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The genera of seed-beetles (*Coleoptera, Bruchidae*)

Rodzaje strąkowców (*Coleoptera, Bruchidae*)

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ABSTRACT. The genera of seed-beetles are reviewed, keyed and figured; 58 genera are given, five of them are described as new: *Protocaryopemon* for *P. archetypus* n. sp. (North India), *Palpibruchus* for *P. longipalpis* n. sp. (Argentina), *Spatulobruchus* for *S. huggerti* n. sp. (Peru), *Kingsolverius* for *K. gibbicollis* n. sp. (Viet-Nam), and *Decellebruchus* for *Bruchidius walkeri* PIC (Paleotropics). New synonyms are proposed: *Abutiloneus* BRIDWELL, 1945 = *Acanthoscelides* SCHILSKY, 1905; *Pygobruchidius* PIC, 1951 and *Tuberculobruchus* DECELLE, 1951 = *Sulcobruchus* CHÛJÔ, 1937; *Cornutobruchus* DECELLE, 1975 = *Conicobruchus* DECELLE, 1951; *Pygospermophagus* PIC, 1912 = *Spermophagus* SCHOENHERR, 1833; *Megabruchidius bifoveolatus* BOROWIEC, 1984 = *M. dorsalis* (FAHRAEUS, 1839) n. comb. A new tribe, *Spermophagini*, is described for *Spermophagus* SCHOENHERR and *Zabrotes* HORN. Geographic distribution, phylogeny and taxonomy of seed-beetles are also given.

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INTRODUCTION

The seed-beetles constitute one of rather little numerous families of beetles but they are of a great economic importance. Some of them are dangerous pests of leguminous plants, particularly in tropics and subtropics. Long years had passed, however, until the family aroused more interest of entomologists. Their passiveness resulted from many facts, as the small body size of the beetles, short period of appearance of imagines, big uniformity of their structure, and at last very laborous preparation techniques. The more intensive investigations have been taken up just in the recent 50 years in both taxonomic and biological aspects. It effected in describing several new genera and species. So, while the world PIC catalogue (1913) reported 13 genera, the present work gives already 58 of them and certainly the number is not definitive.

Although there is a great number of modern works, particularly revisions of New World genera, we still miss a study revising the seed-beetle genus category based on the detailed analysis of their morphology and a well constituded model of the genus criteria in *Bruchidae*. The present work is pretending to fill this gap. The division into genera as well as the idea of the phylogeny of the family presented below is not definitive. It results from several gaps in knowledge of seed-beetles. The other purpose of the present study is to call the attention on these gaps and stimulate other scientists to take up the studies on the seed-beetles.

At last, a practical key to seed-beetle genera provided in this work together with the review of these genera should help the quarantine services in determining and preliminary segregation of the beetles. The family *Bruchidae* belongs to beetles being most often unintentionally diffused in the world. Their capability of adaptation may perform a danger of acclimatization of these imminent pests. Since a long time the quarantine services needed such a synthetic manual for determining seed-beetle genera. I hope that this study rich in figures will be helpful in their work.

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FAMILY NAME *BRUCHIDAE*

In 1758, LINNAEUS placed the name "*Bruchus americae septentrionalis*" among the synonyms of *Dermestes pisorum* L. The name is useless for nomenclature. In 1762, GEOFFROY described the genera *Bruchus* and *Mylabris*, but his work was invalidated for its low nomenclatory value by the International Commision on Zoological Nomenclature (Opinion 228). In 1763, SCOPOLI described the genus *Laria*. BEDEL (1901) designated *Laria salicis* SCOPOLI, 1763 as type-species of *Laria* SCOP. This specific name is a younger synonym of *Dermestes pisorum* LINNAEUS, 1758. The designation made by BRIDWELL (1932) of *Laria dulcamarae* SCOPOLI, 1763 as type-species of *Laria* SCOP. is not valid because it was published later. In 1764, the genera *Bruchus* and *Mylabris* sensu GEOFFROY were redescribed by MÜLLER, making him the author of the names. In this work, MÜLLER only characterized the genera and compared them with LINNAEAN ones. However, he did not mention any species. The next work by MÜLLER (1776) gave the same understanding of *Bruchus* MÜLLER, 1764 as previously. He enumerated three species of the genus *Bruchus*: *B. imperialis*, *B. furunculus* and *B. fur*. FOURCROY's work (1785) was the next one dealing with *Mylabris* MÜLLER, 1764 in the same sense. He listed three species of the genus: *M. crucigera*, *M. fusca* and *M. serices*. The six species mentioned above are to be considered as primarily included among *Bruchus* MÜLLER and *Mylabris* MÜLLER. BRIDWELL (1932) designated *Cerembyx fur* LINNAEUS, 1758 as a type-species of *Bruchus* MÜLLER, 1764, and *Bruchus pisi* LINNAEUS, 1767 (= *Dermestes pisorum* LINNAEUS, 1758 = *Mylabris crucigera* FOURCROY, 1785) as a type species of *Mylabris* MÜLLER, 1764.

In 1767, LINNAEUS described the genus *Bruchus* and listed seven species in it: *B. pisi*, *B. theobromae*, *B. gleditsiae*, *B. bactris*, *B. granarius*, *B. semi-*

narius and *B. pectinicornis*. Describing *B. pisi*, he synonymized *Mylabris* GEOFFROY with his genus *Bruchus*. In 1810, LATREILLE designated *Bruchus pisi* LINNAEUS, 1767 (= *Dermestes pisorum* LINNAEUS, 1758) as type-species of *Bruchus* LINNAEUS, 1767. In the same work from 1767, LINNAEUS also described the genus *Ptinus* and placed two species in it: *P. imperialis* and *P. fur*. Again, LATREILLE (1810) designated *Ptinus fur* (= *Cerambyx fur* LINNAEUS, 1758) as a type-species of the genus *Ptinus* LINNAEUS.

So, according to the rules of nomenclature, the situation is as follows:

1. within the family *Ptinidae* LATREILLE, 1802 there is the genus *Bruchus* MÜLLER, 1764 with its objective synonym *Ptinus* LINNAEUS, 1767,
2. within the family *Bruchidae* LATREILLE, 1802 there is the genus *Laria* SCOPOLI, 1763 with junior synonyms *Mylabris* MÜLLER, 1764 and *Bruchus* LINNAEUS, 1767. In addition, the name *Bruchus* LINNAEUS, 1767 is a junior homonym of *Bruchus* MÜLLER, 1764 and should be rejected.

At that time, the names *Bruchidae* and *Bruchus* reffering to seed-beetles were commonly used in the coleopterological literature. The majority of authors have ignored MÜLLER's work from 1764, and the name *Laria* SCOPOLI, 1763 has been forgotten. If the rules of priority and homonymy were to be applied now, great confusion would be caused in *Bruchidae, Ptinidae* and *Meloidae* family nomenclature. Also, the commonly used name *Bruchus* LINNAEUS would need to be rejected. Applied entomologists especially would protest against substituting *Laria* for *Bruchus*. Many beetle pests of leguminous plants belong to this genus, and the bibliography numbers hundreds of works where the name *Bruchus* has been used whereas the name *Laria* has been used in only a few.

Because of these reasons, the following proposals have been placed before the International Commission on Zoological Nomenclature:

1. To validate the name Bruchus LINNAEUS, with a publication date of 1758, and *Dermestes pisorum* LINNAEUS, 1758 as type species by monotypy.
2. To reject the name *Mylabris* MÜLLER, 1764.
3. To place the following on the list of Official Names: *Bruchidae* LATREILLE, 1802 (type: *Bruchus* LINNAEUS, 1758) and *Bruchus* LINNAEUS, 1758 (type: *Dermestes pisorum* LINNAEUS, 1758).

If the proposals are accepted, the name *Laria* SCOPOLI, 1763 will became a junior synonym of *Bruchus* LINNAEUS, 1758. Until the International Commission on Zoological Nomenclature makes a decision, the generally accepted interpretation ought to be used and so in the present work the name *Bruchidae* (with type-genus *Bruchus* LINNAEUS, 1767) is used in reference to seed-beetles.

AN OUTLINE OF THE HISTORY OF SEED-BEETLE INVESTIGATION

Bruchus pisorum placed within the genus *Dermestes*, and *Callosobruchus chinensis* within *Curculio*, by LINNAEUS in the 10th edition of his "Systema Naturae" from 1758, were the first described seed-beetles. *Bruchus pisorum* was even described several times by XVIIIth century authors under various names, but already in 1767 LINNAEUS had created the genus *Bruchus* restricted to seed-beetles and included seven species within it. Upto the end of the XVIIIth century, J. Ch. FABRICIUS, A. G. OLIVIER, J. A. FRÖLICH, S. F. HERBST, J. C. ILLIGER, G. PAYKULL and F. PANZER described over a dozen of species. At first, all seed-beetles were included in a single genus (mostly called *Bruchus*) within the family *Curculionidae*. As members of that family they were described in a monographic study "Genera et species Curculionidum". This monograph was the result of combined efforts of four authors: C. J. SCHÖNHERR (editor of the whole), C. H. BOHEMAN, C. J. FAHRAEUS, and L. GYLLENHAL. Some genera described upto the time of publication of the above work remained largely forgotten. After this, THUNBERG (1805) separated the genus *Pachymerus*, FISCHER (1809) genus *Kytorhinus*, THUNBERG (1815) *Amblycerus*, HUMMEL (1827) *Caryedes*, and SCHÖNHERR (1823) *Caryedon*. In the *Curculionidae* monograph, seed-beetles were described in the first volume in 1833 and were placed at the beginning of the weevil system. The supplement in the fifth volume of 1839 included the descriptions of new taxa. The majority of species were placed within the genus *Bruchus*, but new genera were also described: *Spermophagus* SCHÖNHERR, 1833 and *Megacerus* FAHRAEUS, 1839. Seed-beetles were separated as a distinct family by SPINOLA (1843), and LACORDAIRE (1845) consolidated the position of *Bruchidae* within *Phytophaga Chrysomeloidea*.

Upto the end of the XIXth century a few other genera were described: *Caryopemon* JEKEL, 1855, *Eubaptus* LACORDAIRE, 1845, *Pygobruchus* SHARP, 1886 (= *Kytorhinus* FISCHER), and *Zabrotes* HORN, 1885. The great majority of species however, were described within the large differential genus *Bruchus*. The XXth century began with the description of *Callosobruchus* PIC, 1902, but it was only SCHILSKY (1905) monograph that caused a turn in seed--beetle classification. The work formally dealt with the *Bruchidae* of Europe, and included all the palearctic species known to the author. He divided the genus *Bruchus* into three genera: *Bruchus*, *Bruchidius* and *Acanthoscelides*. The genera from the New World were contrasted wit those from the Old World. This work was crucial in the investigations of this group of beetles, although the genus *Acanthoscelides* sensu SCHILSKY from the New World represented an artificial group of taxa now classed into three different genera.

Until the end of the 1920s only PIC described new seed-beetle genera, but he didn't develop SCHILSKY's ideas. His works represented a chaotic contribution to the investigations of *Bruchidae*, and included separations of the following genera: *Impressobruchus* (1910), *Pygiopachymerus* (1911), *Phelomerus* (1912), *Pachybruchus* (1912), *Falsobruchus* (1913), *Gibbobruchus* (1913), *Diegobruchus* (1913), and *Pygospermophagus* (1917). His lack of precise taxonomic conceptions and ordinary ignorance caused some of these genera to became synonyms. M. PIC was also predominant in investigating species of tropical seed-beetles. Famous for his maniacal obsession with describing new taxa and for his lack of precise diagnostic notes, he halted investigations for many years. He simply made the proper interpretation of species described by himself impossible for other researchers. His descriptions within the genus *Spermophagus* are good examples of M. PIC's taxonomic untidyness. From 58 species described by him, at least 31 have turned out to be synonyms (BOROWIEC, in preparation).

The first modern classification of seed-beetles was given by J. C. BRIDWELL. In 1932 he presented the division into subfamilies, and since 1929 he has consequently been describing new genera of *Bruchidae* based on important taxonomic characters. BRIDWELL (1929, 1931, 1932, 1938, 1946, 1952a, 1952b) altogether has described 18 new genera, of which only two are synonyms at present. BRIDWELL's generic concept were now developed by different authors. DECELLE separated the following genera: *Tuberculobruchus* (1951), *Conicobruchus* (1951), *Afroredon* (1965), *Exoctenophorus* (1968), *Mimocaryedon* (1968), *Caryotrypes* (1968), *Cornutobruchus* (1975) and *Salviabruchus* (1982). BOROWIEC separated genera *Acanthobruchidius* (1980), *Horridobruchus* (1984c), *Megabruchidius* (1984c) and *Paleoacanthoscelides* (1985b). The investigations in the New World have rapidly been developed thanks to the works of J. M. KINGSOLVER and C. D. JOHNSON with help of D. WHITEHEAD. These authors separated more new genera: *Pectinibruchus* KINGSOLVER, 1967, *Ctenocolum* KINGSOLVER et WHITEHEAD, 1974, *Megasennius* WHITEHEAD and KINGSOLVER, 1975, *Scutobruchus* KINGSOLVER, 1968, *Penthobruchus* KINGSOLVER, 1973, and many new species. From outside, the only people who described the new genera were: CHÛJÔ (1937) — *Sulcobruchus*, ZACHER (1930) — *Euspermophagus*, ZACHER (1952) — *Pseudopachymerina*, and PREVETT (1966b) — the genus *Butiobruchus*.

At present there are 58 genera (including those described in the present work) distinguished within *Bruchidae*, most of which were described during the last 40 years. Undoubtedly it is not a final list, and we must not ignore the possibility of several new genera being discovered, especially in the neotropics.

TAXONOMIC VALUE OF MORPHOLOGICAL CHARACTERS IN SEED-BEETLES

General shape and size of the body

Most of seed-beetles are oval- or suboval-shaped, a little convex or cylindrical. Representatives of *Rhaebinae*, some genera of *Pachymerinae*, many species of *Amblycerus* (*Amblycerinae*), and some species or genera of *Bruchidae* are distinctly elongate. An elongate body shape is rather plesiomorphic. The body of specialized genera and species is usually stout, sometimes almost sphaerical (eg. *Spermophagus*). However, sometimes an elongate body shape can be a secondary synapomorph, probably correlated with the form of the plant seeds (eg. *Bruchidius cinerascens* group, or genera *Cosmobruchus* and *Dahlibruchus*). Body size within *Bruchidae* runs from 1.0 to 25 mm, but the majority are small forms below 5 mm. Within the derived subfamilies (*Rhaebinae*, *Amblycerinae-Amblycerini*) the beetles are mostly of a medium and large size. Also some derived beetles of *Bruchinae* are mostly large. Body size diminution is therefore an apomorph in seed-beetles. It is related to the diminution of the host plant seeds, which results from beetle pressure brought on the host plant (CENTER and JOHNSON, 1974).

Colouration

Seed-beetles are mostly black, yellow, and reddish. Metallic colouration occurs within the *Rhaebinae*, and in a few species of *Bruchidius*, *Meibomeus* and *Stator*, but they are not so intensive in colour as *Rhaebinae*. The distinct metallic colouration is plesiomorphic in seed-beetles, and in *Bruchinae* the metallic colouration is secondary. The yellow, yellow-russet, and russet colours occur in the *Pachymerinae*, and usually cover all the beetle body. Yellow colours predominate also in the derived genus *Amblycerus*, but in specielized genera black predominates. Black occurs in most genera of *Bruchinae* and *Kytorhininae*. Light colours, if present, usually cover only antennae and legs. But even within subfamilies, there are some partly or completely yellow, reddish or russet-coloured species. The colour of the body is often a useful species charcter, but it is of little value as for as separating higher categories is concerned.

Vestiture

All seed-beetles are more or less hairy, including pronotum and elytra. Vestiture of the more derived subfamilies (*Rhaebinae*, *Pachymerinae*) is usually homogenous and thin, but in specialized groups it is mostly dense and arranged in a distinct pattern. Reduction of vestiture occurs secondarily in all groups of seed-beetles, so it is a character of rather low taxonomic

value. The arrangement of hairs, however, is generally constant in each species, so it is diagnostically important in separating species. Some genera (*Gibbobruchus, Specularius, Pygiopachymerus, Penthobruchus*) have areas which are sometimes polished and lack hairs on the pygidium and/or abdomen. These can occur in both sexes or only in females. Such smooth areas on the female pygidium are called "speculum". Undoubtedly in many species this is a secondary sexual character but its function is not clear to us. The polished areas occur in many species of *Bruchidius*, but to a lesser extent (eg. *Bruchidius seminarius* group). Occasionally, some females of the same species have polished areas on the pygidium whilst others do not (BOROWIEC, 1986). The presence of speculum or other polished areas on the abdomen is an undoubted synapomorph. In *Afroredon* and *Diegobruchus*, polished areas occur in females on their elytra. This is also an synapomorphic secondary sexual character.

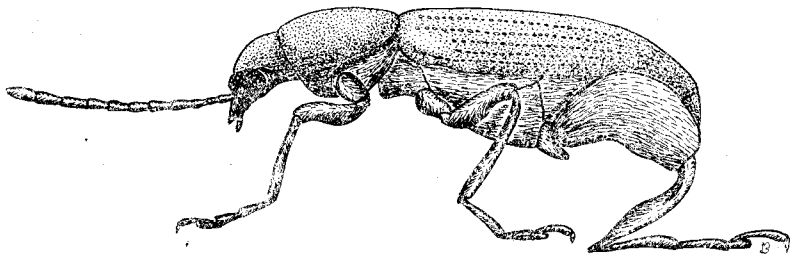
Body sculpture

The majority of seed-beetles have a more or less uniform sculpture of the body surface. This is formed by shallow punctures amongst which there is often fine secondary puncturation or microreticulation. Elytra always have 10 rows or lines of punctures. Variety of puncturation appears in different ratios of large to small punctures, distribution of large punctures (grouped on pronotal sides, thoracic sternites, and hind coxae in many species), and in development of microreticulation. Elytral striae may be shortened or adjacent may join at base or apex of elytra. The shortening of the 10th elytral stria is synapomorphic and it occurs in *Megacerus* and *Zabrotes*. Also strial fusion is apomorphic appearing independently in different developmental lines of seed-beetles. At the base of elytral striae or intervals of many *Bruchidae* of different developmental lines, there occur small tubercles or denticles. These tubercles are of a high taxonomic importance at the species level, but can also be used as subsidiary genus-character. Sometimes elytral striae strongly deepen at the base and the elytral base is folded over (*Acanthobruchidius*).

The pronotal and elytral surface is usually flat in the majority seed-beetles. On the pronotum and/or elytra of *Gibbobruchus* group, *Horridobruchus*, *Kingsolverius* and *Neltumius*, larger or smaller gibbosities occur. In some extreme cases eg. *Horridobruchus*, the gibbosities in the middle of pronotum and at the elytral humeri are shaped like thorns or horns (figs. 34, 104). Gibbosities are presumedly apomorphic, although their reduction in the *Gibbobruchus* group can be a secondary apomorph. The presence or lack of gibbosities is a good character within a genus and at the species level.

Elytral intervals may be a little elevated but they never form distinct costae. *Bruchidae* also have special structures on their body surface, i.e. small granules which make the beetles rough.

Seed-beetles are characterized by a generally high degree of body sclerotization. The least sclerotized genera belong to *Pachymerinae*, and the most sclerotized ones to *Kytorhininae* or *Amblycerinae Spermophagini*. Both external and hidden tergites are strongly sclerotized. In *Kytorhininae*, two last abdominal tergites and pygidium project beyond the elytra, and the tergites are much more strongly sclerotized than the covered ones. Generally, yellow, red, or russet-coloured beetles are less sclerotized than black ones.



1. *Rhaebus* sp., lateral view

Head

Head is usually moderately elongate and the tempora and mouth parts are generally equal in length. In *Caryopemon*, *Gibbobruchus* group, and in some of *Acanthoscelidini*, the mouth parts may elongate but never forms a rostrum. In the repose position, the head of *Rhaebinae* is slanted forwards (subprognatic, fig. 1), but in the majority of genera, however, it is bent and the mouth organs are pointed backwards (opisthognatic, figs. 3, 4). The subprognatic head is undouptedly synplesiomorphic in seed-beetles. Mouth organs are little differentiated because adults of most species either don't eat at all or feed on pollen. Labial and maxillary palps are very little differentiated (figs. 56–58). The front in many species is flat or a little convex, with a sharp longitudinal carina. The presence or lack of carina, and also the degree of its development are very important taxonomic features in seed-beetles. Strongly developed frontal carina is characteristic of the majority of the derived genera, but it seems however, that the frontal carina may occur in the *Bruchinae* and *Amblycerinae* as a secondary apomorph. The tempora and vertex are usually very short, tempora are often reduced. The tempora longer than 1/3 of eye length are known only in several species eg. *Caryedon longivertex* BOROWIEC, 1984b (fig. 90) or *Protocaryopemon archetypus* n. sp. (fig. 93). It is undouptedly apomorphic.

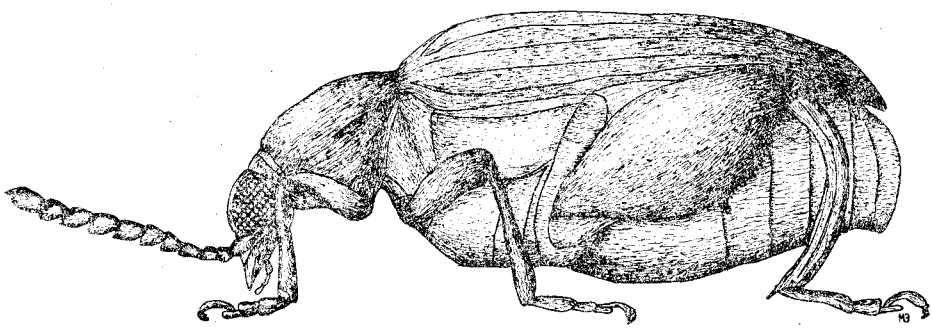
Eyes of seed-beetles are usually very large and convex, sometimes covering nearly all the head width (fig. 82). Almost semisphaerical or not deeply emarginate eyes are characteristic of the derived genera, but the specialized ones usually have deeply emarginate eyes of a crescent shape. The degree of eye emargination is an important taxonomic character at the subfamily and tribe level. There is a distinct sexual dimorphism in the eye structure of many genera. Male eyes are bigger, more convex, and more coarsely facetted. The frons is sometimes reduced to a narrow line in such species (fig. 82). In some specialized genera (eg. *Conicobruchus*), the eyes are weakly convex and hardly protruding beyond the head (fig. 81).

Antennae originate near the sinuate eye emargination. Seed-beetles have the antennae of different types, i.e. subfiliform, subserrate, serrate, clavate subpectinate or pectinate. Subfiliform antennae are unique and occur in the *Rhaebinae* (fig. 69). Subserrate and serrate ones are found in most of the species. Pectinate antennae appear independently in some developmental lines within *Bruchinae* and *Kytorhininae*, mainly in males whose females have serrate or subpectinate ones (*Kytorhinus*, *Rhipibruchus*, *Pectinibruchus*, *Decellebruchus*, *Megacerus*, *Callosobruchus* and *Conicobruchus*). Without doubt, subfiliform antennae are the most derived, and pectinate ones are the most specialized. Antennal length, degree of serration and sexual dimorphism are usually important taxonomic characters at the genus or species level. Some antennal articles may have processes (fig. 71), be monstrously expanded (fig. 70), or be covered with protruding setae (fig. 72). The strong sexual dimorphism and monstrosities in the antenna structure are distinctly apomorphic in the *Bruchidae*.

Pronotum

The pronotum is mostly campanulate, subcampanulate, or conical (figs. 85, 86, 100–102, 105), while the trapezial, square or semicircular is rarer (figs. 94–96, 98, 111). Rectangular or trapezial shape is found mainly in the derived *Pachymerinae*, but can also appear as a secondary apomorph in *Bruchinae* (eg. *Bruchus*, *Sulcobruchus*, *Palpibruchus* and some *Bruchidius*). The *Amblycerinae* has only a subtrapezial or semicircular pronotum, but this shape is also present as an apomorph in *Caryopemonini* (*Pachymerinae*) and in a small number of species of *Bruchinae* (*Bruchidius quinqueguttatus* group, *B. algiricus* group etc.). Pronotal lateral carina occurs in many genera of *Pachymerinae* (*Pachymerini*, *Exoctenophorus*, *Afroredon*, *Mimocaryedon*, *Caryotrypes*, *Protocaryopemon* and *Caryopemon*), in all *Amblycerinae*, and in some genera of *Bruchinae* (*Lithraeus* group, *Stator* group, *Pseudopachymerina* etc.). Reduction of the pronotal carina is apomorphic in seed-

-beetles, but the lateral carina occurring in *Bruchinae* genera is certainly a secondary apomorph. Lateral carina of the derived type extending from the hind angle of pronotum to anterior pronotal angle (figs. 61–64). In *Bruchinae* genera the carina extending anteriorly to procoxal cavity (figs. 109, 115). The following structures appearing on the pronotum may also be synapomorphic: denticles on lateral margin (*Bruchus*), serration along lateral margin (some *Sulcobruchus* and *Mimosestes*), and impressions, tubercles or gibbosities (*Gibbobruchus* group, *Neltumius*, *Horridobruchus*, *Kingsolverius* and some *Callosobruchus*).



2. *Caryedon* sp., lateral view

Scutellum

The majority of seed-beetles have a rectangular scutellum with a triangle-like incision in its posterior margin (fig. 126). The triangular scutellum occurs in *Spermophagus* and *Zabrotes*, but *Amblycerus* represents a quite unique type, bi- or trifid (figs. 119–122). The rectangular form is the most derived type, and the elongate, triangular, bi- or trifid ones belong certainly to the specialized type. Scutellum construction may be an important taxonomic character at genus level.

Elytra

Elytra are strongly sclerotized, rounded at the top and usually with a distinct humeral callus. The elytral margins are not bent and the epipleura are generally not completely formed. Only representatives of *Pachymerinae* may have faint epipleura in the anterior part of the lateral margin. Taxonomically valuable characters in elytra at the species level are shape, strial form, striae and intervals sculpture, and presence or lack of tubercles at the base. Elytra in seed-beetles are generally uniformly constructed and of little value at the genus and subfamily level (excluding the form of the 10th stria and gibbosities, of course).

Thorax

The prosternum is usually a little convex. An elongate prosternal process separates the anterior coxae and occurs in the derived genera of *Pachymerinae* and *Amblycerinae* (figs. 116, 117). In the specialized genera it is shortened a small triangular plate reaching $\frac{1}{3} - \frac{2}{3}$ of the coxal length (fig. 118). The prosternal epimera are completely fused with prosternal epipleura, and the anterior coxal cavities are posteriorly closed.

Mesosternal epimera in the derived genera are long and wide. They extend between the meso- and metasternal episterna (fig. 52), and all along their width touch middle coxae. In the specialized genera, the mesosternal epimera are progressively reduced to at least a small triangular plate at the upper angles of the mesosternum (fig. 53). This plate extends to the middle coxa as a very narrow process. In derived species there is a distinct row along the anterior and ventral margins of the episternal plate of the metasternum. Parallel to this and along the lateral metasternal margin is a further deep row. These two rows form "parasutural rows", which is one of the most derived character in seed-beetles (fig. 52). In specialized genera, parasutural rows gradually reduce, at last with the row at the anterior margin of the metasternal episterna. The degree of prosternal process and meso- and metasternal plate development belongs to the most important taxonomic characters at the generic and subfamily level.

Abdomen

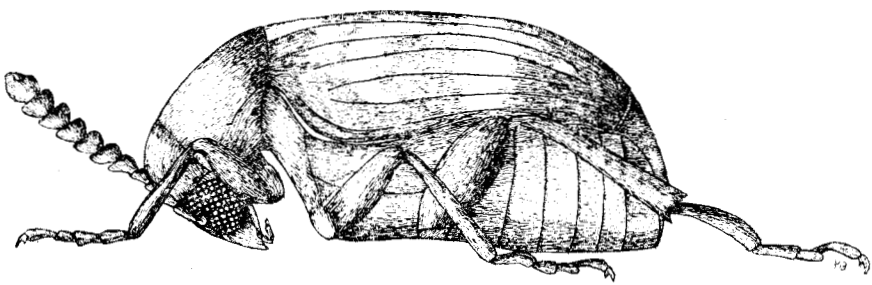
The abdomen is relatively short and strongly convex. The last visible tergite forms a pygidium which is not covered by the elytra. In derived subfamilies (*Rhaebinae*, *Pachymerinae*), the pygidium is relatively small and little sclerotized. In specialized subfamilies and genera the pygidium is large, often convex and bent down under the abdomen (fig. 4). The pygidium apex often goes into the last abdominal sternite cut, especially in males. In some genera (*Algarobius*, *Megabruchidius*) a special synapomorph can be observed, i.e. twin bare foveae on the female pygidium (fig. 127).

Abdominal sternites are little differentiated, but some synapomorphies may be considered: in males the hind margin of the V sternite may be emarginate, sometimes as deep as the base (many *Bruchinae* genera); the I (*Scutobruchus*, some *Sulcobruchus*) or V (*Paleoacanthoscelides*) sternites may have some pits or depressions. The dense and more protruding pilosity on the male sternites may also be an expression of dimorphic characters. In some *Spermophagus*, most *Callosobruchus*, *Megacerus*, *Rhipibruchus*, *Kingsolverius*, *Decellebruchus*, etc., the abdomen is very strongly shortened and

telescoped, i.e. sternites are strongly packed into one another. Thus the pygidium is perpendicular to the body axis. Such an abdomen type is the mostly specialized in *Bruchidae*. In *Kytorhininae*, the pygidium and strongly sclerotized last two abdominal tergotes are not covered by the elytra (fig. 13). It is an unique, distinct synapomorphy.

Wing

No comprehensive comparative studies on wings exist (SINGH, 1981). The venation resembles that within the related and derived *Chrysomelidae*. The most complete venation consists of two medial veins, three cubital, and three anal veins (fig. 60). The first cubital is reduced in many species, and the first medial is a little sclerotized. Representatives of *Pachymerinae* and *Amblycerus* often have a closed cell in the upper part of the first anal vein. This a very plesiomorphic character occuring also in *Sagrinae* within *Chrysomelidae*.



3. *Bruchus* sp., lateral view

Legs

There is strong disproportion in leg construcion. The hind legs are considerably longer and thicker than the fore or middle ones. Fore and middle legs are usually little differentiated, the tibiae ending in two apical spines in derived subfamilies (*Eubaptinae*, *Pachymerinae*). Also the broadened tarsi in the *Pachymerini* is plesiomorphic and inherited from their sagroid ancestors. Apomorphic characters in the forelegs appear mainly as characters of sexual dimorphism. The fore and/or middle tibia can be thicker or curved (*Spatulobruchus*, *Bruchus* and *Bruchidius*), or carinate (some *Bruchus* and *Spermophagus*), the tibia (*Dahlibruchus*) or femur (*Bruchus*) can be denticulate, and last tarsal article can be elongated (*Cosmobruchus*). Spines, crests, or denticles may occur ventrally on the first article of male tarsi (many *Bruchidius*). The middle tibia in males of *Bruchus* is considerably modified, having denticles, plates, and spines apically (figs. 150–152). Fore and middle tarsi

(figs. 226, 227) are sometimes broadened in male (some *Bruchidius*). Claws in seed-beetles usually have a large basel denticle (fig. 134), reduced in some *Spermophagus*. Undouptedly this is apomorphic.

Hind leg structure is the most taxonomically important character at the subfamily as well as at genus and species level. The trends in evolution of seed-beetles are clearest in hind leg structure and this needs to be correlated with other characters for maximum taxonomic understanding.

The most derived type of leg structure occurs in the *Pachymerinae*. It can be characterized by an extraordinary dilatation of the hind femur, presence of a spiny pecten on their ventral side, arch-like tibia curved forwards, and a full set of carinae on tibia. As well as the pecten on the hind femur, some additional denticles, tubercles, or spines situated ventrally are present (figs. 140–146). Two small spines are present at the end of hind tibia in *Caryoborus* (fig. 144). Perhaps this prominent plesiomorphy within *Chrysomeloidea* has appeared secondarily in *Caryoborus*, or is remnant character. The tibia of a derived type has four carinae: lateral — in the middle of the external tibia surface; anteral — along the anterior tibial margin; anterolateral — between anteral and lateral carina; ventral — on the ventral side of tibia and usually a little forward (figs. 132–133). The anteral carina is usually extended and forms a sharp spine, called "mucro". In addition there often occure some additional denticles forming a crown around the tarsus base at the tibia end (coronal denticles). Usually the lateral coronal denticle is most developed and is situated at the extension of the lateral carina. Also, the first article of hind tarsus may have anteral and lateral carinae, and may extend into a sharp spine (fig. 132) apically.

