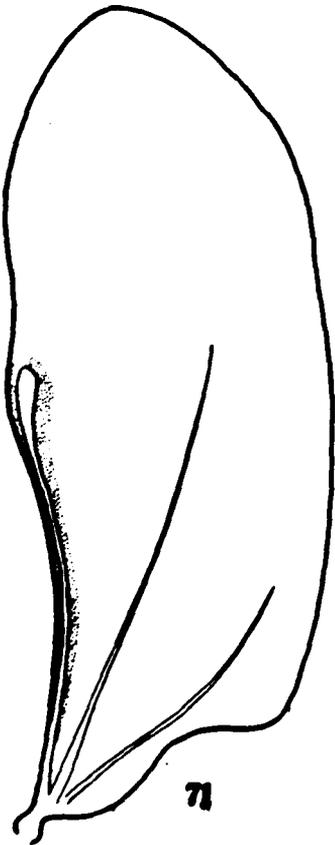
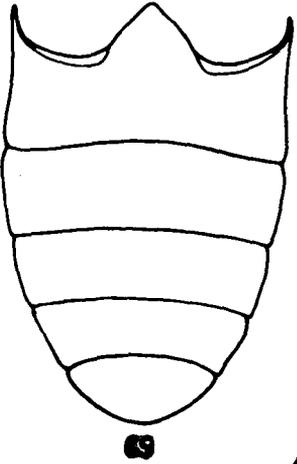
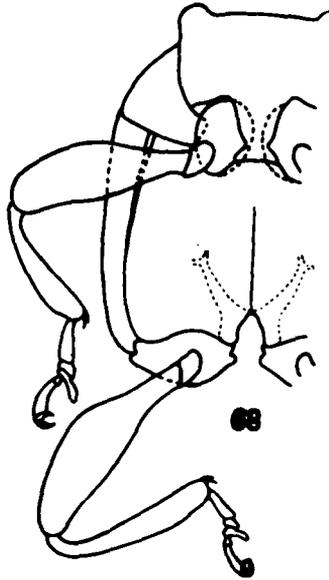
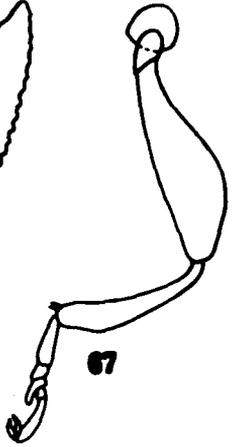
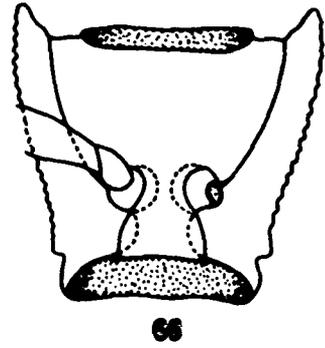
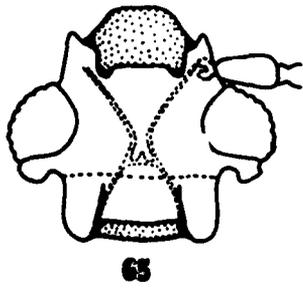
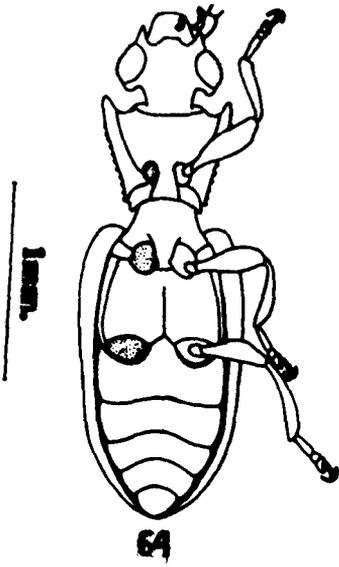


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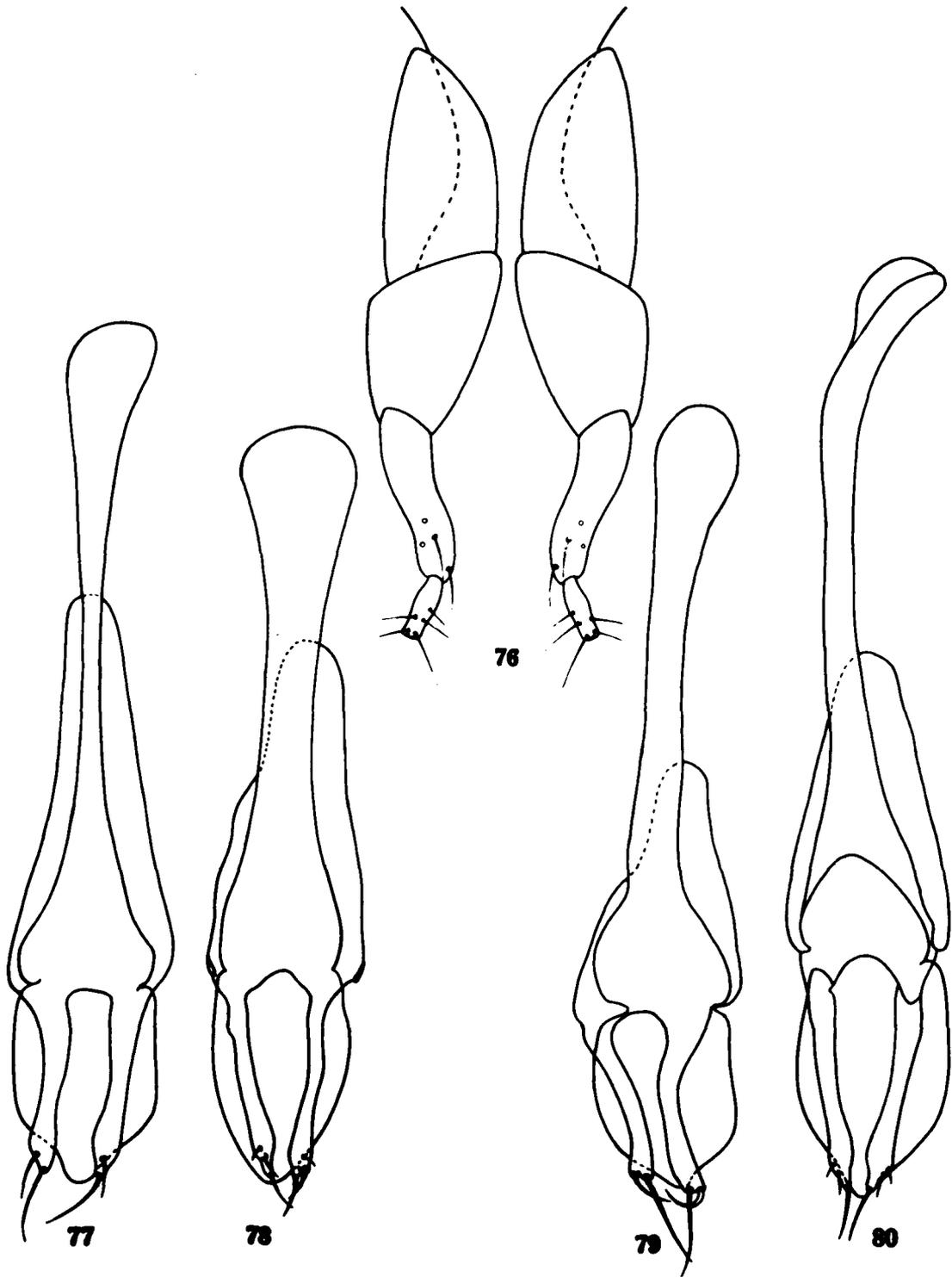
63

Figs.64-75. Silvanoprus scuticollis (Walker): 64, Ventral view; 65, Head, Ventral view; 66, Prothorax, Ventral view; 67, Front leg; 68, Meso-metathorax, Ventral view; 69, Abdomen, Ventral view; 70, Left elytron, Dorsal view; 71, Wing; 72, Left mandible, Ventral view; 73, Maxilla; 74, Labium, Ventral view; 75, Labrum.

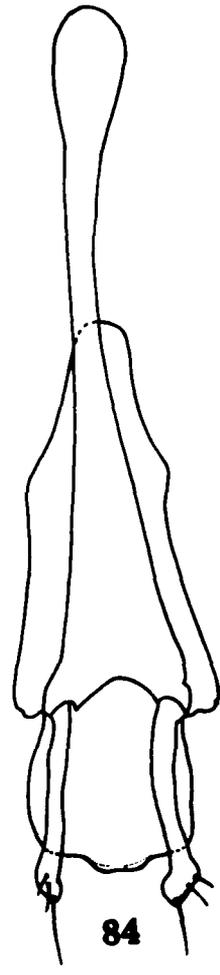
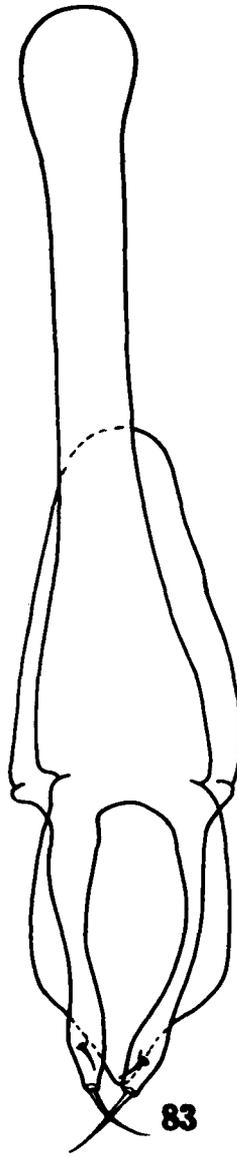
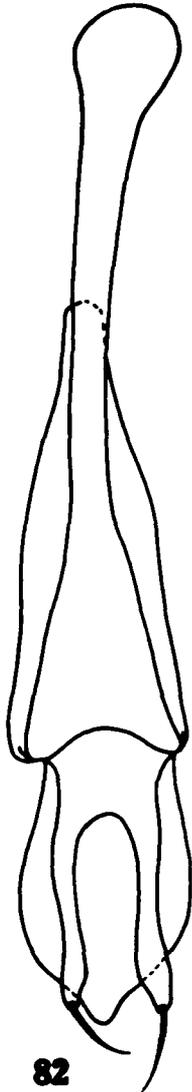
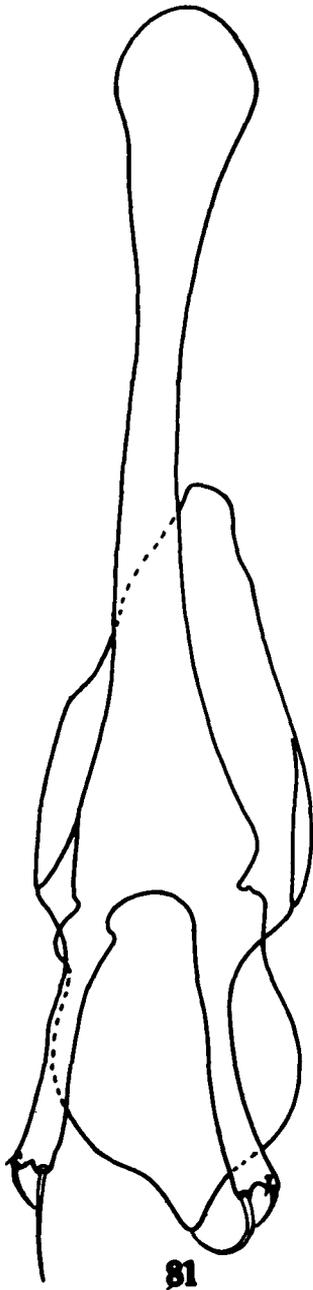


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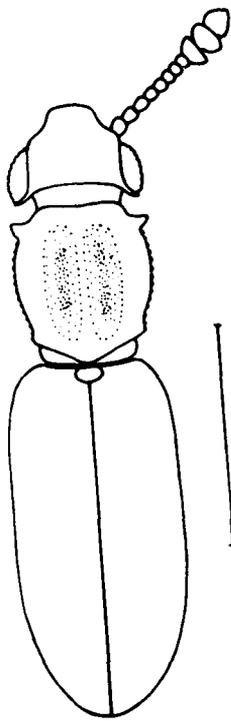
Figs.76-80. 76, Ovipositor of Silvanoprus scuticollis (Walker);
77, Aedeagus of Silvanoprus scuticollis (Walker),
Dorsal view; 78, Aedeagus of Silvanoprus indicus
sp.nov.; 79, Aedeagus of Silvanoprus cephalotes
(Reitter), Dorsal view; 80, Aedeagus of Silvanoprus
prolixicornis sp.nov., Dorsal view.



Figs.81-84. Aedeagus, Dorsal view: 81, Silvanoprus angusticollis (Reitter); 82, Silvanoprus longicollis (Reitter); 83, Silvanoprus palnicus sp.nov.; 84, Silvanoprus distinguendus Halstead sp.nov. (MS.name).

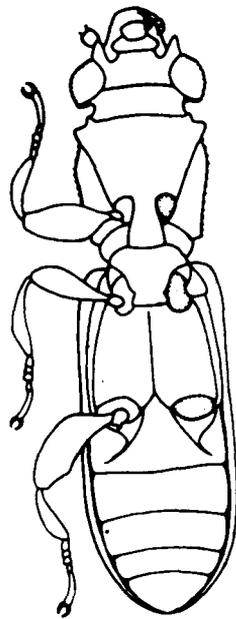


Figs.85-87. Silvanoides cribricollis (Grouvelle): 85, Dorsal view; 86, Ventral view of male; 87, Aedeagus, Dorsal view.

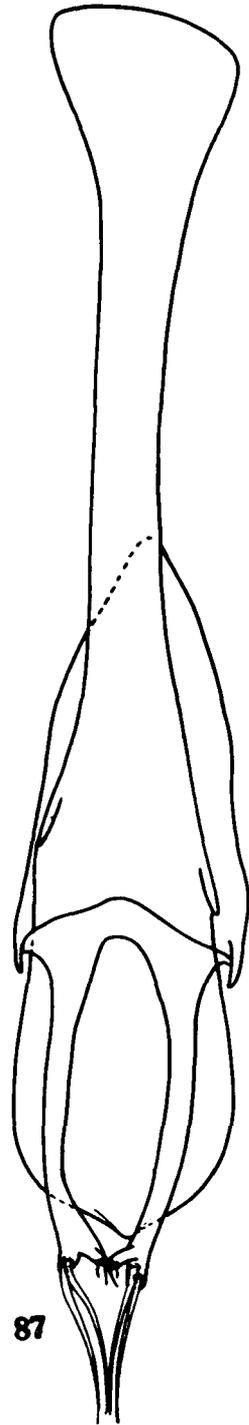


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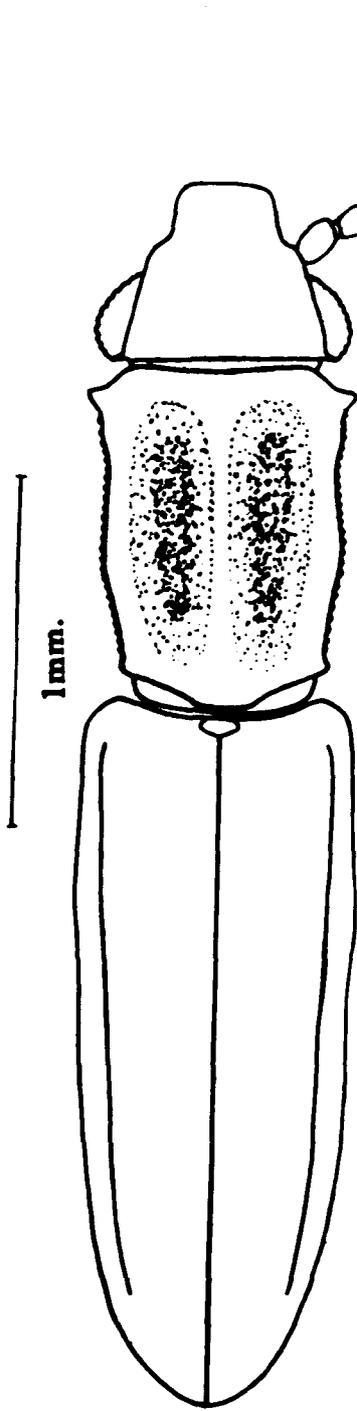
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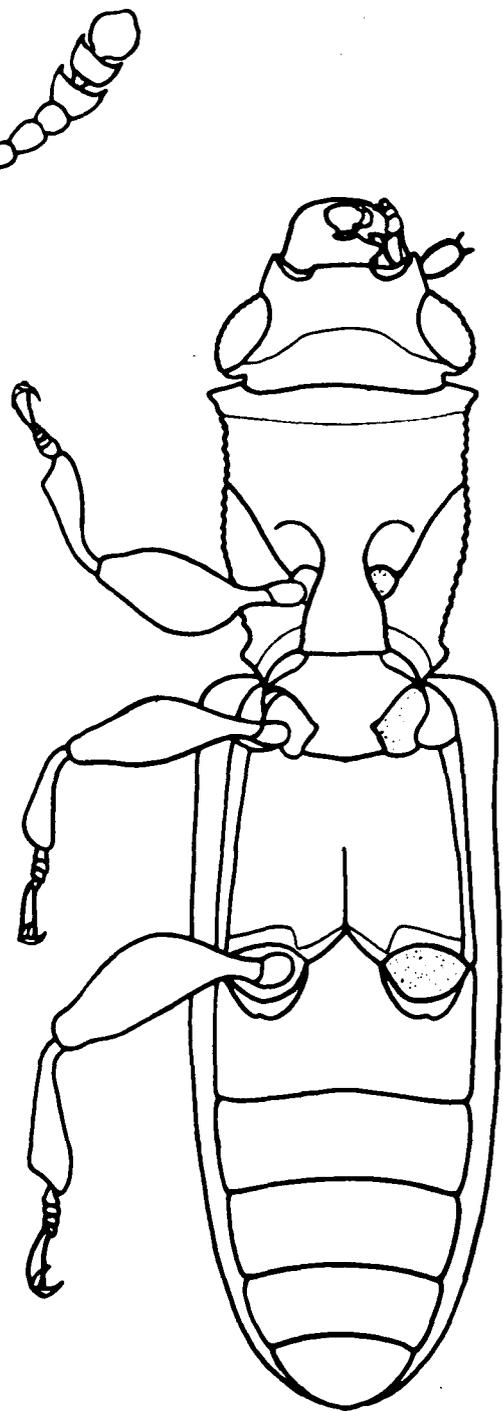
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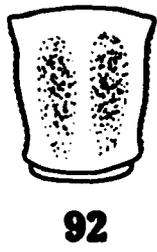
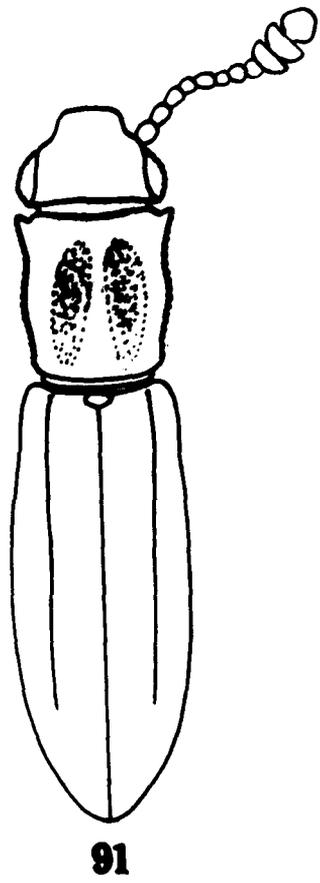
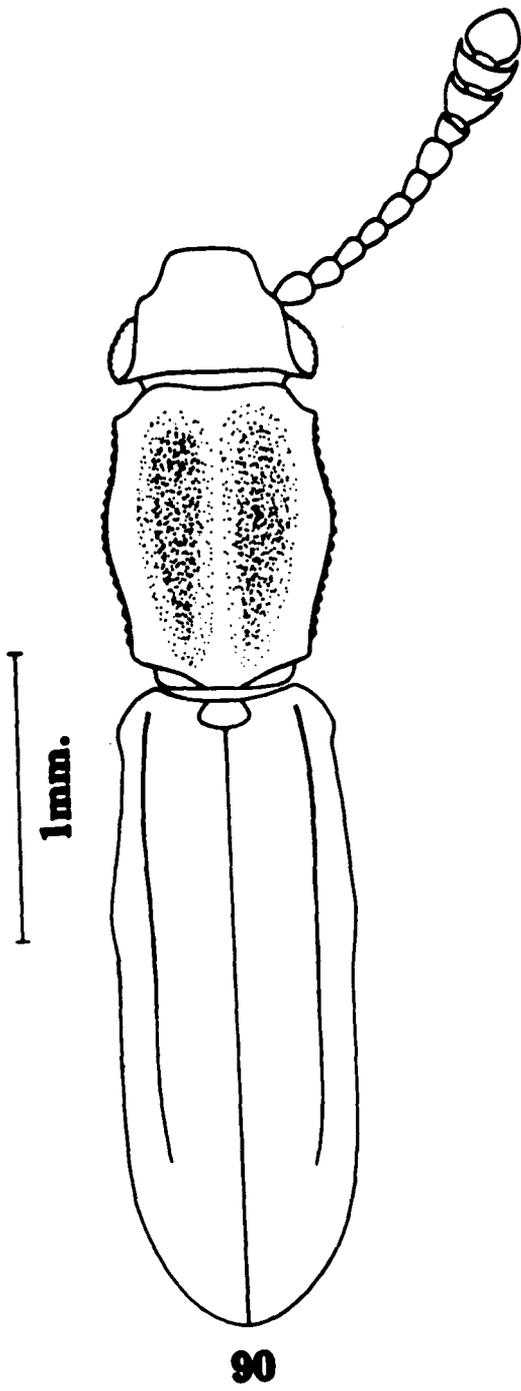


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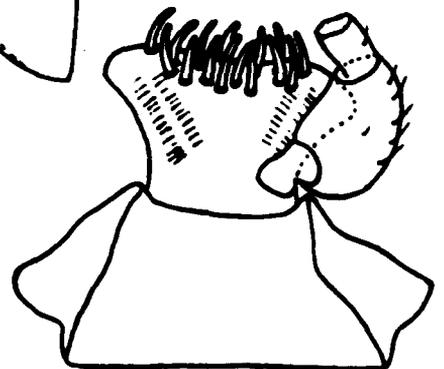
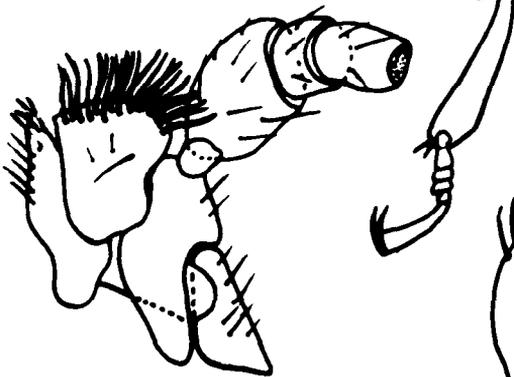
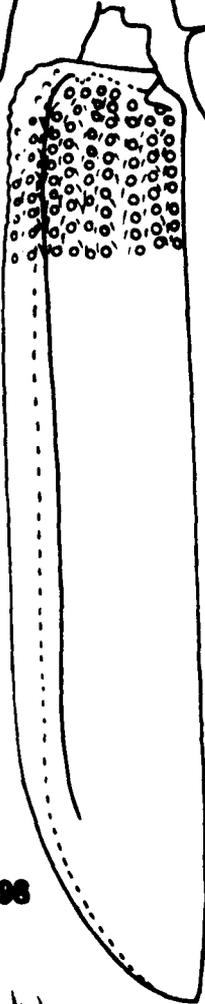
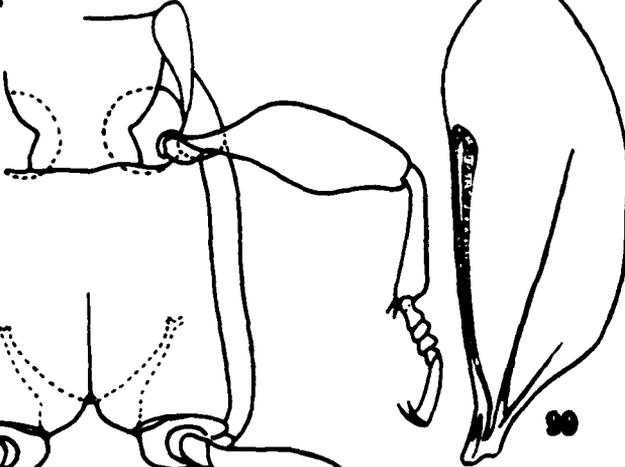
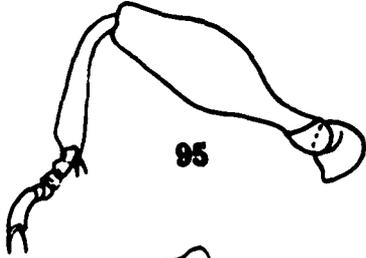
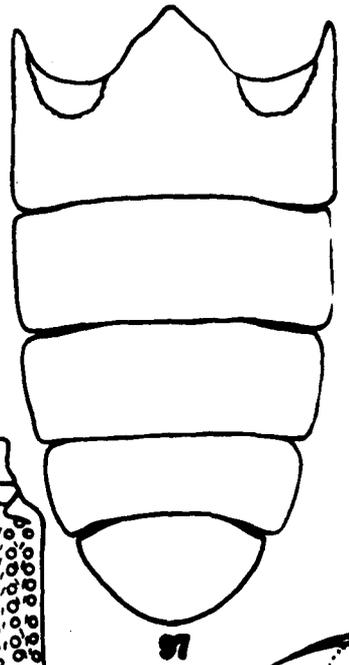
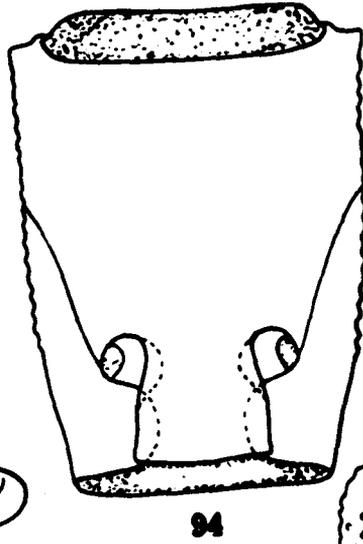
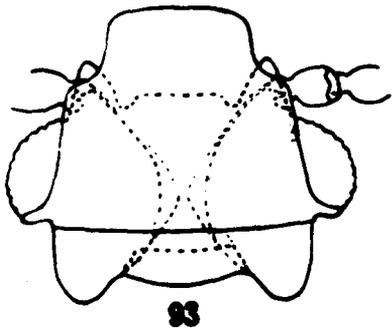


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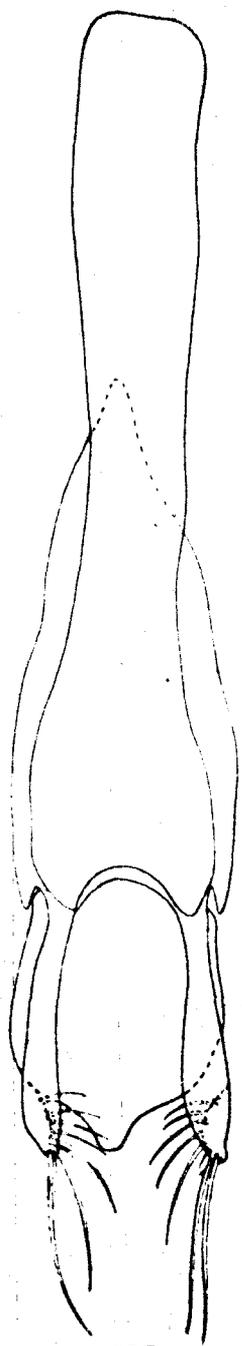
Figs.90-92. 90, Protosilvanus dehradunus sp.nov., Dorsal
view; 91, Protosilvanus minutus sp.nov., Dorsal
view; 92, Pronotum of a variant of Protosilvanus
minutus sp.nov.



