

A P P E N D I X

## A REVISION OF *SILVANUS* (COLEOPTERA: SILVANIDAE) FROM INDIA

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**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 *Silvanooides*, 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 :

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<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 meso-coxae 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). . . . . *ruficorpus*, 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.

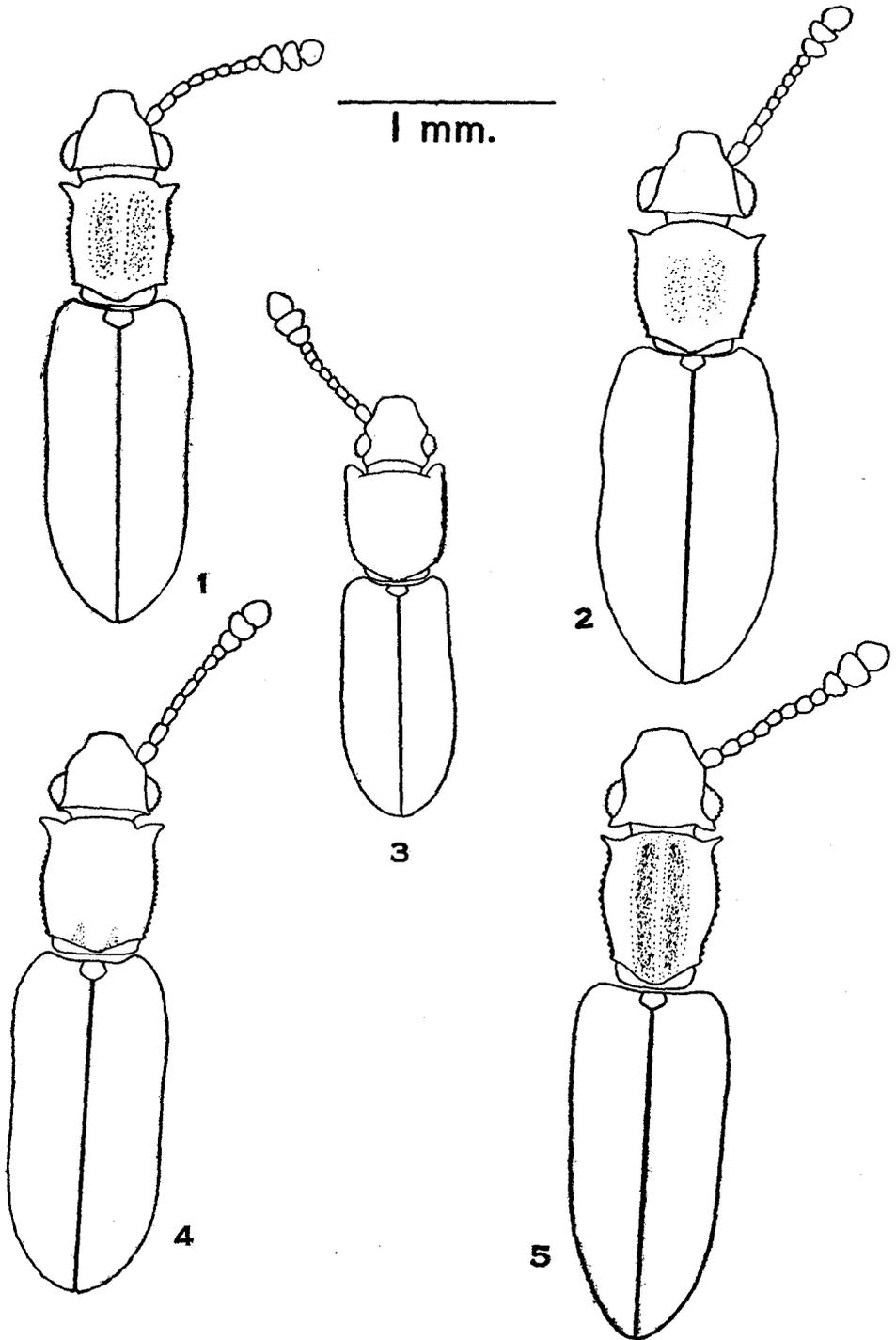
*Specimen examined* : INDIA : TAMIL NADU : Madumalai Reserve Forest, 1 ex, 7.xii. 1971, T. Sen Gupta, under bark of log.