The specialization of seed-beetle hind femoral structure is shown in a gradual slimming of the femur, and reduction of its pecten spines, straightening of hind tibia, and reduction of carinae and mucro on them. Independently from the direction of the main specialization in different developmental lines in seed-beetles, other trends appear which affect various structures in every genus. *Rhaebinae* have hind femur incrassate, but they lack a pecten (fig. 135). The femur of some *Rhaebus* species is little thickened but with some denticles on the ventral side. These denticles are certainly not homologous with those occuring in *Pachymerinae*. *Rhaebinae* is conspicious also by the structure of the trochanter, which is extraordinarily large and completely separates the hind femur from its coxa. In *Eubaptinae*, the hind femur is thickened, but without a spiny pecten. Inside the femur the beetles have a so-called Maulik apparatus which enables them to jump (similar structure occures in *Chrysomelidae Alticinae* and in *Curculionidae Rhynchaeninae*). *Eubaptinae* have a spine at the end of the hind tibia (fig. 138). Leg structure

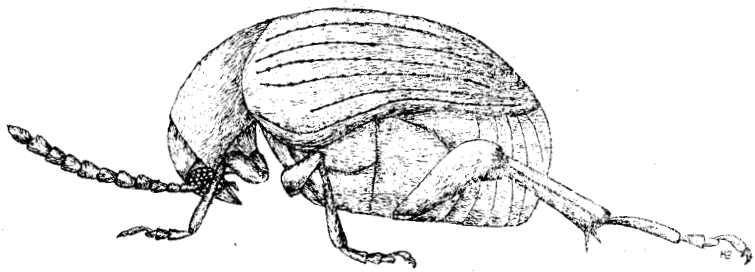
in the subfamily is therefore a special mixture of apomorphic (Maulik apparatus) and plesiomorphic (apical tibial spines) characters.

The *Gibbobruchus* group has the most derived type of hind leg within *Bruchinae*. Its hind femur is still rather thickened having numerous spines on the ventral side, and the hind tibia is curved and bears a complete set of carinae and visible mucro (figs. 160–171). In *Merobruchus*, the number of femoral spines is reduced to 3–4, but the hind tibia is still strongly curved. The majority of species of the *Acanthoscelides* group have straight tibia.

Reduction of lateral carinae on the hind tibia and reduction of femoral spines is the next stage of specialization. The most specialized type of hind leg is in the *Lithraeus* group, in *Dahlibruchus* and some *Bruchidius*. Here femur is slim and without spines. The hind tibia is straight, little dilated, and without carinae, and the mucro is shorter than the lateral coronal denticle (fig. 203). The strongly specielized type of hind leg is also characteristic of *Megacerus* and *Kytorhininae*. Here femur and tibia are formed like in *Lithraeus* group, but the tibia has distinct carinae on the sides. The lateral carina is situated more posteriorly and the anterolateral carina ends almost at the level of the lateral coronal denticle (fig. 147). Males of *Mimosestes* and *Sulcobruchus* have a channel on ventral side of hind femur, often with some setae on its margins. This character occurs independently from the presence or lack of spines on the hind femur (figs. 180, 217). The type of hind femur occuring in *Callosobruchus*, *Bruchus*, *Horridobruchus* and *Acanthobruchidius* is quite specific. A spine occurs on the external margin in *Callosobruchus* in addition to the spine on the ventral margin (fig. 158). *Bruchus*, on the other hand, lacks spines on the ventral margin but has a denticle on the external margin (fig. 155). On the ventral margin of the hind femur in *Horridibruchus* and *Acanthobruchidius* there is a sharp spine, whereas on the external margin is an obtuse denticle (figs. 210, 216). Apart from the large spines or denticles, numerous small teeth may occur on the ventral side of the hind femur. They are common in *Gibbobruchus* group, in *Acanthobruchidius*, *Paleoacanthoscelides* etc. In *Megacerus* (*Serratobruchus*), all the ventral margin of the hind femur is serrate (fig. 149).

In contrast to the fore- and mid legs, hind legs are never dimorphic, except in *Amblycerinae*, where the hind legs are formed in a very specific way. Here femur always lack spines but possesses two sharp margins. The tibia lacks carinae or they are specifically shaped and probably not homologous with carinae of other *Bruchidae* subfamilies. Two sharp calcaria are present at apex of the hind tibia in *Amblycerinae* (fig. 139). Their origin is not completely clear. Perhaps they are homologous with spines occuring in *Eubaptinae*, *Rhaebinae* and in *Caryoborus*. *Amblycerinae* therefore exhibit another

trend in hind leg evolution outside the *Pachymerinae-Bruchinae* line, where the hind tibial spines are gradually reduced. Sexual dimorphism is well expressed in the hind leg structure of some species of *Spermophagus* (BOROWIEC, 1986c). The hind tibia in males is curved with reduced lateral carina, and the anterior carina of tibia and/or the first tarsal article is covered with long hair of setae (fig. 157). The curvation of the hind tibia in *Spermophagus* is a secondary synapomorph.



4. *Spermophagus* sp., lateral view

Male genitalia

The structure of genitalia is one of the most important taxonomic characters in seed-beetles, both at species and genus level. Generally, the genitalia of *Bruchidae* belong to a modified cucujoid type and in the derived groups (*Rhaebinae*, *Pachymerinae*) they are similar to the genitalia of derived *Chrysomelidae*. However, contrary to the gradually reduced parameres of *Chrysomelidae*, the parameres in *Bruchidae* are always well developed and often strongly modified. The male copulatory apparatus consists of median lobe, lateral lobes and their base. Lateral lobes and base are always fused, forming usually a ring around the median lobe (fig. 312). The latter in *Rhaebinae* resembles that in *Sagrinae* (fig. 272). In the course of evolution, the median lobe has developed a ventral valve at its end and in some cases — a dorsal valve. The internal sac of the median lobe is strongly modified, often with large sclerites (fig. 245) on the surface, and is the only part penetrating the female genitalia. The median lobe penetration has been observed only in *Mimosestes*, and in this case the vagina walls are strongly sclerotized. Base of the median lobe is generally spoon-like (fig. 292), rarely tape-like (rys. 354), often consolidated with chitinous strips.

Lateral lobes in the derived groups are short, wide, completely fused, and resembles those of derived *Chrysomelidae* (*Sagrinae*, *Donaciinae*). In *Bruchinae*, the lateral lobes are in course of evolution, and are elongate and divided by a deep cleft sometimes as far as the base (figs. 304, 311, 318, 375).

The apices of the parameres are occasionally modified, i.e. with additional carina, secondarily divided into lobes, strongly sclerotized, etc. At the end of lateral lobes there often occur some membraneous structures, eg. "velum" in *Bruchus* (fig. 288). As a rule, there are numerous setae and sensory hairs at the paramere end, and their arrangement may be an important diagnostic character. Distinct pilosity on the ventral margins of the lateral lobe is plesiomorphic. In specialized species, hairs and sensory setae are placed only on the tip of the lateral lobe. In some genera (*Caryedes, Meibomeus, Paleoacanthoscelides, Megacerus*), lateral lobes are secondarily fused and tape-like in shape (*Caryedes, Meibomeus*), or form a kind of groove close to the median lobe (*Paleoacanthoscelides*), or are very short, with transverse membrane (*Megacerus*). The paramere base (basal strut) in derived groups is flat and lacking a keel, but in specialized groups it has a perpendicular keel on the ventral side. This character appeares mosaically and independently in different seed-beetle genera. Generally, most of the New World species have the basal strut without a keel, whereas in the Old World species with a keel are in the majority.

Ovipositor

There was no comparative study on the ovipositor structure untill now. We know, however, that ovipositors in *Pachymerinae* and *Amblycerinae* and particularly in *Caryedon* and *Spermophagus* are strongly differentiated, and may be utilized as diagnostic characters (figs. 281, 282). The ovipositor in related species may be formed in different ways. It manifests strong modification pressure on the organ which is probably connected with the manner of egg laying, accessibility of host plant seeds, etc. Thus ovipositor structure is not a good character for dividing genera into groups of species from a phylogenetic viewpoint.

Other parts of the female genitalia were not precisely studied. The walls of bursa copulatrix in *Caryedon, Callosobruchus* and some *Bruchidius* are usually armed with sclerites, and their shape may be diagnostic (figs. 279–280).

Anatomical characters

Seed-beetle anatomy has not been widely investigated. Results obtained hitherto are not too exciting. Perhaps the relatively uniform anatomical structure of *Bruchidae* is related to their short life and to the fact that adults of many species don't feed at all.

Structure of larva

Morphology and anatomy of *Bruchidae* larvae has been intensively investigated in recent years. The first results show their differentiation. It is

possible to observe some differences at species, genus, and subfamily level. Unfortunately, there are still too little species studied to draw any far reaching phylogenetic conclusions. I refer anybody interested in the subject to the works of PFAFFENBERGER and JOHNSON (1976), VATS (1973, 1979), PFAFFENBERGER (1974, 1977, 1979, 1980, 1981, 1983, 1984 1985a, b), and PFAFFENBERGER et all. (1984).

BIOSYSTEMATIC PROBLEMS WITHIN SEED-BEETLES

All seed-beetles whose biology has been investigated spend their larval period inside the fruits or seeds of the hist plants. About 84% of the host plants species belong to the pulse crops — *Leguminosae*. The remaining 16% are plants of 32 various families: *Acanthaceae*, *Anacardiaceae*, *Bignoniaceae*, *Bixaceae*, *Bombaceae*, *Boraginaceae*, *Cistaceae*, *Cochlospermaceae*, *Combretaceae*, *Compositae*, *Convolvulaceae*, *Discoceraceae*, *Ebenaceae*, *Euphorbiaceae*, *Lauraceae*, *Lythraceae*, *Malphigiaceae*, *Malvaceae*, *Myrtaceae*, *Nyctaginaceae*, *Nymphaceae*, *Ochnaceae*, *Onagraceae*, *Palmae*, *Pandanaceae*, *Rhamnaceae*, *Sterculiaceae*, *Tiliaceae*, *Umbelliferae*, *Verbenaceae*, *Vitaceae* and *Zygophyllaceae* (JOHNSON 1981, KINGSOLVER 1979). Only three of these are the hosts of considerable numbers of seed-beetle species, i.e. *Palmae* (4.5%), *Convolvulaceae* (4.5%), and *Malvaceae* (2%). Few species develop inside the seeds of the remaining families. Two of seed-beetle subfamilies are not connected with pulse crops. These are *Eubaptinae* (developing in *Acanthaceae*) and *Rhaebinae* (attacking *Zygophyllaceae*), both consisting of several species. Many species of *Pachymerinae* are connected with *Palmae* (*Pachymerini*), *Combretaceae* (*Caryedon*), *Pandanaceae* (*Caryotrypes*) and *Umbelliferae* (*Caryedon*), and some Old World *Amblycerinae* (*Spermophagus*) develop in the seeds of *Boraginaceae*, *Convolvulaceae*, *Malphigiaceae*, and *Malvaceae* (SOUTHGATE, 1979). New World genera of *Amblycerinae* (*Amblycerus*, *Zabrotes*) attack mainly *Leguminosae*.

The following genera develop in the seeds of *Fabaceae*:

Amblycerinae:
- *Amblycerus*
- *Zabrotes*

Bruchinae:

New World
- *Acanthoscelides*
- *Algarobius*
- *Caryedes*
- *Ctenocolum*

Pachymerinae:
- *Caryedon*
- *Caryopemon*

Old World
- *Acanthoscelides*
- *Bruchidius*
- *Bruchus*
- *Callosobruchus*

Gibbobruchus
Megasennius
Meibomeus
Merobruchus
Mimosestes
Neltumius
Penthobruchus
Pectinibruchus
Pseudopachymerina
Pygiopachymerus
Rhipibruchus
Scutobruchus
Sennius
Stator
Stylantheus

Conicobruchus
Decellebruchus
Megabruchidius
Paleoacanthoscelides
Pseudopachymerina
Specularius
Sulcobruchus

From the large genera of *Bruchinae*, only the species of *Megacerus* develop exclusively in the seeds of *Convolvulaceae* (TERAN and KINGSOLVER, 1977).

The majority of seed-beetle species are oligophagous or monophagous. Many plant species produce defensive toxins and this may be the reason for the beetles specialisation (CENTER and JOHNSON 1974, JANZEN 1969, JANZEN et al. 1976). The close connections with host plants give some interesting data for phylogenetic investigations, and it has been noticed that whole genera are connected with definite subfamilies, tribes or genera of plants. *Amblycerus*, *Gibbobruchus*, *Megasennius*, *Penthobruchus*, *Pygiopachymerus*, and *Sennius* prefer the seeds of *Caesalpinioideae*; *Algarobius*, *Merobruchus*, *Mimosestes*, *Neltumius*, *Pectinibruchus*, *Rhipibruchus*, *Scutobruchus*, *Stator* and *Sulcobruchus* choose mainly *Mimosoideae*. Species of *Acanthoscelides*, *Bruchidius*, *Bruchus*, *Callosobruchus*, *Caryedon*, *Caryopemon*, *Conicobruchus*, *Ctenocolum*, *Kytorhinus*, *Meibomeus*, *Specularius*, *Stylantheus* and *Zabrotes* clearly prefer plants of *Papilionoideae* (JOHNSON, 1981). *Bruchus* is an interesting example of the related evolution of beetle and host plant, since all of its species are connected only with the plants of the *Vicieae* tribe. Species of *Algarobius*, *Pectinibruchus*, *Rhipibruchus*, and *Scutobruchus* are connected only with *Mimoseae* and particularly with the genus *Prosopis*. *Pectinibruchus* and *Rhipibruchus* also seem to be closely related, as well as *Algarobius* and *Scutobruchus*. The single genera of the gibbous group close to *Gibbobruchus* show preferences to particular tribes of host plants, eg. *Meibomeus* attacks small seeds of *Hedysareae*. In consequence they develop specialized characters such as reduction of body size as well reduction of the gibbosities on the pronotum and elytra (KINGSOLVER and WHITEHEAD, 1976). *Caryedes* from the

same group of gibbous genera clearly prefers the seeds of *Phaseoleae*, *Ctenocolum* prefers *Tephrosiae*, whilst *Gibbobruchus* prefers seeds of *Cercideae-Caesalpiniaceae*. The related genera *Dahlibruchus* and *Cosmobruchus* feeds in seeds of *Compositae*.

On the other hand, some large seed-beetle genera such as *Acanthoscelides*, *Bruchidius* or *Spermophagus* include species which show quite different feeding preferences from the majority. In such cases we are dealing with a clearly specialized character, although a cladistic approach would to some extent accord the beetles a higher taxonomic rank, eg. at the genus level. In my opinion the taxonomic rank of *Abutiloneus* has been converstated in this way.

Generally speaking, in spite of this, seed-beetles commonly feed on *Leguminosae* seeds, although presumably ancestors of *Bruchidae* attacked plants of other families. Present bruchid subfamilies supposed to be the most primitive, i.e. *Rhaebinae* and *Pachymerinae*, show preferences for families other than *Leguminosae*. *Pachymerinae* contains genera attached to *Leguminosae* (*Caryedon* and *Caryopemon*) but they are considered to be specialized. It is possible that when seed-beetles started to feed on *Leguminosae* was the turning point of their history, and led to the present, strong differentiation within *Bruchidae*. Thus the feeding on leguminous plants must be considered a specialized character, although it is very difficult to deduce which plant families were prefered ancestors of the seed-beetles.

Invstigations on *Bruchidae* bionomy and feeding preferences seem to be very promising for the development of their taxonomy. Unfortunately, intensive research in this sphere is confined to the New World at present. This makes the drawing of far-reaching conclusions impossible. Particularly, if the feeding connections within the genus *Bruchidius* were known, it would be easier to divide this unusually rich and varied genus into species groups or even additional genera. Thus because American genera are more coherent taxonomically, this given the illusion that the New World fauna of seed-beetles is far more diverse than that of the Old World.

PHYLOGENY AND TAXONOMY OF SEED-BEETLES

For many years seed-beetles have been classified among *Rhynchophora* or even *Curculionidae* because of the elongate facial part of the head and the four-segmental tarsi. LACORDAIRE (1845, 1866) noticed the close relationship between seed-beetles and *Chrysomelidae*.

At present, the close phylogenetic relationships are unquestionable. Both of the two families and *Cerambycidae* form the superfamily *Chrysomeloidea*, and of these, *Cerambycidae* was the first which separated from the

common stem. On the other hand, some of the derived *Sagrinae* are suspected to be ancestors of *Bruchidae* and *Chrysomelidae*, even though *Sagrinae* are currently treated as a subfamily of *Chrysomelidae*. This causes major phylogenetic problems because in a cladistic system the paraphyletic *Bruchidae* cannot be considered as a separate family but must be treated as a subfamily of *Chrysomelidae* (MANN and CROWSON, 1981). Members of *Bruchidae*, however, have so many apomorphic characters that from the view point of evolutional taxonomy they should be treated as a separate family.

The primitive *Sagrinae* originated from the southern parts of the ancient continent from which they migrated and spread to occupy the whole of the Old World and South America (BOROWIEC, 1984a). It is extremely difficult to assume when *Bruchidae* separated from *Sagrinae*. Undoubtedly, the *Rhaebinae* possess the greatest number of Sagroid characters. This is reflected in the works of different investigators. Thus SCHÖNHERR (1833), LAPORTE (1840), STURM (1843), LACORDAIRE (1845), MOTSCHULSKY (1845), SUFFRIAN (1867), ABEILLE (1868), MONROS (1959), and IABLOKOFF-KHNZORIAN (1966, 1967) put *Rhaebinae* among *Chrysomelidae*, either as a subfamily or included within *Sagrinae*. The close relationships between *Rhaebinae* and *Bruchidae* were noticed by GEBLER (1830), but it was KRAATZ (1879) who included them among the seed-beetles, a position accepted by the majority of subsequent authors. A detailed analysis of mature and second instar larvae has been made by KINGSOLVER and PFAFFENBERGER (1980), which confirmed the placement of *Rhaebinae* in *Bruchidae*.

Rhaebinae possess the following sagroid characters: metallic colouration of the body, subfiliform antennae, two apical calcaria on hind tibia, wide mesoepisternal plate reaching to mid coxa, closed cell between first and second anal vein on wing, median and lateral lobes of chrysomelid type. Bruchid characters in *Rhaebinae* appear mainly as larva adaptations to development inside host plant seeds, development of frontal carina and pronotal lateral carina, and in the mouthparts of second instar larvae, especially in the reduction of the labial palps (fig. 59). Unfortunately, the first instar *Rhaebinae* larva is still unknown. The presence of the prothoracic plate is the best character to separate larvae of *Bruchidae* from *Chrysomelidae*.

In *Bruchidae* evolution, unlike *Chrysomelidae*, we can assume the following trends (the corresponding state in *Chrysomelidae* is given in brackets): larval adaptation to development inside host plant seeds (plant tissue exo- or endophagy), metallic polish decay (usually strongly metallic), development of frontal carina (absent), antennal modification to serrate or pectinate (usually filiform), gradual development of opisthognate head (usually prognate), development of body pubescence (usually bare), great asymmetry in

leg construction — the strong development of the hind legs with numerous modifications of femur and tibia (asymmetry almost absent), two separate larval instars (one larval type).

In different taxa within different evolutionary lines of seed-beetles, apomorphic characters appear sooner or later so that every genus is a conglomeration of apomorphies and plesiomorphies (table 1). Some apomorphies appear independently in different evolutionary lines quite frequently, which makes phylogenetic analysis of the family difficult.

Table 1. The apomorphous and plesiomorphous characters in the seed-beetles

Lp.	Character	Plesiomorph	Apomorph
1	Body colour	metallic	not metallic
2	Vestiture	absent, or not variegated	present, variegated
3	Head structure	subprognathic	opistognathic
4	Eyes	shallowly emarginate	deeply emarginate
5	Frontal carina	present	absent
6	Postocular lobe	short, not carinate	long, carinate
7	Antennae	subfiliform, subserrate, not sexually dimorphic	serrate or pectinate, sexually dimorphic
8	Pronotal lateral carina	present	absent
9	Prosternal process	long, broad, separating procoxae on whole length	short, narrow, triangular, not separating procoxae
10	Metasternal process	flat	angulate
11	Scutellum	square, not emarginate apically	triangular, or elongate, or square but bifid apically
12	Elytral striae	regular, not abbreviated or closed posterad	not regular, abbreviated or closed posterad
13	First stria	attaining base of elytron	not attaining base of elytron
14	Basal elytral tubercles	absent	present
15	Tenth stria	not abbreviated	abbreviated
16	Mesoepimeral plate	broad, attaining mesocoxal cavity	short, triangular, not attaining mesocoxal cavity
17	Parasutural sulci	present	absent
18	Hind femora	incrassate	slender
19	Femoral spines	numerous	simple or absent
20	Ventral femoral sulcus	absent	present
21	Ventral external margin of hind femur	not dentate	dentate
22	Hind tibia	arcuate	straight
23	Hind tibial carinae	present	absent
24	Mucro	long	obsolete
25	Hind tibial calcaria	present	absent

Lp.	Character	Plesiomorph	Apomorph
26	Pro- and mesolegs	not sexually dimorphic	sexually dimorphic
27	Pygidium	small, not sexually dimorphic	large, sexually dimorphic
28	Abdominal sterna	not modified	modified
29	Median lobe	tubular, without valvae	flattened, with one or two valvae
30	Internal sac	without large sclerites	with large sclerites
31	Lateral lobes	short, fused	elongate, more or less divided
32	Apex of lateral lobe	flat, not modified	modified
33	Base of lateral lobes	without perpendicular keel	with perpendicular keel
34	Legs in first stage larva	present	absent
35	Pupation	outside seed	inside seed
36	Host plant	not legume	legume

Seed-beetles development began during the period of angiosperm plant evolution, i.e. probably at the end of the Cretaceous period. The only fossil seed-beetles come from the North American Oligocene and represent the genus *Oligobruchus* within the *Pachymerinae* (KINGSOLVER, 1965). Apart from numerous plesiomorphies characteristic of the subfamily, the genus shows some apomorphies — convex pronotal disc, narrow prosternal process, middle tibia with carinae, and deeply emarginate eyes. In none of the extant *Pachymerinae* is the prothoracic disc as densely and deeply foveolate as in *Oligobruchus*. It can be presumed therefore that seed-beetles were already a well differentiated group in the Oligocene, and the *Pachymerinae* subfamily is, after *Rhaebinae*, one of the most primitive.

Most *Pachymerinae* show the following set of plesiomorphies: eyes not deeply emarginate, distinct frontal carina, pronotal lateral carina complete, wide prosternal process entirely separating front coxa, rectangular pronotum, wide meso-epimeral plate, parasutural rows present, two small spines at apex of front and middle tibia, posterior femur strongly incrassate with a spiny pecten, hind tibia arcuate, small pygidium, lateral lobes of paramere short and fused. The trends of specialization are expressed in the head elongation, eye-emargination deepening, reduction of pronotal carina, change of pronotal shape from rectangular to semicircular, partial reduction of parasutural rows, and the deepening cleft of the lateral lobes. New World genera have less apomorphies than Old World ones.

Eubaptinae probably represent a collateral development which diverged

the main stem leading to the specialized subfamilies *Bruchinae* and *Kytorhininae*. The subfamily preserves some plesiomorphies, eg. large and wide mesoepimeral plate and apical hind tibial spine. Median lobe and parameres are of a general. structure. The strongly modified male head (except one species) and the saltatorial hind leg with strongly thickened femur but without spiny pecten, are apomorphies in *Eubaptinae*. These characters are not observed in other subfamillies. The partly reduced pronotal lateral carina is also apomorphic. LACORDAIRE (1845) placed the genus *Eubaptus* after *Rhaebus* within *Crioceridae*. *Eubaptus* has lost many sagroid characters in comparision with the representatives of *Rhaebus*, and is rather closer to *Bruchinae* than to *Pachymerinae*. Due to structure of the hind legs, we can confirm *Eubaptinae* as the collateral development line related to *Bruchinae* as well as *Pachymerinae*.

Amblycerus is the most primitive genus within *Amblycerinae*. It has the following plesiomorphies: eyes not deeply emarginate, long and wide prosternal process, suite of parasutural rows, and fused lateral lobes in the male genitalia. The trends of specialization within the subfamily are expressed in prosternal process shortening, partial reduction of parasutural rows, eye--emargination deepening, and strong modification of lateral lobes. The apomorphies characteristic only of the subfamily are: very sharp lateral pronotal carina, triangular or elongate bifid/trifid scutellum, hind femur with two sharp ventral margins but without remains of spines, specific structure of hind tibia with two long apical calcaria, and also the specific structure of male genitalia and ovipositor.

Kytorhininae agrees with *Bruchinae* in respect of most characters. It is distinguishable by a relatively wide mesoepimeral plate. The strongly sclerotized abdomen, elytra which do not cover pygidium and two last tergites are strong apomorphies characteristic only of the subfamily. Fused lateral lobes of paramere manifest their rather general. structure. However, the median lobe has characteristic sclerites in the internal sac (fig. 267), a feature not observed in other seed-beetles. IABLOKOFF-KHNZORIAN and KARAPETJAN (1973) suggest the reduction of *Kytorhininae* to tribal rank within *Bruchinae* in virtue of ovipositor structure. This problem needs some more research however, particularly based on larval stages. Unfortunately, the larvae of *Kytorhininae* are still undescribed.

Bruchinae is most specialized subfamily. Individual genera show more or less specialization of the separate characters. Evolutionary trends within the subfamily are presented below according to the discussion on tribal division.

The most probable phylogenetic tree model of family, subfamilies, and tribes based upon an analysis of apomorphic and plesiomorphic characters

is shown in figs. 43–45. The arrangement of phylogenetic tree within *Bruchinae* is very difficult because of mosaic evolution of the genera.

The subfamilies *Rhaebinae*, *Eubaptinae*, and *Kytorhininae* contain only one genus each, whilst remaining ones contain numerous genera and species placed in tribes. Until now, only *Amblycerinae* has been considered a homogenous group consisting of a single tribe. *Amblycerus* shows such a mixture of apomorphies and plesiomorphies in comparision with *Zabrotes* and *Spermophagus* that it is not justified to make a separate tribe for it. The not deeply emarginate eyes, strongly developed parasutural rows, and wide prosternal process show the *Amblycerus* primitive in relation to *Spermophagus* and *Zabrotes*. On the other hand, the elongate, often bidentate/tridentate scutellum, and strongly modified median lobe with characteristic sclerites of internal sac (figs. 256–257) are strong apomorphies. The genera *Spermophagus* and *Zabrotes* have deeply emarginate eyes, shortened prosternal process, partly reduced parasutural rows, and a median lobe and parameres of a special structure. Such a set of apomorphies warrants their elimination as a separate tribe. Within *Amblycerinae* then, there are two tribes to be separated: *Amblycerini* BRIDWELL, 1932 with *Amblycerus* as type genus, and *Spermophagini* n. trib. with *Spermophagus* as type genus.

Pachymerinae is divided into three tribes. The *Caryopemonini* is distinguishable by the elongate head, eyes emarginate almost to their half length, pronotum semicircular in outline, minute scutellum, wide and flat elytra, and usually variegated dorsal vestiture. Because these features are all apomorphic, *Caryopemonini* is therefore the most specialized within the subfamily, making a collateral development line. *Caryedonini* and *Pachymerini* have some common features, i.e. primitive structure of eyes which are emarginate to at most 1/4 length. A division into two tribes has been suggested by BRIDWELL (1929) prior to the more recently described African and Madagascar genera (DECELLE 1965, 1968). BRIDWELL separated *Caryedonini* on two apomorphies: reduced pronotal lateral carina and shortened prosternal process. Not neglible was also the fact that *Pachymerini* (in his sense) occured only in the New World and *Caryedonini* in the Old World. The definition of *Caryedonini* become complicated when DECELLE found some genera possesing a distinct lateral carina (*Afroredon*, *Exoctenophorus*, *Mimocaryedon* and *Caryotrypes*) and with an elongate prosternal process (*Afroredon* and *Mimocaryedon*) in the Old World. According to present formulation, *Pachymerini* tribe is distinguished by strongly widened pro- and midtarsi and especially wide prosternal process. Representatives of the two tribes also differ in feeding preferencies: *Pachymerini* develop mostly in *Palmae* seeds, whereas *Caryedonini* in the seeds of *Fabaceae*, *Combretaceae* or *Pandanaceae*.

Bruchinae, the largest of all the subfamilies, was divided into four tribes (BRIDWELL, 1946): *Bruchidiini*, *Acanthoscelidini*, *Bruchini*, and *Megacerini*. The separation of *Bruchidiini* and *Acanthoscelidini* was unjustified (BOROWIEC, 1984c) because the type genera of both are so similar to each other that it is often difficult to include some species among them.

Megacerini is the most distinguishable and is separated by the following set of apomorphies: presence of pronotal lateral carina (of secondary type), shortened 10th stria on elytron, very slender hind femur with two sharp ventral margins and a smooth, or unidentate/serrulate internal ventral margin, very stocky and cylindrical body, male antennae often pectinate, pygidium orientated perpendicularly with the body axis, hind tiba with nontypical arrangement of lateral carinae (fig. 147), as well as development in *Convolvulaceae* seeds. It is the only tribe within the subfamily whose representatives do not develop in *Leguminosae* seeds.

Bruchini is distinguishable by the specialized pronotal structure. It is rectangular or trapezial and has (in most species) a distinct denticle on the lateral margin (figs. 94, 95). Males have strongly specialized secondary sexual characters, i.e. spines or plates on the middle tibia (figs. 150–152). The structure of hind femur which has a denticle on the external ventral margin also separates *Bruchini* from other tribes. Median and lateral lobes structure are not too differentiated (contrary to *Acanthoscelidini*) in the tribe. The tape-like base of the median lobe and paramere base without a ring surrounding the median lobe are quite unique features in *Bruchinae* and occur only in *Bruchini*.

Acanthoscelidini (including *Bruchidiini*) is the most numerous in genera, and also the most strongly differentiated. Further division of the genera into tribes is impossible, because some genera posses intermediate features between generic groups. Trends in specialization therefore are of a continuous character and sometimes it is difficult to separate one genus from another. The great number of species in some genera (f.i. *Acanthoscelides* and *Bruchidius*) is an extra difficulty in research and deep analysis is also impossible to provide because we very often deal with units departing from generic definitions. Existing division into genera were based on the fauna of individual zoogeographical regions so that the definitions of some genera are now remarkably similar. Several genera have been characterized more precisely in recent years based upon a detailed analysis of male genitalia, but there is still no good diagnosis for *Acanthoscelides* and *Bruchidius* which leaves their separation based mainly on zoogeographical criteria and not on distinct morphological differences (*Acanthoscelides* — New World, *Bruchidius* — Old World). Numerous evolutionary parallels between New and Old World beetles occurring in the tribe also make taxonomical analysis difficult.

Genera of the *Gibbobruchus* group have the most primitive appearance, closely resembling *Pachymerinae*. They are characterized by strongly incrassate hind femur with a spiny pecten and arcuate hind tibia. Most of the genera of the group have gibbosities on pronotum and elytra. The main trends in development of the New World line of *Acanthoscelidini* are expressed in gradual reduction of gibbosities, straightening of hind tibia and reduction of lateral carinae on them, slimming of hind femur and gradual reduction of spines, and also in numerous developments of median and lateral lobe structure. *Merobruchus* is intermediate genus between the *Gibbobruchus* and *Acanthoscelides* groups. It has lost gibbosities and the number of femoral spines is reduced to three or four whilst at the same time its tibia is still strongly curved and lateral carinae are well developed.

Some American genera (*Stator*, *Bonaerius*, *Lithraeus* group, *Mimosestes*, *Pseudopachymerina*) have a distinct lateral carina on the pronotum, but this is probably a secondary apomorph. The carina does not run around the pronotal disc but usually bends down above the front coxa and sometimes and at the frontal margin of the pronotum. Presumably this carina is not homologous with those occuring in *Pachymerinae*. Similar carinae have developed independently in some generic groups of the New World.

Crucial apomorphic characters used to distinguish genus groups within the New World *Acanthoscelidini* are: elongate scutellum (*Algarobius* and *Rhipibruchus* groups), pronotal gibbosities (*Neltumius* group), pectinate antennae in male (*Rhipibruchus* group), abdomen telescoped in male (*Rhipibruchus* group), median lobe with hinge sclerites (*Sennius* group), basisternum in male or pygidium in female with pits or sulci (*Algarobius* group), median lobe with a perpendicular keel and internal sac with spool-like sclerites (*Algarobius* group), pronotum with lateral carina (*Stator* and *Lithraeus* groups), hind femur without spines or with simple minute spine (*Dahlibruchus* and *Lithraeus* groups), hind tibia without carinae (*Dahlibruchus* and *Lithraeus* groups) and hind tibial mucro obsolete (*Lithraeus* group). The *Lithraeus* group is the most specialized one in the New World. Its representatives do not have large spines on hind femur, hind tibial carinae have been completely reduced, mucro is very short or obsolete, pronotal lateral carina is more or less developed, and all species do not develop in *Leguminosae* seeds.