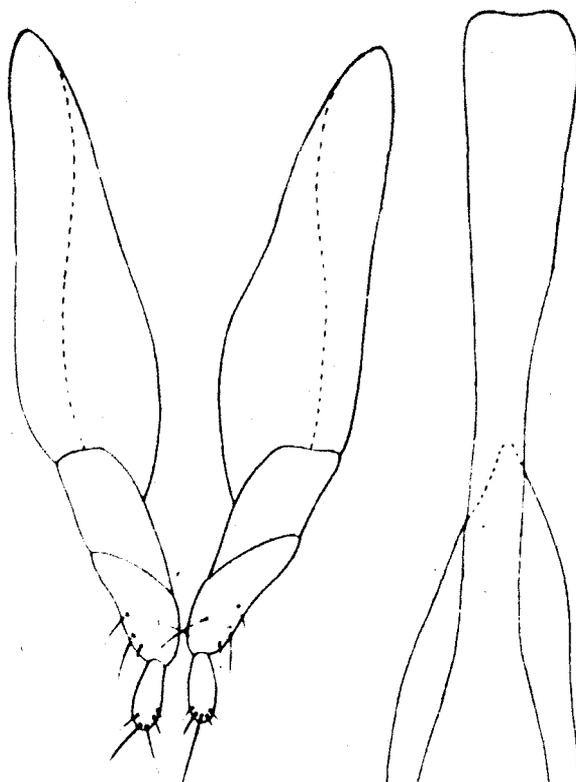
Figs.93-103. Protosilvanus lateritius (Reitter): 93, Head, Dorsal view; 94, Prothorax, Ventral view; 95, Front leg; 96, Meso-metathorax, Ventral view; 97, Abdomen, Ventral view; 98, Left elytron, Dorsal view; 99, Wing; 100, Left Mandible, Dorsal view; 101, Maxilla; 102, Labium, Ventral view; 103, Labrum.



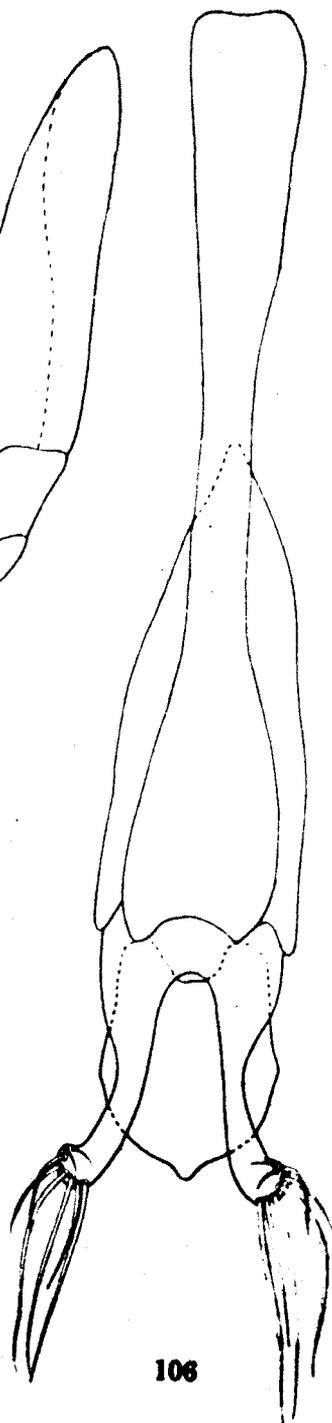
Figs.104-106. 104, Ovipositor of Protosilvanus lateritius (Reitter); 105, Aedeagus of Protosilvanus lateritius (Reitter), Dorsal view; 106, Aedeagus of Protosilvanus minutus sp.nov., Dorsal view.



105

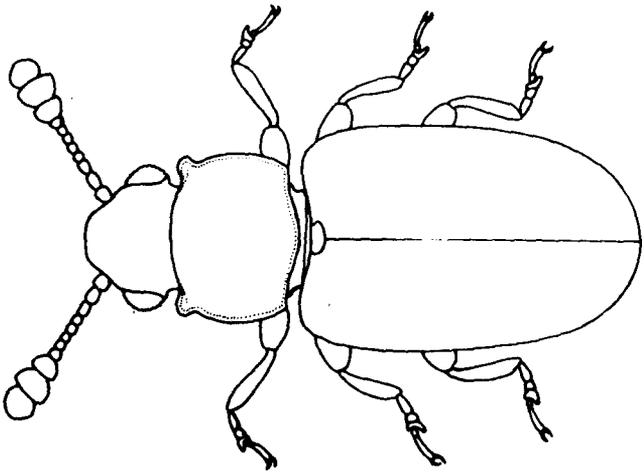


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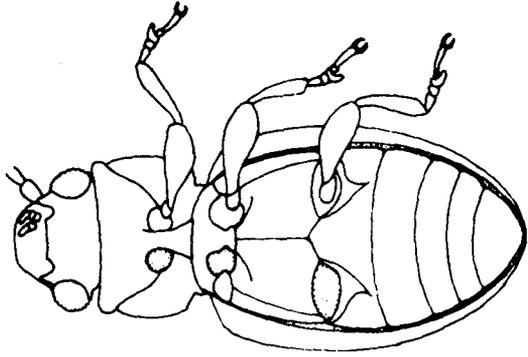
106

Figs.107-108. Ahasverus advena (Waltl) : 107, Dorsal view;
108, Ventral view.



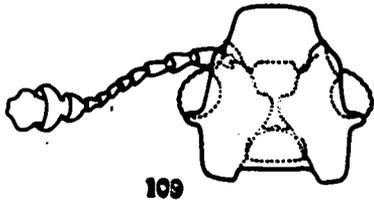
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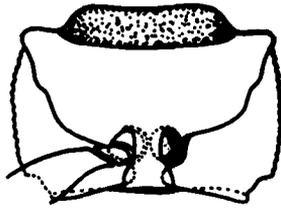


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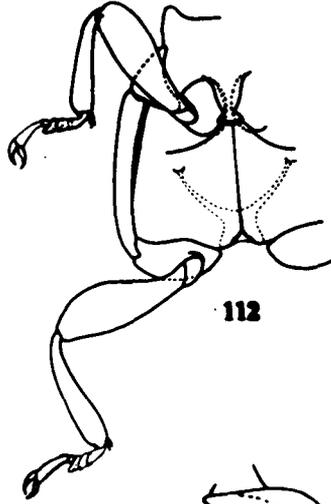
Figs.109-121. Ahasverus advena (Waltl): 109, Head, Dorsal view; 110, Prothorax, Ventral view; 111, Front leg; 112, Meso-metathorax, Ventral view; 113, Abdomen, Ventral view; 114, Right elytron, Dorsal view; 115, Wing; 116, Right mandible, Dorsal view; 117, Maxilla; 118, Labium, Ventral view; 119, Labrum; 120, Aedeagus, Dorsal view; 121, Ovipositor.



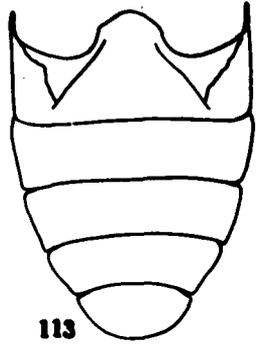
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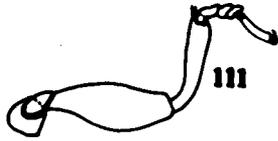
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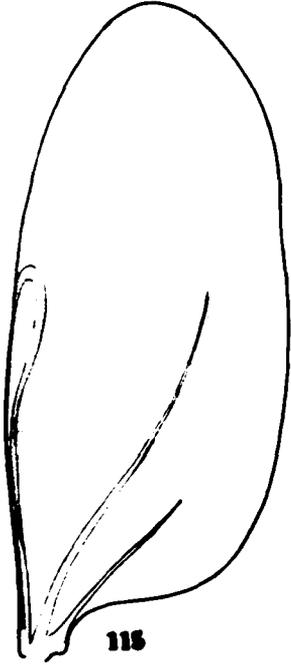
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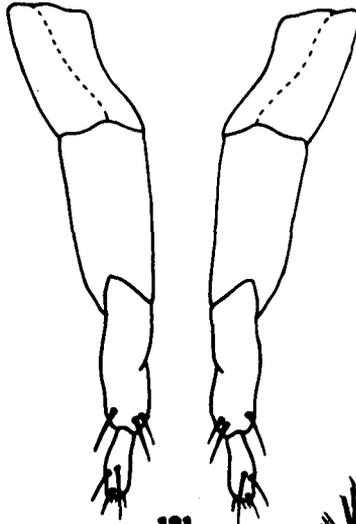
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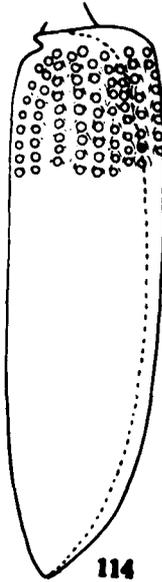
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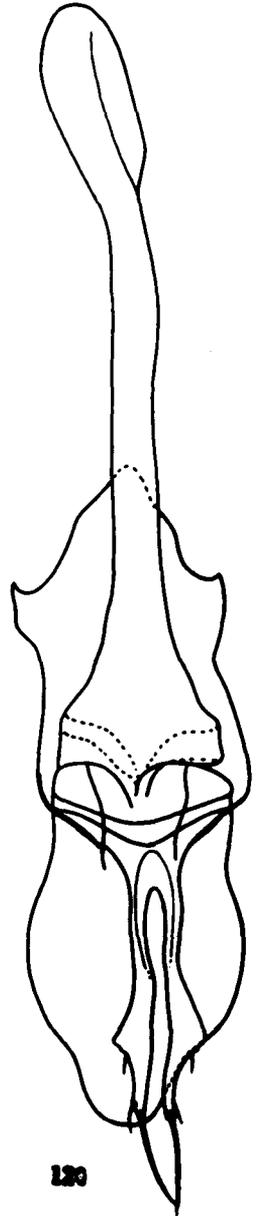
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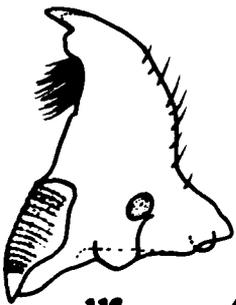
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114



120



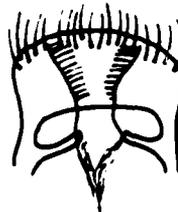
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117

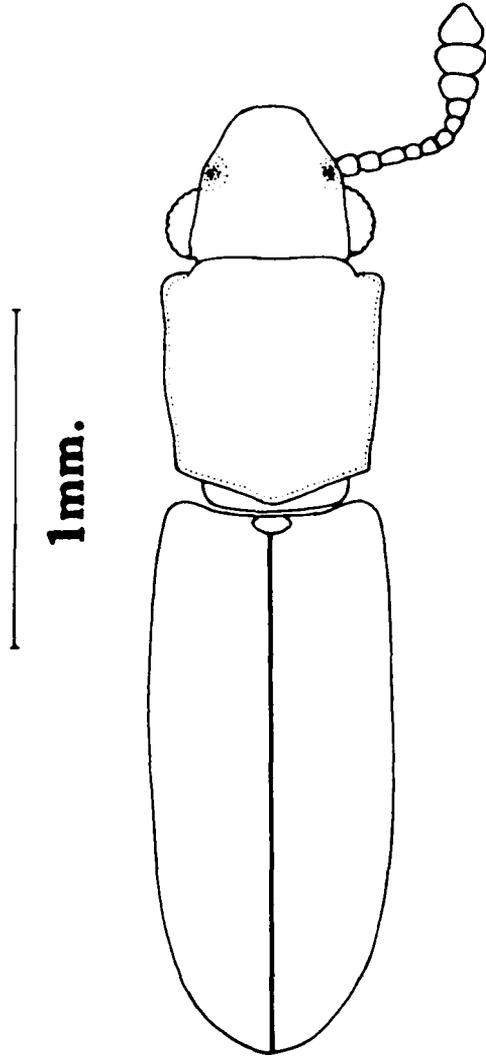


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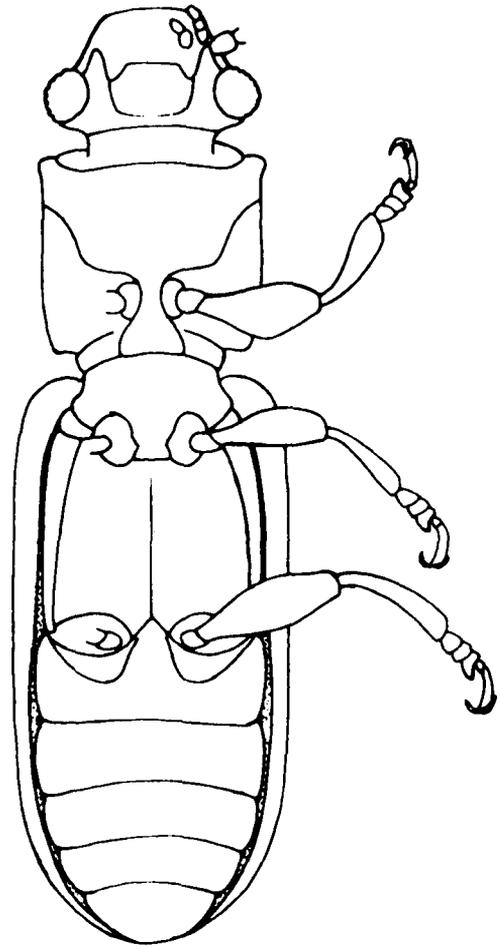


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Figs. 122-123. Cathartus quadricollis (Guérin-Méneville):
122, Dorsal view; 123, Ventral view.

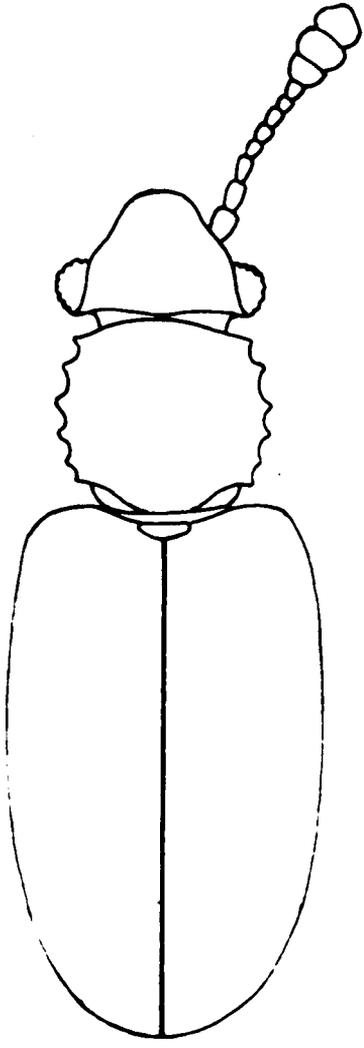


122



123

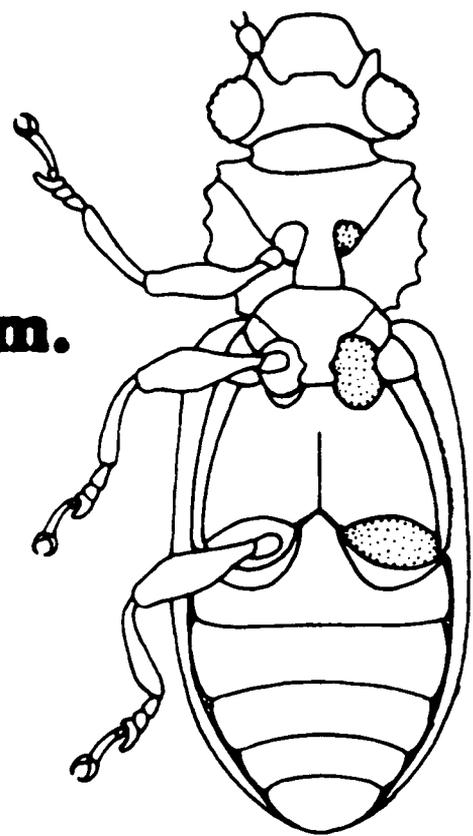
Figs. 124-125. Silvanolomus denticollis (Reitter):
124, Dorsal view; 125, Ventral view.



124

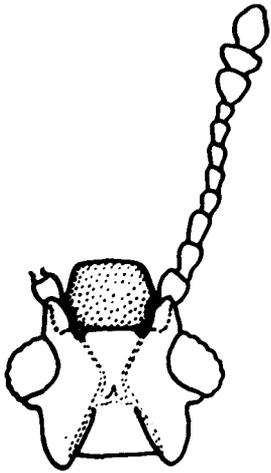


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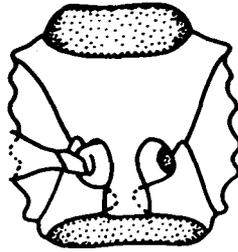


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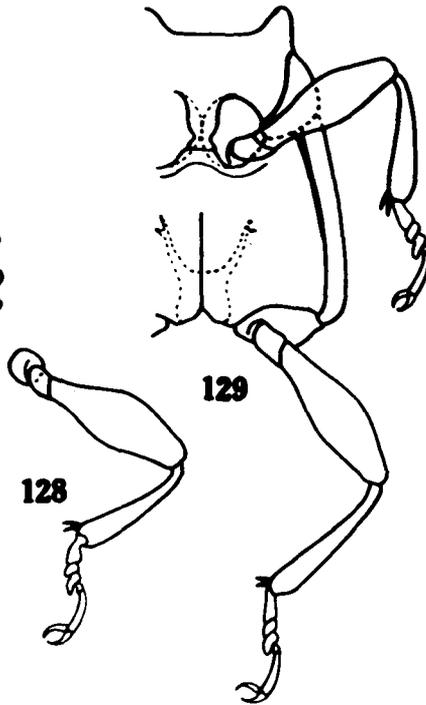
Figs.126-136. Silvanolomus denticollis Reitter: 126, Head, Ventral view; 127, Prothorax, Ventral view; 128, Front leg; 129, Meso-metathorax Ventral view; 130, Abdomen, Ventral view; 131, Right elytron, Dorsal view; 132, Wing; 133, Left mandible, Ventral view; 134, Maxilla; 135, Labium, Ventral view; 136, Labrum.



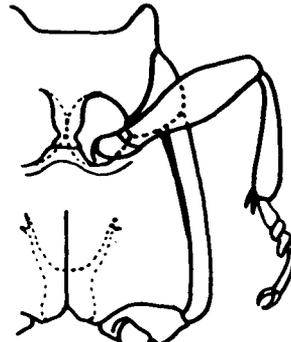
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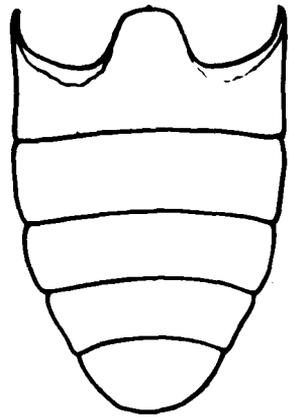
127



128



129



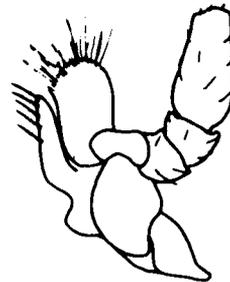
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132



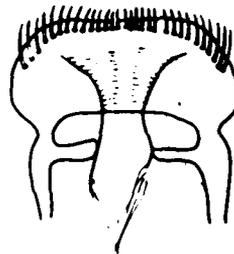
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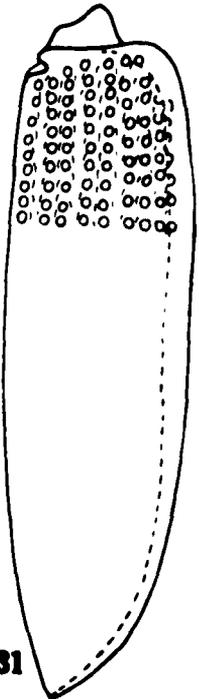
134



135

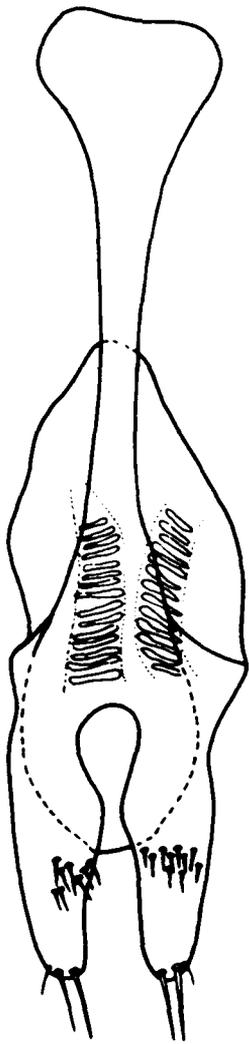


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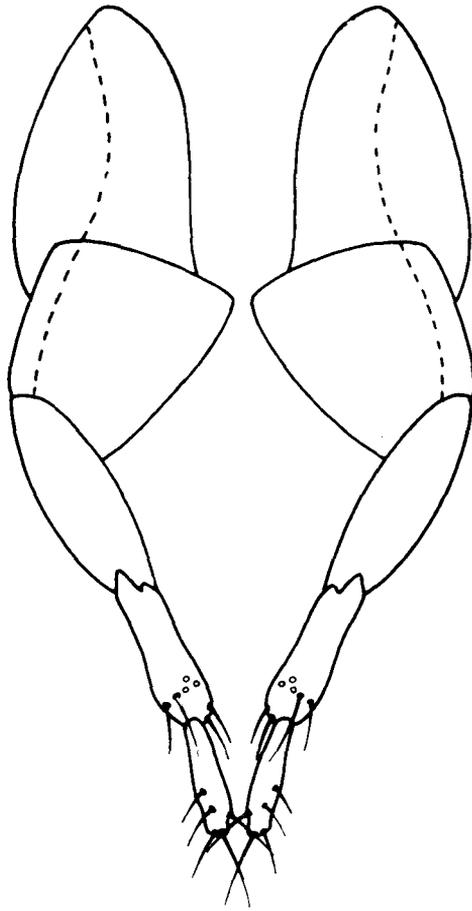


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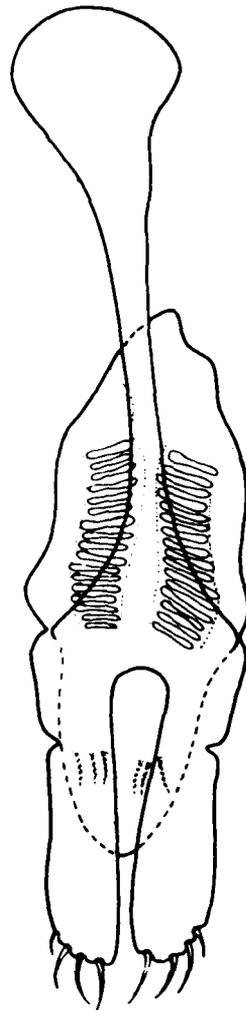
Figs.137-139. 137, Ovipositor of Silvanolomus denticollis
(Reitter); 138, Aedeagus of Silvanolomus
denticollis (Reitter), Dorsal view; 139,
Aedeagus of Silvanolomus meghalayensis sp.nov.,
Dorsal view.



133

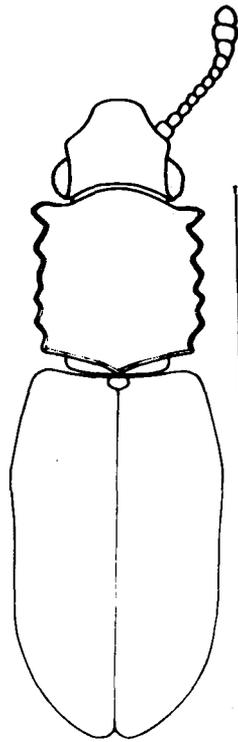


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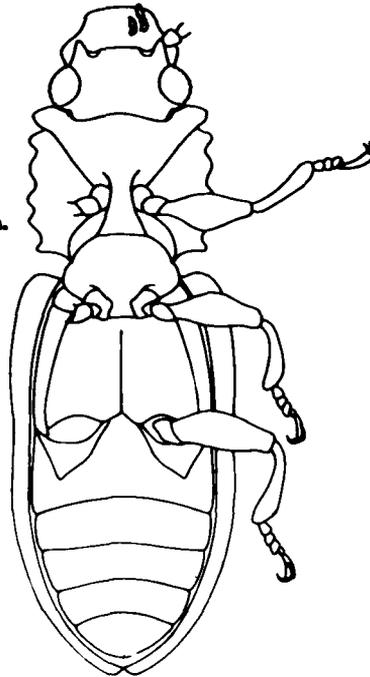


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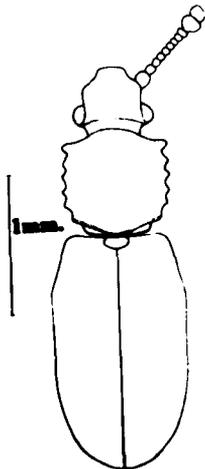
Figs.140-143. 140, Silvanopsis grouvelli sp.nov., Dorsal view; 141, Silvanopsis grouvelli sp.nov., Ventral view; 142, Silvanopsis nepalensis sp.nov., Dorsal view; 143, Silvanopsis nepalensis, Ventral view.



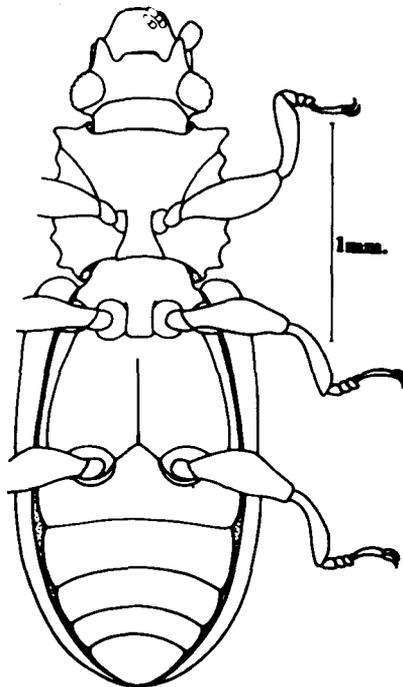
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141

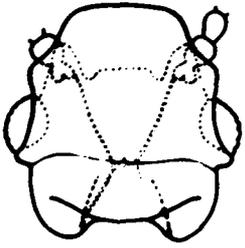


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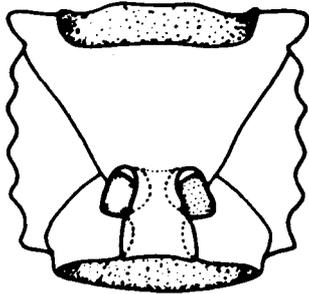


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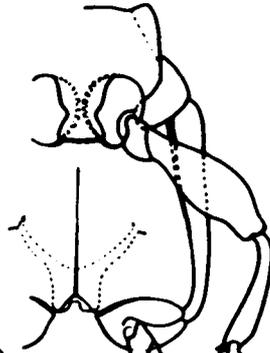
Figs.144-156. Silvanopsis grouvelli sp.nov.: 144, Head,
Dorsal view; 145, Prothorax, Ventral view;
146, Front leg; 147, Meso-metathorax, Ventral
view; 148, Abdomen, Ventral view; 149, Left
elytron, Dorsal view; 150, Wing; 151, Right
mandible, Dorsal view; 152, Maxilla; 153,
Labium, Ventral view; ^{154, Labrum,} 155, Aedeagus, Dorsal
view; 156, Ovipositor.