*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.

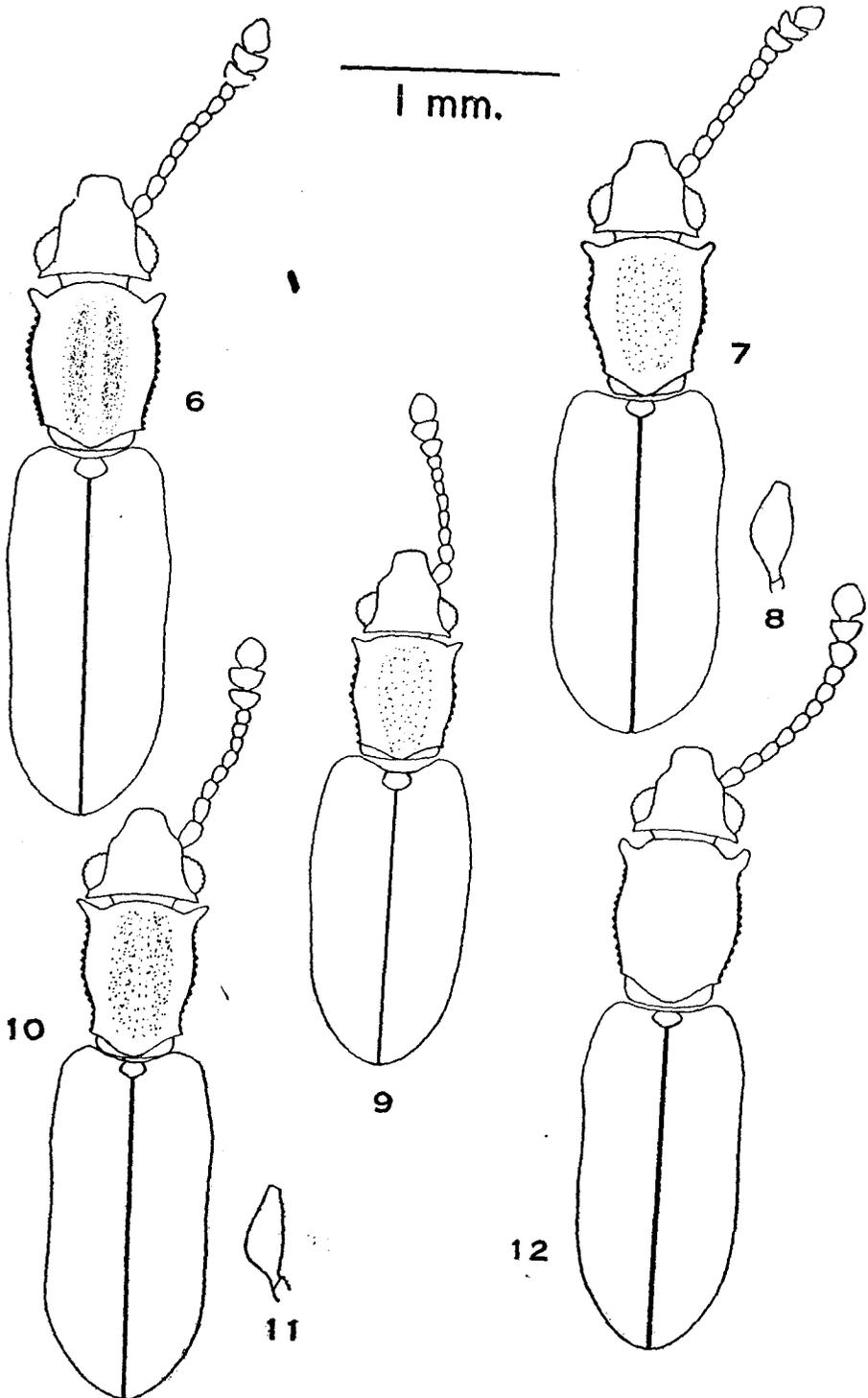
ACKNOWLEDGMENTS. This research was carried out in the Zoological Survey of India. The authors are grateful to the [Director for providing necessary laboratory facilities, to Dr. D.G.H. Halstead, Pest Infestation Control Laboratory, Slough, England for his valuable advice, to Dr. E. Ratti, presently at Museo Civico di Storia Naturale, S. Croce 1730, 30125 Venezia, Italy for loan of few [species of *Silvanus*, and to Mr. A.R. Bhaumik, Coleoptera Section, Zoological Survey of India for reading the manuscript.