Trends in evolution of Old World *Acanthoscelidini* are similar to those of the New World line, but none of the Old World genera have more than three spines on the hind femur (except some species of *Specularius*). New World genera have more spines on the hind femur than the Old World ones, and this is a general principle. Because the reduction of spines manifests the process of evolution, we may say that the Old World line is more specialized,

and the genera divergence in that area runs quite independently from the same process in the New World.

The most isolated position in the Old World is taken by the *Horridobruchus* group. Its sole representative at first glance rather resembles American genera of the *Gibbobruchus* group instead of other genera from the Old World. However, it is closer to the Old World groups mainly because of the unique hind femur structure which has one spine on the internal ventral margin and an obtuse denticle on the external ventral margin.

The *Specularius* group resembles to the *Gibbobruchus* and *Merobruchus*. Here the speculum has been certainly developed in the group independently from the American *Gibbobruchus* group. The presence of three or four large spines on hind femora is plesiomorphic in the *Specularius* group.

The *Callosobruchus* group is well distinguished by the spine or denticle present on the external ventral as well as on the internal ventral margin of hind femora.

The *Paleoacanthoscelides* group is not externally different from the American *Acanthoscelides* group (especially from the genus *Acanthoscelides*) but its males have genitalia of a unique type (fig. 354). The presence of three femoral spines and last sternite not emarginate in both sexes distinguished this group from other Old World groups.

The *Bruchidius* group in the Old World is homologous with the American *Acanthoscelides* group, and differs from only in the reduction of femoral spines. Convergence between some genera of New World and the Old World *Acanthoscelidini* is so clear, that pairs of convergent genera may be recognised (*Acanthoscelides-Bruchidius*, *Mimosestes-Sulcobruchus*, *Rhipibruchus-Decellebruchus*, *Algarobius-Megabruchidius*, *Gibbobruchus-Specularius*, *Caryedes-Horridobruchus*). Most likely, the *Conicobruchus* and *Kingsolverius* groups are the most specialized from all in the Old World. *Conicobruchus* is characterized by the distinctly concave pronotal sides, elongate head, very slim hind femur and tibia, and often reduced lateral carinae on hind tibia. The *Kingsolverius* group represent other trend of specialization. Here body is stout, abdomen short and telescoped in male, antennae strongly serrate or pectinate, and/or scutellum is elongate.

GEOGRAPHICAL DISTRIBUTION OF SEED-BEETLES

Bruchids live on all continents except arctic areas. The great majority of species however, prefer tropical and subtropical zones and their numbers decrease polewards. Northern limits of distribution correspond in principle with the northern limit of the deciduous forests, so in the taiga and tundra

zones seed-beetles are absent. In South America, their extreme occurrence is at Tierra del Fuego (KINGSOLVER, letter inf.). They do not occur on New Zealand, and on other Pacific islands occur only cosmopolitan/subcosmopolitan species brought by man.

Seed-beetles exist in various habitats, both in open and forest biotopes. The distribution of individual species depends on the host plant range, and because most species are oligofagous, their expansion possibilities are limited. A few cosmopolitan or subcosmopolitan species of *Bruchus*, *Callosobruchus*, *Acanthoscelides*, or *Caryedon* are attached to cultivated plants and were distributed by man.

The Neotropical Region is richest both species and genera (table 2). It is characterized by a high number of endemic genera (19 of 34 existing), and the

Table 2. Distribution of seed beetle genera (i — introduced genus)

Genus	Neotropical Region	Nearctic Region	Palearctic Region	Oriental Region	Afrotropical Region	Madagascar	Australian Region
Rhaebinae	—	—	+	—	—	—	—
Rhaebus	—	—	+	—	—	—	—
Pachymerinae	+	+	+	+	+	+	—
Afroredon	—	—	—	—	+	+	—
Butiobruchus	+	—	—	—	—	—	—
Caryedon	i	i	+	+	+	+	—
Caryoborus	+	—	—	—	—	—	—
Caryobruchus	+	+	—	—	—	—	—
Caryopemon	—	—	—	+	+	+	—
Caryotrypes	—	—	—	—	—	+	—
Diegobruchus	—	—	—	—	+	+	—
Exoctenophorus	—	—	—	—	—	+	—
Mimocaryedon	—	—	—	—	+	—	—
Pachymerus	+	—	—	—	—	—	—
Protocaryopemon	—	—	—	+	—	—	—
Eubaptinae	+	—	—	—	—	—	—
Eubaptus	+	—	—	—	—	—	—
Bruchinae	+	+	+	+	+	+	+
Acanthobruchidius	—	—	+	—	—	—	—
Acanthoscelides	+	+	i	i	i	—	—
Algarobius	+	+	—	—	—	—	—
Althaeus	—	+	—	—	—	—	—
Bonaerius	+	—	—	—	—	—	—
Bruchidius	—	i	+	+	+	+	+
Bruchus	i	i	+	i	i	—	—

condt tab. 2

Genus	Neotropical Region	Nearctic Region	Palearctic Region	Oriental Region	Afrotropical Region	Madagascar	Australian Region
Callosobruchus	i	i	i	+	+	+	–
Caryedes	+	–	–	–	–	–	–
Conicobruchus	–	–	–	+	+	+	–
Cosmobruchus	+	–	–	–	–	–	–
Ctenocolum	+	–	–	–	–	–	–
Dahlibruchus	+	–	–	–	–	–	–
Decellebruchus	–	–	–	+	+	–	–
Gibbobruchus	+	+	–	–	–	–	–
Horridobruchus	–	–	–	+	–	–	–
Kingsolverius	–	–	–	+	–	–	–
Lithraeus	+	–	–	–	–	–	–
Megabruchidius	–	–	–	+	–	–	–
Megacerus	+	+	–	–	–	–	–
Megasennius	+	–	–	–	–	–	–
Meibomeus	+	+	–	–	–	–	–
Merobruchus	+	+	–	–	–	–	–
Mimosestes	+	+	i	–	–	–	–
Neltumius	–	+	–	–	–	–	–
Paleoacanthoscelides	–	–	+	–	–	–	–
Palpibruchus	+	–	–	–	–	–	–
Pectinibruchus	+	–	–	–	–	–	–
Penthobruchus	+	–	–	–	–	–	–
Pseudopachymerina	+	–	i	–	i	–	–
Pygiopachymerus	+	–	–	–	–	–	–
Rhipibruchus	+	–	–	–	–	–	–
Salviabruchus	–	–	+	–	–	–	–
Scutobruchus	+	–	–	–	–	–	–
Sennius	+	+	–	–	–	–	–
Spatulobruchus	+	–	–	–	–	–	–
Specularius	–	–	–	+	+	–	–
Stator	+	+	–	–	–	–	–
Stylantheus	–	+	–	–	–	–	–
Sulcobruchus	–	–	+	+	+	+	–
Kytorhininae	–	+	+	+	–	–	–
Kytorhinus	–	+	+	+	–	–	–
Amblycerinae	+	+	+	+	+	+	–
Amblycerus	+	+	–	–	–	–	–
Spermophagus	–	–	+	+	+	+	–
Zabrotes	+	+	i	i	i	–	–
Total – number of endemic genera in brackets	34 (19)	20 (3)	15 (5)	16 (4)	16 (2)	11 (2)	1 (0)

subfamily *Eubaptinae* containing four species is endemic. As many as 31 genera from 37 of the New World are endemic or subendemic to the region. The majority of nearctic species and genera prove to evident genetic relationships with neotropical fauna and the limits of the Neotropical Region as defined by seed-beetles practically corresponds with the northern border of Mexico, since only the representatives of three genera occur exclusively north of Mexico.

Bruchids of the Nearctic Region are related to the neotropical fauna, than to the palearctic one. The only genus common to both the Palearctic and Nearctic Regions (excluding species brought by man) is *Kytorhinus*, with one North American species distributed in the north-eastern part of the continent. There is no doubt that this originated from ancestors migrating from the Palearctic Region through Beringia, because its closest relatives live in the Far East. The three endemic nearctic genera are of a local character and are associated with the south-western deserts. Remaining genera represent groups whose centres of distribution are situated in Central and South America.

Seed-beetles of the Afrotropical Region show some specific characters, although there are relationships with both Palearctic and Oriental faunas. *Bruchidius*, *Caryedon*, *Decellebruchus*, *Spermophagus* and *Sulcobruchus* occur almost all over the paleotropical areae. *Conicobruchus* is widely distributed in the tropics of the Old World. Endemic Afrotropical genera belong mainly to the *Pachymerinae*. Thus *Mimocaryedon* occurs only in Africa, *Afroredon* in Africa and Madagascar, and *Caryotrypes* and *Exoctenophorus* are the endemics of Madagascar.

The Oriental Region is at present the least known region for seed-beetles. Of all the endemic genera, *Protocaryopemon* and *Horridobruchus* are very distinctive. The endemic *Kingsolverius* and *Megabruchidius* belong to the *Bruchidius* complex. Seed-beetles of the Oriental Region show the lowest number of specific characters.

The Palearctic Region, although not too rich in numbers of species, has many specific characteristics. *Rhaebinae* is endemic and *Kytorhininae* subendemic (oriental species occurs in mountains, especially in Himalayas). Connexions with the Afrotropical Region are shown by the presence of *Caryedon*, *Spermophagus* and *Sulcobruchus*, but as many as five genera are endemic (table 2). A conspicuous feature of the Palearctic is the great number of species associated with the eremial zone, whereas the boreal zone is inhabited only by a dozen or so. The fauna of the central and northern parts of the Palearctic Region is therefore formed mainly of species migrating from south to north. In the Eastern Palearctic, the fauna is also visibly separated, showing a very low dispersal pressure towards the west. The majority

of these species are distinctly allied to oriental forms. All species common to both West and East are forms migrating from the west to the east.

Although no species of seed-beetles are known from the Papuan Subregion, probably they do occur there because 12 species occur in Australia (KINGSOLVER, 1977 and letter inf.). All the Australian species are classified in *Bruchidius*. When they are revised it may be necessary to separate a new genus for them (KINGSOLVER, letter inf.).

Existing seed-beetle faunas are the result of evolution lasting for millions of years, with the permanent exchange of species between various zoogeographic areas. The present dynamic balance within every area is also interim because the processes of fauna-forming are still taking place, often through man's interference. Although the remarkable zoogeographical separateness of every region is strongly connected with the processes responsible for the isolation of these regions, the variability of seed-beetles within each areas depends on the evolutionary processes generating differentiation of host plants. Strong evolutionary pressure caused by seed-beetles attacking the extremely important plant survival organs — the seeds, is presumedly one of the more important species-forming factors in plants. According to JANZEN (1975), the coevolutionary relationships between these organisms are one of the reasons for the present structure of New World tropical forests.

Analysing the geographical distribution of seed-beetles in respect of genera primordiality we see that within each of the zoogeographical regions there are forms of a derived as well as specialized type. This makes it very difficult to conclude where the family originated (if such a centre existed at all). It seems that the adaptation of derived *Chrysomeloidea* to development inside plant seeds was such an important preadaptation that in a very short time it led to a strong radiation of the beetles, and their dispersal within all zoogeographical regions.

Beetles developing inside plant seeds are probably under similar evolutionary pressures independently of geographic region. In seed-beetles this may have caused independent development of the same characters within phyletic lines of different zoogeographic areas. Thus, New and Old World forms occupying similar ecological niches became morphologically similar. Differences between the phyletic lines of New and Old World remained undected for long because of existing evolutionary parallelisms.

GAPS IN KNOWLEDGE OF SEED-BEETLES

Research on *Bruchidae* is very irregular, and there are many problems to be solved which would help in a better understanding of *Bruchidae* phylogenesis. The problems can be divided into following groups:

A. Resulting from a low knowledge of tropical regions. Although studies on species and genera continue research on Oriental and Neotropical faunas is extremely neglected. This is due to the work of M. PIC who dominated studies on the family. It is impossible to determine his species without a comparison with his types. It seems that a revision or at least a redescription of PIC's species or those described in "Genera et species Curculionidum" is indispensable. Taxonomic investigation is only provided in the USA at present. None (!) of the larger Old World genera have been revised in modern times (my revision of *Spermophagus* will be ready soon). Even the Palearctic fauna was not comprehensively worled until the time of SCHILSKY. Regional faunistic studies soon become outdated. Also, species described by LUKJANOVITSH, TER-MINASSIAN, and KHNZORIAN need revision, especially since descriptions of the male genitalia were not included.

B. Resulting from imprecise generic categories of *Bruchidae*. The present work also is not exhaustive in this matter. It seems that the definition of large genera, eg. *Acanthoscelides* and *Bruchidius* is especially needed. Many species-groups in these stray from the genus definition, and at the same time the existing mosaic of morphological characters does not stimulate the creation of new genera. Many recently separated genera could be reduced to synonyms (as species groups) when there is greater understanding at the genus level. Of course a broader knowledge of tropical faunas may be helpful in separating one genus from another in a better way. But we must remember that intermediate forms might also be discovered, and this could undermine the overall view which is not clear anyway.

C. Arising from insufficient knowledge of morphology and anatomy, particularly of larvae. There is much to do in this subject. However, we must not overvalue the weight of larval morphological characters in reconstructing *Bruchidae* phylogenesis. Seed-beetles larva biology is complicated due to the strong pressures exerted by the host plant. This results in some apomorphies of very low taxonomic value above the species level.

D. Originating from low knowledge of nutritive spectra. Many genera or species-groups of seed-beetles have strong connections with their host plants, so studying their nutritive spectra may give good results in taxonomic investigations. Unfortunately, host plants of paleotropical Bruchids are very little known, and at the same time we also have taxonomic problems just with those beetles.

E. Resulting from taxonomic traditions. Taxonomic investigations on seed-beetles provided by New and Old World scientists take different approaches. Research in the New World is led methodistically, both taxonomically and bio-ecologically. The Old World is dominated by a faunistic and de-

scriptive approach, and scientists are mainly describing new species and the fauna of various geographical regions. Unfortunately they do not provide any methodical taxonomic research. Partly this is a result of the great dispersion of type material which is deposited in various institutions often reluctant to lend them. Scientific travels are also sometimes impossible due to economic and political obstacles. The revision of any Old World genus needs years of strenuous studies, and this inhibits scientists from taking up such research. To overcome this impasse is an indispensable condition for the development of studies on *Bruchidae* of the Old World.

F. Owing to reasons independent of the present state of knowledge. The number of people now studing *Bruchidae* taxonomy is too little to solve the above problems in a short time. Also the *Bruchidae* family is not to attractive, so the more comprehensive studies are stimulated only by their economic importance. It also needs labourious research techniques (preparing slides of genitalia is practically always indispensable), which slows down the obtaining of results.

SEED-BEETLE GENUS CRITERIA

Early classifications of seed-beetles were based on the investgator's intuition, and genera were described with the use of typological criteria where the taxonomic distinctness had been evaluated subjectively. SCHILSKY (1905) was the first who recognized the hind leg structure to be one of the fundamental characters separating genera. BRIDWELL (1932, 1946) made an analysis of the fundamental morphological features and based on it he created the first coherent system of the family. According to him, fundamental charcters of the subfamily level were as follows: thoracic plates structure, hind femur structure, development of pronotal lateral carina, presence of apical tibial spines, and degree of abdominal sclerotization. Fundamental characters at the genus level were: hind legs structure (particularly the development of spines on hind femora), eye construction, pronotal lateral carina development, elytral rows arrangement, presence of tubercles at base of elytron, antennal length and their degree of sexual dimorphism, pronotum shape, and length of scutellum. BRIDWELL did not prepare seed-beetle genitalia so he could not consider many substantial taxonomic details.

Various taxonomic investigations after 1950 mostly followed BRIDWELL's ideas. Detailed analysis of the male genitalia (TERAN 1967, KINGSOLVER 1970) became the source of more precise genus criteria. Nowdays, male genital structure is the first character used to separate new genera (f.i. *Scutobruchus*,

Salviabruchus or *Paleoacanthoscelides*). The taxonomic value of characters based on male genitalia is inversaly proportional to the diversity degree of their construction. Thus genera with an extremely varied male genitalia should be separated on their remarkably constant and distinct characters. If we do not follow this approach then we will disperse genera too much. Such constant characters should be accompanied by at least one external morphological character distinctly separating the given taxon from other genera. It is easy to find taxonomically valid characters and to evaluate their validity after considering the trends in evolution presented in the sixth chapter.

The following characters are the best criteria for genus definition in seed-beetles:

1. Hind leg construction; state of hind femur enlargement, number of femoral spines, state of hind tibia deflection, development and reduction of tibial carinae and apical denticles.
2. State of pronotal lateral carina development.
3. Depth of eye emargination.
4. Prosternal process length and width.
5. Paramere and median lobe structure.
6. Sexual dimorphism degree in head, antenna, legs and abdomen structure.

Apart from these fundamental characters, the following subsidiary characters can also be used:

7. Development of tubercles at base of elytron.
8. Pronotum shape.
9. Head length.
10. Labial palps structure.
11. Scutellum length.
12. Host plants.
13. Geographical distribution.

Such characters as: development of frontal carina, ovipositor structure, degree of closing of elytral striae, general shape of body, and characters connected with colouration and vestiture are of low taxonomic value at generic level, but may be helpful in species separation.

In analysing the above characters occuring in an investigated unit, attention must be paid to the degree of their differentiation in the most closely related units in our opinion. Sometimes characters described as 1–6 are of high differentiation within large units, and at the same time it is not possible to correlate them. So even when some of the characters are distinctly different from the fundamental type of structure we have always to consider subsidiary characters which can be of a high taxonomic value only for the investigated unit.

REVIEW OF THE SEED-BEETLES GENERA

Family: *Bruchidae* Latreille, 1802

Subfamily: *Rhaebinae* Chapuis, 1874

Genus: *Rhaebus* Fischer von Waldheim

Rhaebus FISCHER VON WALDHEIM, 1824: 178.

Type species: *Rhaebus gebleri* FISCHER von WALDHEIM, 1824 (by monotypy).

The genus is characterized by following combination of characters:

— body colour always metallic
— antennae subfiliform, not sexually dimorphic
— pronotum with sharp lateral carina in posterior 2/3 length
— scutellum triangular
— elytra without basal tubercles
— mesoepimeron clearly borders the coxal cavity
— hind femur strongly sexually dimorphic, bulging or with spicules ventrally in male, without spines in female
— hind tibia with two apical spurs
— median lobe tubular, internal sac without large sclerites
— lateral lobes short, broad, fused, only slightly cleft at apex.

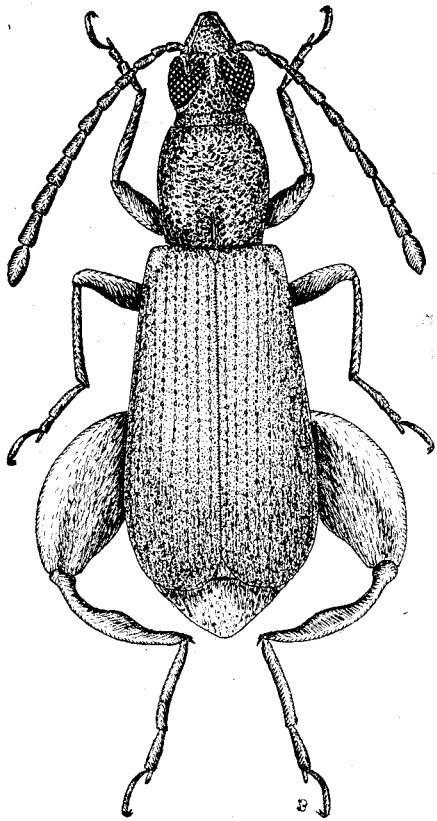
DESCRIPTION

Body length: 3.0–5.0 mm, width: 1.5–2.0 mm. Body elongate, always with metallic tint (fig.5). Head slightly elongate, not strongly constricted behind eyes, postocular lobe elongate (fig. 5). Eyes flat, or moderately bulging, emarginate to half length. Frons with or without median carina. Antennae moderately long, reaching at most to half body length, subfiliform, slightly expanded from the fourth article. Pronotum cylindrical, with sharp lateral carina in posterior 2/3 length (fig. 1). Disc convex, without gibbosities or impressions. Prosternal process triangular, narrow, acute. Scutellum small, triangular. Mesoepimeron is narrower than in the subfamilies *Pachymerinae* and *Amblycerinae*, clearly borders the coxal cavity. Elytra elongate, striae distinct and regularly spaced in basal half of elytron but tend to become confused and randomly placed in apical half. Pro- and mesolegs slender, not sexually dimorphic. Hind femora strongly sexually dimorphic, in male bulging (fig. 135) or spinose, in female slender, without spines. Hind tibia with two apical spurs; carinae, coronal denticles and mucro absent. Hind tarsi longer than hind tibia. Vestiture scarce, not variegated.

Male. Hind femur more or less bulging or expanded, sometimes with small denticles ventrally. Hind tibia often expanded, asymmetrical trickened

medially and somewhat spatulate, in two species tibia is slightly bowed, slender. Median lobe tubular, with apical portion articulated (fig. 269), internal sac without large sclerites. Lateral lobes short, completely fused, strongly sclerotized, only slightly cleft at apex (fig. 272).

Female. Hind femur and tibia slender, not modified.



5. *Rhaebus mannerheimi*, male

DIAGNOSIS

It is unique genus within *Bruchidae*, with characters intermediate between *Chrysomelidae* and *Bruchidae*. The characters mentioned above separated *Rhaebus* from all genera of *Bruchidae*.

HOST PLANTS

Zygophyllaceae: *Nitraria* spp.

DISTRIBUTION

Southeastern part of Europaean USSR, Middle Asia, West and Central China.

Number of species: 5.

References: LUKJANOVITSH, 1939: 546; LUKJANOVITSH and TER-MINASSIAN, 1957: 53; TER-MINASSIAN, 1973: 75; KINGSOLVER and PFAFFENBERGER, 1980: 293.

Subfamily: *Pachymerinae* Bridwell, 1929

Tribe: *Pachymerini* Bridwell, 1929

Genus: *Pachymerus* Thunberg

Pachymerus THUNBERG, 1805: 282.

Type species: *Dermests bactris* LINNAEUS, 1763 (by monotypy).

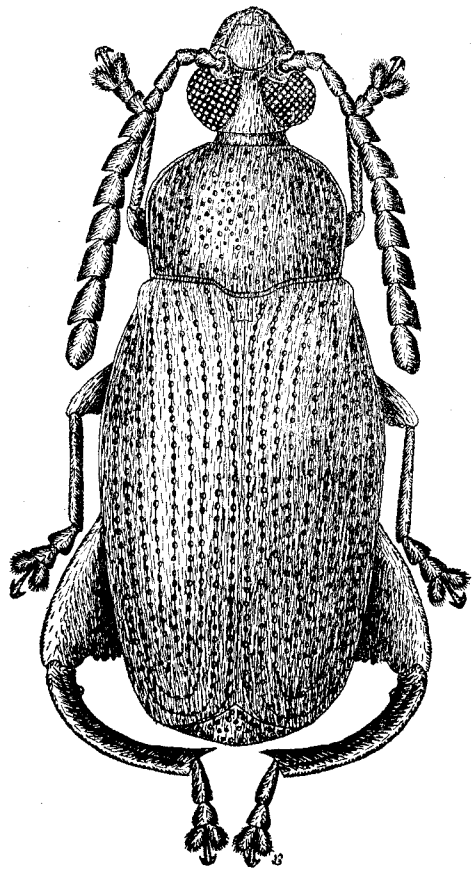
The genus is characterized by following combination of characters:

- antennae serrate from fifth article
- pronotum transverse, pentagonal or subpentagonal, lateral carina complete
- prosternal process long, broad, completely separating procoxae
- mesosternum truncate apically
- hind femur strongly incrassate, with great spine near base followed by 10–13 smaller denticles, apical two or three denticles more tuberculiform than the others
- hind tibia arcuate, carinate, mucronate apically, with ventral subbasal tubercle
- median lobe short, ventral valve triangular, internal sac without large sclerites
- lateral lobes short, fused

DESCRIPTION

Body length: 8–16 mm, width: 5–8 mm. Head short, strongly constricted behind eyes, postocular lobe very short, not carinate posterad (fig. 6). Eyes bulging, emarginate to 1/4 length. Frons with obtuse median carina. Gula subtriangular or semicircular. Antennae serrate from fifth article, articles 2–4 distinctly impressed at base. Pronotum broader than long, subpentagonal, with complete lateral carina. Prosternal process narrow, long and broad, completely separating procoxae (fig. 54). Mesosternum narrow, truncate apically. Scutellum square, truncate apically. Elytra about 1.5–1.7 times longer than broad together. Striae regular, striae 2 and 9, and 3 and 8, so-

metimes also striae 4 and 5, and 6 and 7 closed posterad. Front and middle tarsi incrassate (fig. 6). Hind femur strongly incrassate, with great spine near base followed by 10–13 smaller denticles, apical two or three denticles more tuberculiform than the others. Hind tibia strongly arcuate, with complete set of carinae. Ventral margin with subbasal tubercle (fig. 140). Mucro not longer than apical width of tibia. Abdomen not modified. Vestiture scarce, uniform.



6. *Pachymerus* sp.

Male. Last sternite shorter. Median lobe short, ventral valve triangular, internal sac without large sclerites (fig. 237). Lateral lobes short, completely fused with large basal tapes (fig. 240).

Female. Last sternite longer.

DIAGNOSIS

Subbasal tubercle on hind tibia near this genus to *Butiobruchus* only. It differs in structure of hind femoral pecten with large spine near base. The Old World genus *Exoctenophorus* has subbasal tubercle on hind tibia also, but differs in prosternal process short, separating procoxae to half length only, femoral pecten with row of equal denticles and body short and stout.

HOST PLANTS

Palmae: *Elaeis* sp., *Copernicia* sp., *Orbignyia* sp., *Maximiliana* sp., *Scheelea* sp., *Areca* sp.; *Ebenaceae*: *Diospyros* sp.

DISTRIBUTION

South America, introduced to West Africa with seeds of *Elaeis*.
Number of species: 6.
References: BRIDWELL, 1929: 157; PREVETT, 1966: 181.

Genus: *Butiobruchus* Prevett

Pachymeroides PREVETT, 1966a: 81.
Butiobruchus PREVETT, 1966b: 183 (new name for *Pachymeroides* PREVETT, 1966a not SIGNORET, 1880).

Type species: *Pachymeroides bridwelli* PREVETT, 1966a (by monotypy).
The genus is characterized by following combination of characters:

- antennae serrate from fifth article
- pronotum transverse, pentagonal, with complete lateral carina
- prosternal process long, completely separating procoxae
- mesosternum truncate apically
- hind femur strongly incrassate, without a great spine, with an irregular row of denticles more or less hidden in pubescence, apical denticles more tuberculiform than the others
- hind tibia arcuate, carinate, with ventral subbasal tubercle

DESCRIPTION

Body length: 10–13 mm, width: 5–7 mm. Body oval, elongate. Head short, strongly constricted behind eyes, postocular lobe short, not carinate posterad. Eyes bulging, emarginate to 1/4 length. Frons with obtuse median carina. Sides of gula between eyes almost parallel. Antennae serrate from fifth article, articles 2–4 barely impressed at base. Pronotum broader than long, pentagonal, narrowed in front from a little beyond middle. Lateral

carina complete. Prosternal process narrow, but long, completely separating procoxae. Mesosternum truncate apically. Scutellum square, truncate apically. Elytra about 1.5 times longer than broad together. Striae regular, tenth stria strongly impressed basally. Front and middle tarsi strongly incrassate. Hind femur strongly incrassate, without distinct pecten, with an irregular series of 16–20 denticles, becoming cristate towards apex, three apical denticles more tuberculiform than the others. Hind tibia arcuate, with complete set of carinae, mucronate apically, without apical calcaria, with ventral subbasal tubercle (fig. 141). Abdomen not modified. Vestiture scarce, uniform.

Male. Unknown.

Female. Pygidium longer than broad, a little deflected towards apex.

DIAGNOSIS

It differs from *Pachymerus* in hind femora without large spine. May be there is only distinct species within *Parchyme*; I have examined an unnamed species of *Pachymerus* with first femoral spine only slightly longer than remaining.

HOST PLANT

Palmae: *Butiaca pitata.*

DISTRIBUTION

Paraguay.
Number of species: 1.
References: no further works.

Genus: *Caryobruchus* Bridwell

Caryobruchus BRIDWELL, 1929: 148.

Type species: *Dermestes gleditsiae* LINNAEUS, 1763 (by original designation).

The genus is characterized by following combination of characters:

- antennae serrate from fourth article
- pronotum transverse, subpentagonal, with complete lateral carina
- prosternal process long, broad, completely separating procoxae
- mesosternum bifid or truncate apically
- hind femur strongly incrassate, pecten with large spine beyond the middle of femur and 6–13 smaller denticles, margin before pecten serrulate or with row of sharp spines

— hind tibia arcuate, without lateral carinae, mucronate apically, without subbasal ventral tubercle and without apical calcaria
— median lobe short, ventral valve triangular, internal sac without large sclerites
— lateral lobes short, fused ventrally, but often divided dorsally

DESCRIPTION

Body length: 5–29 mm, width: 3–10 mm. Body elongate. Head short, strongly constricted behind eyes, postocular lobe very short, not carinate posterad. Eyes bulging, emarginate to 1/6–1/4 length. Frons with sharp or obtuse median carina. Gula parallelsided or subtriangular. Antennae serrate from fourth article, articles 2–4 not impressed at base. Pronotum broader than long, subpentagonal, with complete lateral carina. Prosternal process long, broad, completely separating procoxae (fig. 54). Mesosternum in large species bifid apically, in small species almost truncate apically. Scutellum square, truncate apically. Elytra elongate, striae regular, or striae 2 and 9, and 3 and 8 closed posterad. Front and middle tarsi incrassate. Hind femur strongly incrassate, pecten with great spine beyond middle of the femur and 6–13 smaller, often obtuse denticles. Margin before pecten serrulate, or with row of short but sharp spines (fig. 142). Hind tibia arcuate, without ventral subbasal tubercle and apical calcaria, no lateral carinae. Mucro as long as width of apex of tibia. Abdomen not modified. Vestiture scarce, uniform or elytrae striped.

Male. Last sternite shorter. First article of pro- and midtarsi more incrassate. Median lobe short, ventral valve triangular, internal sac without large sclerites (fig. 236). Lateral lobes rather short, completely fused ventrally, but with deep incision dorsally (fig. 239).

Female. Last sternite longer. First article of pro- and midtarsi less incrassate.

DIAGNOSIS

Not carinate hind tibiae and antennae serrate from fourth article near this genus to *Caryoborus* only. Differs in margin before femoral pecten serrate or serrulate, hind tibia without apical calcaria, and internal sac without large sclerites.

HOST PLANTS

Palmae: *Scheelea* sp., *Acrocomia* sp., *Attalea* sp., *Inodes* sp.

DISTRIBUTION

Southern part of North America, Central and South America.
Number of species: at least 16.
References: no further works.

Genus: *Caryoborus* Schoenherr

Caryoborus SCHOENHERR, 1833: 92.

Type species: *Bruchus serripes* STURM, 1826 (by original designation).
The genus is characterized by following combination of characters:

- antennae serrate from fourth article
- pronotum transverse, subpentagonal, with complete lateral carina
- prosternal process long, completely separating procoxae
- mesosternum truncate apically
- hind femur strongly incrassate, with long spine before the middle followed by 10–16 gradually smaller spines — margin before pecten only with several very minute spines
- hind tibia arcuate, without lateral carina, with two small apical calcaria, without subbasal ventral tubercle
- median lobe short, ventral valve triangular, internal sac with large sclerites
- lateral lobes very short, fused, only slightly cleft at apex

DESCRIPTION

Body length: 6.5–7.5 mm, width: 3.5–4.1 mm. Body oval, elongate. Head short, strongly constricted behind eyes, postocular lobe short, not carinate. Eyes bulging, emarginate to 1/6 length. Frons with obtuse median carina. Gula subtriangular. Antennae serrate from fourth article (third in one male), distal articles longer than wide. Basal articles not impressed at base. Pronotum transverse, subpentagonal, lateral carina complete. Prosternal process narrow, long, completely separating procoxae. Mesosternum parallelsided, truncate apically. Scutellum square, truncate apically. Elytra about 1.5 times longer than broad together. Striae regular, strongly punctate. Striae 2 and 9, 3 and 8, and often 4 and 5, and 6 and 7 closed posterad. Pro- and midtarsi dilatate. Hind femur strongly incrassate with large pecten begining before the middle of ventral margin. The first spine of pecten is very long and sharp, often as long as width of tibia, the following 10–16 spines are about thrice shorter, gradually smaller and often obtuse. Margin before pecten with several very minute spines, almost invisible among hairs. Dorsal surface of femur not scabrous. Hind tibia arcuate, without ventral subbasal tubercle,

no lateral carinae (figs. 143–144). Apex of hind tibia with two small unequal calcaria (in dry specimes they are often broken.) Mucro long, as long as width of tibial apex. Abdomen not modified. Vestiture scarce, not variegated or indistinctly variegated.