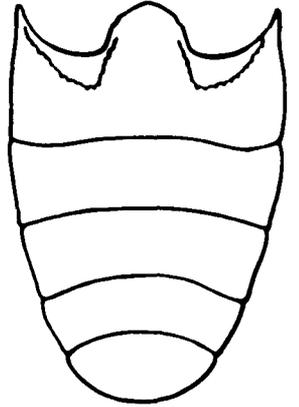
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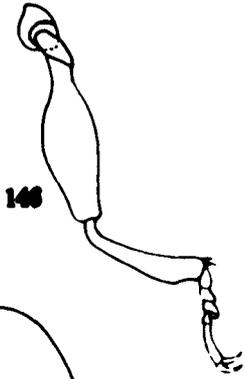
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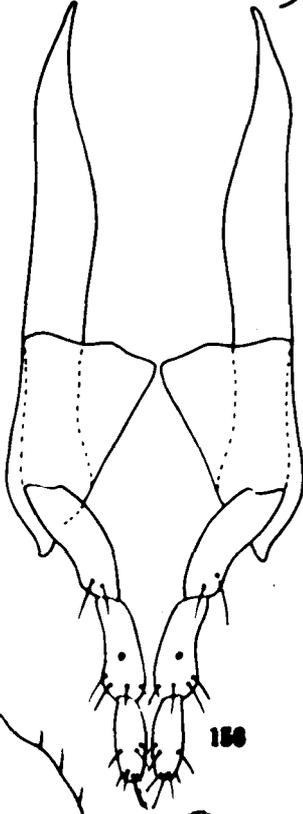
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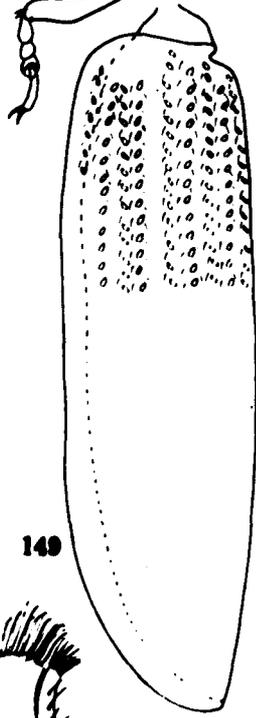
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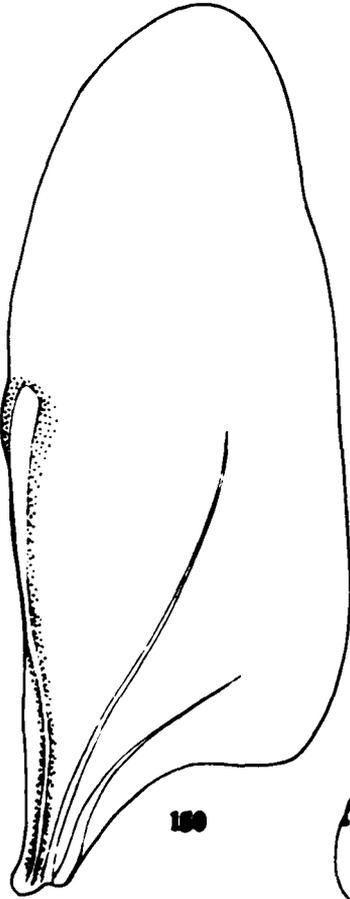
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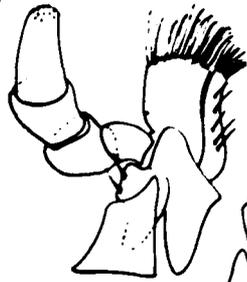
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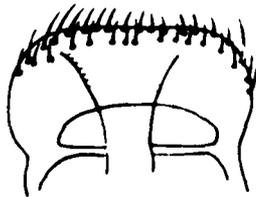
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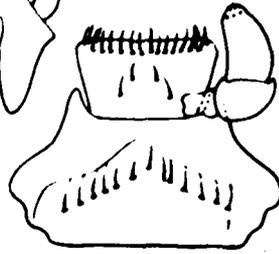
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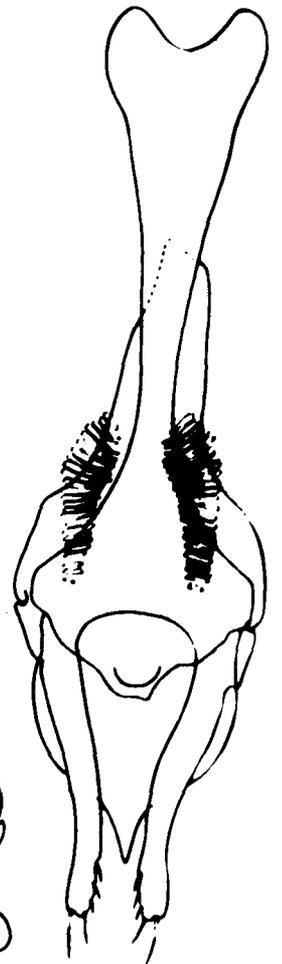
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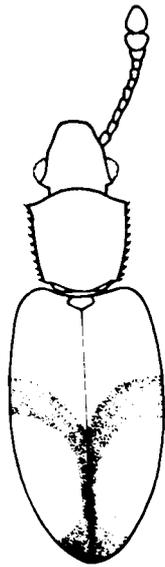
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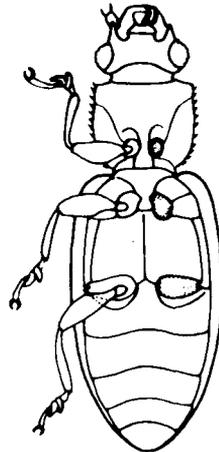
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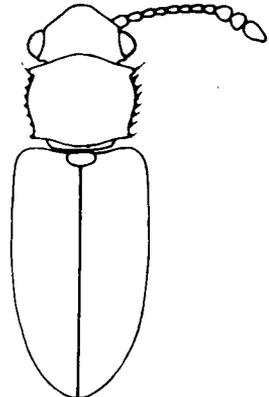
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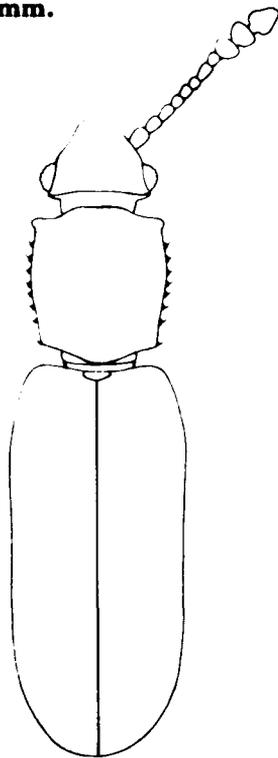


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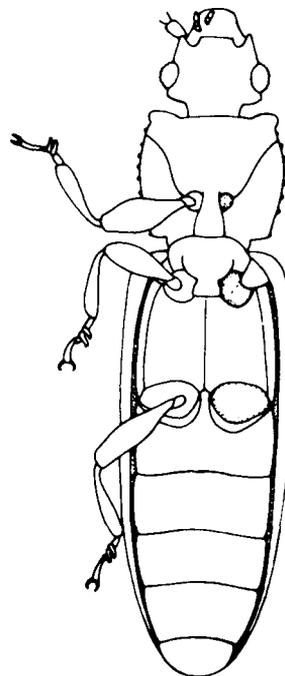


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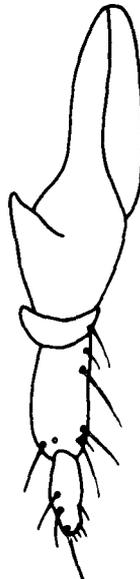
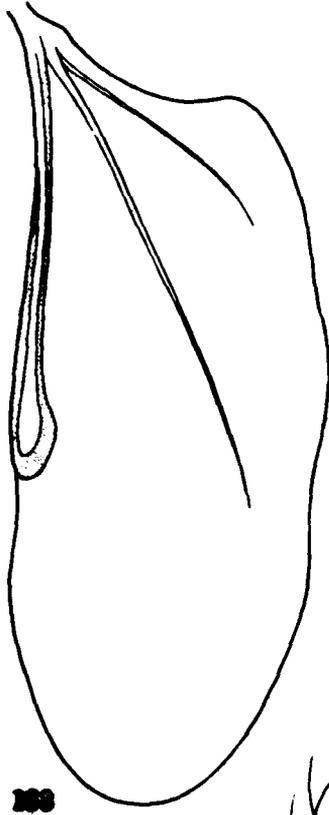
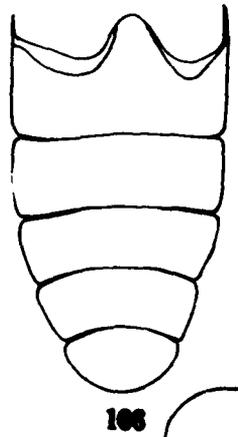
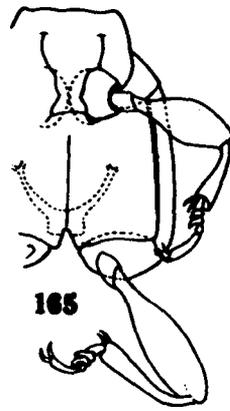
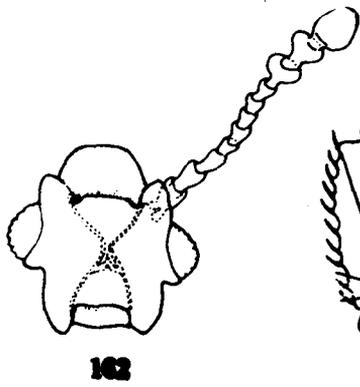
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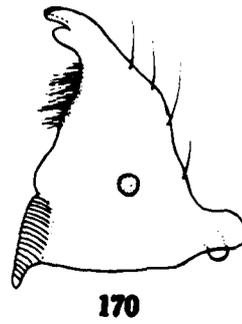
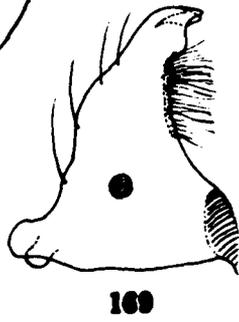
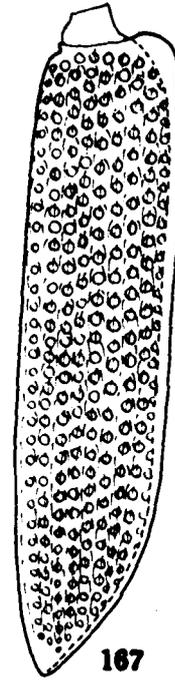
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Figs.157-161. 157, Monanus concinnulus (Walker), Dorsal view;
158, Monanus concinnulus (Walker), Ventral view;
159, Monanus longicornis Grouvelle, Dorsal view;
160, Monanus (Monanops) himalayicus, Dorsal view;
161, Monanus (Monanops) himalayicus sp.nov.,
Ventral view.

Figs.162-175. Monanus concinnulus (Walker): 162, Head, Ventral view; 163, Prothorax, Ventral view; 164, Front leg; 165, Meso-metathorax, Ventral view; 166, Abdomen, Ventral view; 167, Right elytron, Dorsal view; 168, Wing, 169, Left mandible, Dorsal view; 170, Right mandible, Dorsal view; 171, Maxilla; 172, Labium, Ventral view; 173, Labrum; 174, Aedeagus, Dorsal view; 175, Ovipositor.



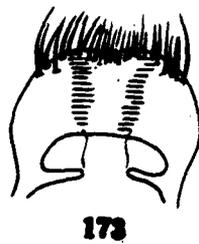
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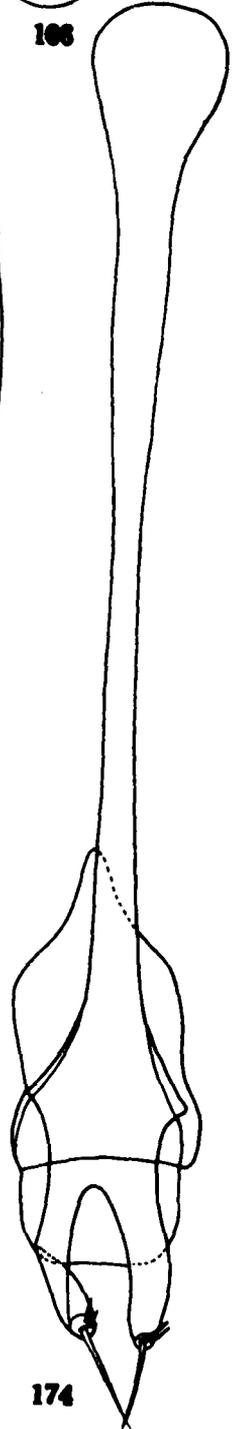
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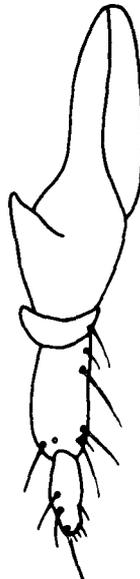
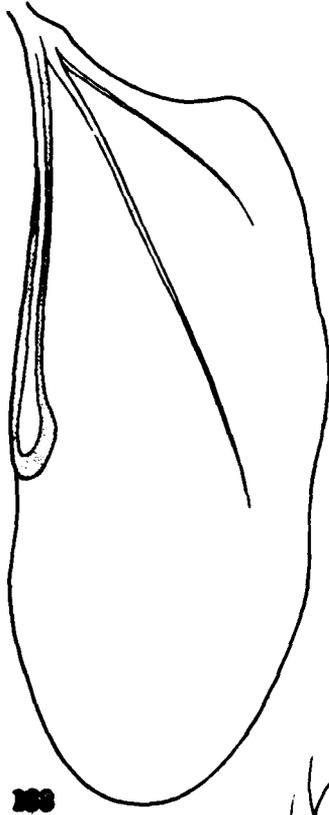
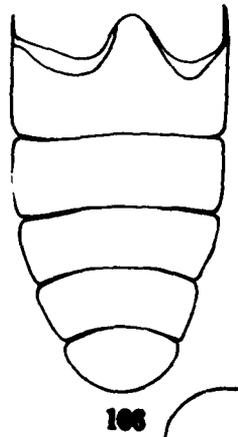
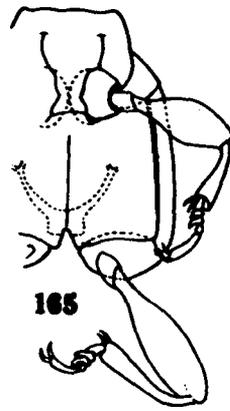
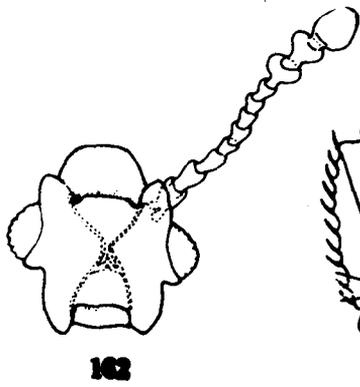
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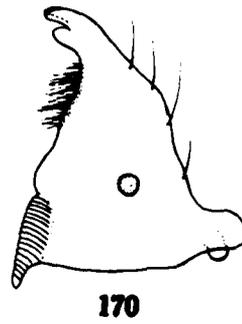
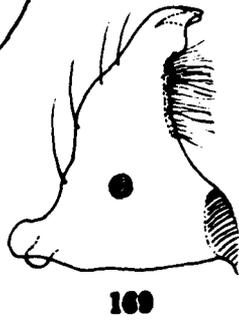
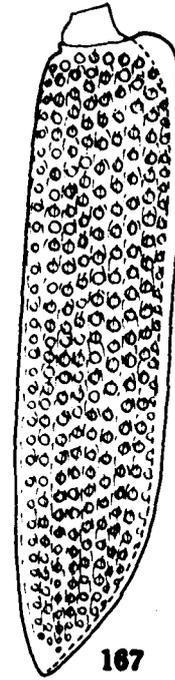
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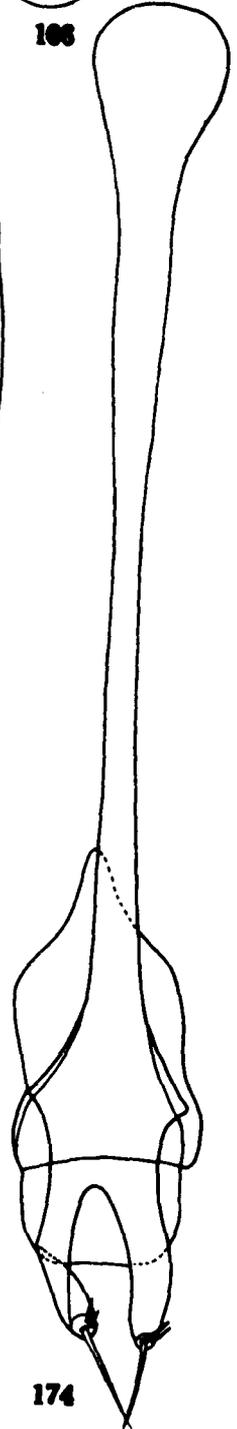
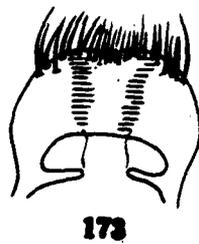
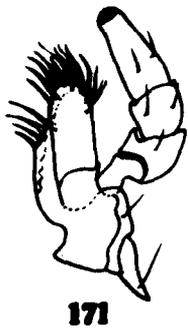
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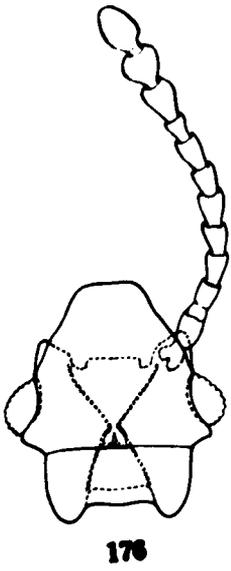
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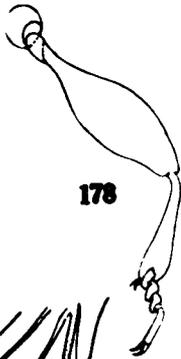
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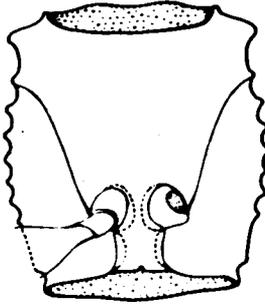
Figs.176-187. Monanus (Monanops) himalayicus sp.nov.: 176,
Head, Dorsal view; 177, Prothorax, Ventral
view; 178, Front leg; 179, Meso-metathorax,
Ventral view; 180, Abdomen, Ventral view;
181, Left elytron, Dorsal view; 182, Wing;
183, Right mandible, Dorsal view; 184, Maxilla;
185, Labium ventral view; 186, Labrum; 187,
Aedeagus, Dorsal view.



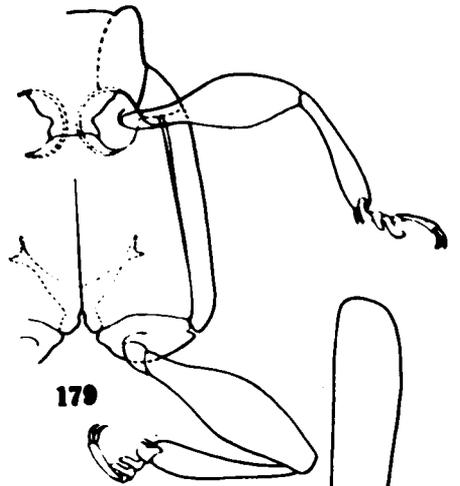
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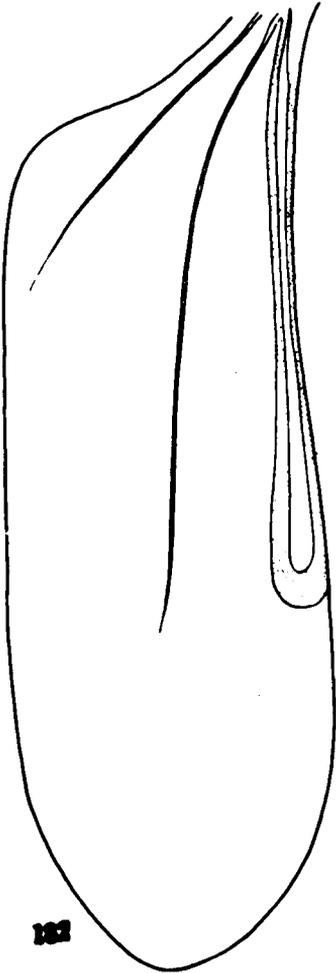
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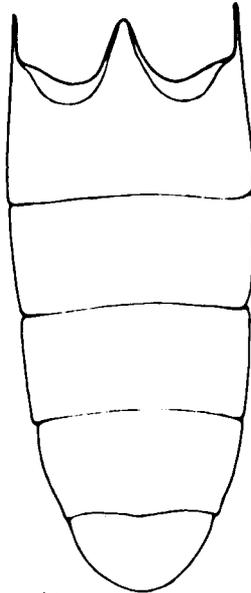
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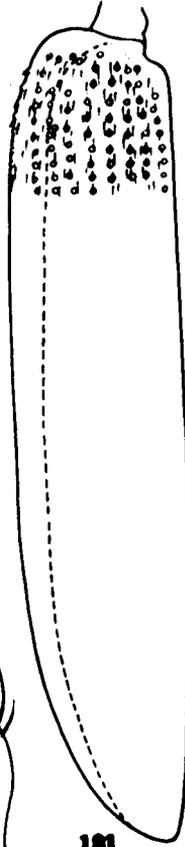
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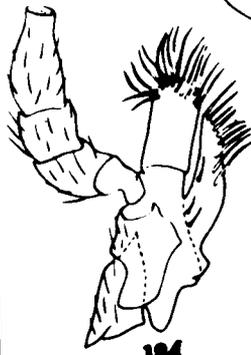
182



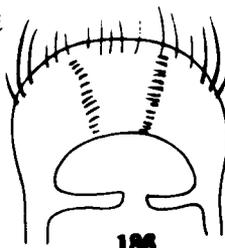
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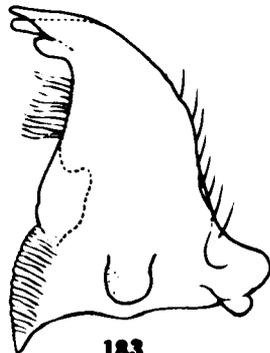
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184



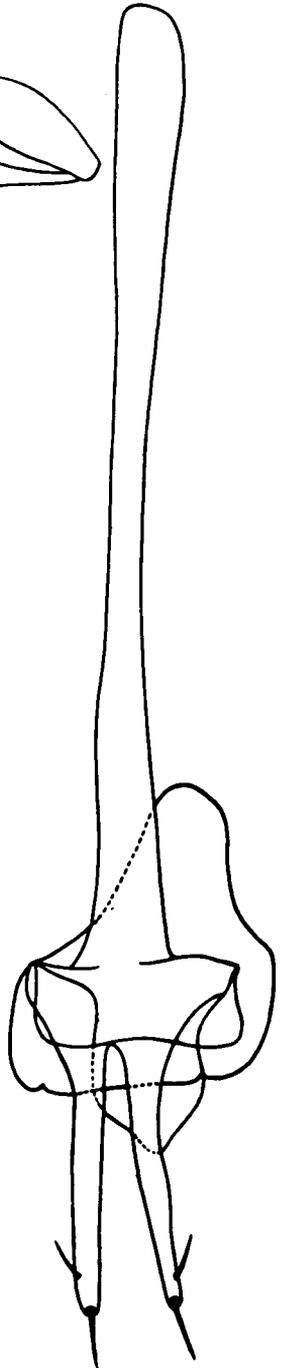
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183

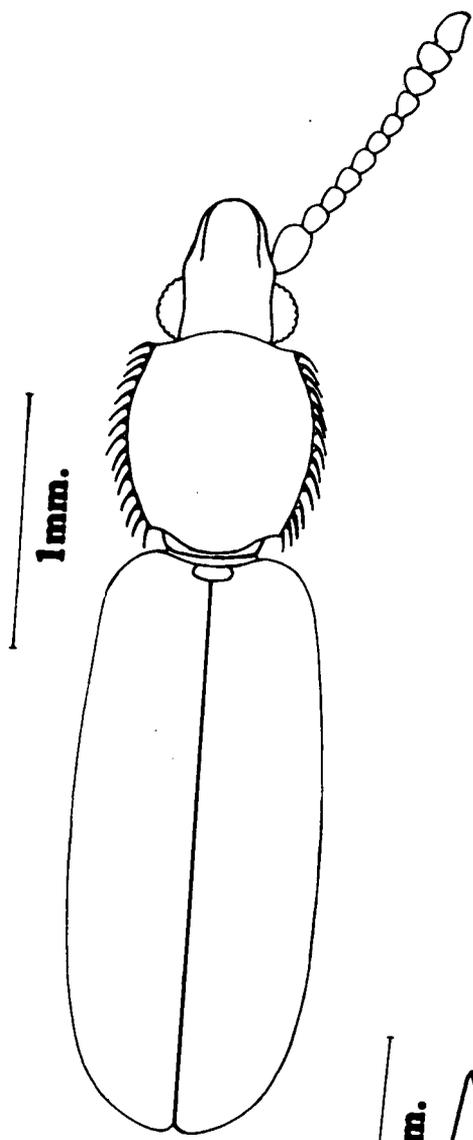


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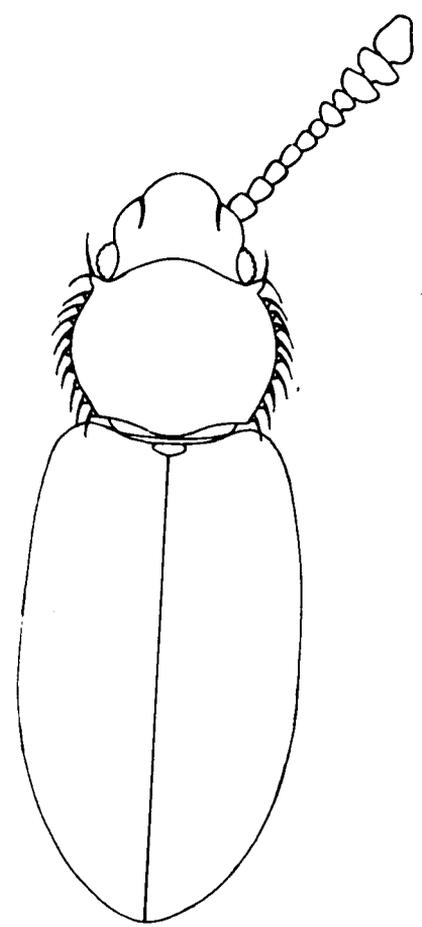


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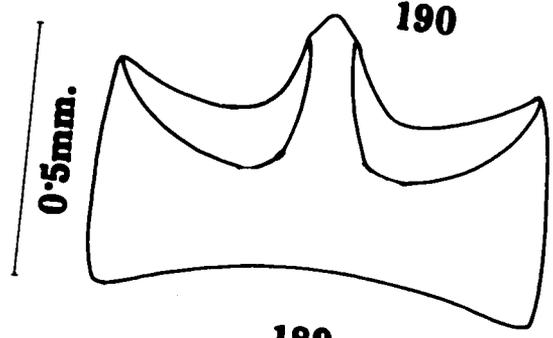
Figs.188-190. 188, Airaphilus abnormis Grouvelle, Dorsal view; 189, First ventrite of Airaphilus abnormis Grouvelle; 190, Airaphilus serricollis Reitter, Dorsal view.