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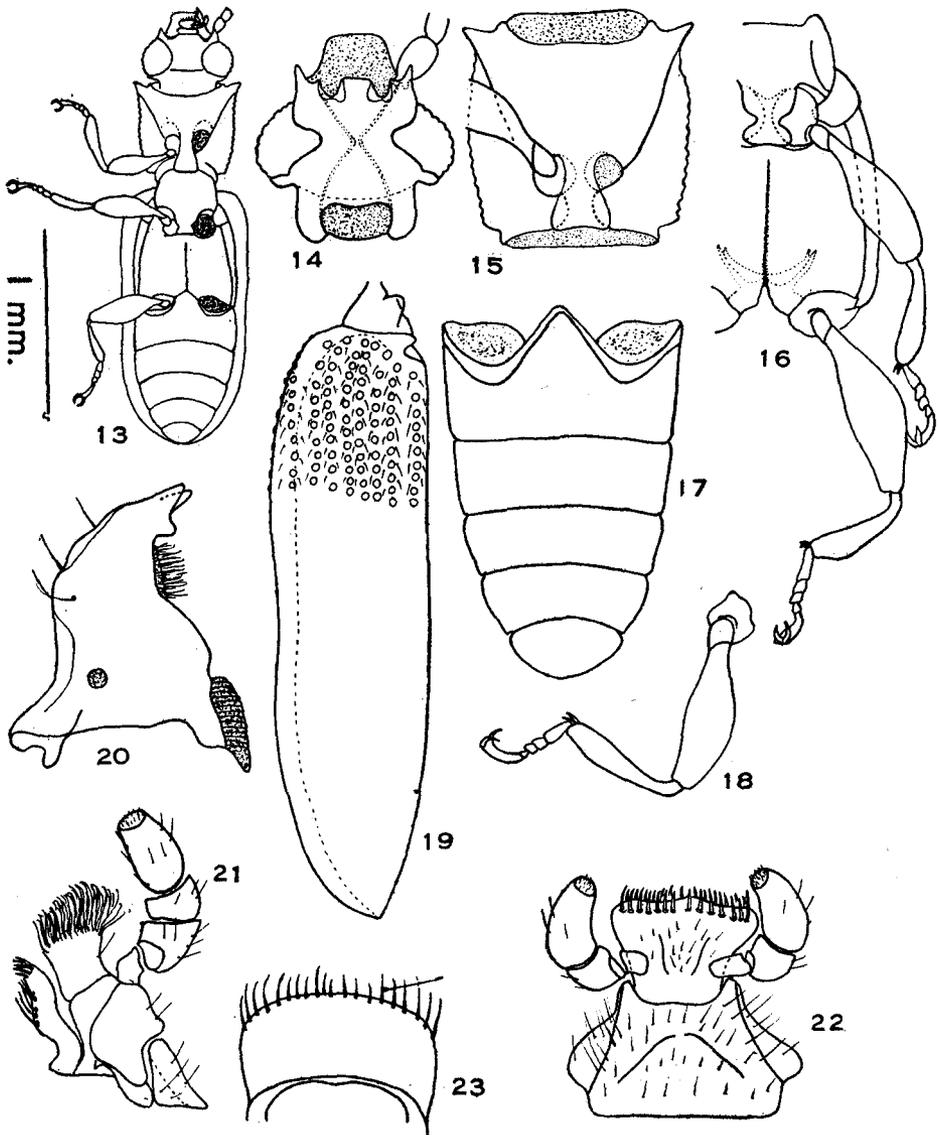
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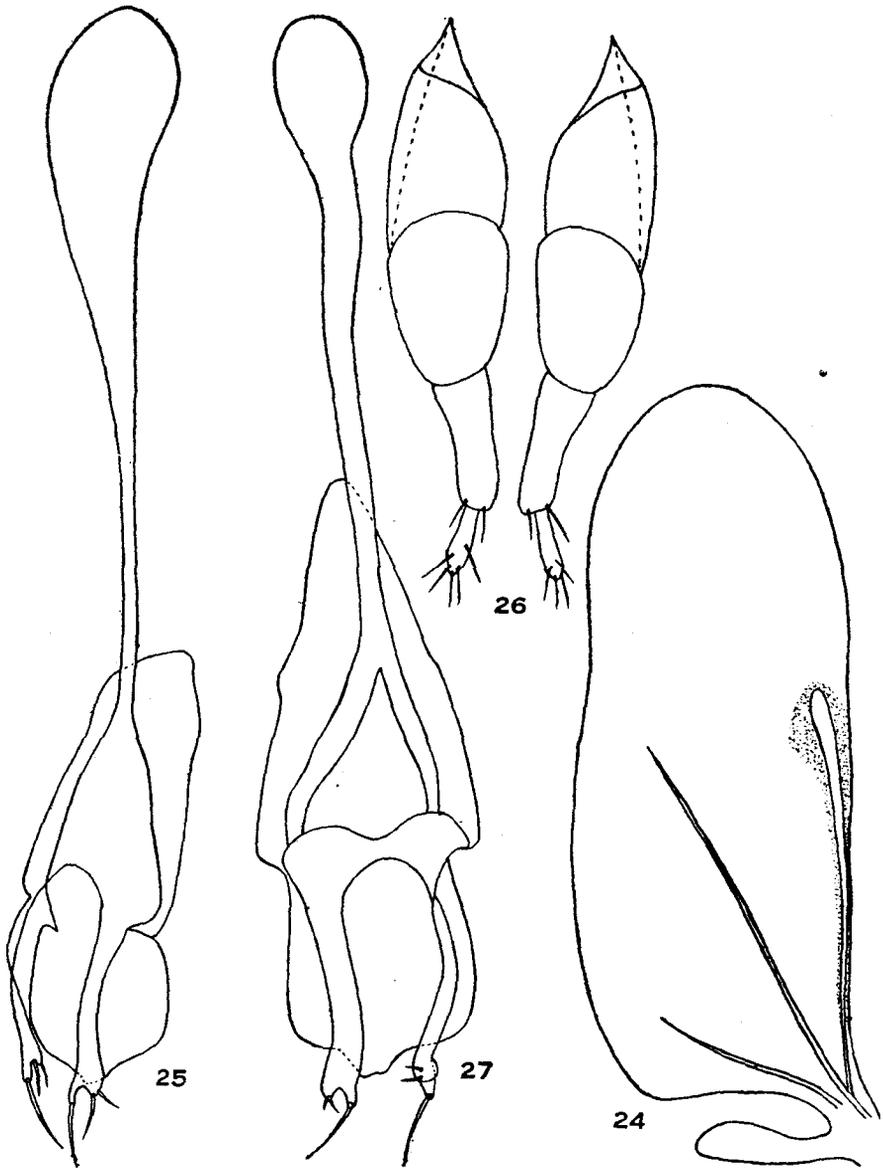
Figs. 1-5. Dorsal view : 1, *Silvanus lewisi* Reitter ; 2, *S. imitatus*, sp. nov. ; 3, *S. recticollis* Reitter ; 4, *S. rossi* Halstead ; 5, *S. bidentatus* (Fabricius).



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.