Male. Antennae sometimes longer than in female and serrate from third article. Last sternite shorter, with shallow apical emargination. Median lobe short, ventral valve large, triangular, internal sac with large sclerites (fig. 238). Lateral lobes very short, fused, only slightly cleft at apex (fig. 241).

Female. Antennae shorter, always serrate from fourth article. Last sternite longer, not emarginate.

DIAGNOSIS

It differs from all genera of *Pachymerini* except *Caryobruchus* in absence of hind tibial subbasal tubercle and lateral carinae. It differs from *Caryobruchus* in structure of hind femora with ventral margin before pecten without spines or denticles. From all genera of *Pachymerinae Caryoborus* differ- in presence of calcaria in apice of hind tibia, but this character has not pra. ctical value, because in old dry specimens the calcaria are usually brokens

HOST PLANTS

Palmae: *Maximiliana* sp., *Phytelephas* sp.

DISTRIBUTION

South America north to Panama. Introduced into Antilles.
Number of species: at least 2.
References: BRIDWELL, 1929: 146.

Tribe: *Caryedonini* Bridwell, 1929

Caryedini BRIDWELL, 1929: 143.
Caryedontini: DECELLE, 1966: 172 (emend.).

Genus: *Mimocaryedon* Decelle

Mimocaryedon DECELLE, 1968: 419.

Type species: *Mimocaryedon freyi* DECELLE, 1968 (by monotypy).

The genus is characterized by following combination of characters:
— eyes shallowly emarginate
— prosternal process narrow but long, completely separating procoxae
— pronotal lateral carina complete

— elytral striae 2 and 9, and 3 and 8 closed posterad
— hind femur strongly incrassate, pecten with one large and 12 gradually smaller denticles, margin before pecten with several small teeth
— hind tibia arcuate, carinate, without ventral subbasal tubercle

DESCRIPTION

Body length: 7.5 mm, width: 4.1 mm. Body oval (fig. 61). Head short, constricted behind eyes, postocular lobe short. Eyes bulging, emarginate to 1/7 length. Frons with median carina. Antennae extending to 1/3 body length, serrate from third article. Pronotum trapezial, about 1.5 times wider than long, lateral carina complete. Disc flat, without gibbosities or impressions. Prosternal process narrow, but long, slightly expanded apically, completely separating procoxae (fig. 116). Scutellum small, trapezial, truncate apically. First elytral stria attaining base of elytron, striae 4–7 abbreviated apically, striae 2 and 9, and 3 and 8 closed posterad (fig. 61). Hind femur strongly incrassate, pecten with one large and 12 gradually smaller denticles, margin before pecten with several small teeth. Hind tibia arcuate, carinate, without ventral subbasal tubercle. Vestiture scarce, not covering body surface, uniform.

Male. Unknown.

Female. Pygidium slightly wider than long, with two shallow depressions laterally.

DIAGNOSIS

Mimocaryedon differs from *Exoctenophorus* and *Afroredon* in body more elongate, from *Exoctenophorus* also in hind tibia without subbasal tubercle, from *Afroredon* in absence of polished subhumeral area on female elytron. It differs from *Caryedon* and *Caryotrypes* in prosternal process elongate, completely separating procoxae.

HOST PLANT

Unknown.

DISTRIBUTION

Tanzania.
Number of species: 1.
References: no further works.

Genus: *Caryedon* Schoenherr

Caryedon SCHOENHERR, 1823: 1134.

Type species: *Bruchus serratus* OLIVIER, 1790 (by monotypy).

The genus is characterized by following combination of characters:

— eyes shallowly emarginate
— prosternal process short, triangular, acute
— pronotum trapezial, lateral carina obsolete, or extending no more than from hind angle of pronotum to half length of lateral margin
— elytral striae regular, or closed posterad, intervals without polished areas
— hind femur strongly incrassate, pecten with 9–16 denticles, margin before pecten with row of small teeth
— hind tibia arcuate, carinate, without ventral subbasal tubercle
— median lobe short, with both ventral and dorsal valvae, internal sac with large sclerites
— lateral lobes short, fused basally, broadly and shallowly divided apically

DESCRIPTION

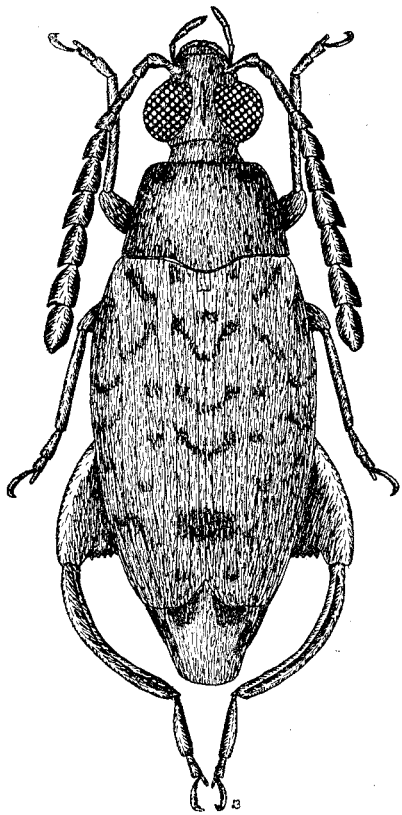
Body length: 2.2–6.7 mm, width: 1.1–3.4 mm. Body oval, elongate. Head usually short, constricted behind eyes, postocular lobe varying from obsolete to as long as 2/3 width of eye (fig. 90). Frons narrow, with median carina. Antennae moderately long, not sexually dimorphic, distal articles subserrate or serrate (fig. 7). Pronotum trapezial, basal margin emarginate, lateral margin with obsolete lateral carina or lateral carina present in posterior half of lateral margin (fig. 7). Disc flat, without gibbosities or impressions. Prosternal process short, triangular, acute, not separating procoxae (fig. 55). Scutellum trapezial, truncate apically. Elytra elongate, striae regular, without basal tubercles. Median striae sometimes closed posterad. Fore and mid legs slender, tarsi not enlarged. Hind femur strongly incrassate, pecten with 9–16 denticles, the first largest, remainder gradually smaller (fig. 146). Margin before pecten with several small teeth. Hind tibia arcuate, with complete set of carinae, without ventral subbasal tubercle, apex mucronate but without coronal denticles. Vestiture scarce, moderately dense, or dense, uniform or variegated.

Male. Last sternite shorter, sometimes shallowly emarginate, pygidium more convex. Median lobe short, with both ventral and dorsal valvae, internal sac with several pairs of large sclerites (figs. 245–248). Lateral lobes short, broad, fused basally, expanded apically, broadly and shallowly divided (fig. 254).

Female. Last sternite longer, not emarginate, pygidium less convex. Bursa copulatrix with several sclerites.

DIAGNOSIS

Caryedon differs from all the genera of *Caryedonini* in partly or complete obsolete lateral pronotal carina.



7. *Caryedon serratus*

HOST PLANTS

Papilionaceae: *Caesalpinia* sp., *Cassia* sp., *Acacia* sp., *Albizia* sp., *Arachis* sp., *Bauhinia* sp., *Ceratonia* sp., *Colutea* sp., *Delonix* sp., *Dialium* sp., *Erythrina* sp., *Hardwickia* sp., *Prosopis* sp., *Tamarindus* sp.; *Combretaceae*: *Combretum* sp.; *Apiaceae*: *Ferula* sp.

DISTRIBUTION

Southern and eastern part of Mediterranean Subregion, tropical Africa, Madagascar, and Asia north to Middle Asia, east to Molukken. Introduced to Central and South America.

Number of species: at least 30.

References: PREVETT, 1965: 523; ARORA, 1977: 98.

Genus: *Caryotrypes* Decelle

Caryotrypes DECELLE, 1968: 422.

Type species: *Pachymerus pandani* BLANCHARD, 1845 (by monotypy).

The genus is characterized by following combination of characters:

— eyes shallowly emarginate
— prosternal process short
— pronotum with complete lateral carina
— elytral striae 2 and 3, and 4 and 5 coalescent at base
— hind femur strongly incrassate, pecten with one large and 9 gradually smaller denticles, margin before pecten serrulate
— hind tibia arcuate, carinate, without ventral subbasal tubercle

DESCRIPTION

Body length: 9.0–10.0 mm, width: 4.6 mm. Body elongate. Head short, constricted behind eyes, postocular lobe short. Eyes bulging, emarginate to 1/6 length. Frons with sharp median carina. Antennae long, extending to half body length. Distal articles elongate, serrate. Pronotum trapezial, broadest in 1/3 length, lateral carina complete. Disc flat. Prosternal process short, extending to half length of procoxae. Elytra elongate (fig. 62), striae 2 and 3, and 4 and 5 coalescent basally. First stria attaining base of elytron. Fore and midlegs slender, tarsi not enlarged, not sexually dimorphic. Hind femur strongly incrassate, pecten with one large and 9 gradually smaller denticles. Margin before pecten with several small teeth. Hind tibia arcuate, carinate, without ventral subbasal tubercle. Abdomen with basal sterna unmodified. Vestiture moderately dense, uniform.

Male. Last sternite shallowly emarginate. Pygidium shorter. Genitalia not dissected.

Female. Last sternite not emarginate. Pygidium longer.

DIAGNOSIS

Short prosternal process, hind tibia without ventral subbasal tubercle, and elongate body near this genus to *Caryedon* only. It differs in pronotal lateral carina complete.

HOST PLANT

Pandanaceae: *Pandanus* sp.

DISTRIBUTION

Reunion Is. and probably Madagascar.
Number of species: 1.
References: no further works.

Genus: *Afroredon* Decelle

Afroredon DECELLE, 1965: 216.

Type species: *Afroredon africanus* DECELLE, 1965 (by original designation).
The genus is characterized by following combination of characters:

- body short
- pronotum rectangular or subtrapezial with complete lateral carina
- prosternal process triangular, but long, separating procoxae on whole length
- first elytral stria attaining base of elytron, striae 2 and 9, and 3 and 8 often closed postered
- base of interval 10 in females with large polished area
- hind femur strongly swollen, pecten with one large and 9–11 gradually smaller denticles
- median lobe short, with both ventral and dorsal valvae, internal sac without large sclerites
- lateral lobes fused, strap-like, only slightly incised apically

DESCRIPTION

Body length: 2.5–6,5 mm, width: 1.7–4.3 mm. Body short, stout (fig. 63). Head short, strongly constricted behind eyes, postocular lobe very short, almost obsolete. Eyes bulging, shallowly emarginate. Frons with more or less developed median carina. Pronotum rectangular or subtrapezial, with complete lateral carina. Disc oblique in relation to elytral disc, flat, sometimes with shallow impressions. Prosternal process triangular, but long, separating procoxae on whole length. Scutellum small, trapezial, truncate apically. Elytral striae 2 and 9, and 3 and 8 closed posterad (except one species). First stria attaining base of elytron, tenth stria extending to 2/3 elytron length. Intervals slightly convex, especially in apices of elytron. Hind femur strongly incrassate, pecten with one large and 9–11 gradually smaller denticles, margin

before pecten slightly serrulate. Hind tibia arcuate, carinate, mucronate apically, without ventral subbasal tubercle. Abdomen not modified. Vestiture scarce or moderately dense, variegated or not.

Male. Base of elytral interval 10 without polished area. Median lobe rather short, with both ventral and dorsal valvae, ventral valve triangular, internal sac without large sclerites but with several small spines (fig. 229). Lateral lobes fused, strap-like, only slightly incised apically (fig. 230).

Female. Base of elytral interval 10 with large polished area.

DIAGNOSIS

Afroredon differs from all the genera of *Caryedonini*, except *Exoctenophorus*, in short, stout body. It differs from *Exoctenophorus* in absence of subbasal tubercle on hind tibia, and presence of polished area on interval 10 of female elytron.

HOST PLANT

Unknown.

DISTRIBUTION

Tropical Africa and Madagascar.
Number of species: 4.
References: no further works.

Genus: *Exoctenophorus* Decelle

Exoctenophorus DECELLE, 1968: 414.

Type species: *Exoctenophorus deflexicollis* DECELLE, 1968 (by monotypy).

The genus is characterized by following combination of characters:

- body short
- pronotum with complete lateral carina
- prosternal process short, separating procoxae to half length
- elytral striae 2 and 9, and 3 and 8 closed posterad, tenth stria extending to 2/3 elytra length
- hind femur strongly swollen, ventral margin with small denticles on whole length, emarginate apically, emargination with two small spines
- hind tibia arcuate, carinate, with ventral subbasal tubercle
- median lobe elongate, internal sac with large sclerite
- lateral lobes elongate, fused, only slightly incised apically

DESCRIPTION

Body length: 4.0–5.0 mm, width: 3.8–3.9 mm. Body short, stout (fig. 64). Head short, constricted behind eyes, postocular lobe short. Eyes bulging, shallowly emarginate. Frons with sharp median carina. Antennae extending to 2/3 body length, serrate from fourth article. Pronotum trapezial, about 1.5 times wider than long, lateral carina complete. Disc oblique in relation to elytral disc, slightly convex. Prosternal process short, narrow, separating procoxae to half length. Scutellum trapezial, truncate apically. Elytral striae 2 and 9, and 3 and 8 closed posterad, tenth stria extending to 2/3 length of elytron, first stria attaining base of elytron. Hind femur strongly incrassate, ventral margin with row of small denticles on whole length, emarginate apically, emargination with two small spines (fig. 145). Hind tibia arcuate, carinate, mucronate apically, with ventral subbasal tubercle (fig. 145). Abdomen not modified. Vestiture scarce, uniform.

Male. Pygidium more convex. Median lobe elongate with both ventral and dorsal valvae, internal sac with a single, large sclerite (fig. 231). Lateral lobes elongate, fused, strap-like, only slightly incised apically (fig. 232).

Female. Pygidium less convex.

DIAGNOSIS

Exoctenophorus differs from all the Old World genera of *Pachymerinae* in presence of subbasal tubercle on hind tibia.

HOST PLANT

Unknown.

DISTRIBUTION

Madagascar.
Number of species: 1.
References: no further works.

Tribe: *Caryopemonini* Bridwell, 1929

Caryopemini BRIDWELL, 1929: 143.
Caryopemontini: DECELLE, 1968: 413 (emend.).

Genus: *Protocaryopemon* nov. gen.

Type species: *Protocaryopemon archetypus* n. sp.

The genus is characterized by following combination of characters:
— head moderately long, eyes emarginate to 2/5 length

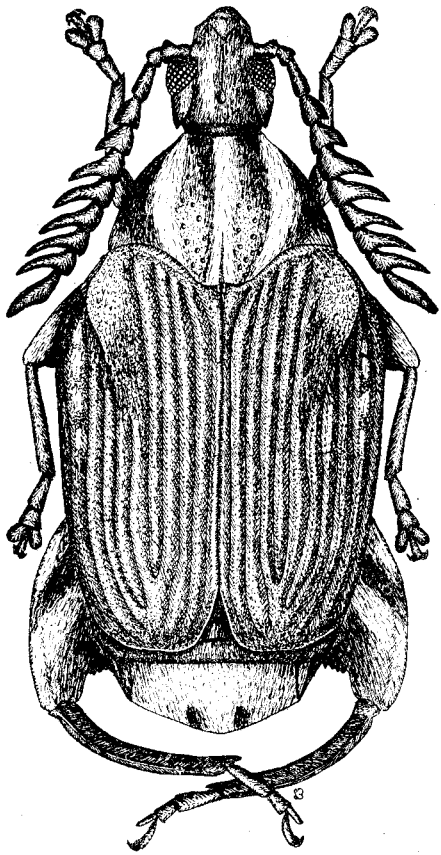
— antennae in male pectinate
— pronotum with distinct lateral carina
— prosternal process long, separating procoxae on whole lenght
— metasternum strongly angulate in profile
— hind femur strongly incrassate, scabrous dorsally, pecten with one large, sharp spine and five smaller, blunt teeth, margin before pecten with row of small spines
— hind tibia arcuate, carinate, mucronate apically
— median lobe elongate, ventral valve strongly bent ventrad, acute apically
— lateral lobes fused, ventral part gutter-like, apical free, flat, incised medially

DESCRIPTION

Protocaryopemon archetypus n. sp.

Body length: 9.0 mm, width: 5.3 mm. Body more elongate than in *Caryopemon* and *Diegobruchus* (fig. 8). All body black. Vestiture moderately dense, whitish and brown. Light hair covers ventral part of body, pygidium, postocular lobes, on pronotum form three longitudinal bands. In elytrae, light hairs are disposed in elytral rows and form several spots on tenth interval, thus elytrae are longitudinally striped. Dark hairs cover frons and vertex, elytral intervals, form two spots on dorsal part of hind femur and round spot in middle of lateral face of hind femur. Head shorter than in related genera, especially in mouth part (fig. 93). Gena shorter than width of antennal fossa. Postocular lobe long, as long as width of eye, sharply carinate posterad. Eyes rather flat, emarginate to 2/5 length. Frons with distinct median carina. Vertex with small, deep pit at the end of frontal carina. Antennae extending to humeral callus. Article 3 about 2.5 times longer than 2, articles 4 and 5 serrate, 6–10 pectinate (fig. 76). Pronotum subtrapezial, shallowly sulcate medially, sides only slightly convex, posterior margin broadly bisinuate, praescutellar lobe shallowly emarginate medially. Lateral carina complete. Disc convex, double punctured. Large punctures in the middle of disc scarce, distance between punctures about 1.5–3.0 times wider than puncture diameter. Prosternal process narrow, but long, separating procoxae on whole lenght. Metasternum convex, metasternal process strongly angulate in profile (fig. 128). Parasutural sulci distinct. Scutellum minute, square. Elytra longer than wide together. Five internal striae attaining base of elytron. Striae 4 and 5, and 6 and 7 closed posterad, humeral callus scabrous. Pygidium with two subapical depressions. First abdominal sternite with shallow, oval de-

pression medially, last sternite shallowly emarginate. Hind femur incrassate, but less than in related genera, about 2.3 times longer than wide, scabrous dorsally. Pecten with one large, sharp spine followed by five gradually smaller, blunt denticles, no large spines before pecten but margin distinctly serrate (fig. 130). Hind tibia arcuate, carinate, mucronate apically. Hind basitarsus not longer than two subsequent articles together. Claws with large basal denticle.



8. *Protocaryopemon archetypus*

Male. Median lobe elongate, tubular, ventral valve not articulated, strongly bent ventrad, acute apically (figs. 249, 250). Lateral lobes fused, with ventral part strongly sclerotized, gutter-like, apices free with median incision (fig. 251).

Female unknown.

DIAGNOSIS

Differs from *Caryopemon* in prosternal process long, head less elongate, and metasternal process angulate in profile. From *Diegobruchus* it differs in body more elongate, hind femur less incrassate, prosternal process elongate and pronotal lateral carina complete.

HOST PLANT

Unknown.

DISTRIBUTION

Holotype male, British Bootang (now North India), Maria Basti, leg. L. DUREL (coll. Muséum National d'Histoire Naturelle, Paris).

Genus: *Diegobruchus* Pic

Diegobruchus PIC, 1913: 110.

Type species: *Bruchus suarezicus* PIC, 1904 (by monotypy).

The genus is characterized by following combination of characters:

- lateral pronotal carina obsolete
- six internal striae attaining base of elytron
- striae 2 and 9, and 3 and 8 closed posterad
- interval 9 in female with polished area
- metasternum angulate in profile
- hind femur strongly swollen, pecten with one large and 3–5 smaller denticles, margin before pecten without large spines, but with several small spines
- hind tibia arcuate, carinate, mucronate apically
- median lobe moderately long, ventral valve strongly bent ventrad, acute apically
- lateral lobes fused, not forming a gutter, with apical cleft

DESCRIPTION

Body length: 3.0–6.0 mm, width: 2.1–3.6 mm. Body stouter than in *Caryopemon*. Head elongate, postocular lobe not longer than half length of eye, strongly carinate posterad. Frons with median carina. Eyes moderately bulging, emarginate to about half length. Antennae extending to humeral callus, pectinate from fifth article. Pronotum strongly narrowed anterad, sides slightly convex, lateral carina obsolete, Disc convex, without gibbosities or depressions, or with median channel. Prosternal process triangular, acute

apically, separating procoxae at most to 0.9 their length. Mesosternum parallel-sided, truncate apically. Metasternal process angulate in profile. Scutellum minute, square. Elytral disc flat, or slightly convex. Six internal striae attaining base of elytron. Striae 2 and 9, and 3 and 8 closed posterad. Hind femur strongly incrassate, shorter and more swollen than in related genera. Pecten with one large and 3–5 gradually smaller blunt denticles, margin before pecten without large spines, but with several small teeth. Hind tibia arcuate, carinate, mucronate apically. Vestiture dense, variegated.

Male. Elytral intervals 9 and 3 without polished areas. Last sternite shorter, shallowly emarginate. Median lobe tubular, ventral valve not articulated, strongly bent ventrad, acute apically. Lateral lobes fused, with ventral part only slightly gutter-like, apices free, flat, incised medially.

Female. Interval 9, and sometimes interval 3 with polished areas. Last sternite longer, not emarginate.

DIAGNOSIS

It differs from *Caryopemon* in hind femora without large spines before pecten, and elytra in female with polished areas. From *Protocaryopemon* it differs in stouter body, lateral carina obsolete, and shorter prosternal process.

HOST PLANT

Unknown.

DISTRIBUTION

South-east Africa and Madagascar.
Number of species: 4.
References: DECELLE, 1981: 728.

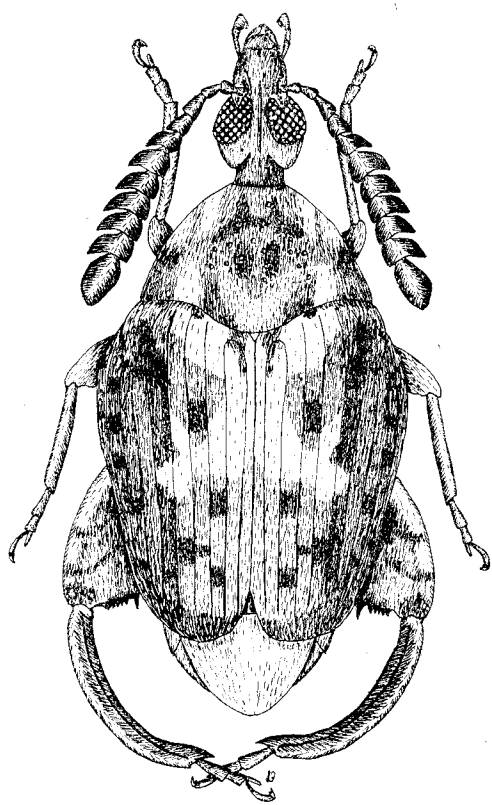
Genus: *Caryopemon* Jekel

Caryopemon JEKEL, 1855: 25.

Type species: *Caryopemon hieroglyphicus* JEKEL, 1855 (by monotypy).
The genus is characterized by following combination of characters:

- head elongate with long postocular lobe
- eyes emarginate to $^{2}/_{5}$–$^{1}/_{2}$ length
- pronotum with distinct lateral carina
- prosternal process triangular, acute, separating procoxae at most to 0.8 their length

— metasternum broadly rounded in profile, not angulate
— hind femur strongly incrassate, pecten with one large, and five smaller blunt denticles, margin before pecten with 2–5 large, sharp spines and several small teeth
— hind tibia arcuate, carinate, mucronate apically
— median lobe moderately long, ventral valve not articulated, strongly bent ventrad, incised apically
— lateral lobes completely fused, forming a gutter surrounding median lobe



9. *Caryopemon cruciger*

DESCRIPTION

Body length: 2.6–6.6 mm, width: 1.6–3.9 mm. Body shorter than in *Protocaryopemon* but longer than in *Diegobruchus* (fig. 9). Head elongate, gena longer than antennal fossa, postocular lobe as long as 0.6 length of eye, stron-

gly carinate posterad. Frons with sharp median carina. Eyes moderately bulging, emarginate to $^2/_5$–$^1/_2$ length. Antennae extending to humeral callus, strongly serrate or pectinate. Pronotum subtrapezial or semicircular, posterior margin broadly bisinuate, preascutellar lobe not emarginate medially. Lateral carina complete. Disc convex, without gibbosities or depressions, or with median, longitudinal channel. Prosternal process narrow, triangular, acute, separating procoxae at most to 0.8 their length. Mesosternum triangular, truncate apically. Metasternal process only slightly convex, broadly rounded in profile. Scutellum minute, square. Elytra only slightly longer than wide together. Five internal striae attaining base of elytron, no closed posterad. Intervals without polished areas in both sexes. Humeral callus scabrous. Pygidium without impressions. Hind femur strongly incrassate, stouter than in *Protocaryopemon* but longer than in *Diegobruchus*. Dorsal face scabrous. Pecten with one large and five smaller, blunt denticles, margin before pecten with 2-5 large, sharp spines and several small teeth (fig. 131). Distance between large spines, and between spines and pecten at least as wide as 0.5 width of base of large spines. Hind tibia arcuate, carinate, mucronate apically. Hind basitarsus not longer than two subsequent articles together. Vestiture dense, variegated, or scarce but with several spots of dense hair.

Male. Last sternite shorter, often shallowly emarginate. Median lobe moderately long, tubular, ventral valve not articulated, strongly bent ventrad, deeply incised apically (fig. 242). Lateral lobes completely fused, forming a gutter surrounding median lobe (fig. 244).

Female. Last sternite shorter, not emarginate.

Diagnosis

It differs from both related genera of *Caryopemonini* in presence of large spines before femoral pecten, and metasternal process not angulate in profile.

Host plants

Papilionaceae: *Abrus* sp., *Mucuna* sp.

Distribution

South and East Africa, Madagascar and Indian Subcontinent.
Number of species: 8–10.
References: Decelle, 1981: 727.

Subfamily: *Amblycerinae* Bridwell, 1932

Tribe: *Amblycerini* Bridwell, 1932

Genus: *Amblycerus* Thunberg

Amblycerus THUNBERG, 1815: 121.

Type species: *Bruchus robiniae* FABRICIUS, 1781 (designated by BRIDWELL, 1930: 29).

The genus is characterized by following combination of characters:

— eyes shallowly emarginate
— prosternal process long, separating procoxae on whole lenght
— pronotum subcampaniform, trapezial or semicircular, lateral carina complete
— scutellum usually elongate, triangular or bidentate, or tridentate apically
— elytral striae regular, without basal tubercles, tenth stria reaching apex of elytron
— metasternum and metaepisternum with parasutural sulci parallel to pleural cleft
— hind femur slender, bicarinate ventrally, without spines
— hind tibia straight, without lateral carinae
— median lobe short, with both ventral and dorsal valvae, internal sac with several large sclerites
— lateral lobes short, fused, shallowly divided apically

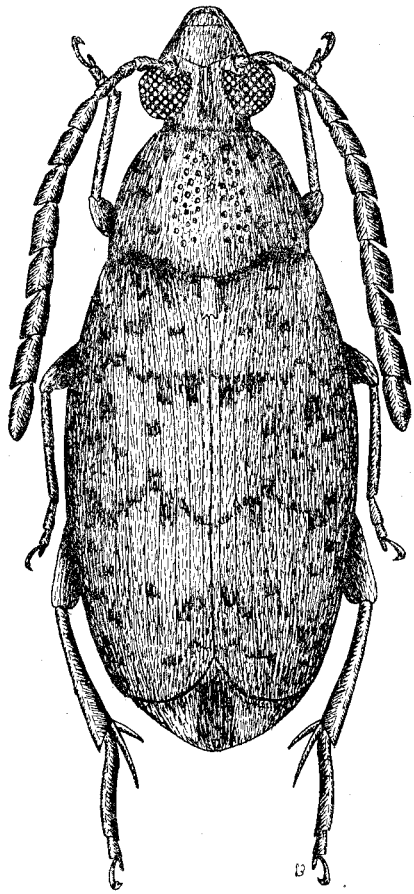
DESCRIPTION

Body length: 2.5–7.6 mm, width: 1.4–4.5 mm. Body oval, suboval or elongate, arched in profile. Head short, strongly constricted behind eyes, postocular lobe short. Eyes bulging, emarginate at most to 1/3 length (fig. 92). Frons with, or without median carina, or smoothly convex. Antennae short to moderately long, extending at most to half body length. Distal articles subserrate or serrate. Pronotum subcampaniform, trapezial or semicircular, with sharp lateral carina. Disc convex, without gibbosities or depressions. Prosternal process long, expanded apically, sometimes carinate or elevated on lateral margins, procoxae completely separated (fig. 117). Metathorax with parasutural sulci on either side of pleural cleft. Scutellum usually elongate, triangular, trapezial, often bi- or tridentate apically (figs. 119–121). Elytral striae regular, without basal tubercle, tenth stria not abbreviated, extending to apex of elytron. Fore and mid legs slender, not sexually dimorphic. Hind femur slender, bicarinate ventrally, without spines or denticles.

Hind tibia straight, without carinae, or with flat ventral carina. Apical calcaria usually unequal in length (fig. 10). Pygidium oblique or vertical.

Male. Last sternite emarginate. Median lobe short, with both ventral and dorsal valvae, internal sac with several large sclerites (figs. 256–257). Lateral lobes short, fused basally, divided at most to half length (figs. 259–260).

Female. Last sternite not emarginate.



10. *Amblycerus robiniae*

DIAGNOSIS

It differs from other genera of *Amblycerinae* in long prosternal process, presence of parasutural sulci and eyes shallowly emarginate.

HOST PLANTS

Papilionaceae: *Cassia* sp., *Caesalpinia* sp., *Gleditsia* sp., *Inga* sp., *Prosopis* sp., *Pterocarpus* sp., *Tachigalia* sp.; *Sterculiaceae*: *Guazuma* sp.; *Euphorbiaceae*: *Hippomane* sp., *Ricinus* sp.; *Verbenaceae*: *Tectona* sp.; *Malphigiaceae*: *Banisteriopsis* sp., *Heteropterys* sp.; *Combretaceae*: *Combretum* sp.; *Boraginaceae* sp.; *Vitaceae*: *Vitis* sp.; *Tiliaceae*: *Apeiba* sp.

DISTRIBUTION

Southern part of North America, Central and South America.

Number of species: 48 in North and Central America, at least 150 in South America (KINGSOLVER, letter comm.).

References: KINGSOLVER, 1970: 471, 1980: 230.

Tribe: *Spermophagini* n. trib.

Genus: *Zabrotes* Horn

Zabrotes HORN, 1885: 156.

Type species: *Zabrotes cruciger* HORN, 1885 (designated by ZACHER, 1930: 237).

The genus is characterized by following combination of characters:

— eyes deeply emarginate
— prosternal process short, triangular, acute
— pronotum semicircular, with sharp lateral carina extending from hind pronotal angle to anterior angle, no supracoxal carina
— scutellum triangular
— elytral striae regular, without basal tubercles, tenth stria abbreviated at the middle of lateral margin
— hind femur slender, bicarinate ventrally, without spines or denticles
— hind tibia straight, bicarinate ventrally, with two apical calcaria about equal length
— median lobe moderately long, with both ventral and dorsal valvae, internal sac with several sclerites
— lateral lobes short, fused basally, shallowly divided

DESCRIPTION

Body length: 1.9–2.5 mm, width: 1.1–1.9 mm. Body short, broad. Head short, constricted behind eyes, postocular lobe short. Eyes moderately bulging, transversely ovate, deeply emarginate. Frontal carina usually present.

Pronotum semicircular, posterior margin broadly bisinuate. Lateral carina sharp, extending from hind angle to anterior angle of pronotum, supracoxal carina absent (fig. 84). Disc slightly convex, without gibbosities or impressions. Prosternal process short, triangular, acute. Scutellum small, triangular. Elytral striae regular, without basal tubercles, tenth stria abbreviated at middle of lateral margin. Fore and mid legs slender, not sexually dimorphie. Hind femur slender, moderately convex on outer face, flat on inner face, bicarinate ventrally. Carinae without spines or denticles. Hind tibia straight, bicarinate and setose ventrally, with or without lateral carina. Apical spines of about equal length. Hind basitarsus with short ventral, apical spine. Claws usually simple or minutely appendiculate. Vestiture moderately dense or dense, variegated.

Male. Vestiture sometimes paler. Last sternite emarginate. Median lobe moderately long, with both ventral and dorsal valvae, internal sac with several sclerites (fig. 255). Lateral lobes short, fused basally, sometimes strap-like, expanded apically, shallowly divided (fig. 258).

Female. Vestiture often darker. Last sternite not emarginate.

DIAGNOSIS

Zabrotes is similar to *Spermophagus* only. It differs in tenth elytral stria abbreviated and supracoxal carina obsolete.