188

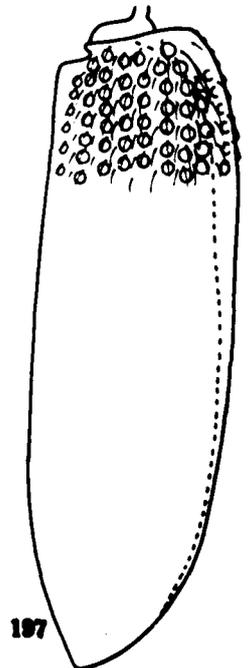
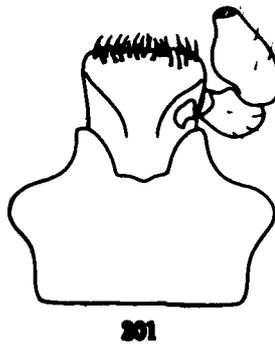
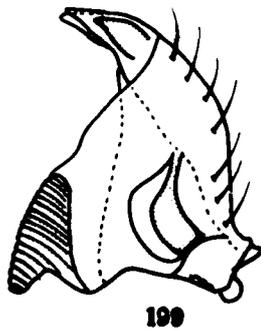
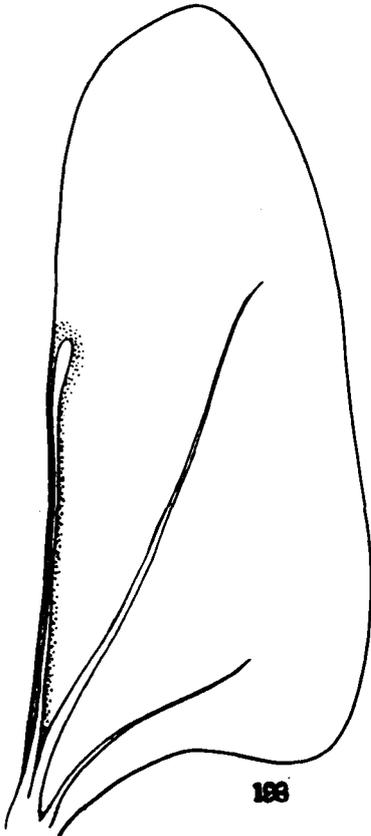
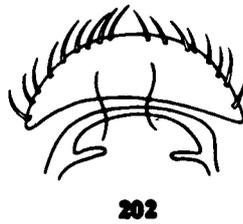
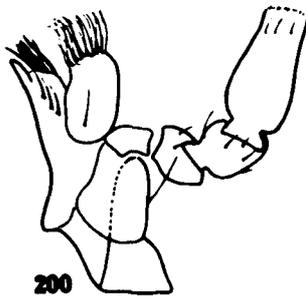
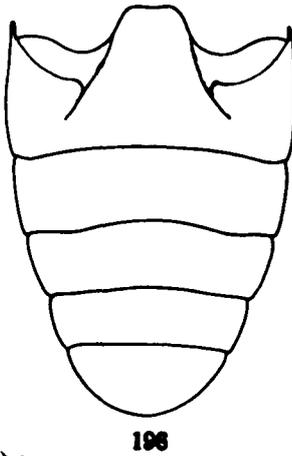
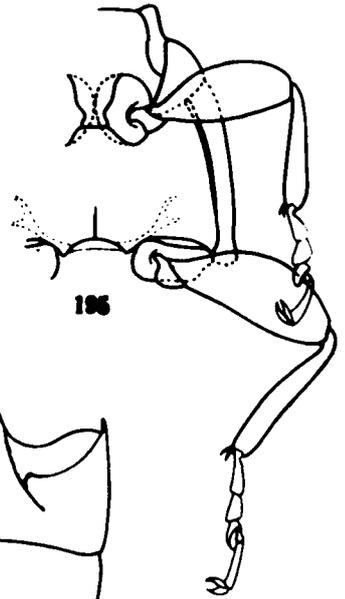
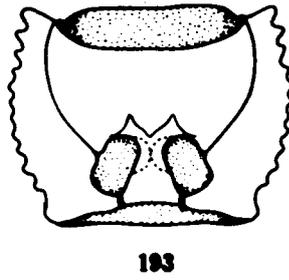
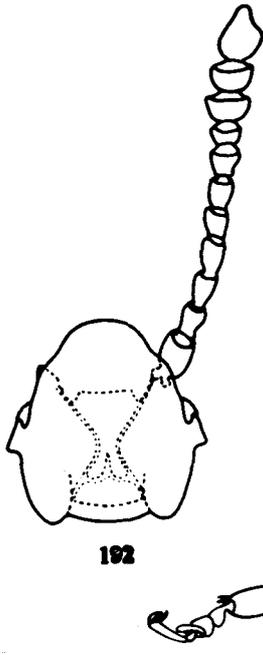
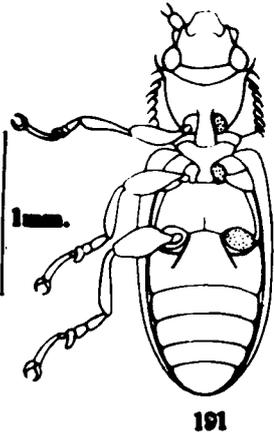


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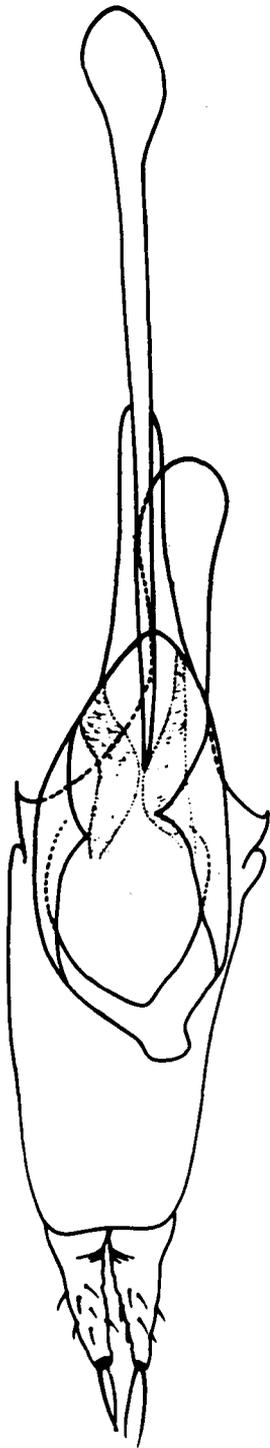


189

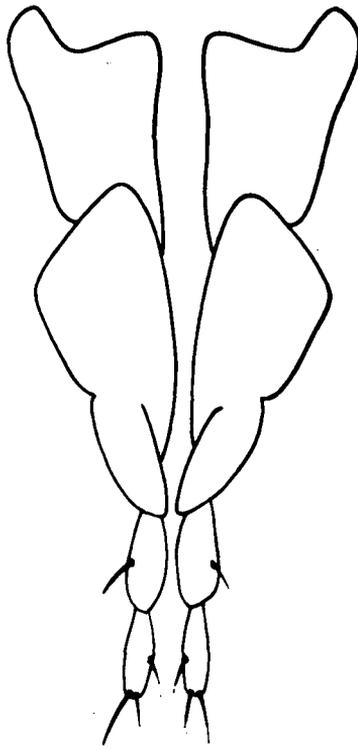
Figs.191-202. Airaphilus serricollis Reitter: 191, Ventral view; 192, Head, Dorsal view; 193, Prothorax, Ventral view; 194, Front leg; 195, Meso-metathorax, Ventral view; 196, Abdomen, Ventral view; 197, Right elytron, Dorsal view; 198, Wing; 199, Right mandible, Dorsal view; 200, Maxilla; 201, Labium, Ventral view; 202, Labrum.



Figs. 203-204. Airaphilus serricollis Reitter: 203, Aedeagus,
Dorsal view; 204, Ovipositor.

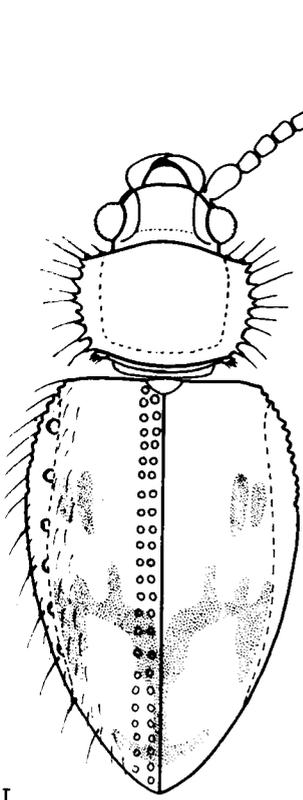


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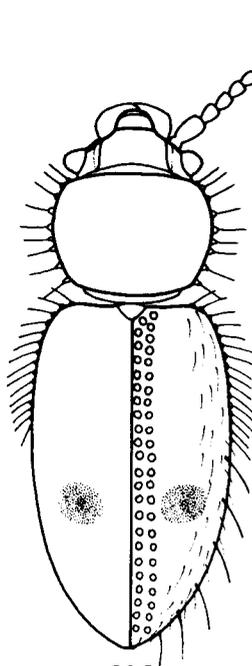


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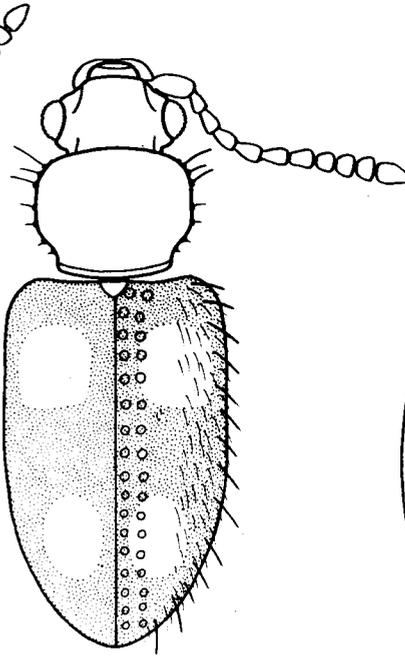
Figs.205-212. Dorsal view: 205, Psammoecus andrewesi Grouvelle;
206, Psammoecus khasia sp.nov.; 207, Psammoecus
decoratus Grouvelle; 208, Psammoecus lepidus
Grouvelle; 209, Psammoecus harmandi Grouvelle;
210, Psammoecus delicatus Grouvelle; 211,
Psammoecus complexus sp.nov.; 212, Psammoecus
wittmeri sp.nov.



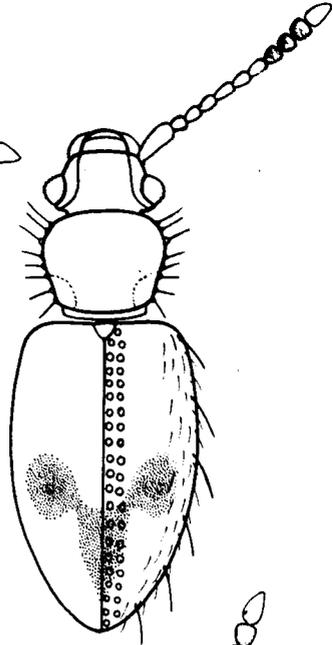
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206

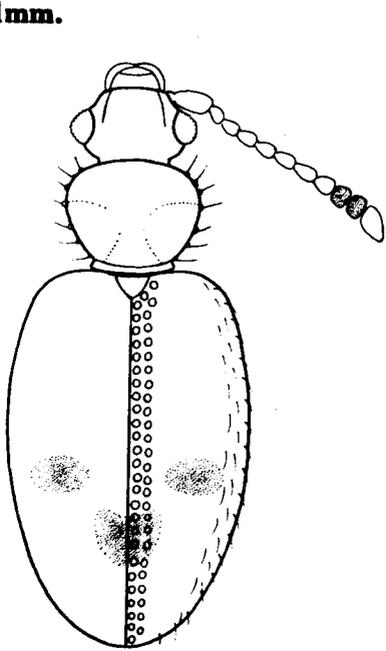


207

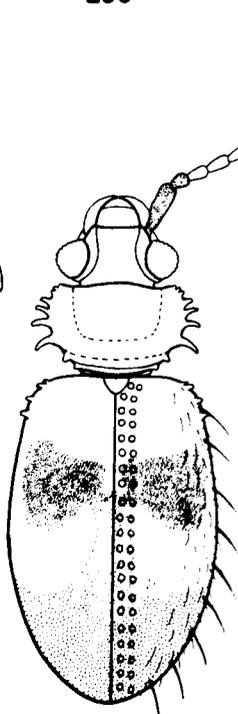


208

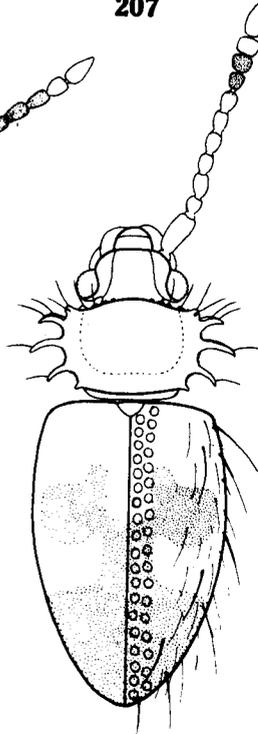
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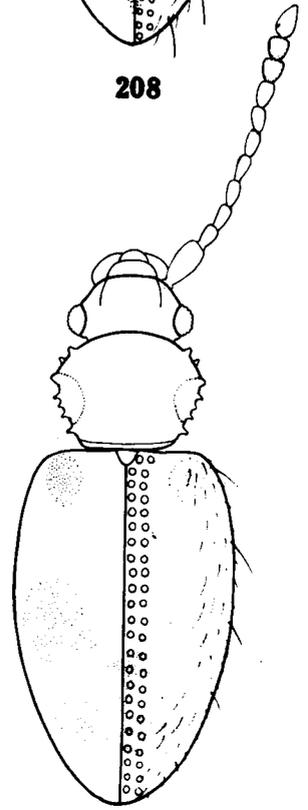
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210



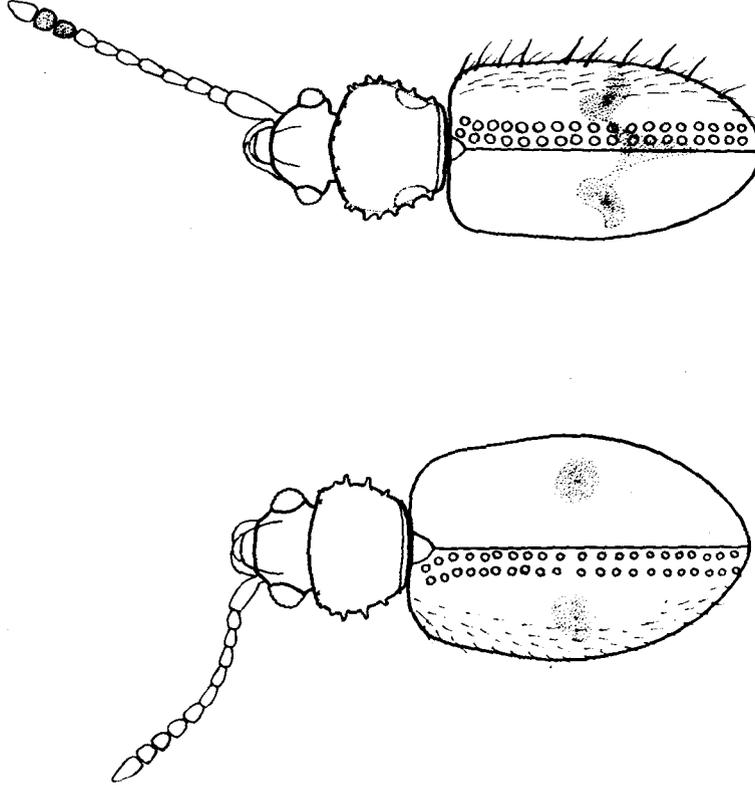
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212

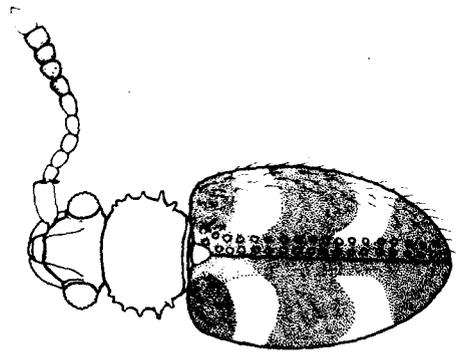
Figs. 213-218. Dorsal view: 213, Psammoecus bhutanicus sp. nov.;
214, Psammoecus trilošana sp. nov.; 215, Psammoecus
simoni Grouvelle; 216, Psammoecus gratiosus
Grouvelle; 217, Psammoecus nitidus Grouvelle; 218,
Psammoecus trimaculatus Motschulsky.

Figs. 219-232. Psammoecus trimaculatus Motschulsky: 219, Ventral view; 220, Head, Dorsal view; 221, Prothorax, Ventral view; 222, Front leg; 223, Meso-metathorax, Ventral view; 224, Abdomen, Ventral view; 225, Left elytron, Dorsal view; 226, Wing; 227, Right Mandible, Ventral view; 228, Left Maxilla; 229, Labium, Ventral view; 230, Labrum; 231, Ovipositor; 232, Aedeagus, Dorsal view.

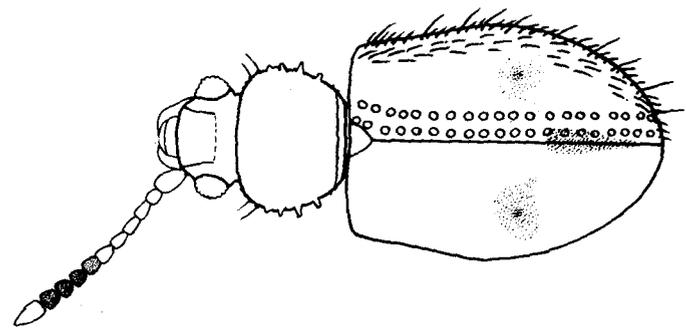


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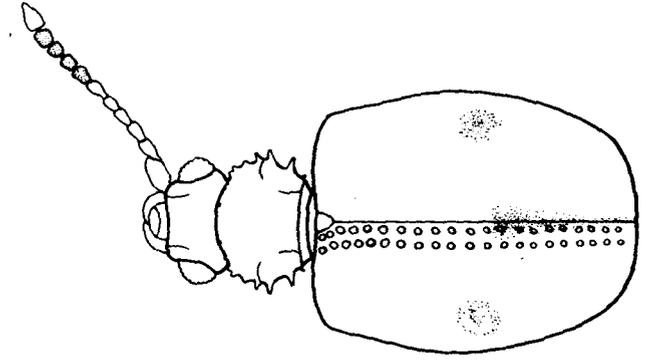
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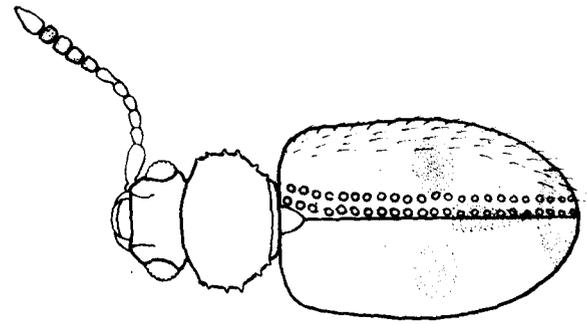
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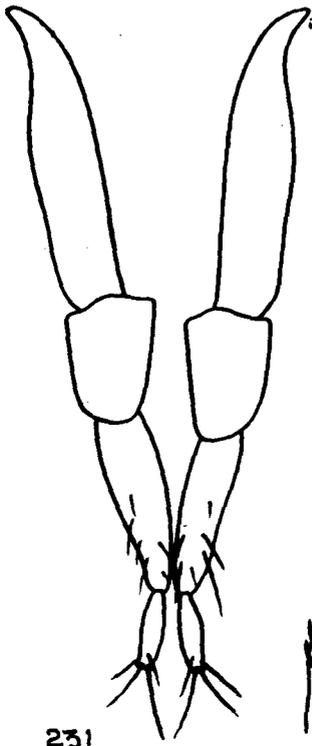
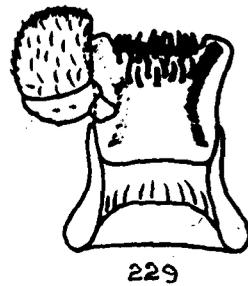
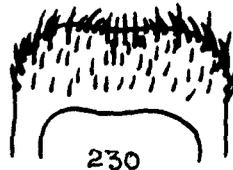
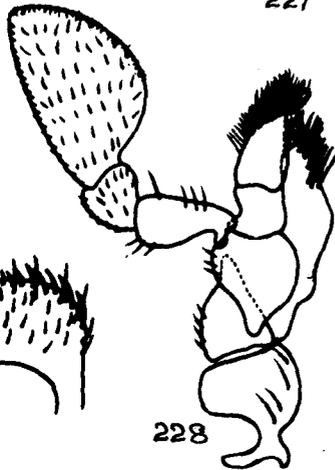
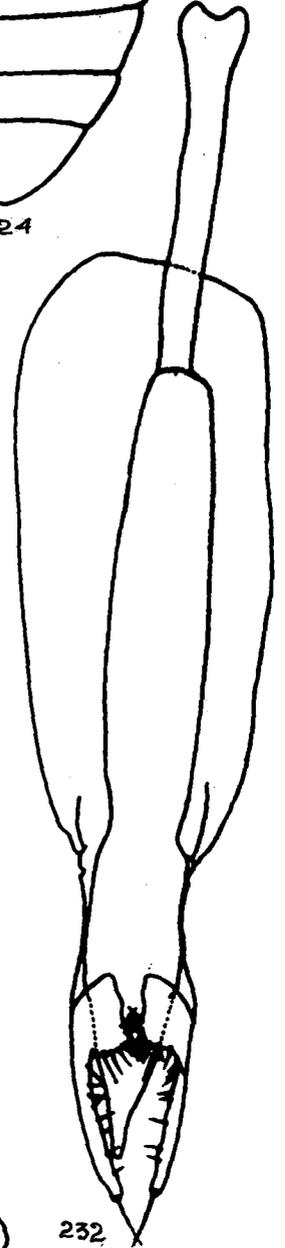
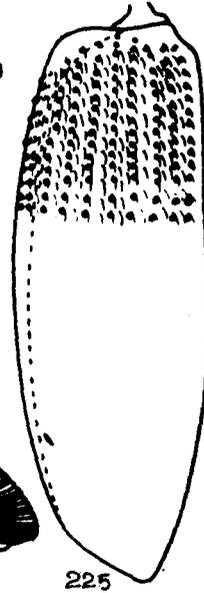
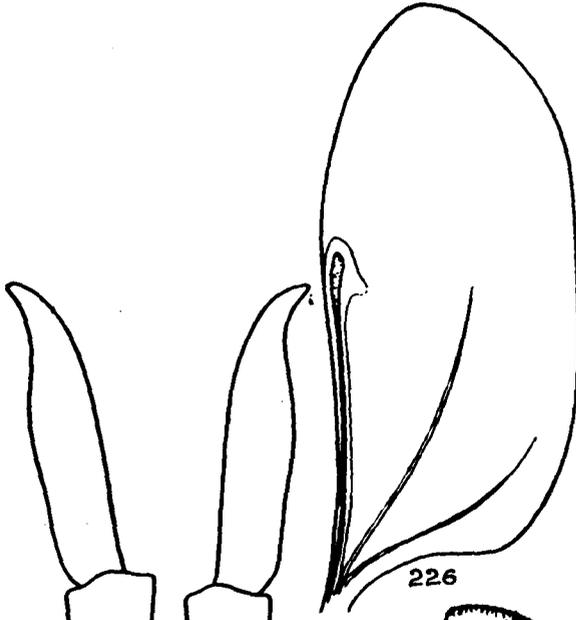
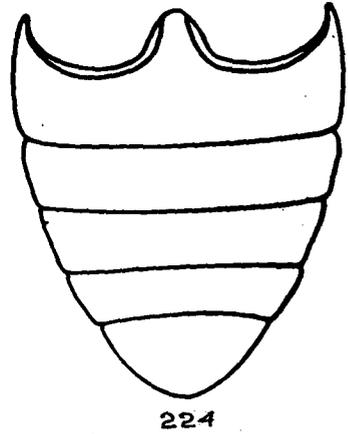
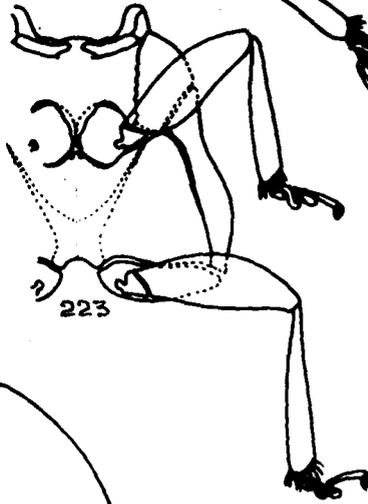
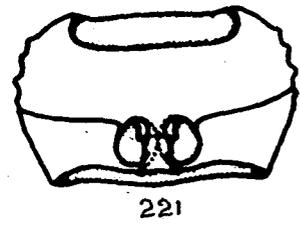
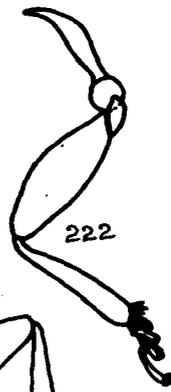
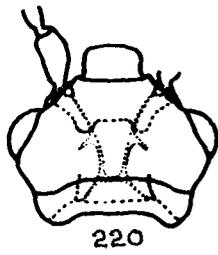
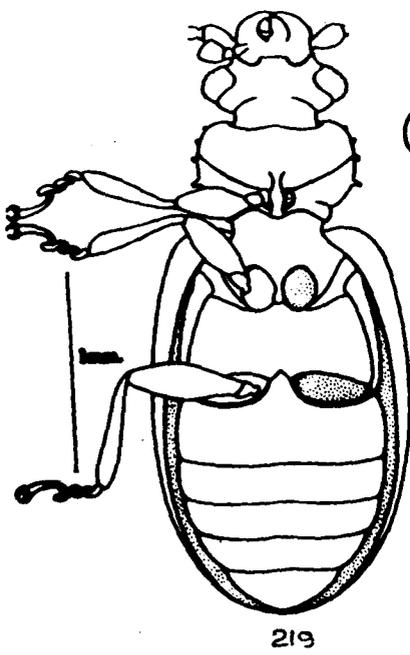
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217



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231

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228

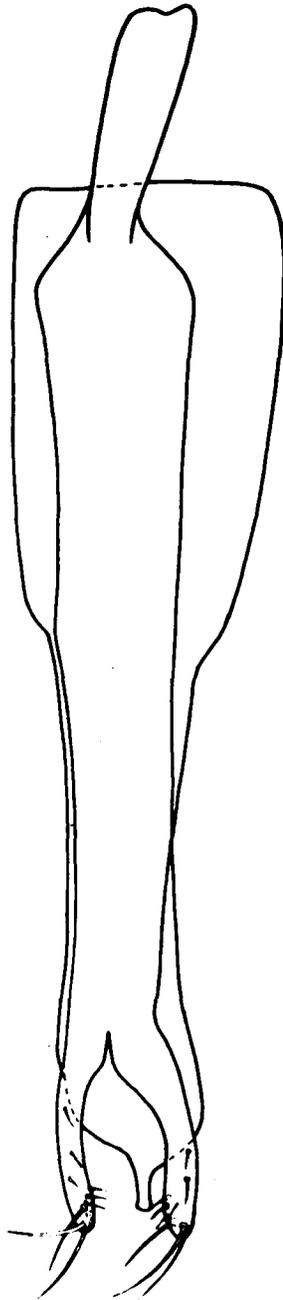
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232

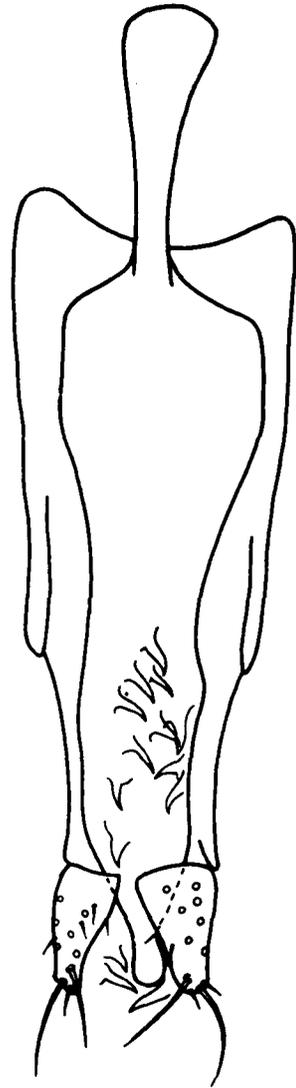
Figs.233-235. Aedeagus, Dorsal view: 233, Psammoecus
trilochana sp.nov.; 234, Psammoecus
lepidus Grouvelle; 235, Psammoecus
harmandi ~~sp.nov.~~ Grouvelle.