HOST PLANT

Papilionaceae: *Caesalpinioideae*: *Cassia* sp.; *Papilionoideae*: *Cajanus* sp., *Cicer* sp., *Dipogon* sp., *Dolichos* sp., *Glycine* sp., *Lablab* sp., *Phaseolus* sp., *Pisum* sp., *Vicia* sp., *Vigna* sp.

DISTRIBUTION

New World. Introduced to warm zones of the Old World, in temperate zone known as storehouse pests.

Number of species: 11 in North and Central America, probably several dozen in South America.

References: KINGSOLVER, 1970: 487, 1980: 243.

Genus: *Spermophagus* Schoenherr

Spermophagus SCHOENHERR, 1833: 102.
Spermatophagus GISTEL, 1856: 375 (unvalid emendation of *Spermophagus* SCHOENHERR)
Pygospermophagus PIC, 1917: 8 (type species: *Pygospermophagus brevicornis* PIC, 1917) **n. syn.**
Euspermophagus ZACHER, 1930: 237 (type species: *Mylabris sericea* GEOFFROY, 1785).

Type species: *Spermophagus titivilitius* BOHEMAN, 1833 (by original designation).

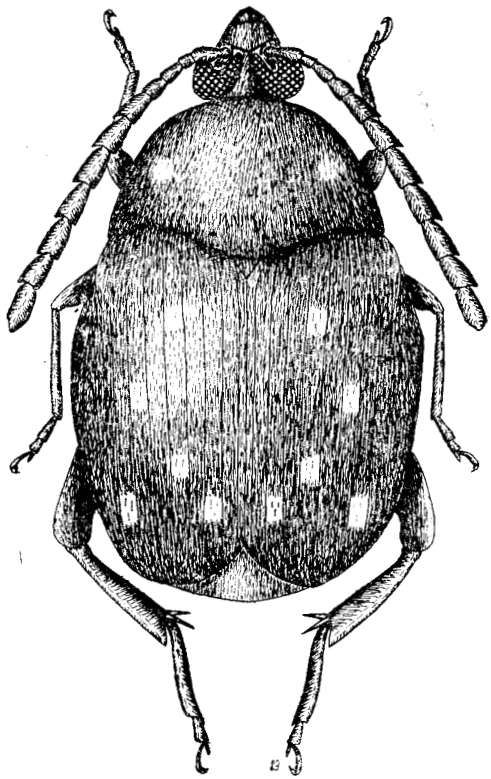
The genus is characterized by following combination of characters:

— eyes deeply emarginate
— prosternal process triangular, acute
— pronotum semicircular, anterior end of lateral carina meeting short, horizontal, supracoxal carina
— scutellum triangular
— elytral striae regular, without basal tubercles, tenth stria extending nearly to apex of elytron
— hind femur slender, bicarinate ventrally, without spines or denticles
— hind tibia straight or in males arcuate, with or without lateral carinae, apical calcaria about equal length
— median lobe varying from short to long, ventral valve in most species triangular, internal sac with or without large sclerites
— lateral lobes varying from very short, fused, to very long, completely divided, sometimes lobe bilobate

DESCRIPTION

Body length: 1.2–4.3 mm, width: 0.9–3.2 mm. Body short, oval, often spherical (fig. 11). Head short, more or less constricted behind eyes, postocular lobes short. Eyes moderately bulging or flat, emarginate to $^{2}/_{3}$–$^{7}/_{8}$ length. Frons with or without median carina. Antennae varying from short, not reaching hind angle of pronotum, to long, longer than body. Distal articles only slightly eccentric, in some species antennae subfiliform. Pronotum semicircular, posterior margin deeply, broadly bisinuate. Lateral margin with prominent, shinning carina extending from posterior angle to anterior angle of pronotum, where is coalescent with short, horizontal, supracoxal carina (fig. 83). Disc flat or slightly convex, without gibbosities or impressions. Prosternal process short, triangular, acute (fig. 118). Scutellum small, triangular (fig. 122). Elytra with regular striae, without basal tubercles. Tenth stria not abbreviated. Fore and mid legs slender, usually not sexually dimorphic. Hind legs sometimes sexually dimorphic. Hind femur slender, flat on inner face, strongly bicarinate and channeled ventrally. Inner carina without spines or denticles. Hind tibia usually straight, oblique cut apically, with two long, short, apical calcaria (fig. 139). Anterior face of hind tibia bicarinate, lateral face sometimes with carina or longitudinal elevation. First hind tarsomere with sharp ventral carina, often ending as sharp spine. Claws usually appendicu-

late (in 8 species simple). Abdominal sternites more or less telescoped, pygidium oblique or vertical. Vestiture varying from extremely scarce, uniform to dense, variegated.



11. *Spermophagus titivilitius*

Male. Antennae usually longer. Hind tibia in several species related to *S. hottentotus* (= *Pygospermophagus* PIC) and to *S. albomaculatus* is densely pubescent or setose ventrally and/or strongly arcuate. Last sternite emarginate. Median lobe variing from short to very long, with both ventral and dorsal valvae, internal sac with or without large sclerites (figs. 261–263). Lateral lobes varying from extremely short, often fused, or secondary divided, to very long, primary divided on whole length (figs. 264–266).

Female. Antennae usually shorter. Hind tibiae always straight, not pubescent ventrally. Last sternite not or very slightly emarginate. Ovipositor strongly sclerotized.

DIAGNOSIS

Spermophagus is similar to *Zabrotes* only. It differs in presence of supracoxal carina and tenth elytral stria not abbreviated.

HOST PLANTS

Convolvulaceae: *Calystegia* sp., *Convolvulus* sp.; *Malvaceae*: *Abelmoschus* sp., *Hibiscus* sp.; *Papilionaceae*: *Acacia* sp., *Sophora* sp.

DISTRIBUTION

Palearctic, Ethiopian and Oriental Regions east to Molukken.

Number of species: 141 nominal (about 115 good species, my revision of the genus is now being prepared).

References: BOROWIEC, 1985a: 3, 1986b: 781, 1986c: 229.

Subfamily: *Eubaptinae* Bridwell, 1932

Genus: *Eubaptus* Lacordaire

Eubaptus LACORDAIRE, 1845: 605.
Impressobruchus PIC, 1910: 95 (type species: *Impressobruchus semiruber* PIC, 1910).

Type species: *Eubaptus palliatus* LACORDAIRE, 1845 (by monotypy).

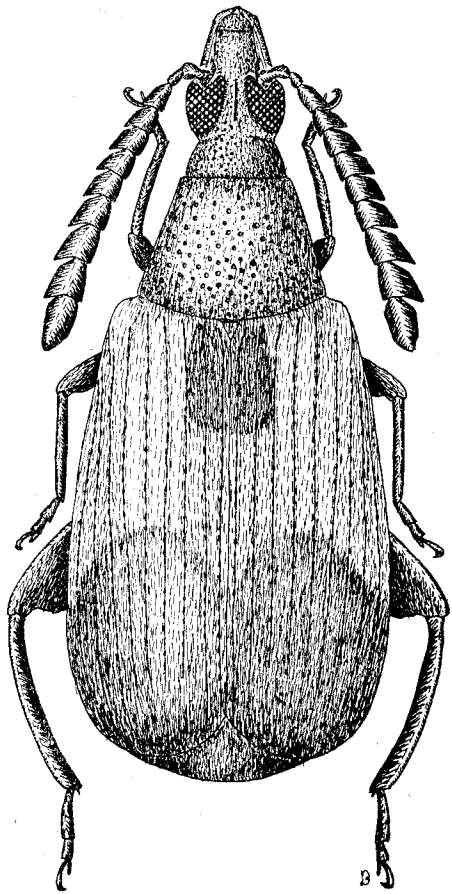
The genus is characterized by following combination of characters:

— antennae long, extending to half body, serrate in both sexes
— head slightly constricted behind eyes, usually strongly modified in male
— pronotum subconical or subcampanulate, without lateral carina
— scutellum triangular
— prosternal process short, triangular, acute
— mesoepimeron attaining coxal cavity with it width at middle
— hind femur strongly incrassate, without spiny pecten, but usually with spine or denticle on ventral margin
— hind tibia slender, with lateral carina and simple apical spine
— median lobe short, constricted in the middle, ventral lobe triangular, internal sac with large sclerites
— lateral lobes short, broad, depressed, divided at most to half length

DESCRIPTION

Body length: 4.5–5.5 mm, width: 1.5–2.5 mm. Body oval, slightly elongate. Head slightly elongate, often sexually dimorphic, slightly constricted behind eyes. Postocular lobe short, emarginate posterad. Eyes moderately

bulging or flat, emarginate to half length (fig. 12). Antennae long, serrate, alike in both sexes, extending to half body length. Pronotum subconical or subcampaniform, without lateral carina, gibbosities or impressions. Scutellum triangular. Elytral striae regular, without basal tubercles, intervals flat. Prosternal process short, triangular, acute. Mesoepimeral plate attaining coxal cavity with it width at middle. Parasutural rows present along internal margin of metaepisternal plate. Fore and mid legs slender, not sexually dimorphic. Hind femur strongly incrassate, with Maulik apparatus inside, wider than hind coxa. Ventral margin simple carinate armed with more or less developed spine or denticle (fig. 137). Hind tibia straight or slightly arcuate, with three carinae (without anterolateral carina), apex wit-



12. *Eubaptus scapularis*

hout coronal denticles, but with simple apical spine (fig. 138). Hind basitarsus not longer than three remainder articles together. Abdomen not modified. Vestiture scarce, uniform.

Male. Frons often strongly modified, with long appendage or broad, flat plate (figs. 233–235). Median lobe short, constricted in the middle, ventral valve triangular. Internal sac with many strongly sclerotized spines and several large sclerites (fig. 268). Lateral lobes short, broad, depressed, divided at most to half length (fig. 271).

Female. Frons without appendages, usually with longitudinal carina.

DIAGNOSIS

The unique structure of hind leg distinguished *Eubatus* from all the genera of *Bruchidae*.

HOST PLANT

Acanthaceae: *Ruellia* sp.

DISTRIBUTION

Argentina, Paraguay, Brasilia and Bolivia.
Number of species: 4.
References: TERAN, 1964: 177–186, 1967a: 71–89.

Subfamily: *Kytorhininae* Bridwell, 1932

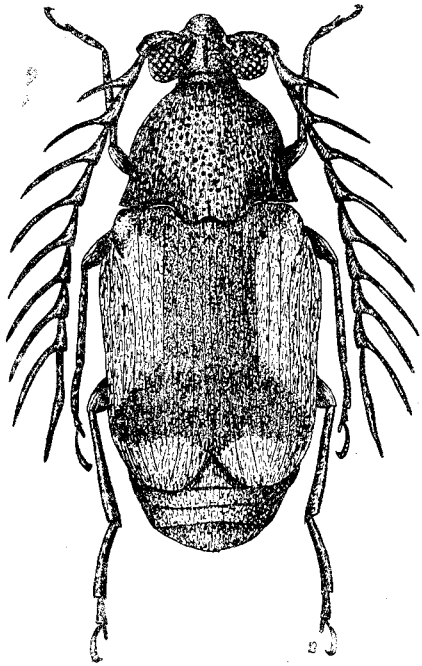
Genus: *Kytorhinus* Fischer von Waldheim

Kytorhinus FISCHER VON WALDHEIM, 1809: 298.
Pygobruchus SHARP, 1886: 38.

Type species: *Kytorhinus karasini* FISCHER VON WALDHEIM, 1809.

The genus is characterized by following combination of characters:
— antennae in male pectinate or strongly serrate, in female serrate
— pronotum campaniform, without lateral carina
— scutellum elongate
— elytra without basal tubercles, tenth stria abbreviated
— abdomen large, three last tergites (including pygidium) exposed behind the elytra
— hind femur slender, without spines
— hind tibia slender, without carinae

— median lobe elongate, ventral valve triangular, internal sac with characteristic large sclerites
— lateral lobes fused, expanded apically, sometimes with shallow median incision



13. *Kytorhinus quadriplagiatus*, male

DESCRIPTION

Body length: 2.5–4.5 mm, width: 1.4–3.0 mm. Body varying from elongate to short, stout (fig. 13). Head short, strongly constricted behind eyes, postocular lobe short, almost visible. Clypeus with large, shallow depression, lateral margin with carinae extending from apex of clypeus to base of antenna. Frons convex, without carinae, often with impunctate median line. Eyes bulging, deeply emarginate to 0.6–0.8 their length. Antenna serrate, subpectinate or pectinate (fig. 13), reaching at least to half body length. Pronotum campaniform, without lateral carina. Disc convex, without gibbosities or depressions. Prosternal process short, triangular, acute. Scutellum elongate, about twice longer than wide, bidentate apically. Mesoepimeron not strongly narrowed basally reaching the coxal cavity. Elytra without basal tubercles, striae 3 and 4 ofter closer to one another at base than to adjacent striae.

Tenth stria abbreviated, reaching at most 2/3 body length. Pro and mesolegs slender, not sexually dimorphic. Hind femur narrow, expanded only slightly medially, vague longitudinal carina on internal ventral margin only, both margins without spines or denticles (fig. 156). Hind tibia slender, without carinae, mucro obsolete or short. Abdomen large, three last tergites strongly sclerotized, exposed behind the elytra.

Male. Antennae strongly serrate or pectinate. Apice of abdomen strongly curved ventrad. Median lobe elongate, ventral valve triangular, internal sac with large sclerites in middle, the same type in all species (fig. 267). Lateral lobes fused, flat, expanded at apex, only slightly cleft at apex (fig. 270).

Female. Antennae serrate. Apice of abdomen not curved ventrad.

DIAGNOSIS

Kytorhinus differs from all genera of *Bruchidae* in structure of abdomen, with three last tergites not covered by elytra.

HOST PLANTS

Papilionoideae: *Caragana* sp., *Hedysarum* sp., *Piptanthus* sp. and *Thermopsis* sp.

DISTRIBUTION

Southeast Europe, Caucasus, Middle Asia, southern part of East Siberia, North China, Korea, Japan, western part of Canada and USA.

Number of species: 15.

References: LUKJANOVITSH and TER-MINASSIAN, 1957: 182; HOFFMANN, 1965: 63; JOHNSON, 1976a: 50.

Subfamily: *Bruchinae* Latreille, 1802

Tribe: *Bruchini* Latreille, 1802

Genus: *Bruchus* Linnaeus

Bruchus LINNAEUS, 1767: 604.

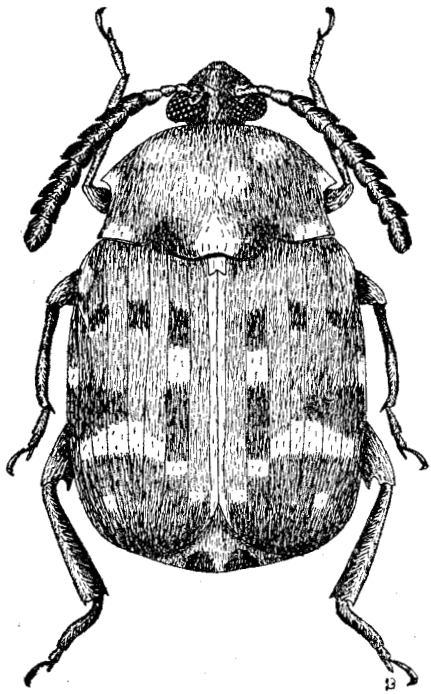
Bruchoides YUS RAMOS, 1978: 317 (proposed as subgenus, type species: *Bruchus tessellatus* MULSANT et REY, 1858) **n. syn.**

Acanthobruchus YUS RAMOS, 1978: 317 (proposed as subgenus, type species: *Bruchus venustus* FAHRAEUS, 1839) **n. syn.**

Type species: *Dermestes pisorum* LINNAEUS, 1758 (= *Bruchus pisi* LINNAEUS, 1767, designated by LATREILLE, 1810: 430).

The genus is characterized by following combination of characters:

– frons without median carina
– pronotum transverse, trapezial, usually with distinct denticle in middle of lateral margin
– elytra without basal tubercles
– mid tibiae in male with plates or denticles apically
– hind femur with denticle on external ventral margin, without spines on internal ventral margin
– median lobe with tape-like base, internal sac without large sclerites
– lateral lobes strongly sclerotized, usually with velum apically, deeply divided, base not forming a ring surrounding median lobe



14. *Bruchus pisorum*

DESCRIPTION

Body length: 1.5–4.3 mm, width: 1.0–2.8 mm. Body oval, stout. Head short, strongly constricted behind eye, postocular lobe short. Eyes moderately bulging, deeply incised, frons without median carina. Antennae rather short, extending at most to 1/3 body length, more or less sexually dimorphic, clavate. Pronotum transverse, trapezial, lateral margin usually with sharp

denticle in the middle, without lateral carina (fig. 94–96). Disc flat or slightly convex. Elytral striae regular, without basal tubercles. Hind femur moderately swollen, not carinate or channeled ventrally. External ventral margin with blunt or sharp subapical denticle (fig. 155), internal ventral margin without spines. Hind tibia straight, enlarged, with three carinae, anterolateral carina absent (fig. 155). Mucro as long or longer than lateral coronal denticle. Vestiture varying from scarce, uniform, to dense, variegated.

Male. Fore tibia often strongly enlarged (fig. 153). Mid tibia enlarged and slightly arcuate, in apical part with plates or spines ventrally (figs. 150–152). Last sternite emarginate. Median lobe short to long, base tape-like, internal sac without large sclerites but with many spines or needles (figs. 283–285). Lateral lobes strongly sclerotized, in many species strongly modified apically, with distinct velum (figs. 286–289). Base of parameres not forming a ring surrounding median lobe.

Female. Fore tibia not enlarged (fig. 154). Mid tibia straight, without plates or spines apically. Last sternite not emarginate.

DIAGNOSIS

Pronotum with lateral denticle, structure of mid tibia in male and unique structure of median lobe and parameres distinguished *Bruchus* from all other genera of *Bruchidae*.

HOST PLANTS

Papilionoideae: *Vicieae*: *Lathyrus* sp., *Lens* sp., *Pisum* sp. and *Vicia* sp.

DISTRIBUTION

Palearctic Region, east to the Far East, south to the northern India. Introduced to tropical Africa, South Asia and North America.

Number of species: 34.

References: HOFFMANN, 1945: 29; LUKJANOVITSH and TER-MINASSIAN, 1957: 70.

Tribe: *Megacerini* Bridwell, 1946

Genus: *Megacerus* Fahraeus

Megacerus FAHRAEUS in SCHOENHERR, 1839: 34.

Pachybruchus PIC, 1912: 92 (type species: *Bruchus coryphae* OLIVIER, 1795, designated by BRIDWELL, 1929: 113), subgenus.

Serratibruchus TERAN et KINGSOLVER, 1977: 174 (type species: *Bruchus maculiventris* FAHRAEUS, 1839, by original designation), subgenus

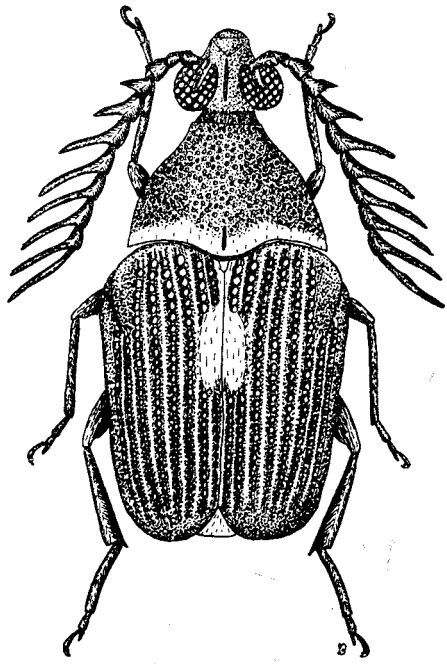
Type species: *Bruchus pescaprae* FAHRAEUS, 1839 (by monotypy).

The genus is characterized by following combination of characters:

- antennae in male pectinate, in female serrate
- frons with sharp median carina
- pronotum conical with distinct lateral carina
- tenth stria abbreviated, not extending beyond the epipleural lobe
- hind femur slender, bicarinate ventrally, internal carina smooth, or with subapical spine, or serrulate
- hind tibia straight, carinate, mucronate apically
- pygidium vertical in both sexes
- median lobe moderately long, ventral valve triangular, internal sac with several small spines
- lateral lobes short, fused, often with hood-like membrane near apex

DESCRIPTION

Body length: 1.2–4.0 mm, width: 0.8–2.8 mm. Body subpentagonal, stout, deep (fig. 15). Head short, strongly constricted behind eyes, postocular lobe absent. Eyes strongly bulging in both sexes, deeply emarginate. Frons



15. *Megacerus bifloccosus*, male

narrow, with sharp median carina (fig. 15). Antennae long, serrate or pectinate (fig. 15). Pronotum campaniform, with lateral carina extending to procoxae. Disc convex, or with indistinct impressions or gibbosities. Prosternal process narrow, triangular, acute. Elytral striae regular, strongly punctate, in many species diameter of punctures is obviously wider than strial width and than width of intervals. Tenth stria abbreviated, not extending beyond the epipleural lobe (except one species). Intervals flat or elevated, without basal tubercles. Hind femur not swollen, bicarinate ventrally. Internal ventral carina smooth, or serrulate, or with single subapical spine (figs. 148–149). Hind tibia straight, cerinate, lateral carina ending at a small lateral coronal denticle or very near or at the base of mucro (fig. 147). Mucro as long as half the width of tibial apex or shorter. Hind basitarsus very long, almost twice longer than outer articles together. Abdomen telescoped in both sexes, pygidium vertical. Vestiture varying from scarce to dense, variegated. Pygidium, pronotum and elytra sometimes with polished or bare areas.

Male. Antennae pectinate. Eyes usually more bulging. Apex of foretibia sometimes with small hook (subgenus *Pachybruchus*). Median lobe similar in most species, ventral valve triangular, acute apically, internal sac with several spines (fig. 273). Lateral lobes short, completely fused, often with hood-like membrane near apex (figs. 274–276).

Female. Antennae strongly serrate or subpectinate. Eyes usually less bulging. Foretibia without hook.

Diagnosis

Megacerus differs from all other genera of *Bruchinae* in tenth elytral stria abbreviated. The structure of lateral lobes in male genitalia is unique and similar more to the lateral lobes in *Kytorhininae* than in other *Bruchinae*. *Megacerus* is the only large genus of *Bruchinae* developing exclusively in the seeds of *Convolvulaceae*.

Host plants

Convolvulaceae: *Calystegia* sp., *Convolvulus* sp., *Ergyreia* sp., *Ipomea* sp., *Merremia* sp.

Distribution

New World from South Canada to northern Argentina. Introduced to Hawaii.

Number of species: 50.

References: Teran and Kingsolver, 1977: 287 pp.

Tribe: *Acanthoscelidini* Bridwell, 1946

Gibbobruchus group

Body stout. Pronotal and/or elytral disc often with gibbosities or depressions. Hind femur strongly incrassate, pecten with 3–16 sharp spines. Hind tibia arcuate, carinate, mucronate apically.

Genus: *Gibbobruchus* Pic

Pachymerus sgen. *Gibbobruchus* Pic, 1913: 110; Bridwell, 1932: 105 (as genus).

Types species: *Bruchus speculifer* Gyllenhal, 1833 (designated by Bridwell, 1932: 105).

The genus is characteized by following combination of characters:
– pronotum campaniform with conspicuous gibbosities
– hind femur with 3–7 denticles
– hind tibia strongly arcuate, carinate
– abdominal sterna and/or pygidium with large polished areas
– ventral sulcus of hind femora not polished
– median lobe short, broad, internal sac without large sclerites
– lateral lobes flat, not tape-like, deeply divided.

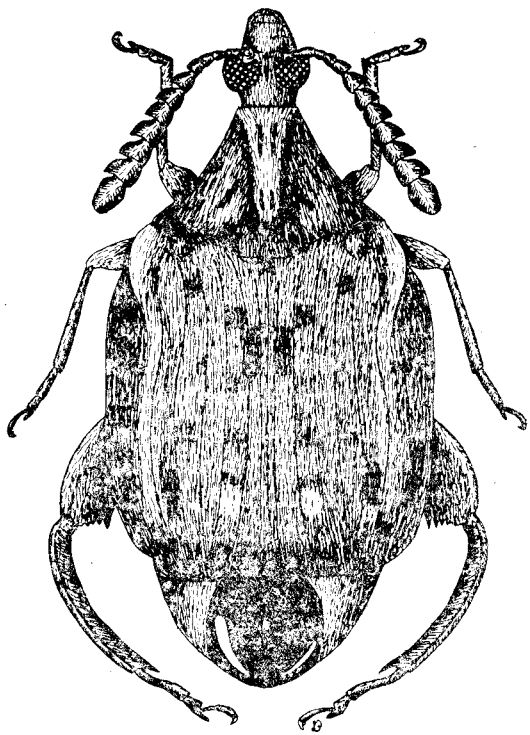
Description

Body length: 2.3–5.0 mm, width: 1.4–5.0 mm. Body stout, depressed, metasternum not or sligthly prominent (fig. 16). Head short, strongly constricted behind eyes, postocular lobe short. Eyes not sexually dimorphic, incised to $^1/_2$–$^2/_3$ length. Frons usually with prominent median carina. Gena between base of mandible and antennal fossa about half as long as diameter of antennal fossa, glabrous. Antennae usually not sexually dimorphic (in species related to *G. polycoccus* antennae are strongly flabellate in male, less in female), articles 7–10 transverse. Pronotum campaniform, sides slightly to deeply concave in dorsal aspect. Median and lateral basal gibbosities low to high, median sulcus shallow to deep. Anterior gibbosities low to moderate. Lateral carina obsolete. Scutellum small, square, bidentate. Prosternal process narrow, acute. Metasternum shallow, flat, apex rounded. Elytra together subquadrate. Striae deep, finely punctate. Stria 3 ended by basal gibbosity, striae 4 and 5 abbreviated apically, coalescent or not. Elytral disc slightly concave to slightly convex between basal gibbosities. Front and middle legs slender, not sexually dimorphic. Hind femur incrassate, ventral sulcus slightly to strongly developed basally, punctate or pubescent. Ventral internal margin with 3–7 large spines and two or more small teeth before pecten. Ventral external margin strongly toothed. Hind tibia arcuate,

strongly carinate, mucro shorter than apical width of tibia. Lateral coronal denticle weakly developed or absent (fig. 164). Hind basitarsus as long as or longer than outer four articles together. Abdominal sterna not strongly telescoped, usually with lateral polished areas. Vestiture usually dense, variegated.

Male. Pygidium usually without speculum. Last sternum slightly to strongly emarginate. Median lobe stout, broad, internal sac without large sclerites but with many needles or spines, accidentally with distinctive sclerites (figs. 291–292). Lateral lobes flat, arcuate, deeply divided, base without median keel, or with short median keel in basal half (fig. 295).

Female. Pygidium usually with speculum. Last sternum not emarginate.



16. *Gibbobruchus speculifer*

DIAGNOSIS

The polished areas on sterna and/or pygidium distinguished *Gibbobruchus* from the related genera *Caryedes*, *Ctenocolum*, *Meibomeus* and *Merobruchus*. From *Penthobruchus* and *Pygiopachymerus* it differs in ventral sulcus

of hind femur not polished. The speculate pygidium is distinct also in Old World genus *Specularius*, but it has hind femur moderately incrassate with three denticles only, pronotal sides not concave, and elytra without distinct gibbosities.

HOST PLANTS

Caesalpinioideae: *Bauhinia* sp. and *Cercis* sp.

DISTRIBUTION

East and south USA, Central America and South America south to north Argentina.

Number of species: 13, probably several undescribed in South America.

References: WHITEHEAD and KINGSOLVER, 1975: 167–225.

Genus: *Ctenocolum* Kingsolver at Whitehead

Ctenocolum KINGSOLVER et WHITEHEAD, 1974: 284.

Type species: *Pachymerus tuberculatus* MOTSCHULSKY, 1874 (by original designation).

The genus is characterized by following combination of characters:

- pronotum gibbous with shallowly concave sides
- hind femur strongly incrassate with 7–16 large spines and two or more small teeth before pecten
- hind tibia arcuate, carinate, mucro distinct
- abdominal sterna without polished areas
- median lobe broad, internal sac with or without distinctive sclerites
- lateral lobes flat, not strap-like, broadly and deeply divided.

DESCRIPTION

Body length: 2.0–4.6 mm, width: 1.4–3.6 mm. Body stout, robust. Head moderately elongate, strongly constricted behind eyes, postocular lobe short. Eyes prominent, sexually dimorphic or not, incised to $^2/_3$–$^3/_4$ length. Frons with prominent median carina. Gena between base of mandible and antennal fossa about as long as width of antennal fossa, glabrous. Antennae sexually dimorphic. Pronotum campaniform, sides shallowly and irregularly concave. Median and lateral basal gibbosities low to moderately elevated, median sulcus shallow to moderately deep. Anterior gibbosities low, not or shallowly sulcate between. Lateral carina obsolete to distinct. Scutellum square, bidentate or truncate. Prosternal process narrow, acute. Metasternum shallow,

broadly rounded in profile. Elytra together subquadrate. Striae deep, punctate. Striae 3 and 4 strongly deflected laterad before base, abbreviated basally by high bidentate gibbosity. Striae 4 and 5 abbreviated apically, coalescent or not. Striae 7–10 abbreviated bassally by humeral gibbosity. Interval 9 flat to moderately convex apically. Elytral disc convex. Front and middle legs slender, not sexually dimorphic. Hind femur strongly swollen, external ventral margin finely dentate to coarsely dentate-carinate to base. Ventral sulcus developed to or nearly to base, deep in apical half. Internal margin with two or more small teeth before pecten. Pecten raised, either with 7–9 apical spines separated from basal spine by distinct gap, or with 12–16 evenly spaced spines (fig. 167). Hind tibia strongly arcuate, carinate, mucro shorter than apical width of tibia, lateral coronal denticle sharply developed or not. Hind basitarsus longer than four outer tarsal articles together. Abdominal sterna without polished, glabrous areas. Dorsal vestiture dense, variegated.

Male. Antennae extending to or beyond humeral callus, outer articles transverse to elongate, eccentric to serrate or subflabellate. Abdominal sterna telescoped. Last sternum emarginate. Median lobe broad, internal sac various, with or without distinctive sclerites, with distinct hinge sclerites (fig. 301). Lateral lobes flat, not modified, broadly and deeply divided, not strap-like (fig. 304). Basal strut with median keel.

Female. Antennae shorter, extended almost to humeral callus, outer articles transverse to slinghtly elongate, moderately eccentric to serrate. Abdominal sterna not telescoped. Last sternum not emarginate.

DIAGNOSIS

Ctenocolum differs from all other genera of the *Gibbobruchus* group in increased number of hind femoral spines. From *Pygiopachymerus* and *Penthobruchus* it differs in lacking polished areas on abdominal sterna, from *Caryedes* and *Meibomeus* in deeply divided, not strap-like lateral lobes. Only *Gibbobruchus* has similar lateral lobes, but *Ctenocolum* differs in lacking polished areas on abdominal sterna and lacking speculum on pygidium.

HOST PLANTS

Papilionaceae: *Dalbergiae*: *Lonchocarpinae*: *Bergeronia* sp., *Lonchocarpus* sp., *Muelleria* sp., *Piscidia* sp.

DISTRIBUTION

Central America, including West Indies and nothern South America. Some undescribed species in South America.

Number of species: 8.

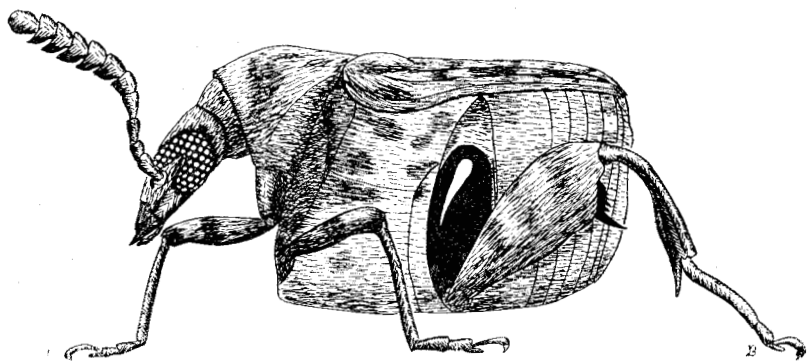
References: no further works.

Genus: *Caryedes* Hummel

Caryedes HUMMEL, 1827: 11.
Pachymerus SCHOENHERR, 1833: 84 (type species: *Bruchus brasiliensis* THUNBERG, 1816), not *Pachymerus* THUNBERG, 1805.
Andromisus GOZIS, 1881: CXIII, new name for *Pachymerus* SCHOENHERR not THUNBERG.
Pedalophus GISTEL, 1848: XI, new name for *Pachymerus* SCHOENHERR not THUNBERG.
Pseudopachymerus PIC, 1913a: 10, new name for *Pachymerus* SCHOENHERR not THUNBERG.
Falsobruchus PIC, 1913b: 110 (type species: *Bruchus cristatus* FAHRAEUS, 1839)

Type species: *Bruchus faldermanni* MANNERHEIM, 1827 (by original designation).

The genus is characterized by following combination of characters:
- pronotum gibbous with deeply concave sides
- hind femur with 3–6 large spines and two or more small teeth before pecten
- ventral sulcus od hind femora not polished
- hind tibia arcuate, carinate, mucronate apically
- abdominal sterna and pygidium without polished areas
- median lobe broad to narrow, internal sac with or without distinctive sclerites
- lateral lobes strap-like, narrowly and shallowly divided



17. *Caryedes basiliensis*

DESCRIPTION

Body length: 2.5–6.6 mm, width: 1.6–4.6 mm. Body stout and deep (fig. 17). Head short to long. Eyes sexually dimorphic or not, incised to $^1/_2$–$^3/_4$ length. Frons with prominent median carina. Gena between base of mandible and antennal fossa about as long as to much longer than width of antennal fossa, glabrous or pubescent. Antennae sexually dimorphic or not.

Pronotum campaniform, sides deeply and irregularly concave. Median and lateral basal gibbosities low to high, median sulcus obsolete to deep. Anterior gibbosities low to moderate. Lateral carina obsolete to distinct. Scutellum small to moderate, square, bidentate. Prosternal process narrow, acute. Metasternum shallow to deep, rounded to angulate in profile. Elytra together subquadrate. Striae deep, punctate. Striae 3 and 4 not strongly deflected laterally before base, stria 3 ended free of basal gibbosity or not. Striae 4 and 5, 5 and 6, or 4 and 6 abbreviated apically, coalescent or not. Interval 9 flat to carinate apically. Elytral disc convex to concave medially. Fore and midlegs slender, not sexually dimorphic. Hind femur strongly incrassate, external ventral margin dentate or not, ventral sulcus obsolete or shallow apically. Internal ventral margin with 3–6 large spines and two or more small teeth before pecten (figs. 160–162). Hind tibia strongly arcuate, carinate. Mucro much shorter to much longer than apical width of tibia. Hind basitarsus about as long as to much longer than outer four tarsal articles together. Abdominal sterna sometimes strongly telescoped in male. Sterna without glabrous, polished areas. Dorsal vestiture usually dense, variegated.

Male. Antennae subclavate, serrate or strongly flabellate, short to long. Last sternum emarginate. Median lobe broad to narrow, internal sac with or without distinctive sclerites (fig. 290). Lateral lobes strap-like, narrowly and shallowly divided (fig. 294). Basal strut without median keel.

Female. Antennae various, but not elongate-serrate or flabellate. Last sternum not emarginate.

Diagnosis

The strap-like lateral lobes near *Caryedes* to *Meibomeus* only. *Meibomeus* differs in reduced pronotal gibbosities, obsolete mucro on hind tibia, and not concave pronotal sides. From *Pygiopachymerus* and *Penthobruchus*, *Caryedes* differs in lacking polished areas on abdominal sterna and ventral sulcus on hind femora not polished. From *Gibbobruchus* it differs in lacking speculum or polished areas on abdominal sterna, and from *Ctenocolum* in less number of spines of femoral pecten.

Host plants

Papilionaceae: *Glycininae*: *Centrosperma* sp.; *Diocleinae*: *Canavalia* sp., *Dioclea* sp.; *Galactinae*: *Galactia* sp.; *Phaseolinae*: *Pachyrhizus* sp.; *Cajaninae*: *Rhynchosis* sp.; *Caesalpiniaceae*: *Bauhinia* sp.

DISTRIBUTION

From northern Mexico to northern Argentina.
Number of species: 22, probably several undescribed in South America.
Rerefences: KINGSOLVER and WHITEHEAD, 1974b: 341–436.

Genus: *Meibomeus* Bridwell

Meibomeus BRIDWELL, 1946: 54.

Type species: *Bruchus musculus* SAY, 1831 (by monotypy).
The genus is characterized by following combination of characters:
– pronotum campaniform with concave sides, without gibbosities
– abdominal sterna and pygidium without polished areas
– hind femur incrassate, pecten with 4–8 large spines, one to three small teeth before pecten
– hind tibia arcuate, carinate, mucro not more than one-half as long as apical width of tibia
– median lobe long and slender, ventral valve strongly modified, internal sac without large sclerites
– lateral lobes elongate, strap-like basally, shallowly divided apically

DESCRIPTION

Body length: 1.1–2.7 mm, width: 0.6–1.6 mm. Body stout, moderately deep. Head short, strongly constricted behind eyes, postocular lobe short. Eyes prominent, sexually dimorphic in most species, incised to $^2/_3$–$^3/_4$ length. Frons with fine median carina. Gena between mandible and antennal fossa about as long as width of antennal fossa or slightly longer, glabrous. Antennae varying from short and not sexually dimorphic to strongly elongate in male, articles transverse to elongate serrate. Pronotum campaniform, sides shallowly concave, dorsal gibbosities obsolete. Lateral carina obsolete. Scutellum square, bidentate. Prosternal process narrow, acute. Metasternum shallow, rounded in profile. Elytron with deep, finely punctate striae, stria 4 abbreviated by basal gibbosity or tooth. Striae 4 and 5 abbreviated apically, coalescent or not. Interval 9 flat to moderate convex apically. Elytral disc convex. Front and middle legs slender, not sexually dimorphic. Hind femur incrassate, external ventral margin without carina or teeth, ventral sulcus poorly developed. Internal ventral margin with 1–3 small teeth before pecten, or with one of then enlarged. Pecten deeply dissected, first spine enlarged in most species, 3–8 smaller posterior spines slanted towards apex of femur (figs. 169–171), no gap between first and following spines in most

species. Hind tibia arcuate, carinate, mucro short to obsolete, not more than one-half as long as apical width of tibia, lateral coronal denticle sharp. Hind basitarsus about as long as four outer articles together. Abdomen slightly sexually dimorphic. Sterna without polished areas. Dorsal vestiture scarce, not variegated, or with indistinct, small spots of dense hair.

Male. Median lobe long and slender, ventral valve variously shaped (figs. 293, 298, 299). Internal sac with uniformly fine denticles or needles, without large sclerites. Lateral lobes elongate, strap-like basally, bisected apically, often strongly arched ventrad at apex (fig. 297). Basal strut keeled.

Female. Similar to the male, but eyes usually smaller and les convex, antennae often shorter and less serrate, and abdomen slightly elongate.

DIAGNOSIS

The strap-like lateral lobes near *Meibomeus* to *Caryedes* only. Differs in lacking pronotal gibbosities, less concave pronotal sides, shorter mucro, body generally smaller and scarcely pubescent.

HOST PLANTS

Papilionoideae: *Hedysareae*: *Adesmia* sp., *Desmodium* sp., *Poiretia* sp., and *Zoria* sp.

DISTRIBUTION

Estern half of temperate North America, Central America, South America south to Argentina.

Number of species: 15.

References: KINGSOLVER and WHITEHEAD, 1976: 54 pp.

Genus: *Penthobruchus* Kingsolver

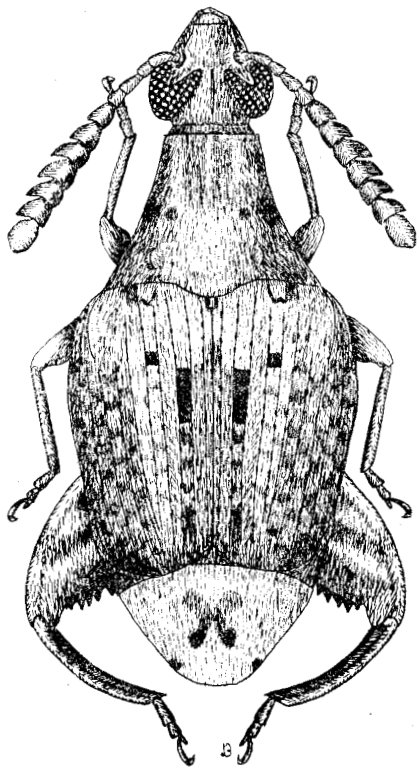
Penthobruchus KINGSOLVER, 1973: 142.

Type species: *Pachymerus germaini* PIC, 1894 (by original designation).

The genus is characterized by following combination of characters:

- pronotum without distinct gibbosities
- abdominal sterna with large polished areas
- pygidium with pair of bare, depressed submarginal spots near apex
- hind femur with polished ventral sulcus, external ventral margin with 12–14 short teeth, internal ventral margin with 6–9 large spines forming strong pecten
- hind tibia strongly arcuate, carinate

— median lobe broad, without lateral processes, internal sac with large sclerites
— lateral lobes short, broad, incised to 1/2 length or less



18. *Penthobruchus germaini*, female

DESCRIPTION

Body length: 3.0–6.0 mm, width: 1.6–4.0 mm. Body depressed above, slightly elongate. Head short, strongly constricted behind eye, postocular lobe short. Eyes protruding, sexually dimorphic, emarginate to 1/2 length. Frons with prominent median carina. Gena between base of mandible and antennal fossa about as long as width of antennal fossa, glabrous. Antennae not sexually dimorphic, articles 5–11 eccentric, clavate. Pronotum campaniform, with slightly concave sides, without lateral carina. Pronotal disc not gibbous or with low lateral basal gibbosities. Scutellum small, square, bidentate or truncate. Prosternal process narrow, acute. Metasternum shallow, broadly rounded in profile. Elytra slightly longer than wide together,

depressed medially between suture and interval 6. Striae 3 and 4, and occasionally 2 abbreviated by small basal tubercles. Front and middle legs slender, not sexually dimorphic. Hind femur strongly incrassate, with apex extending beyond of pygidium. Ventral external margin with 12–14 short teeth and separated by polished channel from pecten on ventral internal margin with 6–9 long spines, anterior spine about 1.5 times as long as any of the posterior spines (fig. 163). The margin before pecten with several extremely short spines. Hind tibia arcuate, carinate, mucro very short, nearly obsolete, coronal denticles lacking. Dorsal face of tibia scabrous. Hind basitarsus shorter than four outer articles together. Abdominal sterna with large polished areas. Dorsal vestiture dense, variegated.

Male. Pygidium without dark markings medially, evenly convex except paired subapical depressions. Median lobe short, broad, ventral valve acute, broad at base. Internal sac with a large rounded, hollow median sclerite bearing a dorsal keel (fig. 303). Lateral lobes short, broad, rounded or truncated apically, incised at most to half length (fig. 306).

Female. Pygidium with X- or M-shape dark spot, sloping, convex except supapical depressions as in male and a semicircular depression at extreme apex (fig. 18).

DIAGNOSIS

The large polished areas on abdominal sterna and polished ventral femoral sulcus near this genus to *Pygiopachymerus* only. Differs in lateral elytral intervals not scabrous, striae 3 and 4 ending in basal tubercles not ridges, and median lobe without lateral processes.

HOST PLANTS

Caesalpinioideae: *Cercidium* sp., *Parkinsonia* sp.

DISTRIBUTION

Argentina and Chile.
Number of species: 2.
References: no further works.

Genus: *Pygiopachymerus* Pic

Pygiopachymerus PIC, 1911: 134.
Phelomerus PIC, 1912: 92 (type species: *Phelomerus ochropygus* PIC, 1912: 92 = *Pygiopachymerus theresae*, PIC, 1911: 134).

Type species: *Pygiopachymerus theresae* PIC, 1911 (by monotypy).

The genus is characterized by following combination of characters:

- pronotum with low gibbosities
- abdominal sterna with large polished areas
- hind femur with polished ventral sulcus, external ventral margin with row of short teeth, internal ventral margin with pecten of 5–7 large spines, initial spine often slightly longer
- hind tibia strongly arcuate, carinate
- median lobe broad, with lateral processes, internal sac without large sclerites
- lateral lobes short, broad, deeply cleft

DESCRIPTION

Body length: 3.5–8.0 mm, width: 2.2–4.8 mm. Body stout, depressed above. Head short, eyes not prominently protruding beyond lateral margins of head, not sexually dimorphic, postocular lobe elongated, strongly delimited by sulci. Frons with prominent median carina. Gena between base of mandible and antennal fossa shorter than width of antennal fossa. Antennae short, not sexually dimorphic, articles 5–11 eccentric, clavate. Pronotum conical or with slightly concave sides, elevated longitudinally in middle of the disc, and with latero-basal gibbosities. Scutellum very small, inconspicuous, bidentate. Prosternal process narrow, acute. Metasternum deep, rounded or bulbous subangulate in profile. Elytra quadrangular together, depressed dorsally. Striae 3, 4 and 5 abbreviated basally by concave ridges. Elytral intervals scabrous basally and/or laterally. Front and middle legs slender, not sexually dimorphic. Hind femur strongly swollen, surprasing apex of abdomen. Ventral external margin with row of short teeth and separated by polished channel from pecten on ventral internal margin with 5–7 nearly equal spines, initial spine often slightly longer (fig. 166). Margin before pecten with 5–6 small teeth. Hind tibia strongly arcuate, carinate, with blunt mucro, without coronal denticles. Hind basitarsus shorter than three outer articles together. Abdominal sterna with large polished areas. Dorsal vestiture moderately dense, variegated.

Male. Scarcely pubescent or polished area on pygidium smaller. Median lobe short, broad, with alate lateral processes, internal sac without large sclerites, but with numerous spines or needles (fig. 302). Lateral lobes short, broad, deeply incised at least to 2/3 length (fig. 305).

Female. Scarcely pubescent or polished areas on pygidium larger.

DIAGNOSIS

The large polished areas on abdominal sterna and polished ventral sulcus on hind femora near this genus to *Penthobruchus* only. Differs in strongly scabrous lateral intervals of elytrae, striae 3 and 4 ending in basal concave ridges, and median lobe with lateral processes.

HOST PLANTS

Caesalpinioideae: *Cassia* sp.; *Detarieae*: *Hymenaea* sp.

DISTRIBUTION

From Salvador to Brazil.
Number of species: 2.
References: KINGSOLVER, 1970a: 37–42.

Acanthoscelides group

Body stout to elongate. Pronotum and elytra without gibbosities. Hind femur incrassate, pecten with 1–5 (usually 3) sharp spines. Hind tibiae straight, sometimes arcuate, usually carinate and mucronate apically. In single species or genera pronotum with gibbosities, hind femoral pecten reduced, and hind tibia without carinae.

Genus: *Merobruchus* Bridwell

Merobruchus BRIDWELL, 1946: 54.

Type species: *Bruchus julianus* HORN, 1894 (by monotypy).

The genus is characterized by following combination of characters:

— antennae short, not sexually dimorphic
— pronotum campaniform, disc without distinct gibbosities, lateral carina obsolete
— elytral striae regular, striae 3–4 or 3–6 with basal gibbosities or denticles
— hind femur swollen, pecten with one long and two or three shorter spines
— hind tibia arcuate basally, carinate, mucro longer than lateral coronal denticle
— ventral valve in male genitalia broad, not acute apically, internal sac with large wishbone-shaped sclerites
— lateral lobes depressed, deeply divided

DESCRIPTION

Body length: 2.0–4.4 mm, width: 1.1–2.7 mm. Body oval, stout. Head short, strongly constricted behind eyes. Eyes moderately bulging, emarginate to $^1/_2$–$^2/_3$ length. Postocular lobe very short. Frons with prominent or obtuse median carina. Antennae rather short, not sexually dimorphic, reaching at most to humeral callus. Distal articles slightly eccentric. Pronotum campaniform, without lateral carina, disc convex with indistinct impressions. Prosternal process narrow, acute, triangular. Scutellum transverse, bidentate apically. Elytral disc slightly depressed between fifth intervals. Elytral striae 3 and 4, or 3–6 ended basally by small tubercles or denticles. Front and middle legs slender, not sexually dimorphic. Hind femur swollen, internal ventral margin with one large and two or three smaller spines. Hind tibia arcuate basally, enlarged, with complete set of carinae or with anterolateral carina obsolete (fig. 186). Mucro longer than lateral coronal denticle. Abdominal sterna not modified. Vestiture dense, variegated.

Male. Last sternite emarginate. Median lobe moderately long or broad, ventral valve broad, transverse or semicircular, or subpentagonal, never acute apically (fig. 307). Internal sac without hinge sclerites but with large wishbone-shaped sclerites in the middle. Lateral lobes depressed, not modified, divided to near base (fig. 310).

Female. Last sternite not emarginate.

DIAGNOSIS

It is an intermediate genus between gibbous genera and *Acanthoscelides*. From gibbous genera it differs in pronotal disc without distinct gibbosities, hind tibia arcuate bassally only, pecten reduced to 3–4 spines. From *Acanthoscelides* it differs in hind tibia arcuate basally and male genitalia as presented above. Some species of *Acanthoscelides* have hind tibia arcuate but they have ventral valve of median lobe acute apically. Limits between these genera are inexact and some species can not be unequivocally assigned to one of them basing on external morphological characters alone.

HOST PLANTS

Mimosoideae: *Acacia*: sp.; *Ingeae*: *Albizia* sp., *Lysiloma* sp., *Pithecollobium* sp.; *Mimoseae*: *Lucaena* sp., *Mimosa* sp.

DISTRIBUTION

Southern part of USA, Central America, northern part of South America.

Number of species: 15 in North and Central America, probably several in South America.

References: KINGSOLVER, 1980: 246.

Genus: *Acanthoscelides* Schilsky

Acanthoscelides SCHILSKY, 1905: C.
Abutiloneus BRIDWELL, 1946: 55 (type species: *Bruchus flavicornis* SHARP, 1885 = *Abutiloneus idoneus* BRIDWELL, 1946) **n. syn.**

Type species: *Bruchus obtectus* SAY, 1831 (designated by BRIDWELL, 1929: 42).

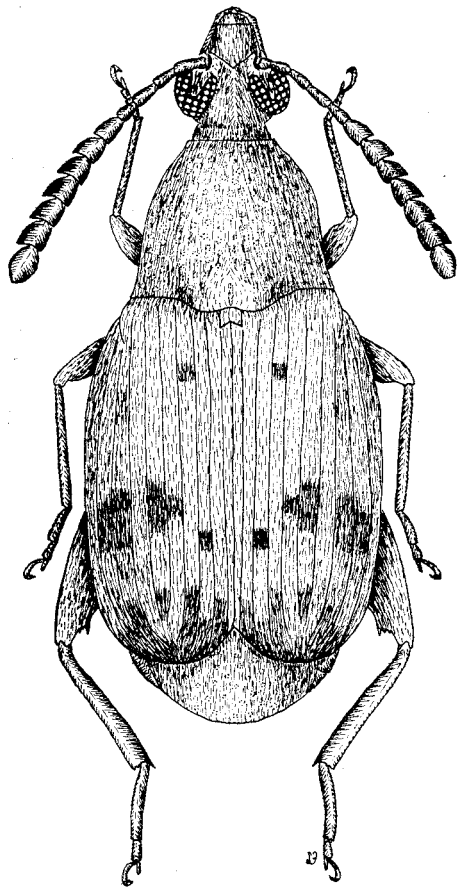
The genus is characterized by following combination of characters:
- antennae short to long, sexually dimorphic or not
- pronotum conical, campaniform, rarely transverse, without lateral carina
- elytra with or without basal tubercles
- hind femur with 1–5 (mostly 3) subapical spines
- hind tibia usually straight, carinate
- median lobe short to long, without hinge sclerites, internal sac with or without large sclerites
- lateral lobes usually depressed, not modified, divided at least to 1/3 length, basal strut usually without perpendicular keel

DESCRIPTION

Body length: 1.1–5.2 mm, width: 0.6–3.0 mm. Body oval, stout or slightly elongate. Eyes moderately bulging, or strongly bulging, sometimes sexually dimorphic, postocular lobe short. Frons with or without median keel, or with impunctate median line. Antennae short to moderately long, usually not sexually dimorphic. Pronotum campaniform, or conical, or transverse, without lateral carina (fig. 105). Disc without gibbosities. Elytral striae regular, with or without basal tubercles. Hind femur moderately swollen. Internal ventral margin armed with large subapical spine followed by one to four smaller spines (in most species pecten consists of three spines, sometimes pecten is reduced to single one, or femur is without spines). Hind tibia straight, with 2–4 carinae, mucro varying from short to very long (figs. 172–178). Abdomen not strongly bulging. Vestiture varying from scarce, uniform to dense, variegated.

Male. Antennae often longer and more serrate. Eyes sometimes strongly bulging. Last sternite emarginate. Median lobe short to long, ventral valve usually triangular, acute apically, internal sac with or without large sclerites (figs. 313–315). Lateral lobes usually depressed, not modified, divided at least to 1/3 length, basal strut usually without perpendicular keel (figs. 316–318).

Female. Antennae often shorter and less serrate. Eyes sometimes less bulging. Last sternite not emarginate.



19. *Acanthoscelides obtectus*

DIAGNOSIS

Acanthoscelides is, apart from *Bruchidius*, one of the most rich in species, and most strongly differentiated. This makes a comprise diagnosis difficult to draw up. Both genera, *Acanthoscelides* and *Bruchidius*, constitute two sister lines — one is developed in the New, and the second in the Old World. In the particular species groups morphological characters may strongly differentiate. Femoral pecten may often be reduced to single spine, hind tibia may be curved at the base, sexual dimorphism may be seen in eyes and antenna structure, parameres may be modified, and basal strut may have medial keel. But there is no case of correlation of all those characters, so it is impossible to divide *Acanthoscelides* into smaller units of a genus rank. In my opinion then, in the face of such a great diversity of characters, sepa-

rating *Abutiloneus* is baseless. The only feature that differs it from *Acanthoscelides* is the reduction of hind femoral pecten. Sometimes, however, hind femur is armed with a very small denticle. All remaining characters occure also in the *Acanthoscelides* species. The median lobe structure sticks to the general type of structure which occures in *Acanthoscelides*. The only known species of *Abutiloneus* developes in seeds of *Abutilon* spp. (*Malvaceae*), but it is not a unique phenomenon because in the *Malvaceae* seeds there de-delop also small species of *Acanthoscelides* (*aequalis* group). A number of the New World genera is very similar to *Acanthoscelides*. They are different in a set of some correlated characters. Undoubtedly they originate from *Acanthoscelides* which, as *Bruchidius* in the Old World, is now submitted to the differentiation process. The characteristic sets of characters separating other New World genera from *Acanthoscelides* are given in the description of the respective ones. The really serious problem is how to distinguish *Acanthoscelides* from *Bruchidius*. Most of the species are distinguished by their hind femur structure (3–4 spines in *Acanthoscelides*, 0–1 spine in *Bruchidius*), but the *Acanthoscelides* species possessing one femoral spine practically don't differ from the *Bruchidius* species. The only separating criterion may be in this case the zoogeographical criterion because, excluding brought species, *Acanthoscelides* lives only in the New World whereas *Bruchidius* in the Old World. Some species with three spines on hind femur, described as *Acanthoscelides* occure in the Middle Asia. Their genitalia have not been studied hitherto and the specimens are deposited in the Russian museums therefore are difficult to obtain. For those reasons their genus affiliation is not quite clear. Perhaps some of them are congeneric rather with *Paleoacanthoscelides* than with *Acanthoscelides*. Perhaps the reduction in number of femoral spines is the independant process observed in the New as well as Old World lines so we deal with an evolutional parallelism which results in difficulties in the phylogenetic analysis.

HOST PLANTS

Papilionaceae: *Acacia* sp., *Aeschynomene* sp., *Amorpha* sp., *Astragalus* sp., *Caesalpinia* sp., *Calopogonium* sp., *Cajanus* sp., *Cassia* sp., *Cicer* sp., *Chaetocalyx* sp., *Clitoria* sp., *Colutea* sp., *Desmanthus* sp., *Desmodium* sp., *Dolichos* sp., *Eriosema* sp., *Errazurizia* sp., *Eysenhardtia* sp., *Galactia* sp., *Glycine* sp., *Glycyrrhiza* sp., *Dalea* sp., *Hoffmanseggia* sp., *Indigofera* sp., *Lablab* sp., *Lathyrus* sp., *Lens* sp., *Lespedeza* sp., *Leucaena* sp., *Lotus* sp., *Lysiloma* sp., *Macroptilium* sp., *Mimosa* sp., *Mucuna* sp., *Nissolia* sp., *Pachyrhizus* sp., *Parkia* sp., *Phaseolus* sp., *Petalostemon* sp., *Piptadenis* sp., *Pisum* sp., *Parryella* sp., *Prosopis* sp., *Rhynchosia* sp., *Schrankia* sp., *Senna*

sp., *Sesbania* sp., *Stylosanthes* sp., *Tephrosia* sp., *Teramnus* sp., *Trifolium* sp., *Oxytropis* sp., *Vicia* sp., *Vigna* sp., *Malvaceae*: *Abutilon* sp., *Anoda* sp., *Herissantia* sp., *Hibiscus* sp., *Kosteletzkya* sp., *Malachra* sp., *Malva* sp., *Malvastrus* sp., *Pavonia* sp., *Pseudabutilon* sp., *Sida* sp., *Wissadula* sp.; *Onagraceae*: *Ludwigia* sp.; *Rhamnaceae*: *Condalia* sp., *Ziziphus* sp.; *Sterculiaceae*: *Guazuma* sp.; *Tiliaceae*: *Heliocarpus* sp., *Triumfetta* sp.; *Cistaceae*: *Helianthemum* sp., *Lechea* sp.; *Lythraceae*: *Lythrum* sp.

DISTRIBUTION

New World except arctic regions. Some species introduced to Europe, Africa and Asia, two of them acclimatized (*A. obtectus* in all parts of the Old World, and *A. pallidipennis* in Europe and Korea).

Number of species: 170 in North and Central America, probably several hundreds in South America.

References: JOHNSON, 1970: 116 pp., JOHNSON, 1983: 370 pp.

Genus: *Mimosestes* Bridwell

Mimosestes BRIDWELL, 1946: 54.
Cercidiestes BRIDWELL, 1946: 55 (type species: *Bruchus ulkei* HORN, 1873).

Type species: *Bruchus sallaei* SHARP, 1885 (by monotypy).

The genus is characterized by following combination of characters:

- head with glabrous area on the vertex
- pronotum subcampanulate to conical with more or less developed lateral carina
- hind tibia straight, carinate, with short mucro
- hind femur in male usually with a channel on the ventral surface, and 3–4 spines on ventral internal margin
- median lobe with a simple, lightly sclerotized armature of internal sac, without hinge sclerites
- ventral valve of median lobe not articulated, partly or completely reduced
- lateral lobes flat, not modified, deeply incised.

DESCRIPTION

Body length: 1.6–6.0 mm, width: 0.9–3.6 mm. Body oval to elongate. Head short, eyes moderately prominent or flat. Posterior margin of eye protruding from adjacent surfaces or merging into contour of head. Frons usually with median, glabrous line or carina extending from frontoclypeal suture to granulate glabrous area, or boss, on vertex; glabrous area of variable

size and shape in various species, sometimes with pit or impressed line on dorsomedial surface. Antennae short, usually not sexually dimorphic, distal articles only slightly eccentric, not serrate, usually reaching to humeral callus. Pronotum subcampanulate to conical. Lateral carina ranging from vague, incomplete, to strong, spinulate, and extending to coxal cavity. Lateral margins near apex sometimes with pronounced hump and strong spines. Elytra elongate, convex. Striae 3–4, and sometimes 3–5, 3–6, and 10 at base with strong, flatened spines. Striae 2 and 3, or 3 and 4 sometimes approaching at base. Front and middle legs slender, not sexually dimorphic. Hind femur expanded medially, in all but one species ventral surface in male channeled, usually deeply, and lined with elongate, dense hairs. Ventral internal margin of hind femur armed with acuminate denticle about as long as or longer than width of tibial base followed by one to four smaller spines, only one species with single spine shorter than width of tibial base (figs. 180–182). Hind tibia straight, carinate, mucro short, 0.2–0.5 as long as first tarsomere. Abdomen usually with sterna not modified, but sterna 2–5 sometimes with faint to deep medial sulcus. Pygidium large, evenly rounded or slightly convex. Dorsal vestiture scarce, variegated or not.

Male. Hind femora channeled ventrally. Last abdominal sternum usually slightly emarginate. Median lobe broad to elongate, ventral valve not articulated or reduced. Armature of internal sac simple, without large spines, and without hinge sclerites (fig. 308). Lateral lobes flat, expanded mesally at apex, deeply incised (fig. 311). Basal strut without keel.

Female. Hind femora without channel. Last abdominal sternum not emarginate.

Diagnosis

Mimosestes differs from all other genera of the group in glabrous area on vertex, channeled hind femora in male, and ventral valve not articulated or reduced. The Old World genus *Sulcobruchus* is very similar to *Mimosestes*, especially in channeled hind femora in male and usually glabrous area on vertex, and spines on base of elytron. *Sulcobruchus* differs in hind femora without pecten, or with only single, minute spine, and ventral valve of median lobe not reduced.

Host plants

Mimosoideae: *Acacia* sp., *Enterolobium* sp., *Prosopis* sp.; *Caesalpinioideae*: *Caesalpinia* sp., *Ceratonia* sp., *Cercidium* sp., *Parkinsonia* sp. Most species developed in seeds of *Acacia* species.

DISTRIBUTION

Southern part of USA, Central America and northern part of South America. *Mimosestes mimosae* (F.) was introduced to Mediterranean Subregion and Canary Is. and established, especially in Canary Is., North Africa and the Middle East.

Number of species: 15.

References: KINGSOLVER and JOHNSON, 1978: 106 pp.

Genus: *Stylantheus* Bridwell

Stylantheus BRIDWELL, 1946: 54.

Type species: *Bruchus macrocerus* HORN, 1873 (by monotypy).

The genus is characterized by following combination of characters:

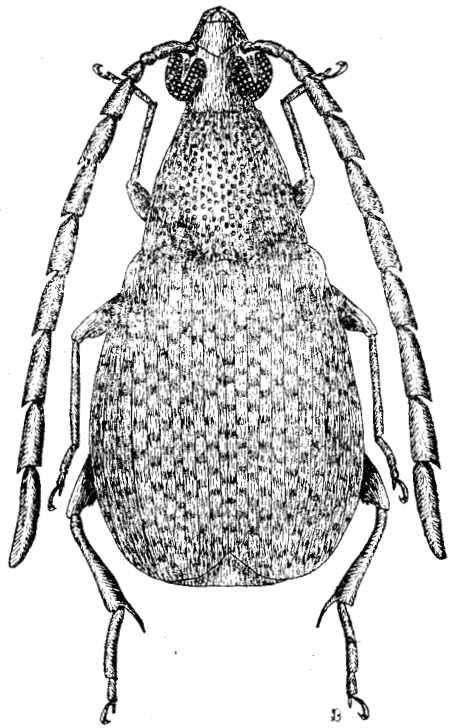
- antennae very long, extending at least to hind coxae
- pronotum subconical, without lateral carina
- elytral striae 3 and 4 abbreviated at base by small denticles
- hind femur with three small subapical spines
- hins tibia straight, with three carinae, mucro long, about 0.5 as long as first tarsomere
- median lobe elongate, ventral valve triangular, internal sac without arge sclerites
- lateral lobes elongate, depressed, divided to 0.75 their length.

DESCRIPTION

Body length: 1.7–2.2 mm, width: 1.0–1.3 mm. Body oval. Head slightly elongate, strongly constricted behind eye, postocular lobe short. Eyes emarginate to 0.9 their length. Frons with faint, median finely punctate line. Antennae very long, extending at least to hind coxae. Distal articles elongate, serrate (fig. 20). Pronotum subconical, without lateral carina, disc convex, without gibbosities. Prosternal process separating coxae for about 0.5 their length. Scutellum square, bidentate apically. Elytral striae regular, striae 3 and 4 abbreviated at base by small denticle. Hind femur moderately swollen, without channel or carinae ventrally. Internal ventral margin with three subapical spines about $^1/_2$–$^3/_4$ as long as width of tibial base, middle spine often shorter than others, first spine often longer than others. Hind tibia moderately englarged, without anterolateral carina. Mucro long, distinctly longer than lateral coronal denticle (fig. 183). Abdominal sterna not modified, pygidium vertical. Vestiture scarce and dense, variegated.

Male. Antennae extending to apex of pygidium. Last sternite emarginate. Median lobe elongate, ventral valve triangular, acute apically, internal sac without hinge sclerites or other large sclerites (fig. 320). Lateral lobes depressed, elongate, divided to 0.75 their length (fig. 323).

Female. Antennae shorter, extending to apex of elytra. Last sternite not emarginate.



20. *Stylantheus macrocerus*, male

DIAGNOSIS

The very elongate antennae separated *Stylantheus* from all other genera of the *Acanthoscelides* group. Some species of the Old World genus *Bruchidius* have antennae as elongate as *Stylantheus* but they differ in hind femur with single spine or without spines.