233

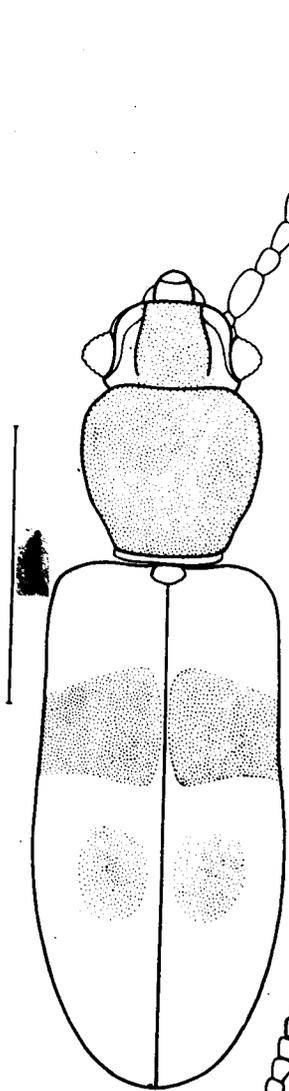


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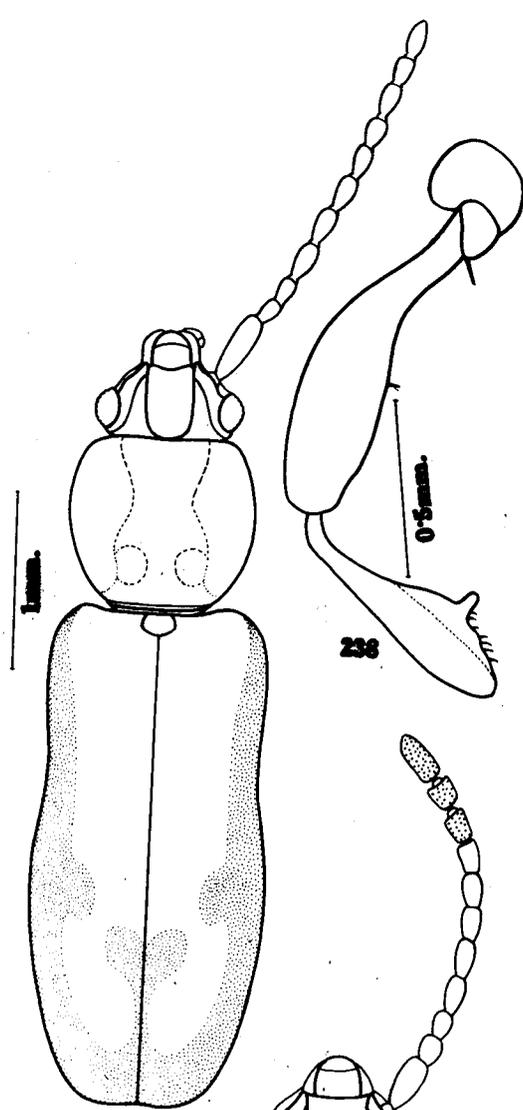


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Figs. 236-242. 236, Cryptamorpha infans Grouvelle, Dorsal view;
237, Cryptamorpha abnormis sp.nov., Dorsal view;
238, Middle leg of Cryptamorpha abnormis sp.nov.;
239, Ventricle 5 of Cryptamorpha abnormis sp.nov.;
240, Cryptamorpha desjardinsi (Guerin-Meneville),
Dorsal view; 241, Cryptamorpha nepalensis sp.nov.,
Dorsal view; 242, Aedeagus of Cryptamorpha
nepalensis sp.nov.



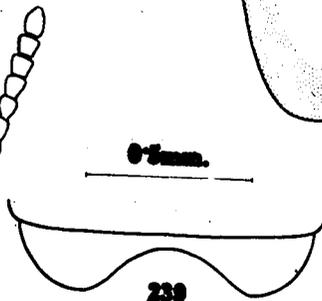
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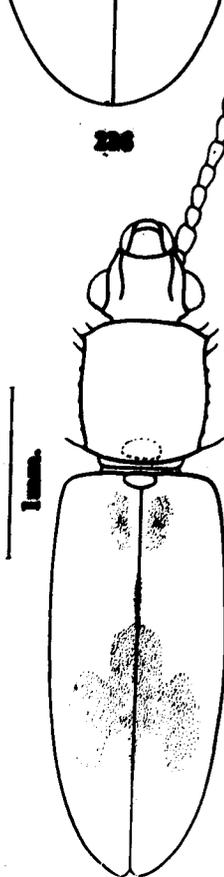
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0.5mm.

237

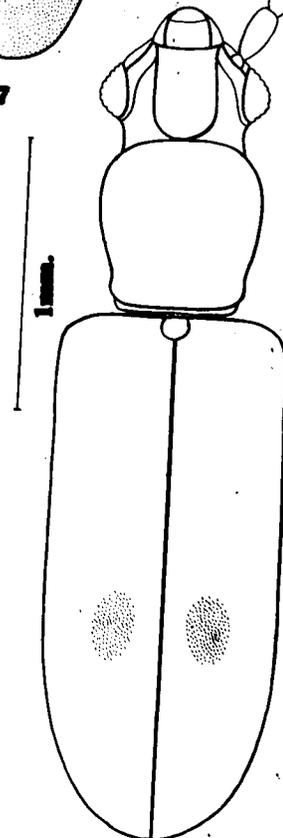


239



1mm.

240



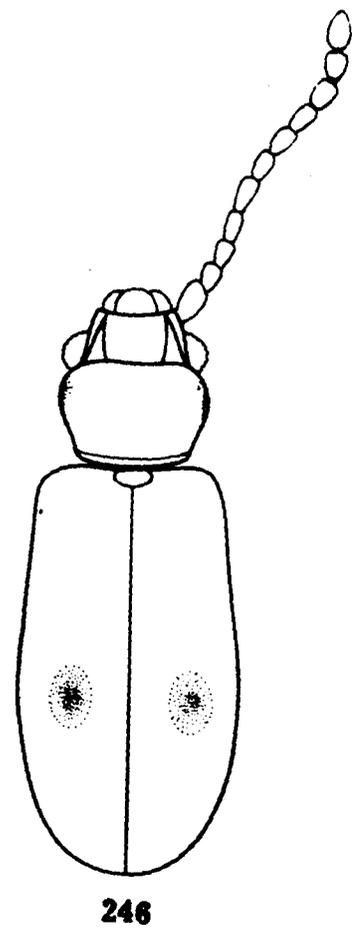
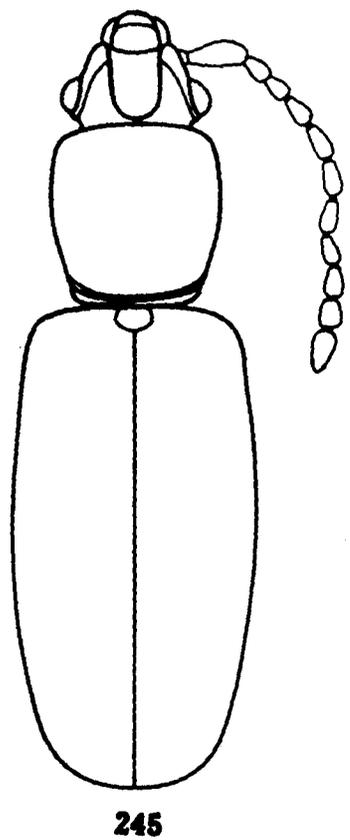
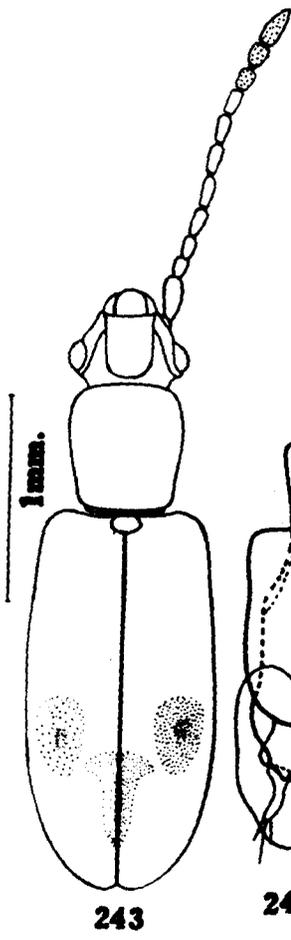
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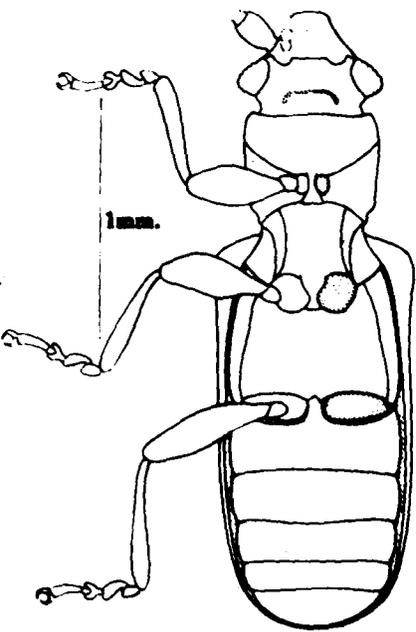


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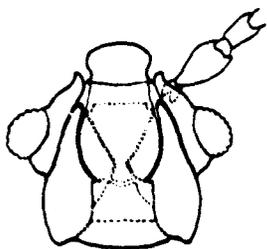
Figs.243-246. 243, Cryptamorpha kaszabi sp.nov., Dorsal view; 244, Aedeagus of Cryptamorpha kaszabi sp.nov., 245, Cryptamorpha sculptifrons Reitter, Dorsal view; 246, Cryptamorpha bhutanensis sp.nov., Dorsal view.



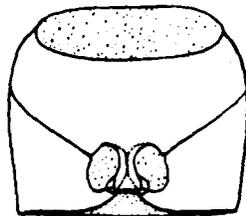
Figs.247-259. Cryptamorpha infans Grouvelle: 247, Ventral view; 248, Head, Dorsal view; 249, Prothorax, Ventral view; 250, Front leg; 251, Meso-metathorax, Ventral view; 252, Abdomen, Ventral view; 253, Left elytron, Dorsal view; 254, Wing; 255, Left Mandible, Dorsal view; 256, Right Mandible, Ventral view; 257, Maxilla; 258, Labium, Ventral view; 259, Labrum.



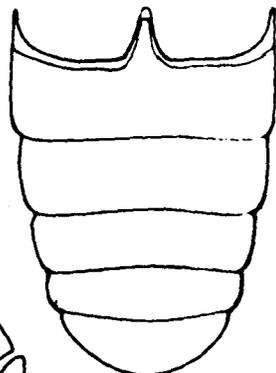
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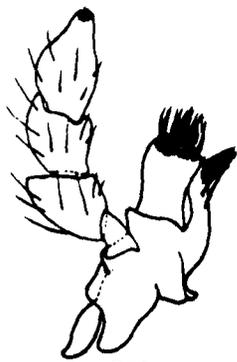
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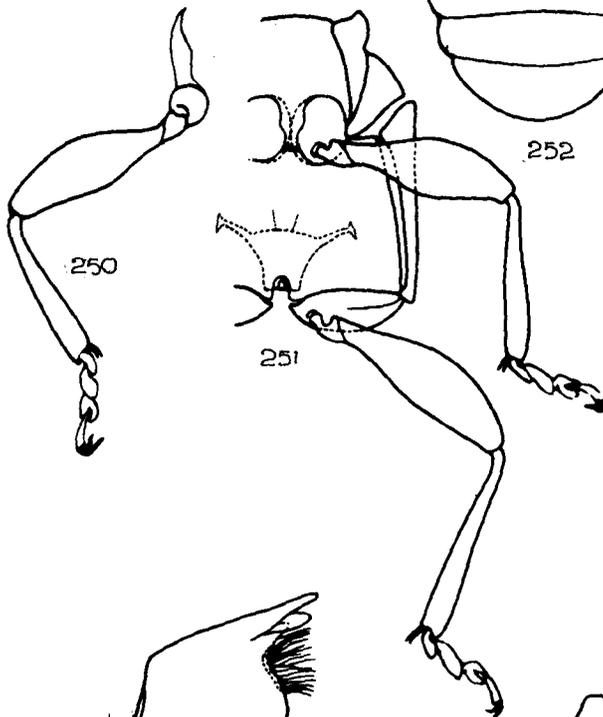
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252

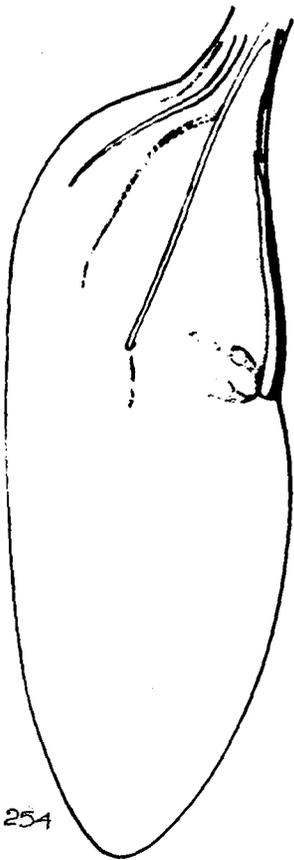


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250

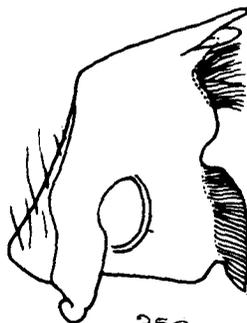
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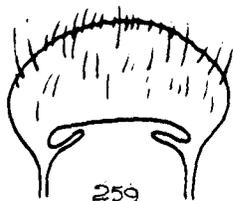
254



255



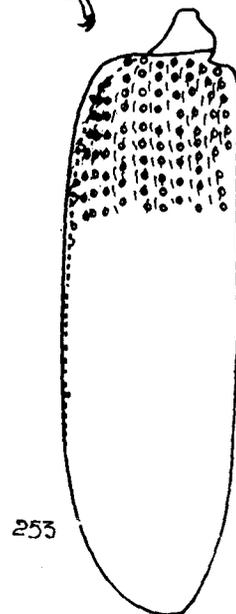
256



259

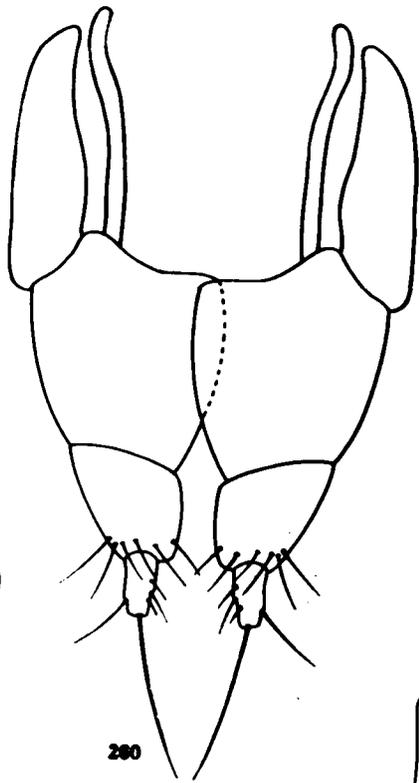


258

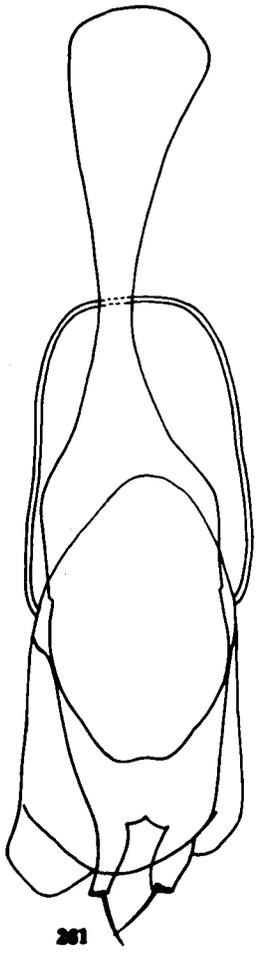


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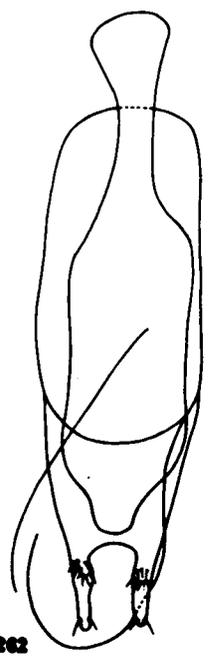
Figs.260-263. 260, Ovipositor of Cryptamorpha sp.; 261,
Aedeagus of Cryptamorpha infans Grouvelle;
Dorsal view; 262, Aedeagus of Cryptamorpha
sculptifrons Reitter; Dorsal view; 263,
Aedeagus of Cryptamorpha bhutanensis sp.nov.,
Dorsal view.



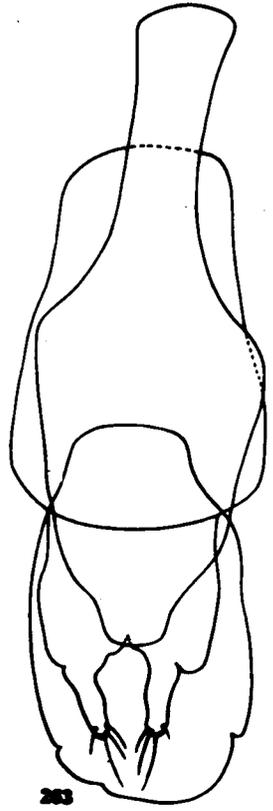
280



281

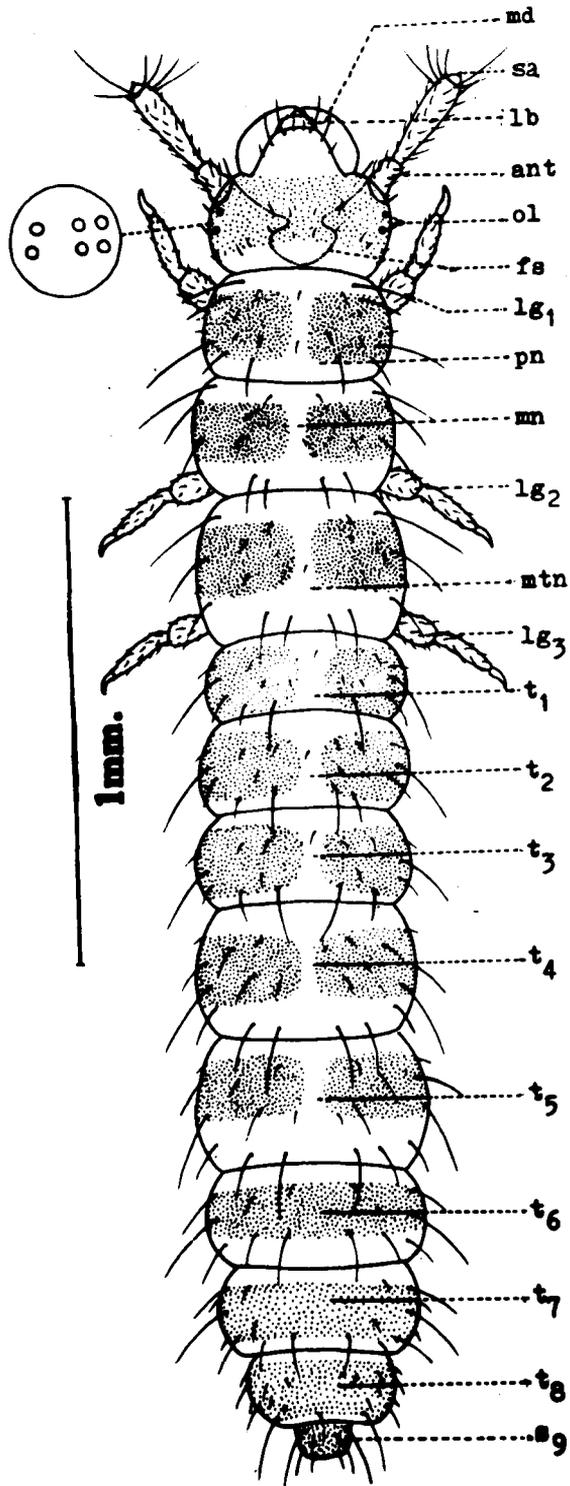


282

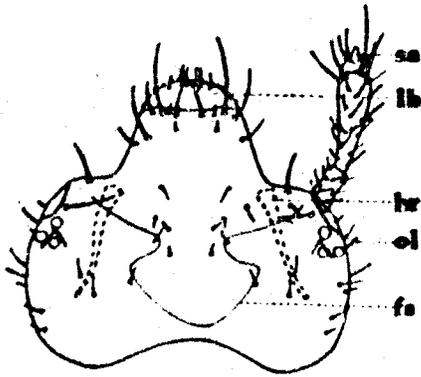


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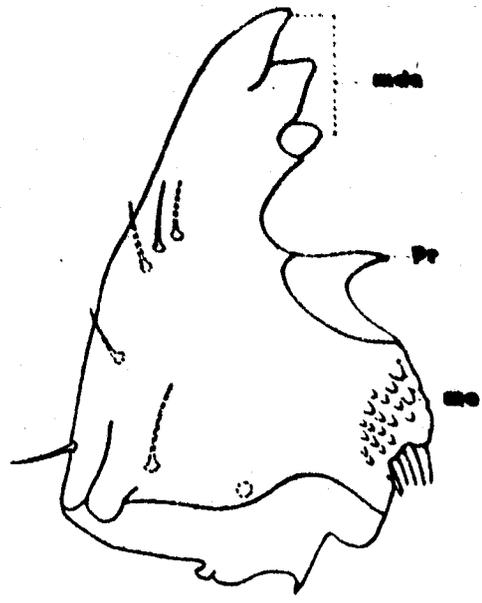
Figs.264, Larva of Oryzaepphilus mercator (Fauvel), Dorsal view.



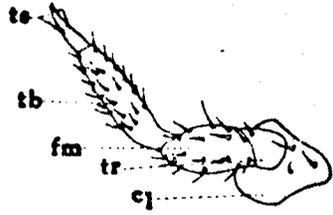
Figs. 265-270. Larva of Oryzaephilus mercator (Fauvel): 265, Head, Dorsal view; 266, Right mandible, Ventral view; 267, Left maxilla, Ventral view; 268, Labium, Ventral view; 269, Leg; 270, Posterior abdominal segments, Dorsal view.



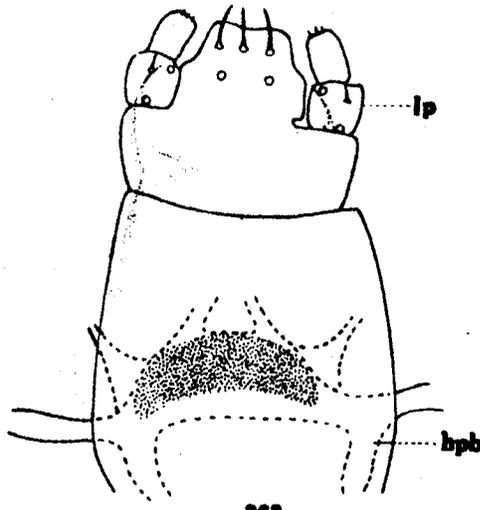
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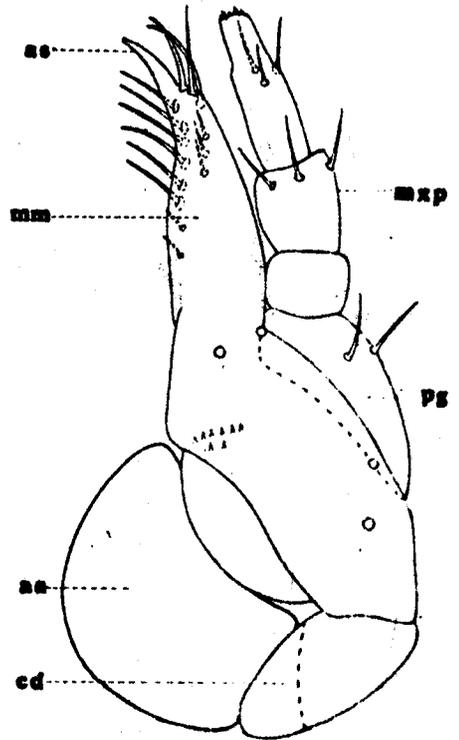
266



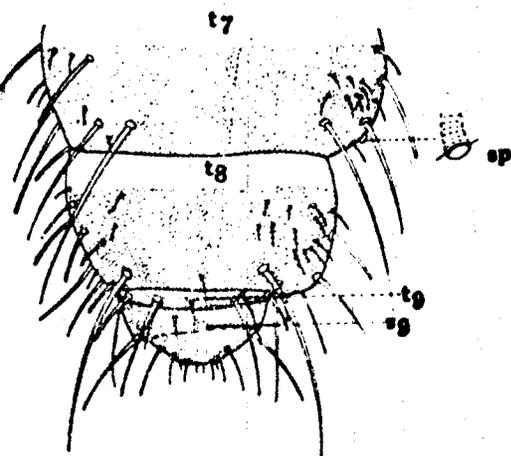
269



268

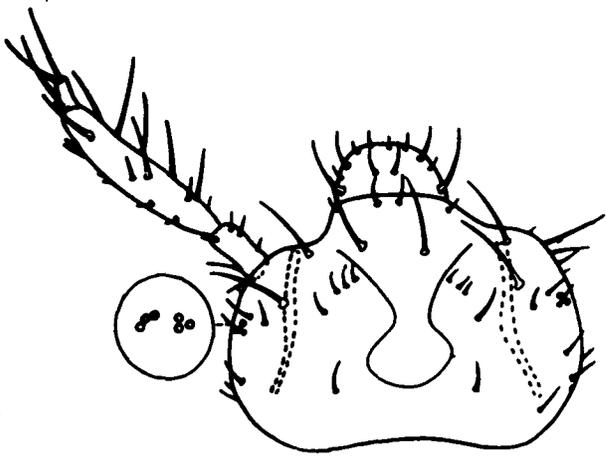


267

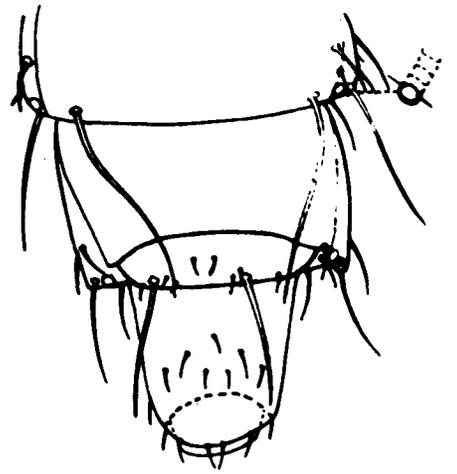


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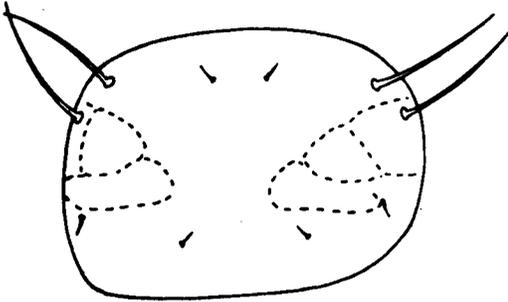
Figs.271-277. Larva of Silvanoprus angusticollis (Reitter):
271, Head, Dorsal view; 272, Prothorax, Dorsal
view; 273, Right mandible, Ventral view; 274,
Labium, Dorsal view; 275, Right maxilla, Dorsal
view; 276, Leg; 277, Posterior abdominal segments,
Dorsal view.