HOST PLANTS

Papilionoideae: *Aeschynomeneae*: *Stylosanthes* sp.

DISTRIBUTION

Southeastern part of USA.
Number of species: 1.
References: JOHNSON, 1976: 254–261.

Genus: *Althaeus* Bridwell

Althaeus BRIDWELL, 1946: 55.

Type species: *Bruchus hibisci* OLIVIER, 1795 (by monotypy).

The genus is characterized by following combination of characters:

— antennae short, not sexually dimorphic
— pronotum subcampaniform, without lateral carina
— elytral striae without basal tubercles
— hind femur moderately swollen, internal ventral margin with simple spine, hind margin of the spine serrulate
— abdomen not modified
— median lobe short, without hinge sclerites, base extremely large, ventral valve long and narrow, about twice narrower than lobe, internal sac with several large spines
— lateral lobes strongly sclerotized, narrowly divided only to 1/6 length.

DESCRIPTION

Body length: 1.8–2.3 mm, width: 1.3–1.5 mm. Body oval, stout. Head short, strongly constricted behind eyes, postocular lobe short. Eyes bulging, emarginate to 2/3 length. Frons broad, without median carina. Antennae short, extending to hind angle of pronotum, distal articles transverse. Pronotum subcampanulate, broad, without lateral carina. Disc flat, without gibbosities or depressions. Scutellum square, bidentate apically. Elytral striae regular, without basal tubercles or spines, striae 5 and 6 abbreviated apically. Fore and mid legs slender, not sexually dimorphic. Hind femur moderately swollen, with internal ventral carina, and with simple subapical spine. Hind margin of the spine distinctly serrulate (fig. 184). Hind tibia straight, with complete set of carinae, coronal denticles distinct, mucro slightly longer than lateral coronal denticle. Abdomen not modified. Vestiture moderately dense, variegated.

Male. Last sternite emarginate. Median lobe short, base extremaly large, ventral valve long, narrow, acute apically, about twice narrower than tubular part of lobe. Internal sac without hinge sclerites, in the hind part with about 8 large spines and two groups of numerous, dense denticles (fig. 319).

Lateral lobes strongly sclerotized, fused, divided only to 1/6 length. Apices strongly modified with narrow sensoral area (fig. 322). Basal strut with perpendicular keel.

Female. Last sternite not emarginate.

DIAGNOSIS

Externally, *Althaeus* is very similar to *Sennius*. Differs in median lobe without hinge sclerites. From other genera of the *Acanthoscelides* group it differs in simple femoral spine, pronotum without gibbosities, and lateral lobes strongly sclerotized, divided only to 1/6 length.

HOST PLANTS

Malvaceae: *Hibiscus* sp.

DISTRIBUTION

East part of USA from Pennsylvania to Georgia, west to Texas.
Number of species: 1.
References: no further work.

Genus: *Pseudopachymerina* Zacher

Pseudopachymerina ZACHER, 1952: 467.

Type species: *Bruchus spinipes* ERICHSON, 1834 (= *Bruchus* (*Pachymerus*) *lallemanti* MARSEUL, 1876) (by monotypy).

The genus is characterized by following combination of characters:
- head extremely short, eyes emarginate to half length
- antennae serrate, not sexually dimorphic
- pronotum campaniform, with lateral carina extending from hind angle of pronotum to procoxal cavity
- elytral striae 2–5 with basal spine
- hind femur swollen, bicarinate ventrally, internal carina with pecten from four spines, the first spine largest, remainder gradually smaller
- hind tibia straight, carinate, mucro longer than lateral coronal denticle
- median lobe short, ventral valve triangular, internal sac with large sclerites
- lateral lobes depressed, not modified, divided at to near base.

DESCRIPTION

Body length: 3.0–5.5 mm, width: 2.5–4.0 mm. Body oval, slender. Head very short, clypeus shorter than frons, postocular lobes absent. Eyes strongly bulging, emarginate to half length. Frons convex, without or with indistinct

median carina. Antennae rather short, extending to humeral callus, serrate, articles 5–10 slightly longer than wide. Pronotum campaniform, sides distinctly convex (fig. 108). Disc with flat gibbosities in 2/3 length of each side. Lateral carina present, extending from hind angle of pronotum to procoxal cavity (fig. 109). Elytra distinctly longer than wide together. Striae little bent outwards in basal 1/3 length. Striae 2–5 each with small basal denticle or spine. Prosternal process short, narrow, acute. Hind femur swollen, bicarinate ventrally, internal carina with one large, and three gradually smaller spines. Hind tibia straight with complete set of carinae, mucro distinctly longer than lateral coronal denticle (fig. 185). Abdomen bulging, large, pygidium oblique. Vestiture moderately dense, variegated.

Male. Last sternite emarginate. Median lobe short, ventral valve triangular, internal sac with two pairs of large sclerites (fig. 309). Lateral lobes depressed, not modified, broadly divided at to near base (fig. 312).

Female. Last sternite not emarginate.

DIAGNOSIS

From *Acanthoscelides* it differs in distinct lateral carina, from *Mimosestes* in hind femur of male not channeled ventrally, ventral valve in male genitalia not reduced, and internal sac with large sclerites. From Old World genus *Specularius* it differs in hind tibia not arcuate, body more elongate and frons with obsolete median carina.

HOST PLANTS

Caesalpinioideae: *Caesalpinia* sp., *Ceratonia* sp.; *Mimosoideae*: *Acacia* sp.; *Papilionoideae*: *Astragalus* sp.

DISTRIBUTION

Argentina, Bolivia, Brasilia, Chile, Ecuador and Peru. Introduced and established in Algeria, Tunisia, Egypt, Israel, Syria and Turkey.

Number of species: 1.

References: TERAN, 1962: 213–232; DECELLE, 1966: 109–116.

Genus: *Neltumius* Bridwell

Neltumius BRIDWELL, 1946: 54.

Type species: *Bruchus arizonensis* SCHAEFFER, 1904 (by monotypy).

The genus is characterized by following combination of characters:

– pronotum strongly convex, gibbous, without lateral carina

— antennae subserrate, not sexually dimorphic
— elytral striae regular, without basal tubercles or spines
— hind femur moderately swollen, with shallowly sulcate ventral face and small, single subapical spine
— hind tibia straight, carinate
— median lobe broad to elongate, with ventral valve, internal sac with or without large sclerites
— lateral lobes depressed, rounded or angulate apically, deeply divided.

DESCRIPTION

Body length: 2.0–4.0 mm, width: 1.1–2.2 mm. Body oval. Head short, eyes prominent, deeply emarginate, postocular lobe very short. Frons with distinct median keel. Antennae short, not sexually dimorphic, subserrate, extending to base of elytron. Pronotum subconical, strongly convex, gibbous, without lateral carina (fig. 129). Prosternal process short, narrow, acute. Scutellum small, square, bidentate apically. Elytra with striae regular, without basal tubercles or spines. Front and middle legs slender, not sexually dimorphic. Hind femur moderately swollen with shallowly sulcate ventral face. Internal ventral margin carinate with single subapical spine (fig. 205). Hind tibia straight, carinate, with coronal denticles, mucro not longer than lateral coronal denticle. Abdominal sterna not modified. Pygidium vertical. Dorsal vestiture dense, variegated.

Male. Pygidium evenly convex. Last sternite emarginate. Median lobe broad or elongate, without hinge sclerites, internal sac with or without large sclerites (fig. 327). Lateral lobes depressed, rounded or angulate apically, divided nearly to base (fig. 330).

Female. Pygidium somewhat gibbous at apex. Last sternite not emarginate.

DIAGNOSIS

Neltumius does not seem to be closely related to any New World genera. Other New World genera with gibbous pronotum representing different groups are not related to *Neltumius* (they differ in spiny pecten on hind femora). The structure of the hind femur indicates that it might be an offshoot of the Old World *Bruchidius* complex (especially *Kingsolverius* or *Decellebruchus*), but some characters (elytral striae without basal tubercles, hind femur with single spine, lateral lobes deeply divided) need to be confirmed.

HOST PLANTS

Mimosoideae: *Mimoseae*: *Prosopis* sp.; *Rhamnaceae*: *Condalia* sp.

DISTRIBUTION

Arizona, Nevada, California, Utah, Texas, northern Mexico.
Number of species: 3.
References: KINGSOLVER, 1964, 105–111.

Stator group

Antennae short, not sexually dimorphic. Pronotum campanulate with distinct lateral carina. Elytral striae without basal spines. Hind femur with single spine.

Genus: *Stator* Bridwell

Stator BRIDWELL, 1946: 55.

Type species: *Bruchus pruininus* HORN, 1873 (by monotypy).
The genus is characterized by following combination of characters:
- antennae short, not sexually dimorphic
- pronotum with complete lateral carina extending from hind angle to coxal cavity
- elytral striae without spines or tubercles
- hind femur with single spine on ventral internal margin
- hind tibia straight with 2–4 carinae
- median lobe moderately long or broad, internal sac with large sclerites
- lateral lobes depressed, deeply incised.

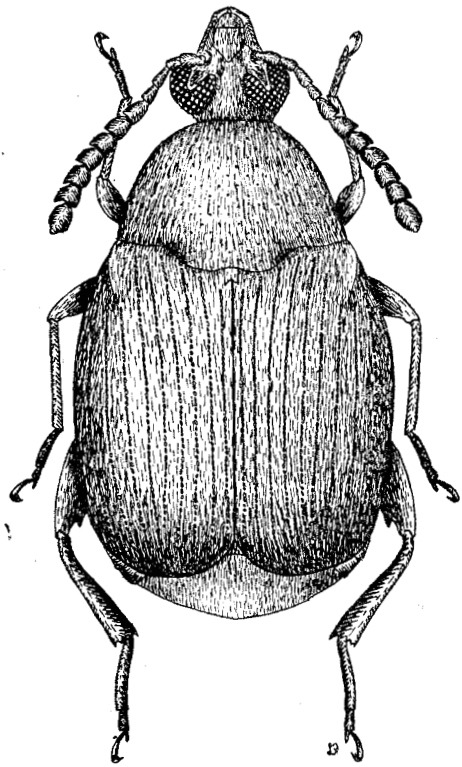
DESCRIPTION

Body length: 1.3–3.2 mm, width: 0.8–2.2 mm. Body oval, stout. Head short, posterior margin of eye usually protruding laterally, well separated from vertex. Frons with median carina or finely punctate line. Antennae not sexually dimorphic, short, not serrate, reaching at most to humeral callus. Pronotum campaniform or subcampaniform with complete lateral carina extending to coxal cavity, sometimes extending only 0.5–0.6 distance to coxal cavity. Prosternal process separating front coxa for 0.8–0.9 their length. Elytron with striae regular, well marked, without basal gibbosities, tubercles or spines. Striae sometimes abbrevieted at base, usually with striae 3 and 4, and 5 and 6 closer to each other at base than to adjacent striae. Scutellum short, broad, bifid apically. Front and middle legs slender, not sexually dimorphic. Hind femur broad, as wide or slightly wider than hind coxa, with both ventral margin carinate, carinae sometimes faint or spinulate. Internal ventral margin with single subapical spine, usually strong and acuminate. External ventral margin sinuately emarginate apically with or without blunt

angulation. Hind tibia straight, with 2–4 carinae, 11 of the 22 species with a fossa on dorsal curface. Mucro short, but usually longer than lateral coronal denticle (figs. 198–199). Abdomen with basal sterna not modified. Pygidium evenly rounded or slightly convex. Dorsal vestiture varying from all hairs uniformly distributed and scarce, to dense, variegated.

Male. Last abdominal sternum broadly emarginate. Median lobe short to moderately long, ventral valve distinct, internal sac usually with large, strongly sclerotized spines and denticles (fig. 321). Lateral lobes flat, not modified, deeply incised. Basal strut without median keel (fig. 324).

Female. Last abdominal sternum not emarginate.



21. *Stator pruininus*

DIAGNOSIS

Distinct lateral carina of pronotum and simple femoral spine distinguish *Stator* from most genera of *Acanthoscelidini* except ***Bonaerius***. ***Stator*** can be distinguished from ***Bonaerius*** in presence of lateral carina on hind tibia, and

absence of bare foveae in female pygidium. From *Mimosestes* and *Pseudopachymerina* it differs in simple femoral spine, from *Lithraeus* group in stouter hind legs with femoral spine large, not reduced.

HOST PLANTS

Mimosoideae: *Acacia* sp., *Albizia* sp., *Calliandra* sp., *Desmanthus* sp., *Enterolobium* sp., *Leucaena* sp., *Lysiloma* sp., *Mimosa* sp., *Neptunia* sp., *Piptadenia* sp., *Pithecollobium* sp., *Samanea* sp., *Papilionoideae*: *Coursetia* sp., *Indigofera* sp., *Olneya* sp., *Piscidia* sp., *Robinia* sp., *Sesbania* sp.; *Caesalpinioideae*: *Cercidium* sp., *Parkinsonia* sp.; *Bixaceae*: *Bixa* sp.; *Myrtaceae*: *Eugenia* sp.

DISTRIBUTION

New World from USA to Argentina, including the West Indies. Introduced and established in Hawaii.

Number of species: 22 in North and Central America, probably several in South America.

References: JOHNSON, 1963: 869–865; JOHNSON and KINGSOLVER, 1976: 101 pp.

Sennius group

Antennae short, not sexually dimorphic. Pronotum without lateral carina. Hind femur with simple spine and occasionally with smaller secondary spine. Hind tibia carinate. Internal sac of median lobe with hinge sclerites.

Genus: *Sennius* Bridwell

Sennius BRIDWELL, 1946: 55.

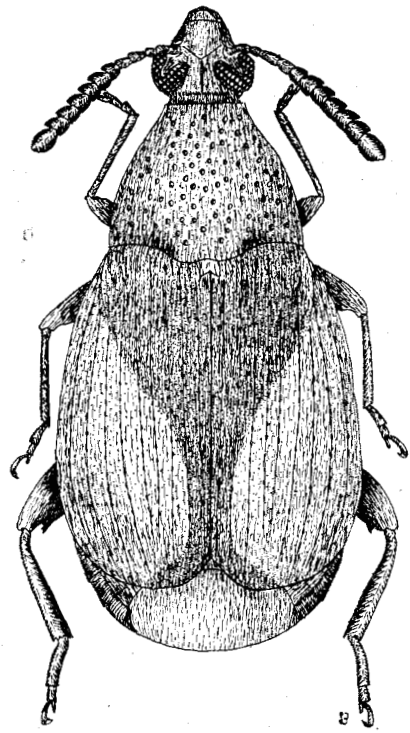
Type species: *Bruchus cruentatus* HORN, 1873 (by monotypy).

The genus is characterized by following combination of characters:

- antennae short, not sexually dimorphic
- pronotum without lateral carina
- elytral striae without basal tubercles or spines
- hind femur with single subapical spina, followed sometimes with one or two minute spines
- hind tibia straight with 3–4 carinae
- median lobe broad to elongate, internal sac with hinge sclerites and numerous small needles or spines
- lateral lobes depressed, not modified, incised at least to 1/2 length, basa strut without keel.

DESCRIPTION

Body length: 1.3–3.4 mm, width: 0.9–2.4 mm. Body oval, stout. Head short, eyes not sexually dimorphic. Frons obtusely ridged or bluntly carinate. Antennae short, not sexually dimorphic, extending at most to humeral callus. Distal articles slightly eccentric, not serrate. Pronotum campaniform, without lateral carina, or carina present only as blunt posterolateral ridge. Pronotal disc smoothly convex, without depressions or gibbosities. Prosternal process narrow, acute, separating front coxa for 0.4–0.8 their length. Elytral striae regular, not ended basally by tubercles or spines (except one species). Scutellum broad, short, bidentate apically. Front and middle legs slender, not sexually dimorphic. Hind femur broad, with ventral face flattened. Internal ventral margin with single spine, occasionally with smaller secondary spine at base of first spine or with one or two minute noches on the distal margin of first spine. External ventral margin not carinate, without blunt angulation. Hind tibia with 3–4 carinae, coronal denticles distinct, mucro rather short, scarcely longer than lateral coronal denticle (figs. 193–196).



22. *Sennius cruentatus*

Abdomen with basal sterna unmodified. Dorsal vestiture varying from scarce, not variegated to dense, distinctly variegated.

Male. Apical margin of last sternite emarginate. Median lobe broad to elongate, with large hinge sclerites. Internal sac with many needles or spines (fig. 325). Lateral lobes flat, expanded mesally at apices, incised at least to 1/2 length (fig. 328). Basal strut without median keel.

Female. Last sternite not emarginate.

DIAGNOSIS

From other genera with elytral striae without basal tubercles, and with hind tibia carinate *Sennius* can be distinguished by presence of hinge sclerites in median lobe. Only *Megasennius* has large hinge sclerites also. It is distinguished from *Sennius* in elytron with strong teeth at base of striae 3–6.

HOST PLANTS

Caesalpinioideae: *Cassieae*: *Cassia* sp. Records from *Medicago* sp. and *Trifolium* sp. needs confirmation.

DISTRIBUTION

New World from the United States to the northern part of Argentina including the West Indies.

Number of species: 31 in North and Central America, probably many species in South America.

References: JOHNSON and KINGSOLVER, 1973: 135 pp.

Genus: *Megasennius* Whitehead et Kingsolver

Megasennius WHITEHEAD et KINGSOLVER, 1975: 461.

Type species: *Bruchus muricatus* SHARP, 1885 (by monotypy).

The genus is characterized by following combination of characters:

- antennae short, not sexually dimorphic
- pronotum conical, without lateral carina
- elytra with prominent teeth at base of striae 3–6
- hind tibia straight with three carinae
- hind femur with single subapical spine
- median lobe broad, internal sac with hinge sclerites
- lateral lobes flat, not modified, deeply incised.

DESCRIPTION

Body length: 4.6–5.0 mm, width: 3.0–3.2 mm. Body oval, stout. Head short, postocular lobes elongated, sharply delimited. Eyes not sexually dimorphic, emarginate to 2/3 length. Antennae very short, extending to hind angles of pronotum, articles slightly eccentric, not serrate. Frons with blunt carina, alutaceous at base. Pronotum conical, with lateral carina present only as blunt posterolateral ridge. Pronotal disc regularly convex. Prosternal process short, narrow, acute. Elytra with striae regular, well marked, with prominent teeth at base of striae 3–6 (fig. 66), base strongly declivous. Scutellum short, broad, bidentate apically. Front and middle legs slender, not sexually dimorphic. Hind femur broad, with ventral face flattened, ventral external margin not carinate, ventral internal margin with single subapical spine. Hind tibia straight, with distinct coronal denticles, mucro much longer than lateral coronal denticle (fig. 197). Lateroventral carina reduced to basal remnant. Abdomen with basal sterna unmodified, pygidium evenly convex. Dorsal vestiture moderately dense, uniform.

Male. Last sternite broadly emarginate. Median lobe broad, with hinge slerites oblique and crossed, internal sac with many small spines and needles, without large sclerites (fig. 326). Lateral lobes strongly bowed, flat, divided to near base. Basal strut without median keel (fig. 329).

Female. Last sternite not emarginate.

DIAGNOSIS

The presence of hinge sclerites in male genitalia and straight hind tibiae near this genus to *Sennius* only. *Sennius* differs in elytral striae without basal teeth, short mucro, and hinge sclerites arcuate.

HOST PLANTS

Caesalpinioideae: *Cassieae*: *Cassia grandis*.

DISTRIBUTION

Central America from El Salvador to Panama.
Number of species: 1.
References: no further works.

Algarobius group

Antennae short, not sexually dimorphic. Scutellum elongate, about twice as long as width at base. Pronotum campaniform, without lateral carina. Hind femur with one long and two or three small spines. First abdominal sternum of male or pygidium of female with pit, sulci or foveae.

Genus: *Algarobius* Bridwell

Algarobius BRIDWELL, 1946: 54.

Type species: *Bruchus prosopis* LECONTE, 1858 (by monotypy).

The genus is characterized by following combination of characters:

- antennae short, not sexually dimorphic
- pronotum campaniform, without lateral carina
- scutellum about twice longer than wide
- elytra with small tubercles at base of striae 2–5 or 2–6
- hind femur with one long and two small subapical spines
- hind tibia straight with complete set of carinae
- female pygidium with two polished sulci or foveae apically
- median lobe broad, with subtriangular ventral valve, without median keel, internal sac with large sclerites
- lateral lobes flat, not modified, incised to 1/3 length.

DESCRIPTION

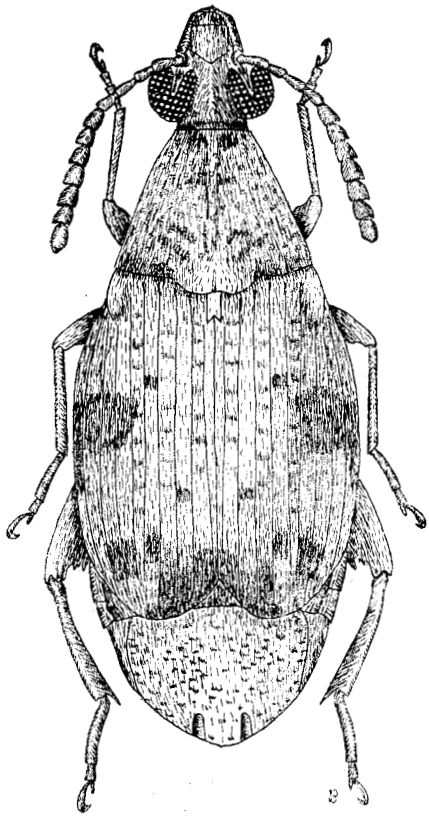
Body length: 2.5–4.3 mm, width: 1.4–2.4 mm. Body oval. Head short, eyes prominent, emarginate to 1/2 length. Frons without median carina, but usually with impunctate median line. Antennae short, not sexually dimorphic, distal articles slightly eccentric. Pronotum campaniform, disc convex with four slight depressions on basal margin, lateral carina absent. Prosternal process short, narrow, acute. Scutellum elongate, about twice as long as width at base, bidentate apically (fig. 123). Elytral disc evenly convex. Striae regular, 2–5 or 2–6 each with a small basal tubercle. Front and middle legs slender, not sexually dimorphic. Hind femur swollen, slightly sulcate ventrally. Internal ventral margin with one long and two shorter subapical spines. Hind tibia straight, with complete set of carinae, mucro distinctly longer than lateral coronal denticle (fig. 192). Pygidium in both sexes sloping at about 30° from horizontal. Dorsal vestiture dense, variegated.

Male. Pygidium without polished sulci or foveae. Last sternum slightly emarginate. Median lobe broad, with subtriangular ventral valve. Internal sac with several large sclerites (fig. 336). Lateral lobes depressed, rounded apically, incised to 1/3 length (fig. 337).

Female. Pygidium with two longitudinal or oval, polished sulci or foveae apically (fig. 23). Last sternum not emarginate.

DIAGNOSIS

The elongate scutellum, short antennae, and spinose hind femur near this genus to *Scutobruchus* only. It differs in male basisternum without pit, median lobe not keeled, with distinct ventral valve.



23. *Algarobius prosopis*, female

HOST PLANTS

Mimosoideae: *Mimoseae*: *Prosopis* sp.

DISTRIBUTION

Texas, New Mexico, Baja California, California, Arizona, Mexico and Guatemala. Introduced to Hawaii.

Number of species: 2.

References: KINGSOLVER, 1972: 116–120.

Genus: *Scutobruchus* Kingsolver

Scutobruchus KINGSOLVER, 1968: 280.

Type species: *Bruchus ceratioborus* PHILIPPI, 1859 (by original designation).

The genus is characterized by following combination of characters:

— antennae short, not sexually dimorphic

— pronotum campaniform, without lateral carina
— scutellum elongate, about twice longer than wide
— elytral striae 3–6 with small basal tubercles
— hind femur with one long and two or three small subapical spines
— hind tibia straight, with 3–4 carinae
— first abdominal sternite in male with a median pit
— median lobe without ventral valve, but with strongly developed ventral keel
— lateral lobes flat, elongate, incised to near base.

Description

Body length: 2.5–4.5 mm, width: 1.2–2.0 mm. Body oval. Head short, eyes prominent, deeply emarginate, not sexually dimorphic. Frontal carina obsolete or absent. Antennae short, not sexually dimorphic, distal articles slightly eccentric. Pronotum campaniform, lateral carina only faintly indicated at base, disc convex. Prosternal process short, narrow, acute. Elytral striae regular, striae 3–6 (occasionally 2–6) each with small basal tubercle. Scutellum elongate, about twice longer than wide, bidentate apically. Front and middle legs slender, not sexually dimorphic. Hind femur swollen, slightly sulcate ventrally. Internal ventral margin with one long and two or three shorter spines. Hind tibia straight, with complete set of carinae, or lateral carina reduced, mucro longer than lateral coronal denticle. Pygidium in both sexes sloping at about 30° from horizontal at base but vertical apically. Vestiture dense, variegated.

Male. Basisternum with small or large oval depression or pit often filled with farinose deposit. Last sternum slightly emarginate. Median lobe lacking ventral valve but with strongly developed ventral keel and lateral processes (figs. 331–334). Internal sac with or without large sclerites. Lateral lobes depressed, rounded apically, cleft between them extending nearly to base (fig. 335).

Female. Basisternum without pit or depression. Last sternum not emarginate.

Diagnosis

The elongate scutellum, short antennae, and spinose hind femur near this genus to *Algarobius* only. It differs in presence of pit on male basisternum, keeled median lobe and reduced ventral valve. Females differ in pygidium without apical sulci or foveae.

HOST PLANTS

Mimosoideae: *Mimoseae*: *Prosopis* sp.

DISTRIBUTION

Argentina, Chile, Paraguay, Ecuador, Peru and Galapagos Is.
Number of species: 6.
References: KINGSOLVER, 1983: 513–527.

Rhipibruchus group

Antennae long, pectinate in male, strongly serrate in female. Eyes strongly bulging, sexually dimorphic. Pronotum campaniform, without lateral carina. Hind femur moderately swollen with 3–4 subapical spines. Abdominal sterna more or less telescoped.

Genus: *Rhipibruchus* Bridwell

Megalorhipis PHILIPPI, 1859: 668, not LACORDAIRE, 1857: 160.
Rhipibruchus BRIDWELL, 1932: 105, new name for *Megalorhipis* PHILIPPI nec LACORDAIRE.

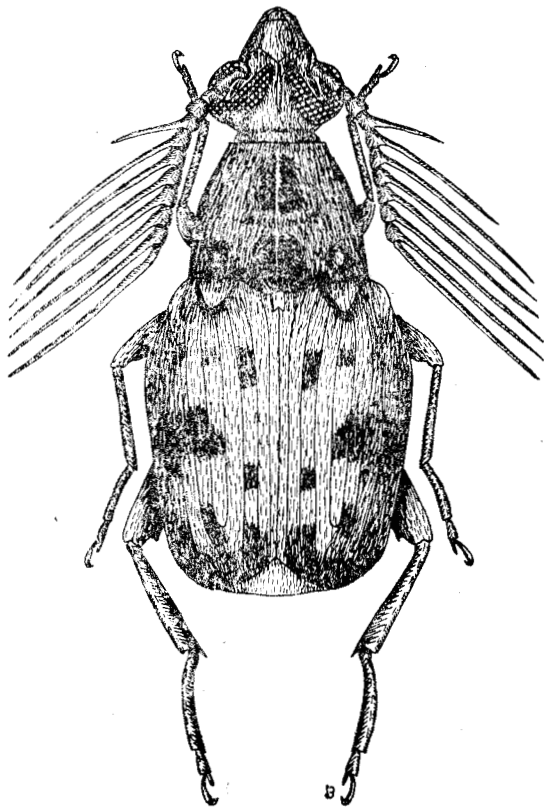
Type species: *Bruchus picturatus* FAHRAEUS, 1839 (= *Megalorhipis leiboldi* PHILIPPI, 1959) (by monotypy).

The genus is characterized by following combination of characters:
— antennae strongly pectinate in male, strongly serrate in female
— pronotum campaniform, lateral carina obsolete
— elytral striae 3 and 4 commonly arising at base from prominent, bidentate tubercle
— hind femur moderately swollen, with 3 or 4 subapical spines
— hind tibia straight, carinate, mucro longer than lateral coronal denticle
— median lobe elongate, ventral valve acuminate, internal sac with groups of similar sclerites
— lateral lobes depressed, elongate, divided at least to 1/2 length.

DESCRIPTION

Body length: 2.2–5.4 mm, width: 1.4–2.6 mm. Body ovate, stout. Head short, strongly constricted behind eyes. Eyes prominent, more narrowly separated in male than in female. Frons with sharp median carina. Anatennae long, pectinate or strongly serrate from fourth article (fig. 24). Pronotum campaniform, disc convex with narrow median sulcus separating paired basal and apical tumescenses, or pronotum uniformly convex, without tumescenses. Lateral carina obsolete or faintly indicated by threadlike line. Scutellum small, narrow, bidentate apically. Elytra subquadrate, disc flat

or subdepressed medially. Striae well defined, striae 3 and 4 commonly arising at base from prominent, bidentate tubercle. Front and middle legs slender, not sexually dimorphic. Hind femur moderately swollen. Internal ventral margin in basal 2/3 finely serrate, pecten with 3 or 4 small spines. Hind tibia straight, carinate, mucro longer than lateral coronal denticle (fig. 202). Vestiture moderately dense or dense, variegated.



24. *Rhipibruchus picturatus*, male

Male. Eyes more bulging, frons narrower. Antennae strongly pectinate (fig. 24). Pygidium arcuate in profile. Sterna 2–5 telescoped. Last sternite emarginate. Median lobe elongate, ventral valve acuminate. Internal sac with several groups of sclerites, in basic structure similar in all species (fig. 338). Lateral lobes elongate, depressed, divided at least to 1/2 length (fig. 342).

Female. Eyes less bulging, frons wider. Antennae strongly serrate. Pygidium nearly flat in lateral profile, vertical or oblique. Abdominal sterna only slightly telescoped. Last sternite not emarginate.

DIAGNOSIS

Rhipibruchus is closely related to *Pectinibruchus* only. It differs in short scutellum, stouter body and mucro longer than lateral coronal denticle. The Old World genus *Decellebruchus* differs in pronotum lacking tumescences, median lobe with distinct sclerites of different type, and lateral lobes strongly sclerotized.

HOST PLANTS

Mimosoideae: *Mimoseae*: *Prosopis* sp.

DISTRIBUTION

Chile, Argentina, Paraguay and Bolivia.
Number of species: 7.
References: KINGSOLVER, 1967: 318–324, 1982: 661–684.

Genus: *Pectinibruchus* Kingsolver

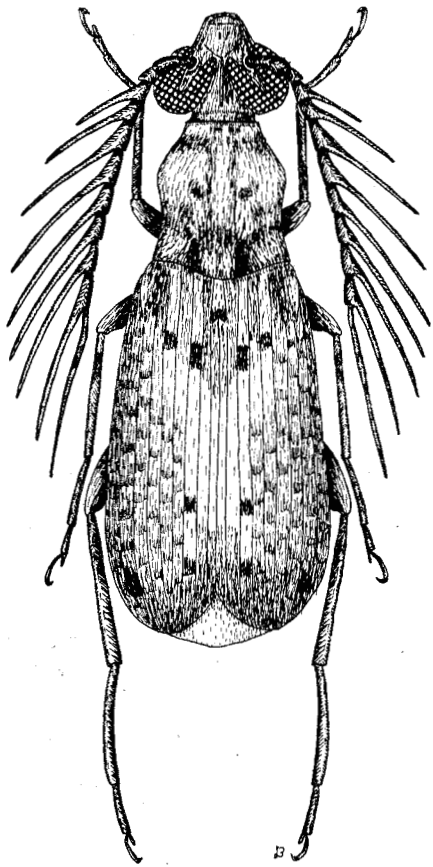
Pectinibruchus KINGSOLVER, 1967: 324.

Type species: *Pectinibruchus longiscutus* KINGSOLVER, 1967 (by monotypy).
The genus is characterized by following combination of characters:
— body elongate
— antennae strongly pectinate in male, strongly serrate in female
— pronotum campaniform, without lateral carina
— scutellum elongate, quadridentate apically
— elytral striae without basal tubercles or spines
— hind femur moderately swollen, with three subapical spines
— hind tibia straight, with obsolete lateral carina, mucro absent
— median lobe elongate, ventral valve acuminate, internal sac with several groups of sclerites
— lateral lobes depressed, elongate, divided to 2/3 length.