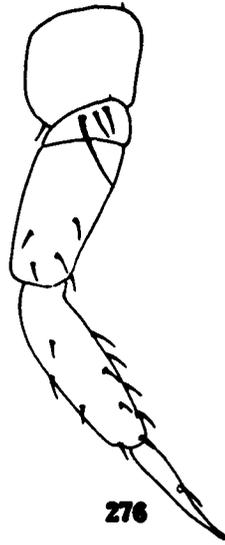
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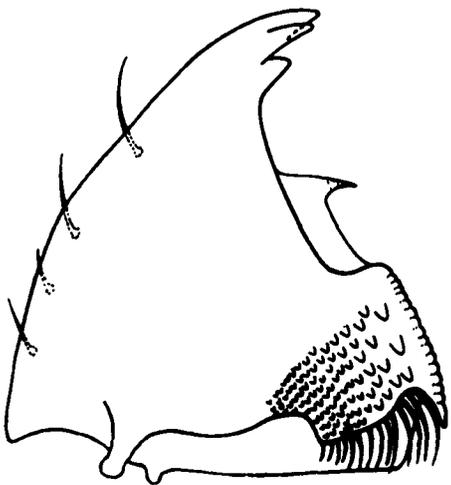
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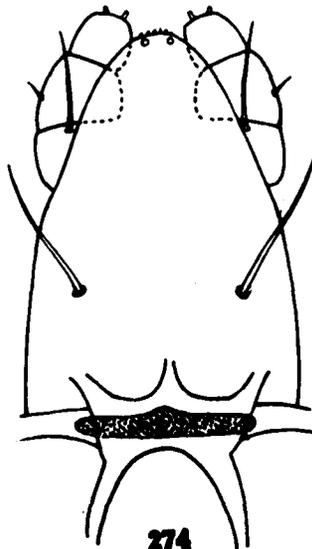
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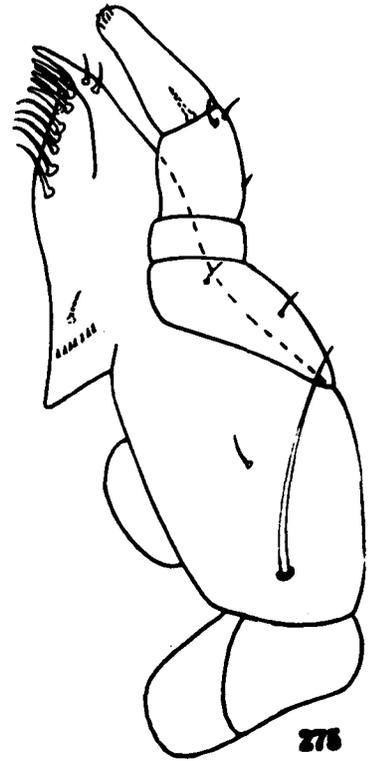
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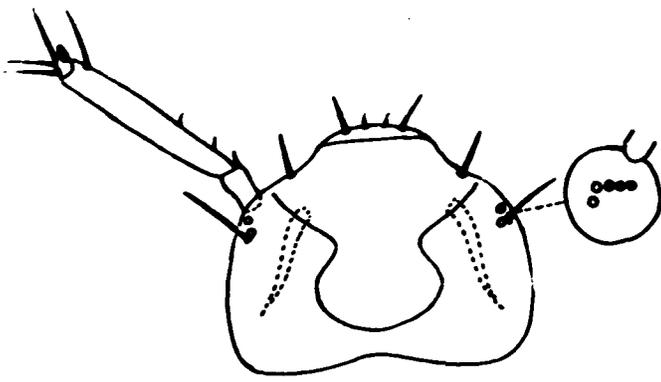


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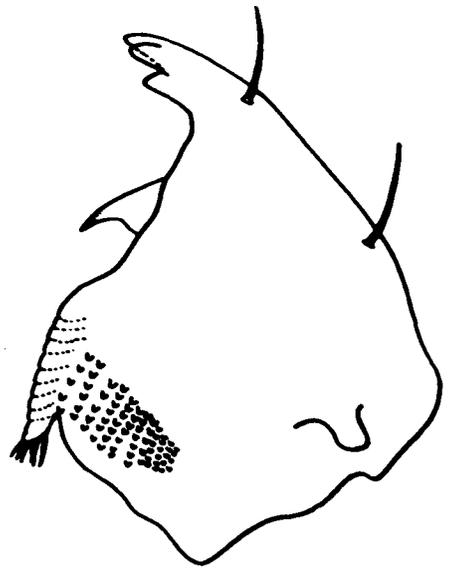


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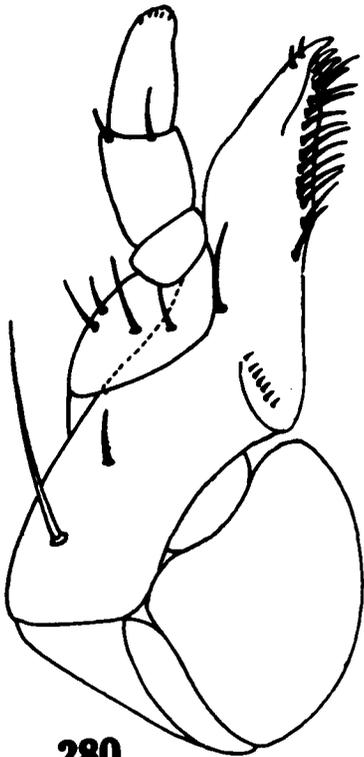
Figs.278-283. Larva of Protosilvanus lateritius (Reitter):
278, Head, Dorsal view; 279, Left mandible,
Ventral
~~view~~ view; 280, Left maxilla, Dorsal view;
281, Labium, Ventral view; 282, Leg; 283,
Posterior abdominal segments, Dorsal view.



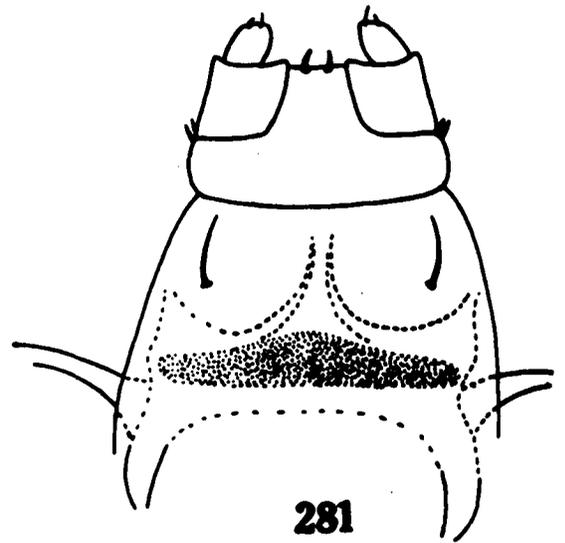
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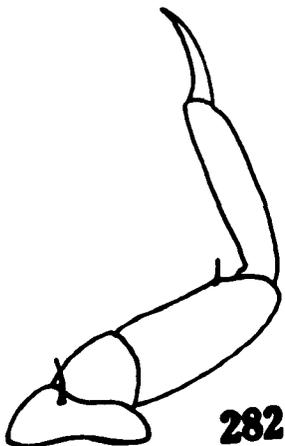
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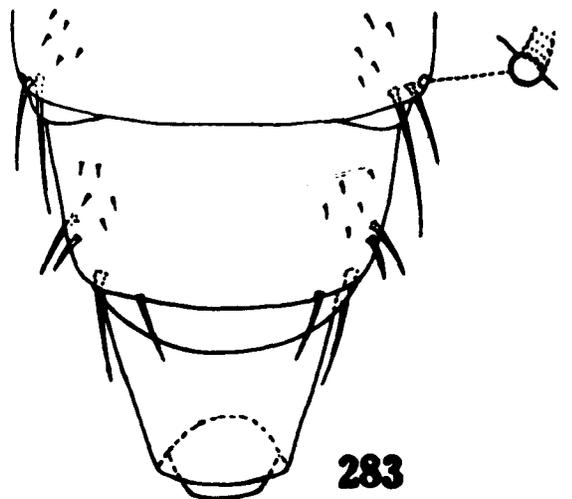
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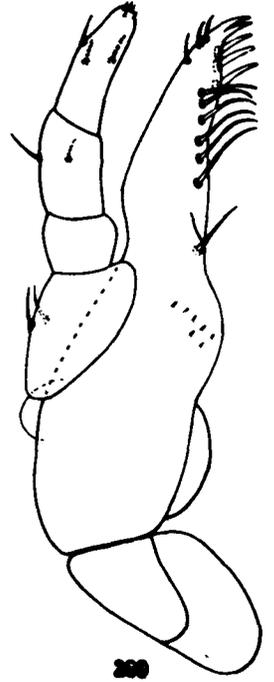
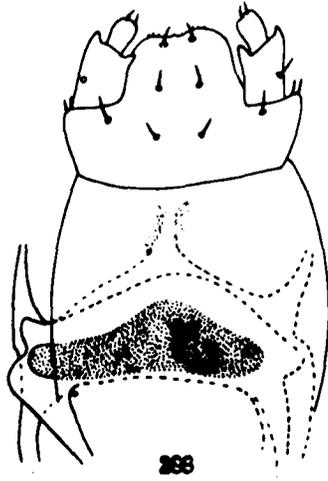
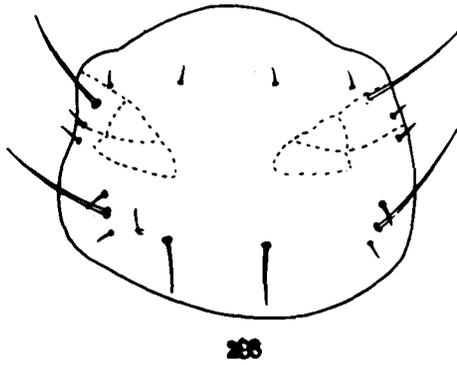
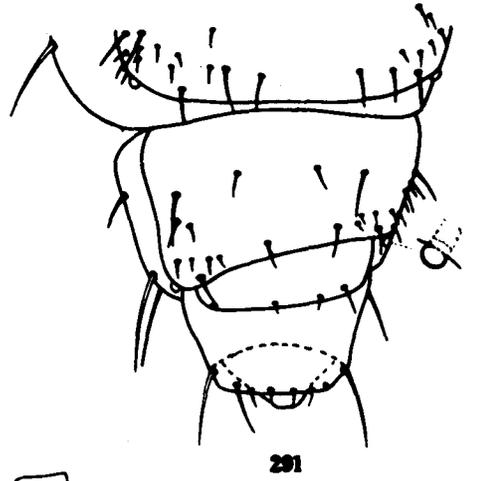
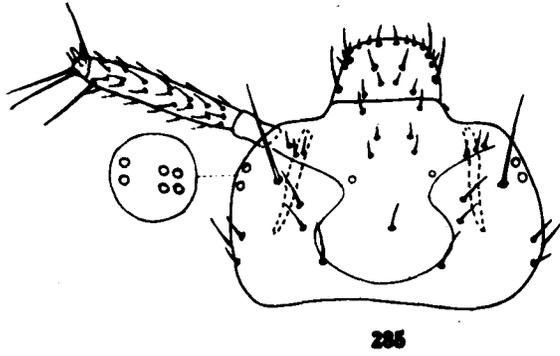
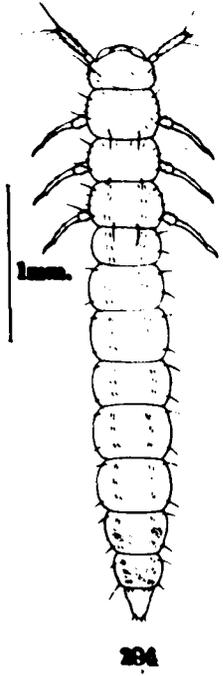


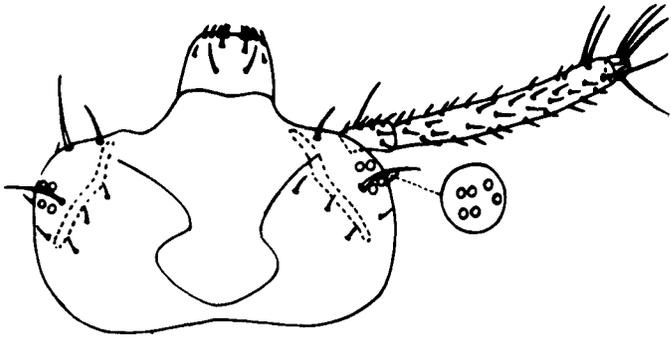
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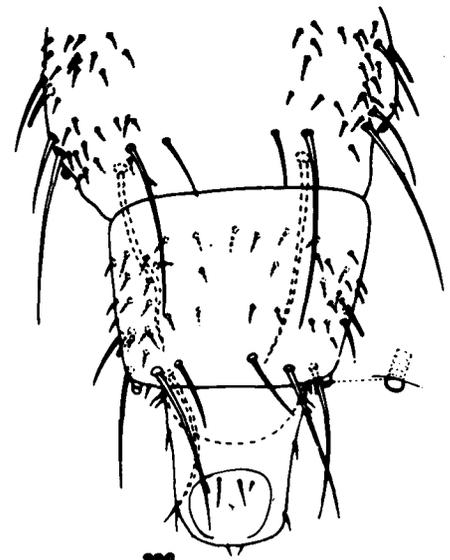
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Figs.284-291. Larva of Ahasverus advena (Waltl): 284, Dorsal view; 285, Head, Dorsal view; 286, Prothorax, Dorsal view; 287, Left mandible, Ventral view; 288, Labium, Ventral view; 289, Left maxilla, Dorsal view; 290, Claw; 291, Posterior abdominal segments, Dorsal view.

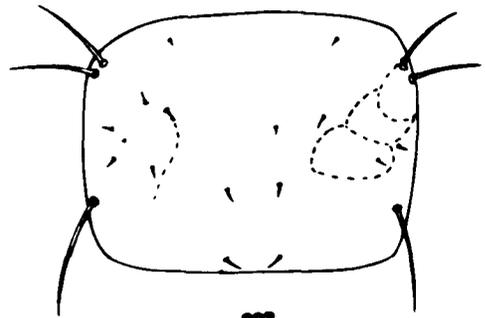




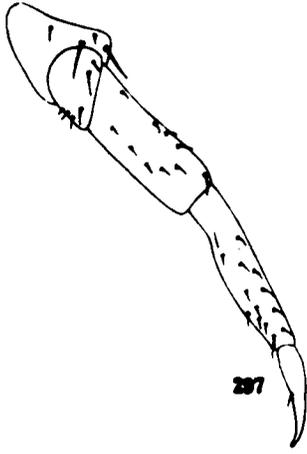
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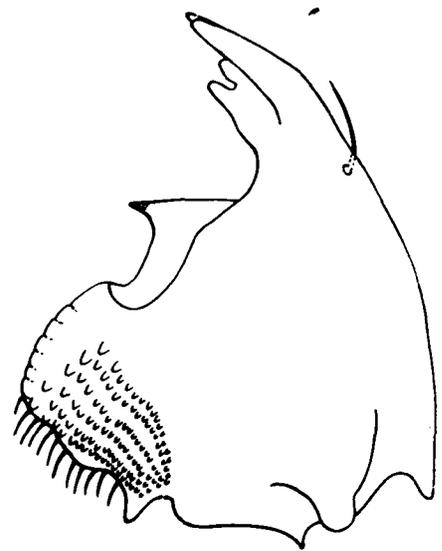
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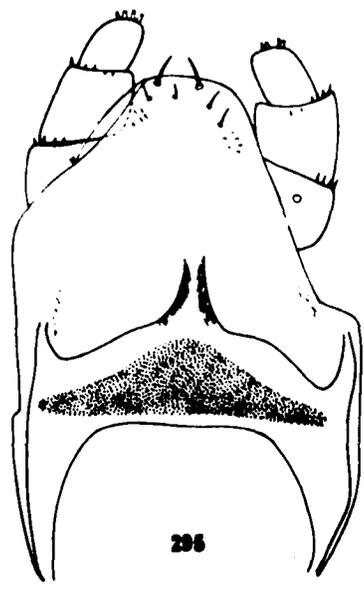
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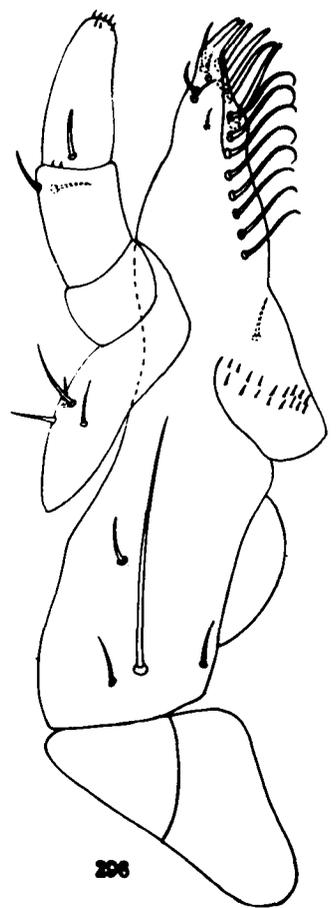
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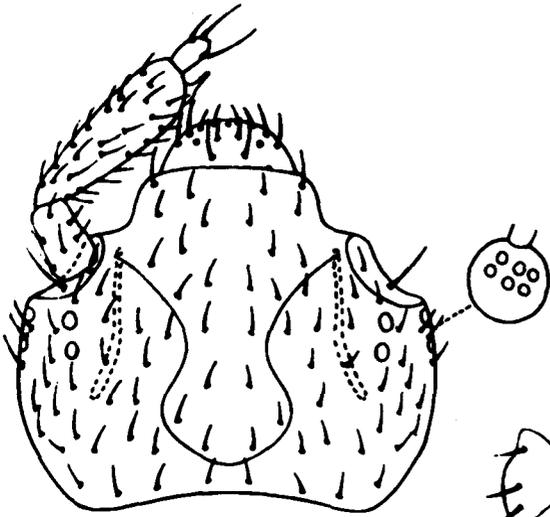


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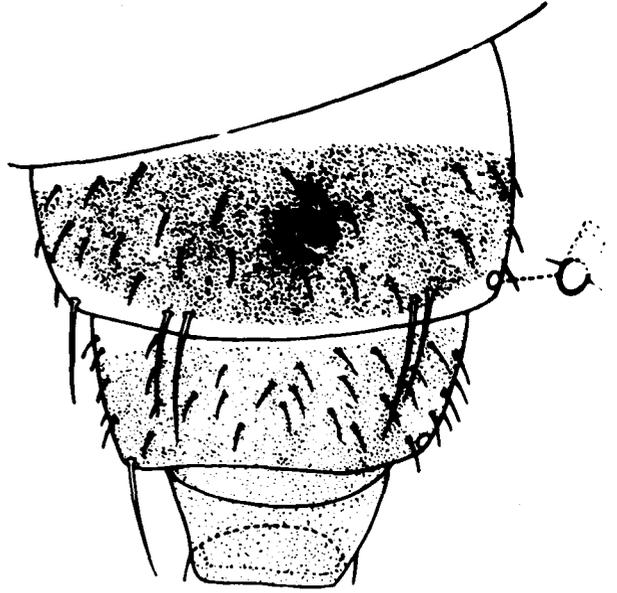


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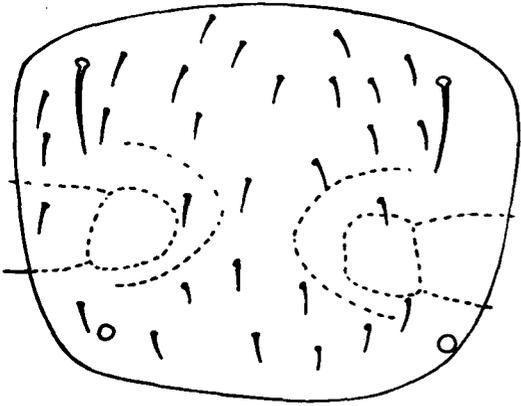
Figs.299-305. Larva of Airaphilus serricollis Reitter: 299, Head, Dorsal view; 300, Prothorax, Dorsal view; 301, Left mandible, Ventral view; 302, Labium, Ventral view; 303, Left maxilla, Ventral view; 304, Leg; 305, Posterior abdominal segments, Dorsal view.



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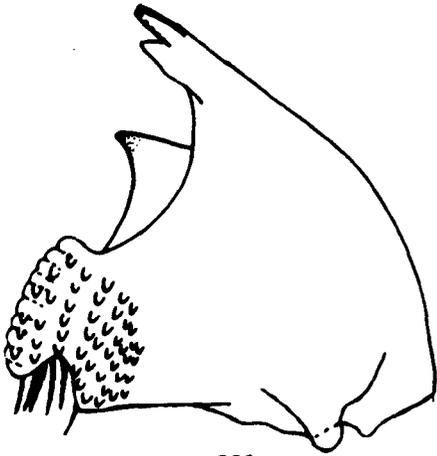
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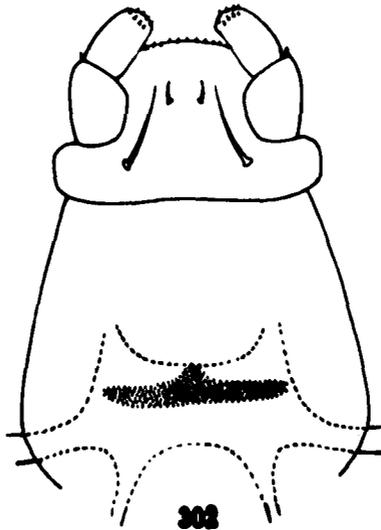
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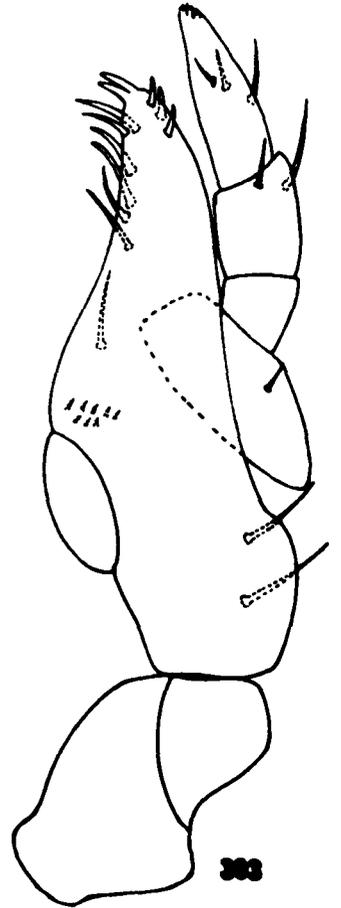
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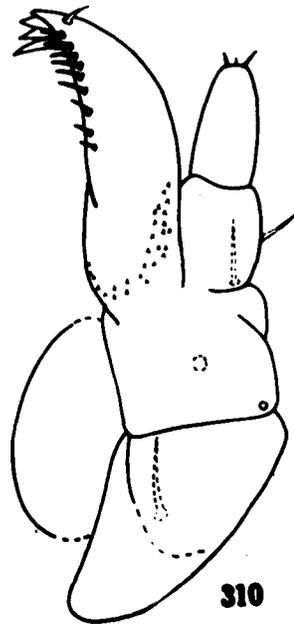
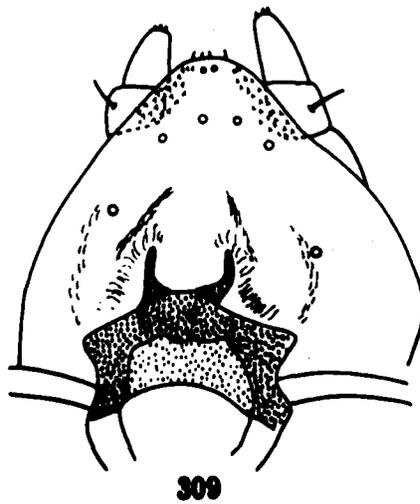
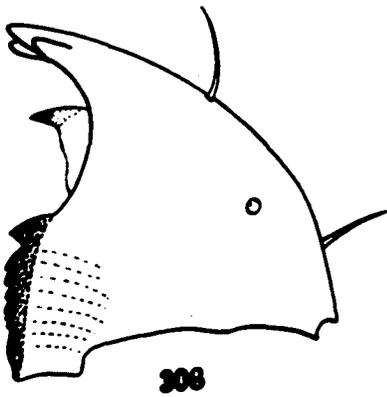
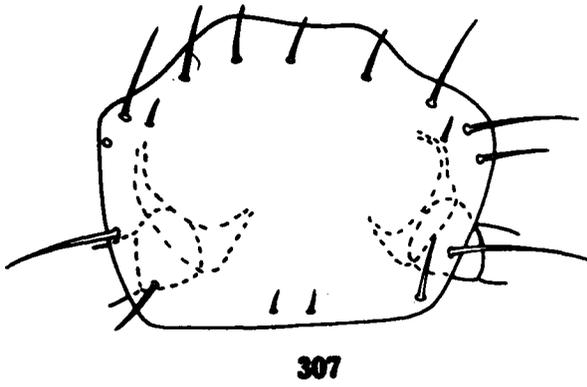
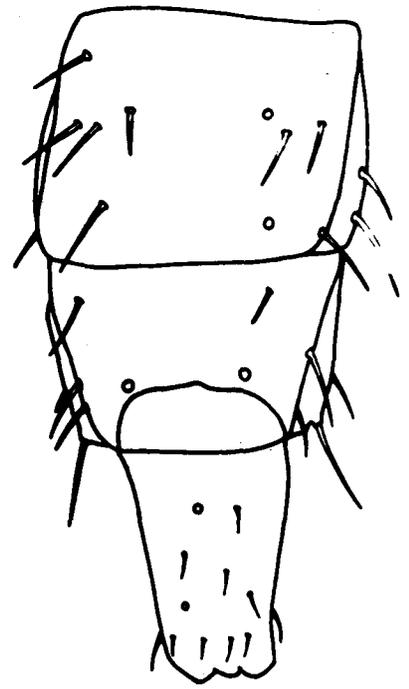
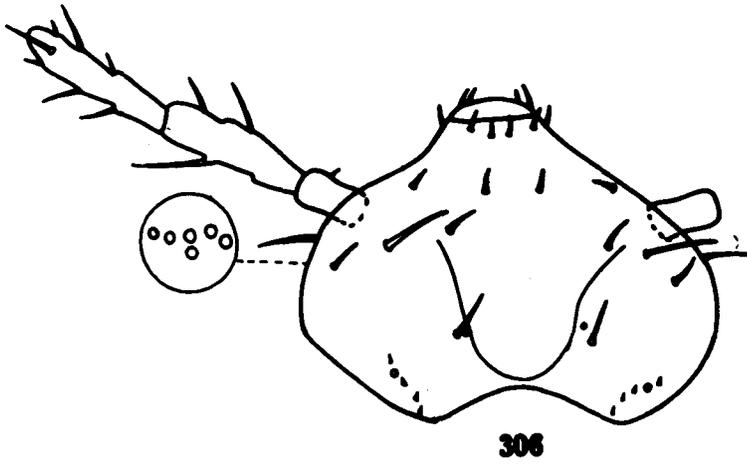
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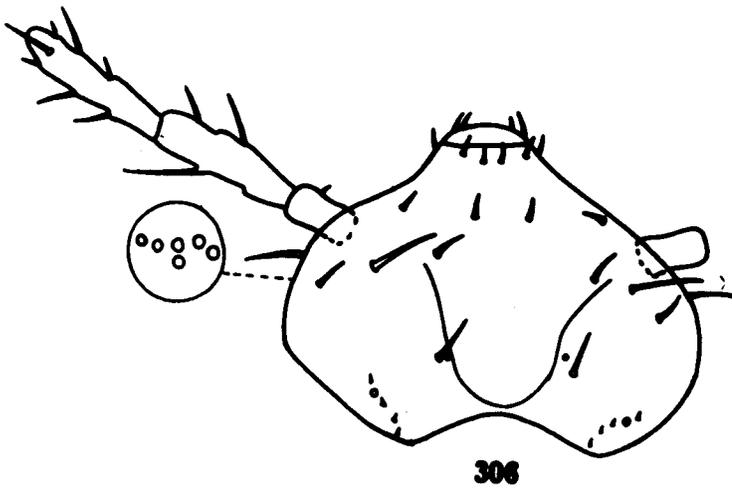
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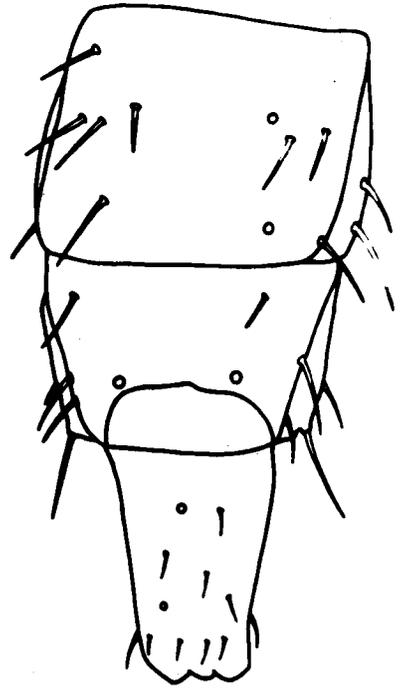
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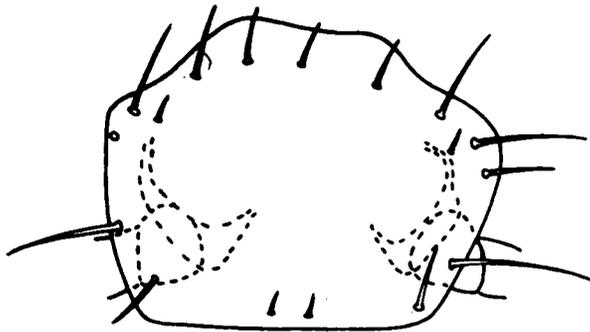
Figs. 306-312. Larva of Psammoecus bipunctatus (F.): 306, Head, Dorsal view; 307, Prothorax, Dorsal view; 308, Left mandible, Ventral view; 309, Labium, Dorsal view; 310, Right maxilla, Dorsal view; 311, Claw; 312, Posterior abdominal segments, Dorsal view.



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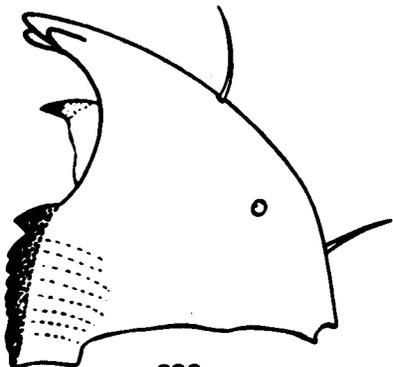
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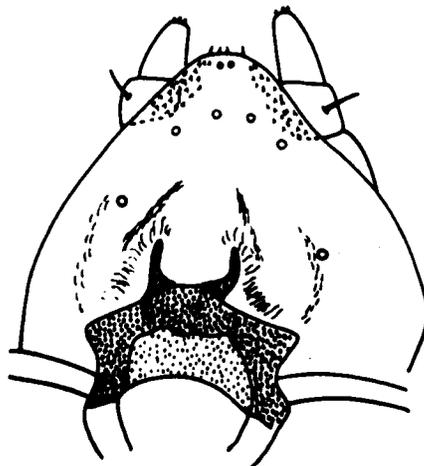
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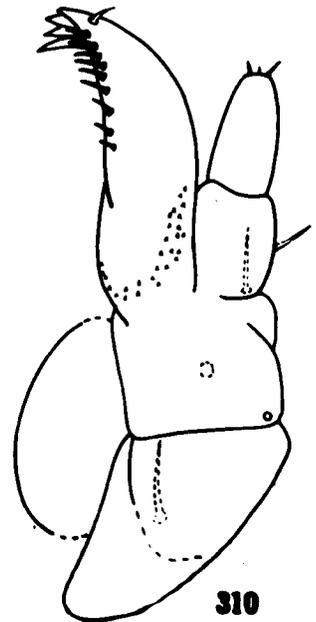
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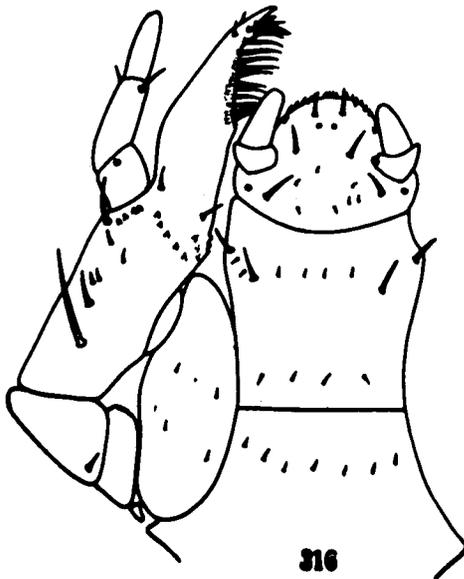
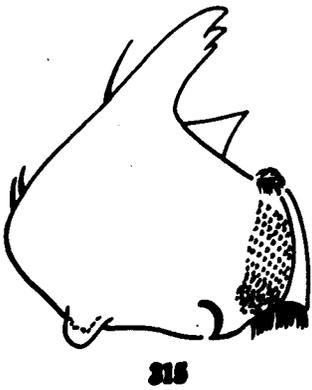
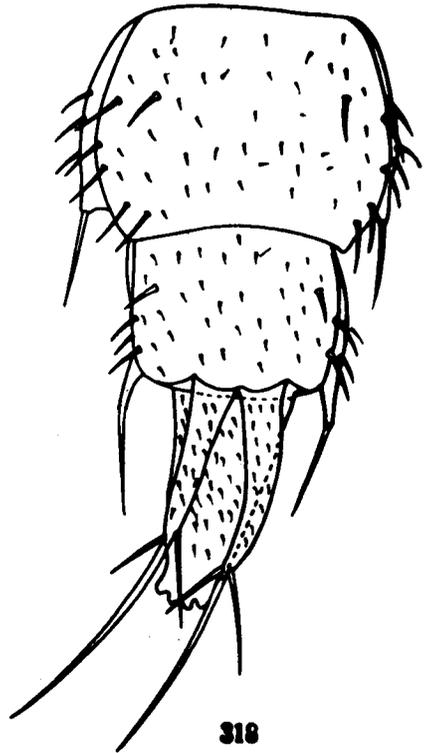
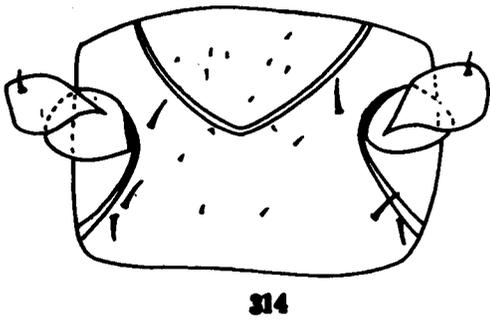
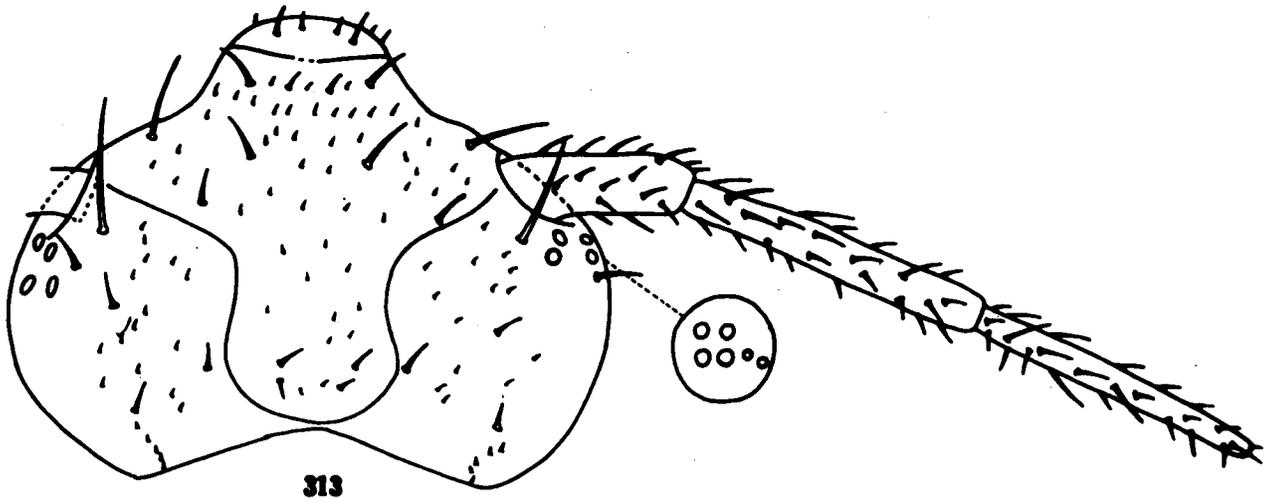
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Figs. 313-318. Larva of Cryptamorpha brevicornis (White): 313, Head, Dorsal view; 314, Prothorax, Ventral view; 315, Right mandible, Ventral view; 316, Labium and Right maxilla, Ventral view; 317, Claw; 318, Posterior abdominal segments, Dorsal view.





A P P E N D I X

A REVISION OF *SILVANUS* (COLEOPTERA: SILVANIDAE) FROM INDIA

T.K. Pal and T. Sen Gupta

Zoological Survey of India, 34 Chittaranjan Avenue, Calcutta-700012, India

ABSTRACT. Systematic position and relationship of *Silvanus* Latreille is discussed. *Silvanus* is redefined with several additional characters. Five new species are described and illustrated. A key to the Indian species of *Silvanus* is given.

The present work is based mainly on the collection made by one of us (Sen Gupta) from different parts of India. *Silvanus* Latreille comprises minute and flat beetles ranging from 2.00 to 3.50 mm in length. These beetles primarily live under bark of trees and are found also in mouldy stored food products. Halstead (1973) reported twelve species associated with stored food products. The genus *Silvanus* is widely distributed to all zoogeographical regions and also occurs abundantly all over India, of which the species *S. lewisi* Reitter is the most common and widely distributed.

Silvanus is one of the largest genus of the subfamily Silvaninae of the family Silvanidae. This genus was proposed by Latreille (1804) for the species *Ips unidentata* Olivier, later in 1807 described as the genus *Silvanus*. Subsequently, several unrelated species were described under this genus by various workers. Ganglbauer (1899) first revised the genus *Silvanus*. Grouvelle (1912) erected four subgenera, viz., *Microsilvanus*, *Parasilvanus*, *Protosilvanus* and *Cathartosilvanus* under this genus. Hetschko (1930, in : Junk's Coleopterorum Catalogus) listed fiftyfive species under this genus, including three species, viz., *S. bidentatus* (Fabricius), *S. lateritius* Reitter and *S. lewisi* Reitter from India. Halstead (1973) while revising the genus *Silvanus* pointed out that in Junk's 'Coleopterorum Catalogus, Hetschko has erroneously included twentyone species. He also established three more new genera, viz. *Calpus*, *Pensus* and *Silvanoidea*, and given generic status to Grouvelle's subgenera *Cathartosilvanus*, *Parasilvanus* and *Protosilvanus*, and merged the subgenus *Microsilvanus* with *Silvanus*. Halstead recognised seventeen valid species, of which five species are from India, viz., *S. lewisi*, *S. bidentatus*, *S. recticollis* Reitter, *S. difficilis* Halstead and *S. rossi* Halstead and transferred the Indian species *S. lateritius* Reitter to the genus *Protosilvanus* Grouvelle.

The genera *Silvanus*, *Protosilvanus* and *Silvanoprus* Reitter are closely related. Chief differences of these genera are as follows :

Published August 1977

<i>Silvanus</i>	<i>Silvanoprus</i>	<i>Protosilvanus</i>
1. Dorsal surface moderately depressed.	Dorsal surface moderately depressed.	Dorsal surface markedly flat.
2. Lateral spines of antennal joints 9 and 10 absent.	Lateral spines of antennal joints 9 and 10 absent.	Lateral spines on antennal joints 9 and 10 usually distinct.
3. Apical segments of maxillary and labial palpi largest and fusiform.	Apical segments of maxillary and labial palpi largest and fusiform.	Apical segments of maxillary and labial palpi shorter than previous segment and apical segment of labial palpi not fusiform.
4. Anterior spines on front angles of prothorax prominent, apex of prosternum moderately broad.	Anterior spines on front angles of prothorax prominent, apex of prosternum moderately broad.	Anterior spines on front angles of prothorax less prominent, apex of prosternum broad.
5. Elytral interstices not carinate.	Elytral interstices not carinate.	Seventh elytral interstice strongly carinate.
6. Tarsi simple.	Tarsal segment 3 strongly lobed below.	Tarsi simple.
7. Habitat: Under bark.	Habitat : From haystack, leaves garbage, lac and stored rice.	Habitat : Under bark.

Genus *Silvanus* Latreille

Silvanus Latreille, 1804, *Histoire Naturelle, générale et particulière, des crustacés et des insectes*, 11 : 158; Latreille, 1807, *Genera Crustaceorum et Insectorum*, 3 : 19. *Leptus* Duftschmidt, 1823, *Fauna Austriae*, 3 : 156.

Silvanus Latreille : Ganglbauer, 1899, *Die Käfer Von Mitteleuropa*, 3 : 581 ; Grouvelle, 1912, *Ann. Soc. Ent. France*, 81 : 332-340; Halstead, 1973, *Bull. Brit. Mus. Nat. Hist. (Ent.)*, 29 (2) : 41, 47.

Type-species : *Silvanus unidentata* (Oliveir).

General appearance (Fig. 1) elongated, depressed, and dorsal surface usually reddish brown to blackish brown.

Head (Fig. 14) with eyes moderately large and coarsely faceted, anterior margin of clypeus usually almost straight, temple often flat and shelf-like beneath eye, vertex with a transverse impressed line behind eyes, tentorium as seen in figure (Fig. 14). On ventral side gular sutures moderately widely separated. Antennal insertions hidden by the projection of frons, antenna (Fig. 1) moderately long, slender, 11-jointed, scape broadly elongate, joints 2-8 subequal and narrower than scape, club loose and 3-jointed. Mandible (Fig. 20) with three apical teeth, mola well developed and a trace of dorsal mandibular cavity near base present. Maxilla (Fig. 21) with lacinia narrow elongated and without apical spines, galea short and broad and its apex densely hairy, palpi

with segment 2 slightly longer than segment 3, apical segment longest and fusiform. Labium (Fig. 22) with mentum triangular, palpi with apical segment longest and fusiform. Labrum (Fig. 23) with apical margin slightly convex. *Prothorax* (Fig. 15) longer than broad, front angles with a prominent spine, side margins finely serrated, pronotum with a median disc usually demarcated by shallow lateral depressions. Prosternal process broad at apex. Front coxae narrowly separated, coxal cavities round with hidden trochantins and externally broadly closed behind and internally opened. *Meso-metathorax* (Fig. 16) with mesocoxae narrowly separated, cavities broadly opened outwardly, lateral margins of mesosternal process notched at middle, sternal fitting between mesocoxae almost in a straight line. Metasternum elongated, median impressed line extends almost up to apex, hind coxae more widely separated than mesocoxae. Metendosternite simple with two appophyses. *Wing and Elytra* : wing (Fig. 24) with single anal vein and radial cell, without anal cell and subcubital fleck. Elytra (Figs. 1, 19) somewhat parallel-sided, usually slightly sinuate across anterior one third, each elytron with 9 rows of stria punctures, without scutellary striole, single and double rows of pubescens on alternate interstices, epipleura narrow and complete up to apex. *Legs* (Fig. 18) moderately long, trochanters simple and broadly elongate, femora usually broadened towards middle, tibiae not broadened at apex and with two apical spurs. Tarsal formula 5-5-5 in both sexes, tarsi simple, tarsal segment 1 long, segments 2 and 3 short and subequal, segment 4 smallest, claws simple. *Abdomen* (Fig. 17) narrow and elongated, ventrites freely articulated, ventrite 1 longest, intercoxal process broad and narrowed at apex, ventrites 2-5 subequal. Aedeagus (Fig. 25) uninverted cucujoid type, median lobe broad, tegmen complete, median sturt single, long and its apex spatulate, parameres well developed, slender, elongate and its apex bilobed. Ovipositor (Fig. 26) with well developed paraprocts, vaivifers, coxites and long styli attached on outer margin of apex of coxites.

Distribution : All zoogeographical regions.

KEY TO THE INDIAN SPECIES OF *SILVANUS*

1. Temple not flattened beneath the eye to form a platform, eyes small with few facets, anterior spine of prothorax directed towards front and its tip blunt. (Fig. 3) *recticollis* Reitter
 Temple flattened beneath the eye to form a platform, eyes moderately or markedly large with many facets, anterior spine of prothorax directed slightly outwards and its tip pointed. 2
2. Temple markedly short and represented by a thin platform (Figs. 1, 2), length of temple shorter than the width of one eye facet. 3
 Temple distinct and thick, its length longer than the width of one eye facet. . . . 4
3. Prothorax broad and short, excluding the anterior spines hardly longer than broad (2 : 1.95), anterior one-third of the lateral margins of prothorax excluding the anterior spines almost parallel (Fig. 2). *imitatus*, sp. nov.
 Prothorax narrower and elongated, excluding the anterior spines prothorax distinctly longer than broad (2 : 1.75), anterior one-third of the lateral margin of prothorax sinuate before the formation of anterior spine. (Fig. 1). *lewisii* Reitter

4. Inner margin of anterior spine of prothorax distinctly curved outwardly (Fig. 4) *rossi* Halstead
 Inner margin of anterior spine of prothorax not curved outwardly and usually almost straight. 5
- 5 Prothorax hardly longer than broad excluding the anterior spines (1.90 : 1.65), and slightly convergent posteriorly behind the middle (Fig. 9). *difficilis* Halstead
 Prothorax distinctly longer than broad excluding the anterior spines, and prothorax distinctly convergent posteriorly behind the middle (Fig. 5). 6
6. Meeting point of outer margin of anterior spine and lateral margin of prothorax forms almost an obtuse angle. (Fig. 6). *gibbus*, sp. nov.
 Meeting point of outer margin of anterior spine and lateral margin of prothorax not forms an angle but distinctly concave (Figs. 5, 7, 10, 12). 7
7. Prothorax somewhat elliptical excluding the anterior spines; outer margin of the anterior spine of prothorax curved inwardly and its tip projected somewhat inwardly and towards front (Fig. 12). *curvispinus*, sp. nov.
 Prothorax not elliptical excluding the anterior spines and distinctly narrowed posteriorly; outer margin of the anterior spine of prothorax straight and its tip directed more outwardly (Figs. 5, 7, 10). 8
8. Anterior spine of prothorax short, narrow and its tip pointed (Fig. 5); distance between two eyes on ventral side of head more than two times wider than length of each eye. *bidentatus* (Fabricius)
 Anterior spine of prothorax distinctly longer and broader and its tip less pointed (Figs. 7, 10); distance between two eyes on ventral side of head less than 1.5 times of length of each eye. 9
9. Dorsal surface blackish brown; hind femora widest before middle; lateral margin of prothorax sinuate before posterior angle to form a short spinous projection; anterior spine of prothorax large, distinctly longer than half of the length of each eye; anterior spine slightly narrow and its tip somewhat sharply pointed (Fig. 10) *nigrans*, sp. nov.
 Dorsal surface reddish brown; hind femora widest at middle; lateral margin of prothorax not or very little sinuate before the posterior angle and without spinous projection; anterior spine of prothorax slightly shorter than half of the length of each eye; anterior spine comparatively broader and its tip blunt (Fig. 7). *ruficarpus*, sp. nov.

1. *Silvanus lewisi* Reitter (Fig. 1, 13, 25)

Silvanus lewisi Reitter, 1876, *Col. Hefte*, 15 : 76. (Type loc.—Japan).

Grouvelle (1908) first time reported this species in India from Nilgiri Hills. Halstead (1973) reported it from Sendhara (Madhya Pradesh), Cinchona, Anaimalai Hills, Coimbatore (Tamil Nadu), Dohnavar, Kanara, Mysore, (Karnataka). He recorded this species from various stored food products and dunnage, at light, under bark of tree stumps. *S. lewisi* is a rather distinct species and can be easily distinguished from other Indian species of *Silvanus* in having large eyes, temple shorter than one eye facet and with pointed tip, prothorax elongated and slightly convergent posteriorly with anterior spine about half as long as eye and its tip pointed; aedeagus (Fig. 25) with median lobe broad and its apical projection short and rounded at apex, apex of paramere bilobed, the outer lobe shorter than inner one and bears two setae of which the inner one comparatively longer.

Specimens examined : 32 ex. INDIA : ASSAM : Phulbari, 4 ex, 24.xi.1974, T. Sen Gupta, under bark of *Shorea robusta*; 1 ex, same data, under bark of *Borax* sp.; MEGHALAYA : Dainadubi Reserve Forest, Garo Hills, 3 ex, 18.xi.1974, T. Sen Gupta, under bark of fallen *Shorea robusta* tree. WEST BENGAL : Sukna, 1 ex, 22.iv.1971, T. Sen Gupta, under bark; same locality, 1 ex, 5.v.1976, A.R. Bhaumik, under bark; Calcutta (Ultadanga and Chetla), 5 ex, 16.iii.1975, T.K. Pal, under bark; 3 ex, 12.iv.1975, 20.iv.1975 and 24.iv.1975, T.K. Pal, under bark of *Borax* sp. UTTAR PRADESH : Dehra Dun, Lakshibag, 2 ex, 10.vi.1975, T. Sen Gupta, under bark; Dehra Dun, Jhajra, 1 ex., 18.viii.1926, F. Ent., *Shorea robusta*. KERALA: Walayar Forest, 1 ex, 1.xii.1971, T. Sen Gupta, under bark. ANDAMAN IS. : S. Andaman, Chatham, 8 ex, 5.xii.1928, B.M. Bhatia, under bark of *Sterculia campanulata* (3 ex), *Terminalia bialata* (4 ex), *Shorea robusta* (1 ex).

Distribution : India : Assam, Meghalaya, West Bengal, Uttar Pradesh, Tamil Nadu, Karnataka, Kerala. Andaman Is., Sri Lanka. Vietnam. Taiwan, Japan. Malaysia. Singapore. Indonesia. Philippines. New Guinea. Solomon Is. Australia. Congo. Ghana.

So far this species has been recorded from Southern India, in the present study it is first time recorded from Assam, Meghalaya, West Bengal, Uttar Pradesh, Kerala and Andaman Is.

2. *Silvanus imitatus*, sp. nov. (Fig. 2)

This species is close to *S. lewisi* but can be easily separated from *S. lewisi* in having its prothorax comparatively broad, excluding anterior spines the prothorax hardly longer than broad (2 : 1.95), anterior one third of lateral margin of prothorax not sinuate before formation of anterior spine, puncturation of pronotum slightly coarser, lateral margins of elytra more distinctly wavy at middle.

General appearance elongated, moderately depressed, uniformly reddish brown with short semierect golden pubescence.

Head : Exposed part of head wider than long, eyes large, length of eye slightly greater than half of length of head, eyes coarsely faceted, length of temple shorter than length of one eye facet, temple extended laterally beneath eye and its tip pointed, puncturation on vertex coarse and dense and that of near anterior margin of clypeus finer, pubescence short and projected towards middle line. Antenna moderately long and slender, scape moderately large, joint 2 about as long as scape but slightly narrower, joint 3 slightly shorter and narrower than joint 2, joints 4 and 5 equal and shorter than joint 3, joint 6 shorter than joint 5, joints 7 and 8 equal and slightly shorter than joint 6, joints 9 and 10 transverse and joint 11 elongate. *Prothorax* almost equal in length and breadth (2.00 : 2.05), width across anterior spines of prothorax greater than width across middle (2.05 : 1.85). Anterior spines originate rather gradually from sides, moderately large and its length slightly less than

half of length of an eye and its tip pointed. Lateral margin of prothorax curved and with thirteen small denticles. Lateral depressions on pronotal disc slightly marked. Puncturation on pronotum coarse, dense and similar to that of vertex of head, pubescence projected towards middle line. *Scutellum & Elytra* : Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large and pubescence projected posteriorly, Puncturation on ventral side finer than on dorsal side, and femora widest before middle.

Measurements of holotype : Total length 2.41 mm, width of head across eyes 0.52 mm, length of antenna 0.80 mm, width of prothorax across middle 0.54 mm, length of elytra 1.50 mm and width across middle 0.75 mm.

Holotype, 1 ex, INDIA : ASSAM : Phulbari, 24.xi.1974, T. Sen Gupta, under bark of log. (In the collection of Zoological Survey of India, Calcutta.)

Distribution : India : Assam.

3. *Silvanus recticollis* Reitter (Fig. 3)

Silvanus recticollis Reitter, 1876, *Col. Hefte*, 15 : 61. (Type loc. — Japan).

Silvanus reflexus Reitter, 1879, *Verh. Zool.- Bot. Ges. Wien*, 29 : 85.

Silvanus vitulus Grouvelle, 1882, *Ann. Mus. Civ. Stor. Nat. Giacomo Doria*, 32 : 294.

Silvanus (Microsilvanus) vitulus : Grouvelle, 1912, *Ann. Soc. Ent. France*, 81 : 332.

Silvanus (Microsilvanus) pumilus Grouvelle, 1912, *Ibid.*, 81 : 332.

Silvanus (Microsilvanus) minimus Grouvelle, 1912, *Ibid.*, 81 : 334.

Silvanus recticollis Reitter : Halstead, 1973, *Bull. Brit. Mus. Nat. Hist. (Ent.)*, 29 (2) : 55.

Reitter (1876) described this species from Japan. Halstead (1973) redescribed this species and mentioned several synonyms. This species is shorter (2.00 mm) than *S. lewisi* (2.50 mm), and can be easily distinguished from other species in having characteristic shape of head and prothorax (Fig. 3), eyes small and temple not flattened beneath eye to form a platform. Prothorax almost quadrate, anterior spine broad, projected forward and its tip distinctly blunt.

Specimens examined : 6 ex. INDIA : WEST BENGAL : Calcutta, 5 ex, May-June 1914, F.H.G., at light. WEST BENGAL, Howrah Dist., Sankrail. 1 ex, 13.i. 1976, T.K. Pal, haystack.

5 examples present in the collection of Zoological Survey of India, labelled as *Silvanus pumilus* Grouvelle are *Silvanus recticollis* Reitter.

Distribution : India : West Bengal, Thailand. Vietnam. Laos. Sulawesi. Japan. Taiwan (Ryuku Is). Mauritania. Congo. Zaire. Rhodesia.

4. *Silvanus rossi* Halstead (Fig. 4)

Silvanus rossi Halstead, 1973, *Bull. Brit. Mus. Nat. Hist. (Ent.)*, 29 (2) : 54. (Type loc.-India, Thailand, New Guinea).

Halstead recorded this species in India from W. Almorah Divn., Kumaon,

Uttar Pradesh. General appearance of this species is similar to *S. lewisi* and can be separated from the latter species in having temple of head about as long as one eye facet and its tip blunt, eyes slightly smaller, antennal joint 2 slightly longer than scape, inner margin of anterior spine of prothorax slightly curved, scutellum about as broad as long, lateral margin of elytra more wavy.

Specimens examined : INDIA : HIMACHAL PRADESH : Solan, 1 ex, 17.vi 1975, T. Sen Gupta, under bark of Pine log.

Distribution : India : Uttar Pradesh, Himachal Pradesh. Thailand. New Guinea.

5. *Silvanus bidentatus* (Fabricius) (Fig. 5)

Dermestes 2 dentatus Fabricius, 1792 a, *Entomologiae Systematicae Emedate et Auctae*, 1 (1) : 233. (Type loc.-Germany).

Colydium sulcatum Fabricius, 1792 b, *Ibid*, (12) : 555.

Silvanus bidentatus (Fabricius) : Sturm, 1826, *Katalog meiner Insekten Sammlung*, 1. Käfer : 196.

Silvanus affinis Reitter, 1876, *Col. Hefte*, 15 : 58.

Silvanus bidentatus var *affinis* Reitter : Reitter 1880, *Verh. Zool.-Bot. Ges. Wien*, 29 : 509.

Silvanus bidentatus (Fabricius) : Grouvelle, 1908, *Ann. Soc. Ent. France*, 77 : 490; Halstead, 1973, *Bull. Brit. Mus. Nat. Hist. (Ent.)*, 29 (2) : 68.

Grouvelle (1908) recorded this species for the first time in India from Nilgiri Hills. Halstead (1973) gave a detailed description of this species and mentioned several synonyms. *S. bidentatus* can be easily recognised by its length of temple being about as long as two eye facets and flattened beneath eye, tip of temple broad, eyes moderately large and distance between two eyes on ventral side of head more than two times wider than length of each eye, prothorax elongated and convergent posteriorly, anterior spine rather short, its tip pointed and directed more towards lateral side, and lateral depressions on pronotal disc well marked.

Specimens examined : 10 ex. EUROPE : 1 ex., (Z.S.I. Reg. No. 747). ITALY : PIEMONTE, Novara, Passo, COLMA, 900 m, 9 ex, iv. 71, Rosa.

Distribution : India : Tamil Nadu. Britain. Russia. Italy. U.S.A. Thailand.

6. *Silvanus gibbus*, sp. nov. (Figs. 6, 27)

This species is related to *S. difficilis* Halstead, but can be easily separated from the latter species by its anterior spine of prothorax originates more abruptly from lateral side, puncturation on vertex of head and pronotum coarser, lateral depressions on pronotal disc rather well marked, antennal club comparatively broader. This species also has some similarity with *S. robustus* Halstead in its general appearance, but can be separated from the latter species by following characters : (i) the apical projection of median lobe

of aedeagus short and blunt, (ii) trochanter of hind leg of male devoid of any tubercle, (iii) ridge on anterior margin of hind femora absent.

General appearance elongated, moderately depressed, uniformly reddish brown with short semierect golden pubescence.

Head : Exposed part of head wider than long, length of eye about half of length of head, eyes coarsely faceted, length of temple about as long as two eye facets, temple extended laterally beneath eye and its tip broad. Puncturation on vertex coarse and dense, and that of near anterior margin of clypeus slightly finer, pubescence short and projected towards middle line. Antenna moderately long and slender, scape moderately large, joint 2 as long as scape and slightly narrower, joint 3 slightly shorter and narrower than joints 2, joint 4 and 5 equal and slightly shorter than joint 3, joint 6 shorter than joint 5, joint 6 slightly longer and broader than joint 7, joint 8 slightly elongate and broader than joint 7, joint 10 slightly more transverse than joint 9, joint 11 slightly longer than broad. *Prothorax* convex, elongate and narrowed posteriorly, width across middle almost equal to width across anterior spines (1.99 : 2.02). Anterior spine of prothorax moderately long and about half as long as an eye, its tip slightly blunt, anterior spines originating abruptly from lateral sides of prothorax. Lateral margin curved and with fifteen small denticles. Lateral depressions on pronotal disc rather well marked. Puncturation on pronotum coarse, dense and similar to that of vertex of head, pubescence projected towards middle line. *Scutellum & Elytra* : Scutellum moderately large, transverse and pubescent. Elytra more than two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large, interstices alternately wider and narrower, pubescence projected posteriorly. Puncturation on ventral surface finer than that of dorsal surface, and femora widest before middle. Aedeagus as seen in figure 27, median lobe broad posteriorly, apex of each paramere bilobed, inner lobe with a long seta and outer one with two short setae.

Measurements of holotype : Total length 2.73 mm, width of head across eyes 0.55 mm, length of antenna 1.02 mm, width of prothorax across middle 0.58 mm, length of elytra 1.58 mm and width across middle 0.74 mm.

Holotype 1 ex, and *paratypes* 4 ex, INDIA : WEST BENGAL : Calcutta, 20.iv. 1975, T.K. Pal, under bark of *Borax* sp., brought from Assam; *Paratype* 1 ex, INDIA : ASSAM : Kaziranga, Panbari, 15.xi. 1974, T. Sen Gupta, under bark of *Shorea robusta*. *Paratype* 1 ex, INDIA : MEGHALAYA : Dainadubi Reserve Forest, 18.xi. 1974, T. Sen Gupta, under bark of *Shorea robusta*. (In the collection of Zoological Survey of India, Calcutta).

Distribution : India : West Bengal, Assam, Meghalaya.

7. *Silvanus ruficarpus*, sp. nov. (Fig. 7)

This species is related to the species *S. gibbus*, sp. nov., but can be separated from latter species in having prothorax excluding anterior spines (2.40 : 1.80)

distinctly longer, anterior spine of prothorax originating not abruptly from lateral margin, and femora of hind leg widest at middle.

General appearance elongated, moderately depressed, uniformly reddish brown with short semierect golden pubescence.

Head : Exposed part of head wider than long, length of eye about half as long as head, eyes coarsely faceted, length of temple as long as two eye facets, temple extended laterally beneath eye and its tip broad, Puncturation on vertex coarse, dense and that of towards anterior margin of clypeus slightly finer, pubescence short and projected towards middle line. Antenna moderately long and slender, scape moderately large, joint 2 about as long as scape and narrower, joint 3 slightly shorter than joint 2, joints 4 and 5 equal and shorter than joint 3, joint 6 shorter than joint 5, joint 7 slightly longer and wider than joint 6, joint 8 slightly shorter than joint 7, joints 9 and 10 transverse and 11 elongate. *Prothorax* convex, elongate and narrowed posteriorly, width across anterior spines wider than width across middle (2.00 : 1.80). Anterior spines of prothorax moderately large, originating gradually from lateral sides, its length about half as long as eye and its tip somewhat blunt. Lateral margin curved with thirteen small denticles. Lateral depressions on pronotal disc rather well marked. Puncturation on pronotum coarse and dense and similar to that of vertex of head, pubescence projected towards middle line. *Scutellum & Elytra*: Scutellum moderately large, transverse and pubescent. Elytra about two times as long as broad, widest near middle, lateral margins wavy and explanate, rows of punctures on elytra deep and large. Ventral surface shiny, puncturation finer than that of dorsal surface, and femora of hind leg (Fig. 8) widest near middle.

Measurements of holotype : Total length 2.64 mm, width of head across eyes 0.43 mm, length of antenna 0.95 mm, width of prothorax across middle 0.43, mm, length of elytra 1.50 mm and width across middle 0.74 mm.

Holotype 1 ex, INDIA : ASSAM : Kaziranga, Panbari, 15.xi.1974, T. Sen Gupta, under bark of *Borax* sp. (In the collection of Zoological Survey of India, Calcutta.)

Distribution : India : Assam.

8. *Silvanus nigrans*, sp. nov. (Fig 10)

General appearance of this species somewhat similar to the species *S. bidentatus* (Fabricius) but can be easily separated in having anterior spine of prothorax longer, its apex not sharply pointed and less outwardly projected; eyes large and distance between two eyes on ventral side distinctly shorter than in *S. bidentatus*. This species also shows some resemblances with *S. ruficarpus*, sp. nov., but can be separated in having anterior spine of prothorax longer, narrower and more acute at apex. Unlike *S. bidentatus* lateral margin of prothorax sinuates before posterior angle and form a small spinous projection, hind

femora widest before middle, antennal joint 7 not longer than joint 6, and uniformly blackish brown.

General appearance elongated, moderately depressed, uniformly blackish brown with short semierect golden pubescence.

Head : Exposed part of head wider than long, length of eye slightly less than half of length of head, eyes coarsely faceted, length of temple about as long as two eye facets, temple extended laterally beneath eye and its tip broad. Punctuation on vertex coarse, dense and that of towards anterior margin of clypeus slightly finer, pubescence short and projected towards middle line. Antenna moderately long and slender, scape moderately large, joint 2, about as long as scape and narrower, joint 3 shorter than joint 2, joints 4 and 5 equal and shorter than joint 3, joints 6 and 7 equal in length and shorter than joint 5, joint 7 slightly wider than joint 6, joint 8 shorter than joint 7, joint 9 and 10 transverse and joint 11 elongate. *Prothorax* convex, elongate and narrowed posteriorly, width across anterior spines wider than width across middle (2.00 : 1.80). Anterior spines of prothorax moderately large, originate gradually from sides, its length slightly greater than half of length of an eye, and its tip slightly pointed. Lateral margin curved with fifteen small denticles. Punctuation on pronotum coarse, dense and similar to that of vertex of head, pubescence projected towards middle line. *Scutellum & Elytra* : Scutellum moderately large, transverse and pubescent. Elytra about two times as long as as broad, widest near middle, lateral margins wavy and explanate, punctures on elytra deep and large, pubescence projected posteriorly. Punctuation on ventral surface finer than that of dorsal surface and shiny, and femora of hind leg (Fig. 11) widest near middle.

Measurements of holotype : Total length 2.57 mm, width of head across eyes 0.51 mm, length of antenna 0.94 mm, width of prothorax across middle 0.43 mm, length of elytra 1.50 mm and width across middle 0.73 mm.

Holotype 1 ex, INDIA : WEST BENGAL : Darjeeling district, Tistabazar, 18. iv. 1971, T. Sen Gupta, under bark of log. (In the collection of Zoological Survey of India, Calcutta).

Distribution : India : West Bengal.

9. *Silvanus curvispinus*, sp. nov. (Fig. 12)

This is a distinct species, nearest the species *S. gibbus*, sp. nov., and can be easily separated from the latter species in having its prothorax excluding the anterior spines somewhat elliptical, outer margin of anterior spine of prothorax curved inwards, lateral depressions on pronotal disc absent, punctures on pronotum coarse, hind trochanter in male with a spine.

General appearance elongated, moderately depressed, uniformly reddish brown with short semierect golden pubescence.

Head : Exposed part of head wider than long, length of eye slightly less than half of length of head, eyes coarsely faceted, length of temple about as

long as two eye facets, temple extended laterally beneath eye and its tip broad. Puncturation on vertex coarse, dense and that of towards anterior margin of clypeus slightly finer, pubescence short and projected towards middle line. Antenna moderately long and slender, scape moderately large, joint 2 as long as scape and narrower, joints 3, 4 and 5 equal and slightly shorter than joint 2, joint 6 shorter than joint 5, joint 7 as long as joint 6 and slightly wider, joint 8 shorter than joint 7, joints 9 and 11 slightly elongate and joint 10 slightly transverse. *Prothorax* convex, elongate, excluding anterior spines somewhat elliptical, width across anterior spines almost equal to width across middle (2.00 : 1.98). Anterior spine of prothorax moderately large and originating gradually from sides, its length about half as long as an eye, outer margin of anterior spine curved and projected in front and its tip blunt. Lateral margin of prothorax evenly curved and with fifteen small denticles. Lateral depressions on pronotal disc absent. Puncturation on pronotum coarse, dense and slightly coarser than that of vertex of head, pubescens projected towards middle line. *Scutellum & Elytra*: Scutellum moderately large, transverse and pubescent. Elytra slightly more than two times as long as broad, widest near middle, lateral margins wavy, explanate, punctures on elytra deep and large, pubescence projected posteriorly. Puncturation on ventral surface finer than on dorsal surface and shiny. Femora widest near base, hind trochanter with a spine in male.

Measurements of holotype : Total length 3.01 mm, width of head across eyes 0.43 mm, length of antenna 1.08 mm, width of prothorax across middle 0.58 mm, length of elytra 1.53 mm, and width across middle 0.73 mm.

Holotype ♂, INDIA : ASSAM : Kaziranga, Panbari. 15.xi.1974, T. Sen Gupta, under bark of *Borax* sp. (In the collection of Zoological Survey of India, Calcutta.)

Distribution : India : Assam.

10. *Silvanus difficilis* Halstead (Fig. 9)

Silvanus difficilis Haestead, 1973, *Bull. Brit. Mus. Nat. Hist. (Ent.)*, 29 (2) : 73.

Halstead (1973) described this species and mentioned that in this species there are two distinct forms, viz., 'Normal form' and 'New Guinea' form'. The 'Normal form' differs from the 'New Guinea form' by its short temple, and wider and shorter prothorax. Halstead recorded this species ('Normal form') in India as follows : Cinchona, Anamalai Hills, Tamil Nadu; Malabar coast, Mahe, Kerala ; Kanara, Karnataka ; W. Almorah Divn., Kumaon, Kheri Forest, Uttar Pradesh.

The specimen studied here is a 'Normal form' of *S. difficilis* (Fig. 9), which can be distinguished by its temple of head being longer than one eye facet and its tip broad, eyes large, anterior spine of prothorax small and somewhat pointed at apex, excluding the anterior spines prothorax little longer (1.90 : 1.65), prothorax less convergent posteriorly, puncturation on vertex of head and pronotum coarse and dense.

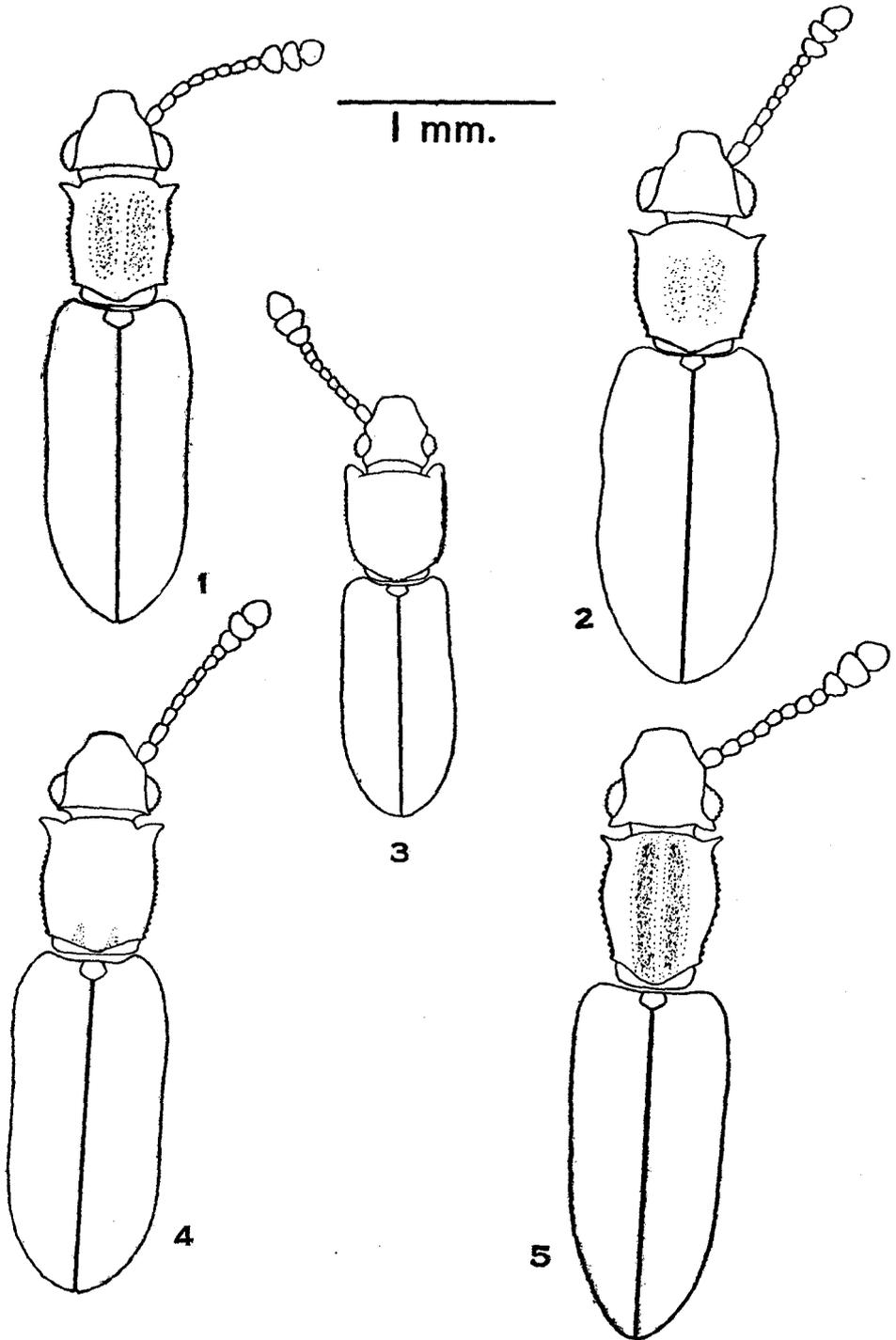
Specimen examined : INDIA : TAMIL NADU : Madumalai Reserve Forest, 1 ex, 7.xii. 1971, T. Sen Gupta, under bark of log.

Distribution : 'Normal form'. India : Tamil Nadu, Kerala, Karnataka, Uttar Pradesh. Ceylon. Vietnam. Taiwan. Malayasia. Singapore. Indonesia. Philippines. Moluccas. New Guinea. I. Delcas (Off. N. Coast of Britain). Solomon Is. Samoan Is. Australia. West Africa.

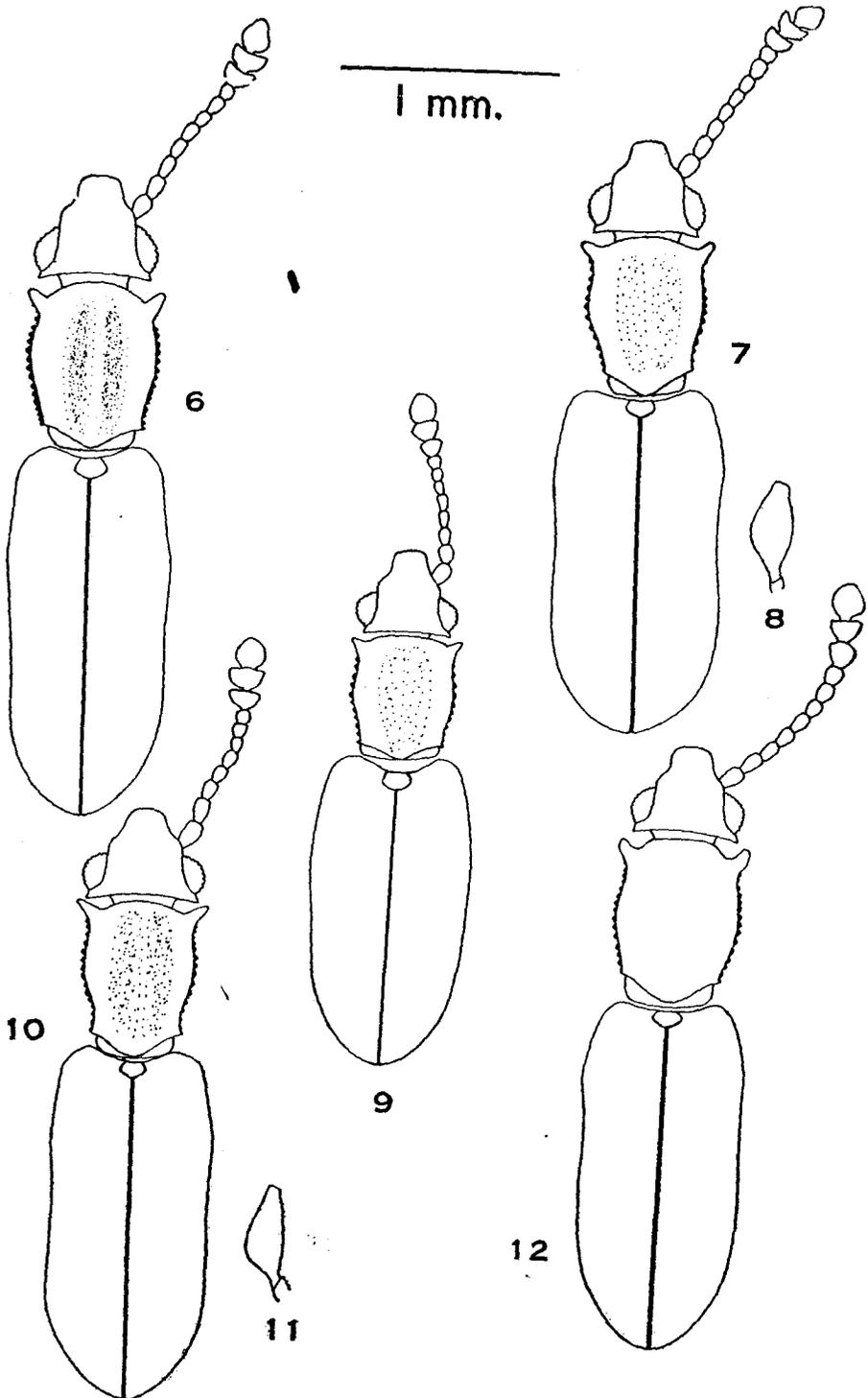
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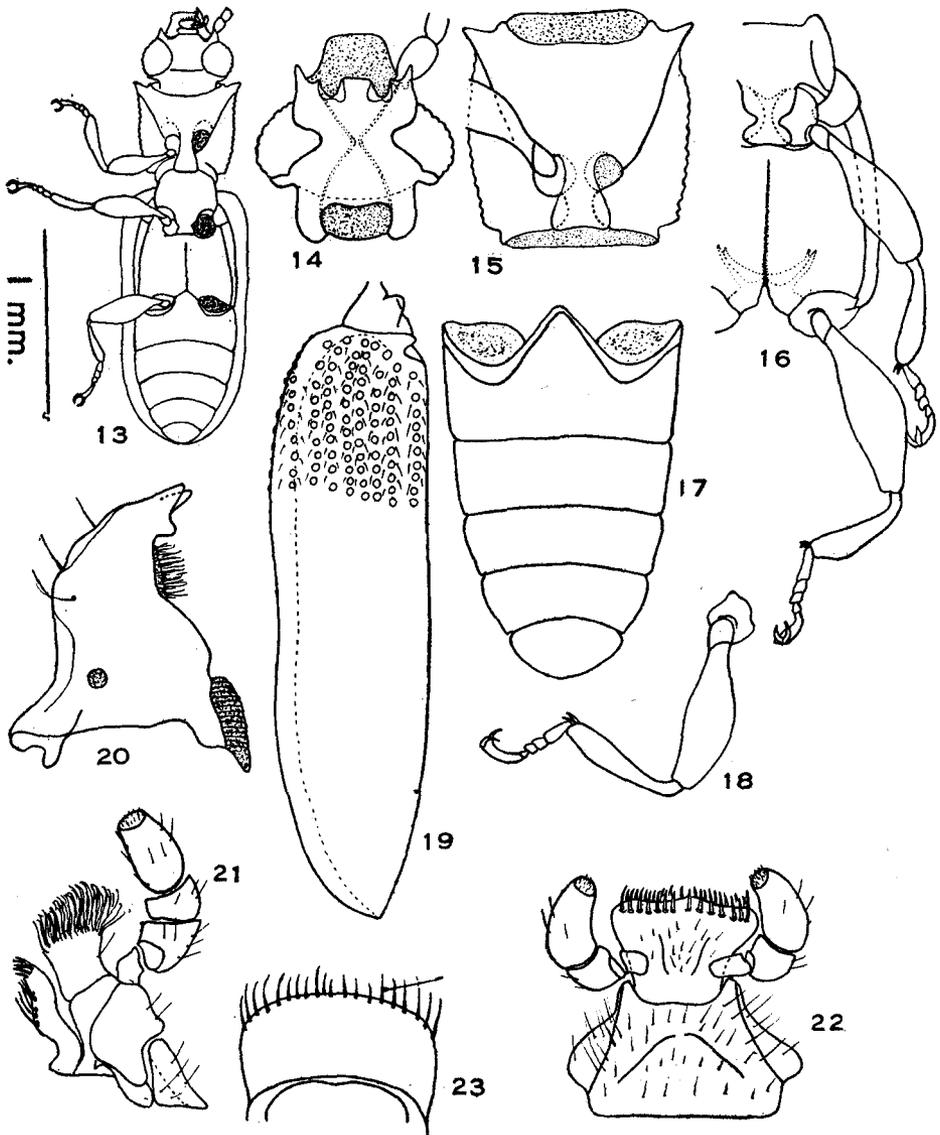
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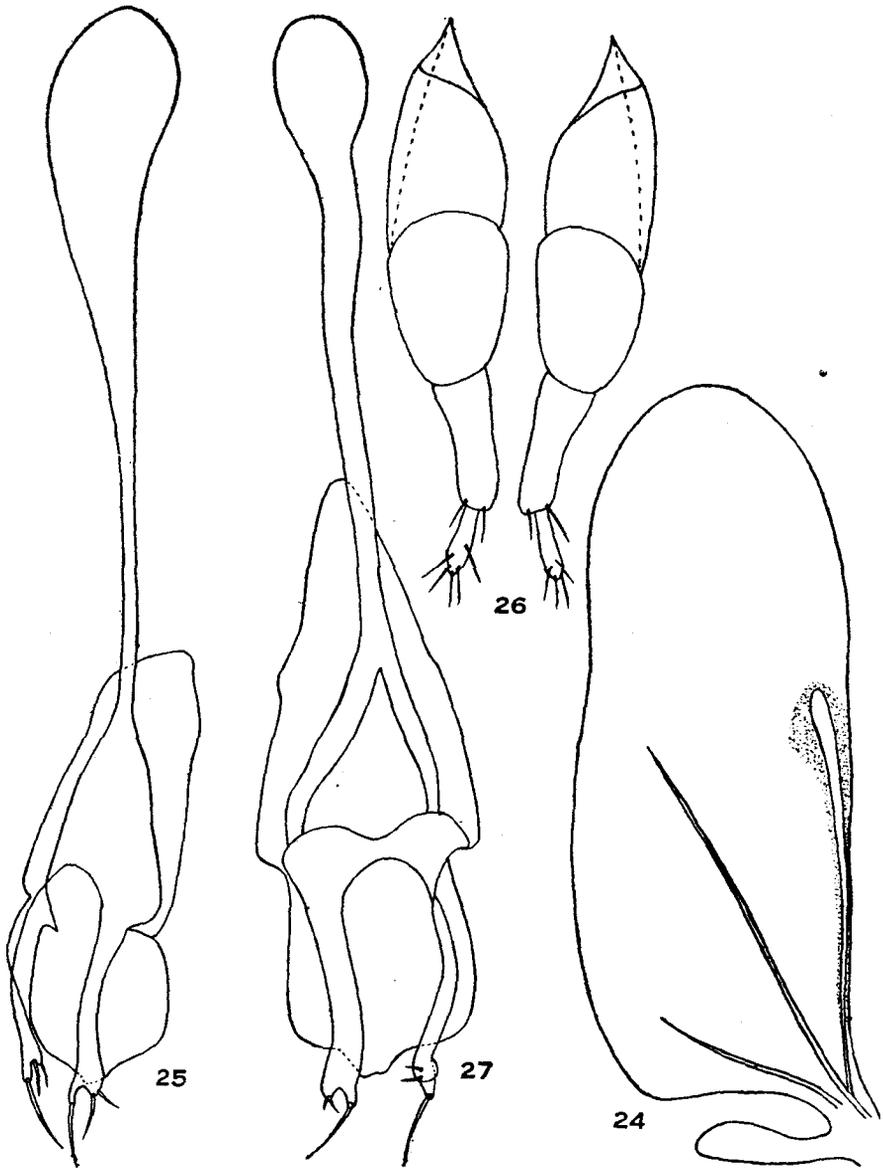
Figs. 1-5. Dorsal view : 1, *Silvanus lewisi* Reitter ; 2, *S. imitatus*, sp. nov. ; 3, *S. recticollis* Reitter ; 4, *S. rossi* Halstead ; 5, *S. bidentatus* (Fabricius).



Figs. 6-12. 6, *Silvanus gibbus*, sp. nov., Dorsal view ; 7, *S. ruficarpus*, sp. nov., Dorsal view ; 8, Hind femur of *S. ruficarpus*, sp. nov. ; 9, *S. difficilis* Halstead, Dorsal view ; 10, *S. nigrans*, sp. nov., Dorsal view ; 11, Hind femur of *S. nigrans* sp. nov. ; 12, *S. curvispinus*, sp. nov., Dorsal view.



Figs. 13-23. *S. lewisi* Reitter : 13, ventral view ; 14, Head, ventral view ; 15, Prothorax, Ventral view ; 16, Meso-metathorax, Ventral view ; 17, Ventrites, Ventral view ; 18, Front leg ; 19, left elytron, Dorsal view ; 20, Left mandible, Dorsal view ; 21, Left maxilla, Ventral view ; 22, Labium, Ventral view ; 23, Labrum.



Figs. 24-27. 24-26, *S. lewisi* Reitter : 24, Wing ; 25, Aedeagus ; 26, Ovipositor.
27, Aedeagus of *S. gibbus*, sp. nov.