DESCRIPTION

Body length: 3.5–4.0 mm, width: 2.0–2.3 mm. Body elongate (fig. 25). Head short, eyes enlarged, postocular lobe almost completely reduced. Frons with sharp median carina. Antennae long, strongly pectinate or strongly serrate. Pronotum campaniform, convex, without lateral tumescences, without lateral carina. Scutellum greatly elongated, clavate, quadridentate apically (fig. 124). Elytral striae slightly disorted basally, no basal tubercles or

spines. Front and middle legs slender, not sexually dimorphic. Hind femur moderately swollen, internal ventral margin in basal 2/3 finely serrate, pecten with one large and two small spines. Hind tibia straight, without lateral carina. Coronal denticles small, mucro absent (fig. 200). Pygidium vertical. Vestiture dense, variegated.



25. *Pectinibruchus longiscutus*, male

Male. Eyes more bulging, frons narrower. Antennae strongly pectinate (fig. 25), axial portion of antennal articles elongate. Last abdominal sternum emarginate. Median lobe elongate, ventral valve acuminate. Internal sac with several groups of similar sclerites (fig. 339). Lateral lobes depressed, elongate, divided to 2/3 length (fig. 343).

Female. Eyes less bulging, frons wider. Antennae strongly serrate. Last sternite not emarginate.

DIAGNOSIS

Pectinibruchus is related to *Rhipibruchus* only. It differs in elongate scutellum and reduced mucro. The elongate, quadridentate scutellum distinguishes *Pectinibruchus* from all other genera of the tribe *Acanthoscelidini*.

HOST PLANTS

Mimosoideae: *Mimoseae*: *Prosopis* sp.

DISTRIBUTION

Argentina.
Number of species: 1.
References: no further works.

Dahlibruchus group

Body elongate. Antennae short, not sexually dimorphic. Pronotum campaniform, without lateral carina. Elytra without basal tubercles or with very small basal spines. Hind femur slender, with simple subapical spine, or without spines. Hind tibia without carinae, mucro very short or obsolete. Last sternite not emarginate in both sexes.

Genus: *Dahlibruchus* Bridwell

Dahlibruchus BRIDWELL, 1931: 40.

Type species: *Dahlibruchus sharpinaus* BRIDWELL, 1931 (by original designation).

The genus is characterized by following combination of characters:
- antennae short, not sexually dimorphic
- pronotum campaniform, without lateral carina
- elytral striae 4 and 5 with small basal spine
- hind femur slender, without subapical spine
- hind tibia straight, without carinae, coronal denticles short, mucro shorter than lateral coronal denticle
- last sternite not emarginate in both sexes
- median lobe short, broad, ventral valve subpentagonal, internal sac with numerous spines
- lateral lobes strongly sclerotized, not pubescent ventrally, divided to 2/3 length.

DESCRIPTION

Body length: 2.4 mm, width: 1.4 mm. Body elongate. Head short, strongly constricted behind eyes, postocular lobe short. Eyes moderately bulging, emarginate to 2/3 length. Frons with or without median carina. Antennae short, extending to hind angle of pronotum, distal articles about as long as wide. Pronotum campaniform, without lateral carina. Disc convex, without depressions or gibbosities. Scutellum square, bidentate apically. Elytral intervals 4 and 5 with small basal spine, striae 5 and 6 abbreviated at apex. Hind femur slender, not carinate ventrally, without spines. Hind tibia straight, slender, without carinae (fig. 203). Coronal denticles short, mucro distinctly shorter than lateral coronal denticle. Abdomen elongate, last sternite not emarginate in both sexes. Vestiture moderately dense, uniform.

Male. Fore tibia sometimes with sharp spine in the middle (fig. 208). Pygidium more convex. Median lobe short, broad. Ventral valve subpentagonal, acute apically, internal sac with numerous spines in the middle, but without large sclerites (fig. 340). Lateral lobes strongly sclerotized, not pubescent ventrally, divided to 2/3 length, apices with transverse sensoral carina (fig. 344). Basal strut without keel.

Female. Fore tibia without spines. Pygidium less convex.

DIAGNOSIS

Elongate body, pronotum without lateral carina and hind tibia without carinae near this genus to *Cosmobruchus* only. It differs in hind femur without spine and elytral striae 5 and 6 abbreviated apically.

HOST PLANTS

Compositae: *Dahlia* sp.

DISTRIBUTION

Mexico, Guatemala and Nicaragua.
Number of species: 2.
References: no further works.

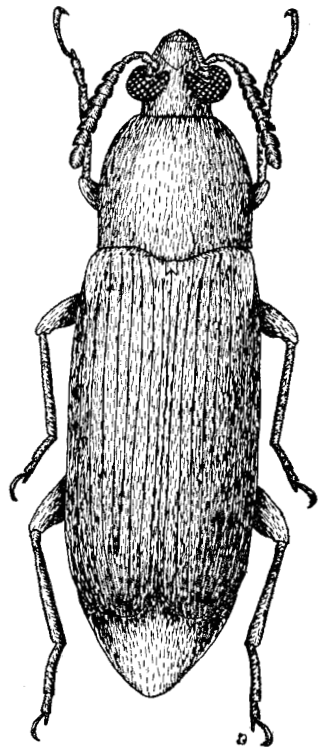
Genus: *Cosmobruchus* Bridwell

Cosmobruchus BRIDWELL, 1931: 41.

Type species: *Cosmobruchus russelli* BRIDWELL, 1931 (by monotypy).

The genus is characterized by following combination of characters:
— antennae very short, not sexually dimorphic

— pronotum campaniform, without lateral carina
— elytral striae without basal spines or tubercles
— hind femur slender, with simple subapical spine
— hind tibia straight, without carinae, coronal denticles extremely short, almost visible
— last sternite not emarginate in both sexes
— median lobe moderately long, ventral valve cordate, acute apically, internal sac with numerous needles in the hind part
— lateral lobes strongly sclerotized, not pubescent ventrally, divided to 2/3 length



26. *Cosmobruchus russelli*, male

DESCRIPTION

Body length: 2.0–2.6 mm, width: 1.0–1.2 mm. Body distinctly elongate (fig. 26). Head short, constricted behind eyes, postocular lobe short. Eyes bulging, emarginate to 2/3 length. Frons without median carina, or with

impunctate median line. Antennae very short, extending to 2/3 length of pronotum. Distal articles transverse. Pronotum campaniform, without lateral carina. Disc convex, without depressions or gibbosities. Scutellum square, bidentate apically. Elytral striae without basal spines or tubercles. Striae 4 and 5 abbreviated apically. Hind femur slender with fine internal ventral carina and simple subapical spine. Hind tibia straight, slender, without carinae, coronal denticles extremely short, hardly visible (fig. 204). Abdomen elongate, last sternite not emarginate in both sexes. Vestiture moderately dense, uniform.

Male. Last article of protarsi elongate, about twice longer than basal three articles together (fig. 209). Median lobe moderately long, ventral valve cordate, acute apically, internal sac with numerous dense needles in the hind part, without large sclerites (fig. 341). Lateral lobes strongly sclerotized, not pubescent ventrally, apices without sensoral carina (fig. 345). Basal strut without keel.

Female. Last article of protarsi not elongate, about as long as three basal articles together.

DIAGNOSIS

Cosmobruchus is very similar to *Dahlibruchus*, differs in hind femur with subapical spine, coronal denticles hardly visible, elytral striae 4 and 5 abbreviated apically, and last articles of male protarsi distinctly elongate.

HOST PLANTS

Compositae: *Cosmos* sp.

DISTRIBUTION

Mexico.
Number of species: 1.
References: no further works.

Lithraeus group

Antennae short, not sexually dimorphic. Pronotum with distinct lateral carina. Elytron without basal tubercles or spines. Hind femur slender, without spines, or with simple subapical spine. Hind tibia straight, slender, without lateral carinae.

Genus: *Lithraeus* Bridwell

Lithraeus BRIDWELL, 1952: 125.

Type species: *Bruchus elegans* BLANCHARD, 1851 (= *Lithraeus electus* BRIDWELL, 1952) (by monotypy).

The genus is characterized by following combination of characters:
- antennae short, not sexually dimorphic
- frons without median carina
- pronotum campaniform, with lateral carina extending to procoxal cavity
- elytron without basal tubercles
- hind femur slender, not carinate ventrally, internal ventral margin with very minute subapical spine
- hind tibia straight, slender, without carinae, coronal denticles very short, mucro obsolete
- median lobe short, ventral valve not triangular, internal sac with several strong spines
- lateral lobes depressed, not modified, divided to about half length.

DESCRIPTION

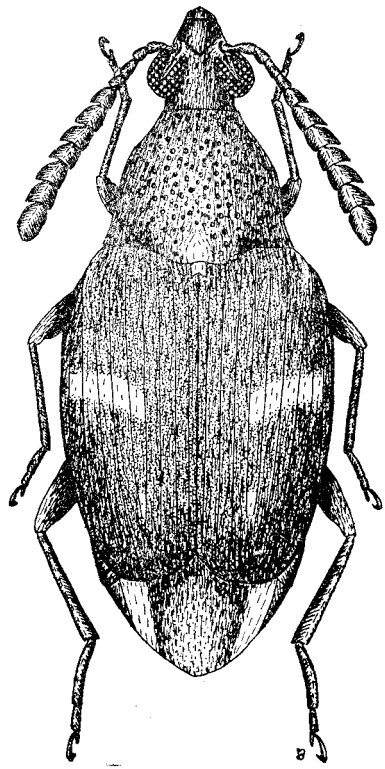
Body length: 2.3–3.1 mm, width: 1.3–1.6 mm. Head short, constricted behind eyes, postocular lobe short. Eyes moderately enlarged, emarginate to 2/3 length. Frons without median carina or impunctate line. Antennae short, not sexually dimorphic, extending to humeral angle. Distal articles transverse, slingtly eccentric. Pronotum campaniform, sides slightly convex, lateral carina indistinct, extending from hind angle of pronotum to coxal cavity. Disc convex, without gibbosities or impressions. Prosternal process short, triangular, acute. Scutellum square, bidentate apically. Elytra about 1.4 times longer than wide together. Striae regular, deeply punctate, without basal tubercles. Intervals flat, without rows of large punctures. Striae 4 and 5 abbreviated apically. Fore and mid legs slender, not sexually dimorphic. Hind femur slender, not carinate ventrally, internal ventral margin with very small subapical spine (fig. 201). Hind tibia straight, slender, without carinae, coronal denticles very small, mucro almost obsolete. Abdomen not modified, pygidium oblique in both sexes. Vestiture scarce in major part of body, dense hair forming several spots and bands.

Male. Last sternite emarginate. Pygidium more convex. Median lobe rather short, ventral valve semicircular, internal sac with several elongate spines in the middle (fig. 346). Lateral lobes not modified, depressed, divided to about half length (fig. 350). Basal strut without keel.

Female. Last sternite not emarginate. Pygidium less convex.

DIAGNOSIS

It differs from other genera with hind tibia not carinate and pronotum with lateral carina in fore legs not modified (from *Spatulobruchus*), maxillary palpi in female not elongated (from *Palpibruchus*), and hind femora with very minute spine (from *Bonaerius*).



27. *Lithraeus elegans*

HOST PLANT

Anacardiaceae: *Lithraea* sp.

DISTRIBUTION

Chile, Argentina and South Brasilia.

Number of species: 1, probably several undescribed or described as *Bruchus*.

References: no further works.

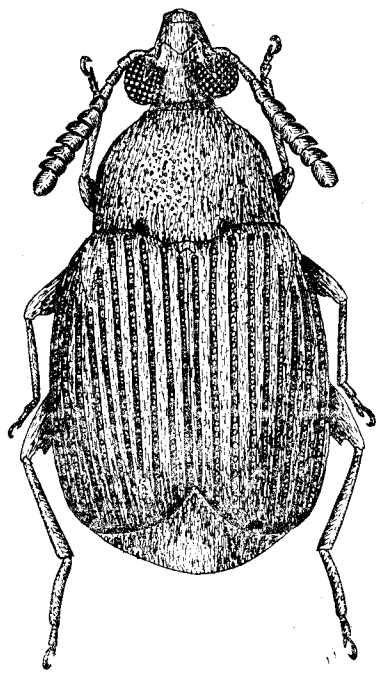
Genus: *Bonaerius* Bridwell

Bonaërius BRIDWELL, 1952a: 50.

Type species: *Bruchus inlineatus* PIC, 1930 (by monotypy).

The genus is characterized by following combination of characters:

— antennae short, not sexually dimorphic
— pronotum campanulate, with sharp lateral carina
— elytral striae without basal tubercles
— hind femur slightly incrassate, with simple subapical spine
— hind tibia slender, straight, without carinae, mucro not longer than lateral coronal denticle
— pygidium in female with two deep apical depressions
— median lobe short, ventral valve pentagonal, internal sac with three large sclerites
— lateral lobes depressed, not pubescent ventrally, divided to 3/4 length.



28. *Bonaerius inlineatus*

DESCRIPTION

Body length: 1.9–2.1 mm, width: 1.3–1.4 mm. Body oval, stout. Head short, strongly constricted behind eyes, postocular lobe short. Eyes bulging, emarginate to half length. Frons broad, with short median carina. Antennae

very short, extending to 3/4 length of pronotum. Distal articles transverse, only slightly eccentric. Pronotum campaniform, transverse, with sharp lateral carina. Disc flat, without gibbosities. Scutellum square, bidentate apically. Elytral striae regular, without basal tubercles or spines, strongly impressed and punctured. Hind femur slightly swollen, with single subapical spine. Posterior margin of the spine distinctly serrate. Hind tibia slender, straight, without carinae, coronal denticles about equal in length (fig. 206). Last sternite not emarginate in both sexes. Vestiture scarce, uniform.

Male. Pygidium without apical depressions. Median lobe short, ventral valve pentagonal, distinctly narrower than tubular part, internal sac with three large sclerites (fig. 348). Lateral lobes depressed, not pubescent ventrally, divided to 3/4 length (fig. 352). Basal strut without keel.

Female. Pygidium with two deep apical depressions.

DIAGNOSIS

It differs from *Stator*, *Pseudopachymerina* and *Mimosestes* in hind tibia slender, without carinae. From other genera with pronotum carinate from the *Lithraeus* group it differs in hind femur with strong subapical spine.

HOST PLANT

Malvaceae: *Hibiscus* sp.

DISTRIBUTION

Argentina.
Number of species: 1.
References: no further works.

Genus: *Spatulobruchus* gen. nov.

Type species: *Spatulobruchus huggerti* n. sp.

The genus is characterized by following combination of characters:

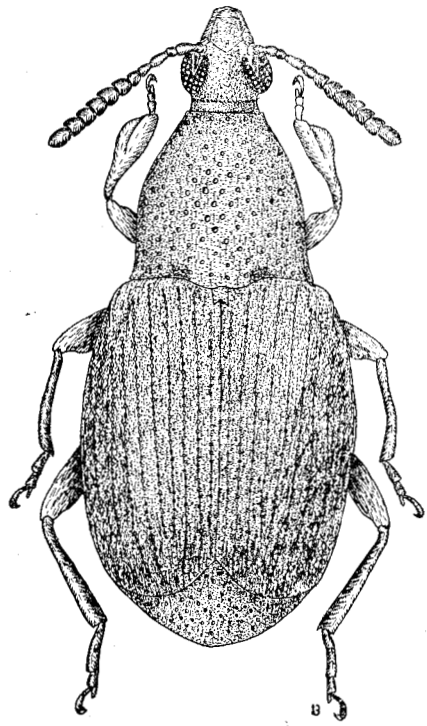
- antennae short, reaching to hind angle of pronotum, probably not sexually dimorphic
- frons without median carina
- pronotum campaniform, with indistinct lateral carina, extending from hind angles of pronotum to procoxal cavity
- elytra without basal tubercles
- fore tibia strongly enlarged, spatulate

— hind femur slender, not carinate ventrally, internal ventral margin with minute subapical spine
— hind tibia straight, not carinate, coronal denticles very short, mucro almost obsolete
— median lobe rather short, ventral valve not triangular, internal sac without large sclerites, but with several spines apically
— lateral lobes moderately long, divided to half length, apices modified.

DESCRIPTION

Spatulobruchus huggerti n. sp.

Body length: 1.5 mm, width: 0.9 mm. Black, fore legs and five basal antennal articles yellowish, mid legs brownish. Dorsal vestiture extremely short, almost visible, greyish and brownish, uniform. Ventral vestiture greyish, scarce, not covering body surface. Head short, constricted behind eyes, postocular lobe almost obsolete. Eyes moderately bulging, emarginate to 2/3 length. Frons without median carina or impunctate line. Antenna short,



29. *Spatulobruchus huggerti*, male

reaching to hind angle of pronotum, distal articles transverse, slightly eccentric (fig. 80). Pronotum campaniform, with indistinct lateral carina, extending from hind angle of pronotum to procoxal cavity. Disc convex, without gibbosities or depressions. Prosternal process short, triangular. Scutellum square, truncate apically. Elytra about 1.5 times longer than wide together. Striae regular, deeply punctate, without basal tubercles. Striae 4–5 abbreviated apically. Fore tibia strongly enlarged, spatulate, curved ventrad (fig. 207). Apices of mid tibia slightly curved ventrad. Hind femur slender, not carinate ventrally, internal ventral margin with minute subapical spine (fig. 201). Hind tibia slender, not carinate, coronal denticles very short, mucro almost obsolete. Abdomen not modified, last sternite not emarginate.

Male. Median lobe rather short, ventral valve transverse, not triangular, internal sac with several spines apically (fig. 347). Lateral lobes moderately long, rather strongly sclerotized, divided to half length. Apices with sensoral plate densely pubescent on ventral edge. Basal strut without keel (fig. 351).

Female. Unknown. May be spatulate fore tibia is only the sexual character and females have tibiae not enlarged.

DIAGNOSIS

Distinctly differs from all other New World genera of the tribe in fore tibia enlarged, spatulate.

HOST PLANT

Unknown.

DISTRIBUTION

Holotype ♂, Peru, Huanuco, Tingo Maria, 26 I 1984, leg. L. Huggert (coll. Zoological Museum, Lund University).

Number of species: 1.

Genus: *Palpibruchus* gen. nov.

Type species: *Palpibruchus longipalpis* n. sp.

The genus is characterized by following combination of characters:

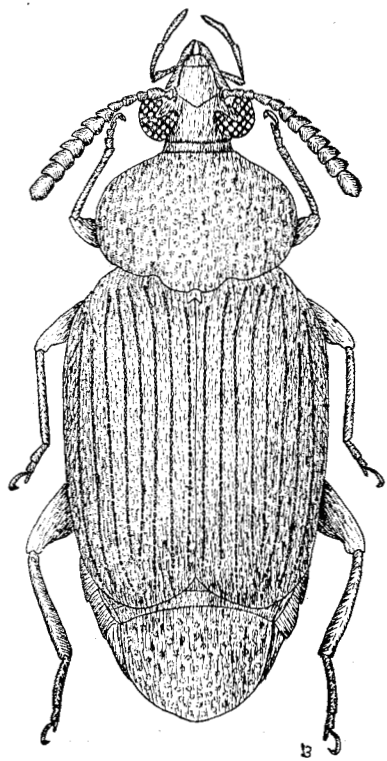
– maxillary palpi in female extremely long, almost as long as antenna
– antenna short, not sexually dimorphic
– pronotum transverse, with distinct lateral carina
– elytral striae regular, without basal tubercles

— hind femur short, moderately swollen, with indistinct internal ventral carina, without spines or with very minute suhapical spine
— hind tibia straight, slender, without carinae, coronal denticles very short, mucro obsolete
— median lobe very long, ventral valve triangular, internal sac without large sclerites
— lateral lobes very long, incised to 1/5 length, apices modified.

DESCRIPTION

Palpibruchus longipalpis n. sp.

Body length: 2.1–2.6 mm, width: 1.2–1.4 mm. Uniformly yellowish-red. Vestiture scarce, whitish, uniform, not covering body surface. Head short, strongly constricted behind eyes (fig. 87), postocular lobe obsolete. Eyes bulging, incised to 2/3 length. Frons with glabrous, flat median carina. Antennae short, subserrate, reaching to hind angle of pronotum. Pronotum trans-



30. *Palpibruchus longipalpis*, female

verse, on sides broadly rounded, with sharp lateral carina extending from hind angle to anterior pronotal angle (figs. 111, 112). Disc convex, without gibbosities or impressions, largery and densely punctate. Prosternal process short, triangular, acute. Scutellum square, bidentate apically. Elytra slightly longer than wide together. Striae regular, deeply punctate, without basal tubercles. Intervals flat, without large punctures. Fore and mid legs slender, not sexually dimorphic. Hind femur moderately swollen, with indistinct internal ventral carina, without spines or with very minute subapical spine. Hind tibia straight, slender, without carinae, coronal denticles very short, mucro obsolete (fig. 201). Abdomen large, bulging, basal sternites not modified.

Male. Maxillary palpi not elongate (but longer than in related genera). Last sternite emarginate. Median lobe very long, ventral valve triangular, internal sac without large sclerites (fig. 349). Lateral lobes very long, incised to 1/5 length, apices bent ventrally, forming a short gutter (fig. 353). Basal strut with perpendicular keel.

Female. Maxillary palpi very long, about as long as antenna (fig. 68). Last sternite not emarginate.

DIAGNOSIS

It differs from all other genera of *Acanthoscelidini* in very long palpi in female, and in transverse pronotum with sharp lateral carina.

HOST PLANT

Unknown.

DISTRIBUTION

Holotype ♂, allotype and paratype ♀, Argentina, Cordova, leg. Davis (holotype and allotype in coll. Institute of Zoology, Polish Academy of Sciences, Warsaw, paratype in author's collection).

Number of species: 1.

Specularius group

Body stout. Pronotum campaniform with indistinct gibbosities, without lateral carina. Elytral stria 4 with basal tubercle. Hind femur swollen, with pecten of 3–4 large spines. Hind tibia enlarged, arcuate basally, carinate. Pygidium sometimes with large polished speculum.

Genus: *Specularius* Bridwell

Specularius BRIDWELL, 1938: 71.

Type species: *Bruchus impressithorax* PIC, 1932 (= *Specularius erythrinae* BRIDWELL, 1938).

The genus is characterized by following combination of characters:

— antennae serrate, not sexually dimorphic
— pronotum campaniform, with indistinct gibbosities and impressions, without lateral carina
— elytral stria 4 with basal tubercle
— hind femur swollen, external ventral margin with blunt denticle, internal ventral margin with one large spine followed by two or three smaller spines
— hind tibia strongly enlarged, carinate, slightly arcuate basally
— median lobe moderately long, ventral valve triangular, internal sac without large sclerites
— lateral lobes depressed, not modified apically.

DESCRIPTION

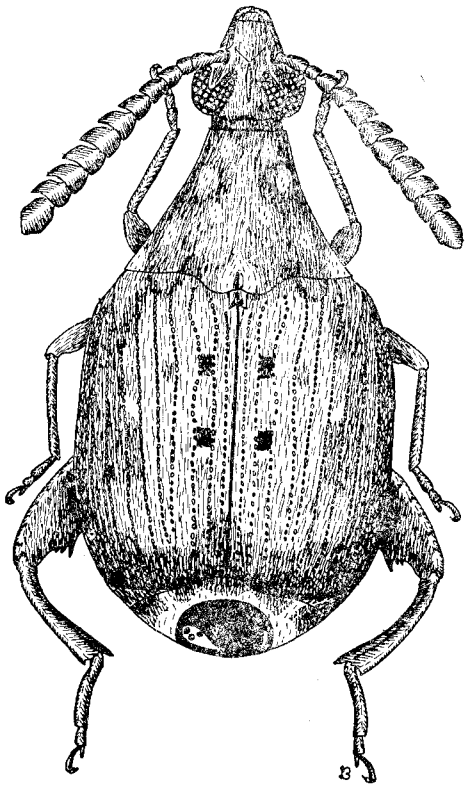
Body length: 3.2–4.5 mm, width: 1.9–2.5 mm, Body oval, stout. Head short, constricted behind eyes, postocular lobe short. Eyes moderately bulging, deeply incised. Frons with median carina. Antennae rather short, extending at most to humeral callus, serrate, not sexually dimorphic (fig. 31). Pronotum campaniform, without lateral carina. Disc rough, with several indistinct gibbosities and impressions. Prosternal process narrow, triangular, acute. Scutellum square, bidentate apically. Elytral striae regular, stria 4 (and sometimes 3) abbreviated basally by tubercle. Fore and mid legs slender, not sexually dimorphic. Hind femur swollen, internal ventral margin with one large and two or three smaller subapical spines. External ventral margin incised subapically, forming a blunt denticle. Hind tibia arcuate basally, strongly enlarged, with sharp lateral carina, mucro longer than lateral coronal denticle (fig. 191). Abdomen not modified or (in two species) with large polished pygidial speculum.

Male. Last sternite emarginate. Median lobe moderately long, ventral valve triangular, internal sac without large sclerites, but with several small spines (fig. 380). Lateral lobes depressed, not modified, deeply incised (fig. 383).

Female. Last sternite not emarginate.

DIAGNOSIS

Specularius is more similar to the New World genera of the *Gibbobruchus* and *Acanthoscelides* groups than to other Old World genera. In most structures it is intermediate between these groups (as *Merobruchus*), but the similarity to the New World genera is probably a result of evolutionary parallelism. *Specularius* differs from *Merobruchus* in structure of male genitalia with ventral valve triangular and acute apically.



31. *Specularius impressithorax*

HOST PLANTS

Papilionoideae: *Erythrininae*: *Erythrina* sp.; *Phaseolinae*: *Psophocarpus* sp., *Physostigma* sp.; *Cajaninae*: *Rhynchosia* sp.

DISTRIBUTION

Tropical Africa. Introduced into India and Sumatra.

Number of species: 9.

References: KINGSOLVER and DECELLE, 1979: 528–532.

Genus: *Acanthobruchidius* Borowiec

Acanthobruchidius BOROWIEC, 1980: 127.

Type species: *Mylabris spinigera* BAUDI, 1886 (by monotypy).

The genus is characterized by following combination of characters:

— antennae very long, in male extending to apice of elytron, in female to half body length
— frons with sharp median carina
— pronotum conical, without lateral carina
— elytral striae 2–6 deeply impressed basally
— hind femur with simple, large spine on internal ventral margin
— hind tibia straight, carinate, serrulate posteriorly
— median lobe short, broad, internal sac with large comb-like sclerite
— lateral lobes depressed, broadly and deeply divided.

DESCRIPTION

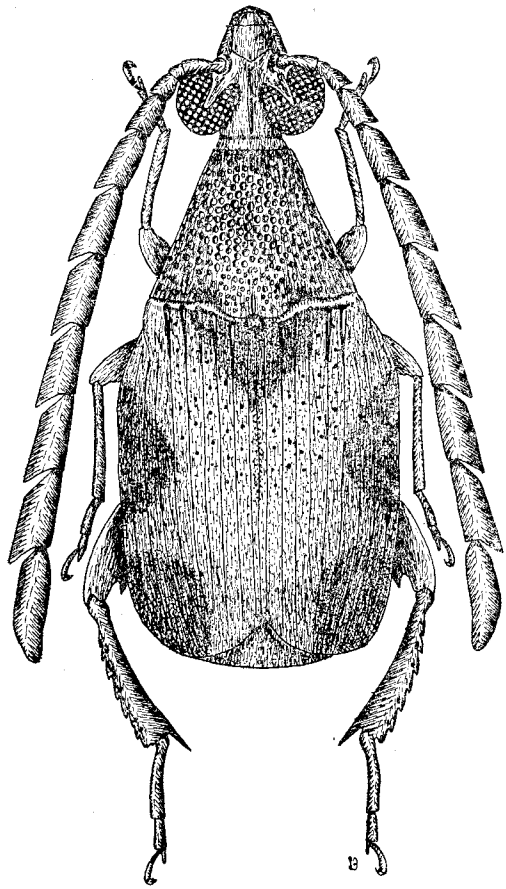
Body length: 3.4–4.6 mm, width: 2.4–2.9 mm. Body oval, stout. Head short, strongly constricted behind eyes. Postocular lobe very short. Eyes strongly bulging, emarginate to 3/4 length. Frons narrow, with very sharp median carina. Antennae very long, extending at least to half body length. Distal articles elongate, strongly serrate (fig. 32). Pronotum conical, without lateral carina (fig. 102). Prosternal process short, narrow, acute. Scutellum transverse, bidentate apically. Elytral striae regular, almost impunctate, striae 2–6 deeply impressed basally, without basal tubercles. Front and middle legs slender, not sexually dimorphic. Hind femur moderately swollen, bicarinate ventrally. Internal ventral margin with a single, large subapical spine, external ventral margin with 3–4 minute spines (fig. 216). Hind tibia strongly enlarged, straight, with three carinae. Posterior surface of hind tibia strongly serrulate or scabrous. Mucro distinctly longer than lateral coronal denticle. Vestiture scarce, variegated.

Male. Antennae longer, extending to elytral apices, more serrate. Pygidium more convex. Last abdominal sternite emarginate. Median lobe short, broad, ventral valve subtriangular. Internal sac with large, comb-like sclerite (fig. 382). Lateral lobes depressed, broadly and deeply incised. Basal strut without median keel (fig. 385).

Female. Antennae shorter, extending to half body length, less serrate. Pygidium less convex. Last abdominal sternite not emarginate.

DIAGNOSIS

The large subapical femoral spine and strongly serrulate hind tibiae distinguished *Acanthobruchidius* from all other genera of *Acanthoscelidini.*



32. *Acanthobruchidius spiniger,* male

HOST PLANT

Unknown.

DISTRIBUTION

The Middle East, Turkey and Lesbos Is. Record from Sardinia needs confirmation.

Number of species: 1.

References: no further works.

Paleoacanthoscelides group

Antennae short, not sexually dimorphic. Pronotum campanulate, without lateral carina. Base of elytral interval 4 with tubercle. Hind femur with one large and two small subapical spines. Base of median lobe tape-like, lateral lobes completely fused.

Genus: *Paleoacanthoscelides* Borowiec

Paleoacanthoscelides BOROWIEC, 1985: 457.

Type species: *Bruchus gilvus* GYLLENHAL, 1839 (by monotypy).

The genus is characterized by following combination of characters:

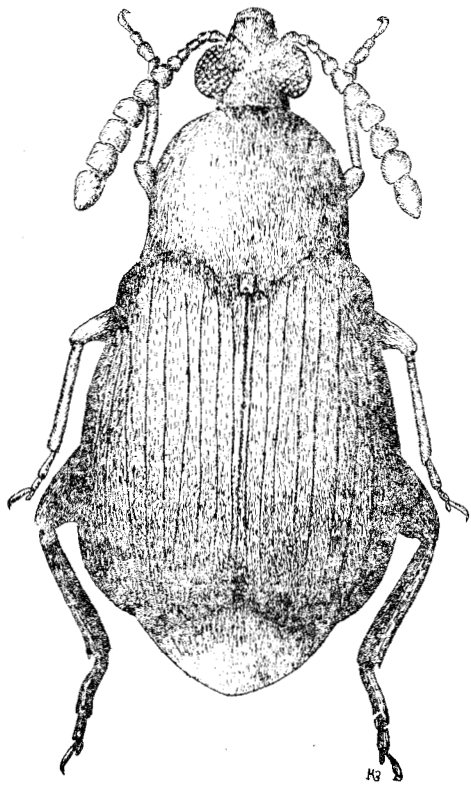
- antennae short, not sexually dimorphic
- pronotum campanulate, without lateral carina
- base of elytral interval 4 with small tubercle
- last abdominal sternite not emarginate in both sexes but with median impression in male
- hind femur with one large and two small subapical spines
- hind tibia straight, with three carinae, mucro shorter than lataral coronal denticle
- base of median lobe tape-like, internal sac with large sclerites
- lateral lobes completely fused, strongly sclerotized, forming a deep gutter surrounding median lobe

DESCRIPTION

Body length: 1.7–2.4 mm, width: 1.1–1.6 mm. Body oval. Head short, strongly constricted behind eyes. Postocular lobe short. Eyes moderately bulging, emarginate to 2/3 length. Frons with impunctate median line, without carina. Antennae short, extending to hind angle of pronotum, not sexually dimorphic. Distal articles slightly eccentric. Pronotum campaniform, without lateral carina. Pronotal disc convex, without depressions or gibbosities. Prosternal process short, narrow, acute. Scutellum square, bidentate apically. Elytral striae regular, interval 3 at base distinctly wider than interval 4. Base of elytral interval 4 with small tubercle. Front and middle legs slender, not sexually dimorphic. Hind femur moderately swollen, with ventral internal margin carinate. Carina with one large and two minute subapical spines, all margin before large spine serrate (fig. 179). Hind tibia straight, not enlarged, without anterolateral carina. Mucro very short, shorter than lateral coronal denticle. Pygidium feebly convex. Last sternite in both sexes not emarginate. Vestiture dense, uniform.

Male. Central part of last sternite with shallow, not pubescent impression. Median lobe elongate with very long, tape-like base. Ventral valve trilobate, strongly curved ventrad (fig. 354). Internal sac with group of large spines in the middle, forming a large pecten. Lateral lobes strongly sclerotized, completely fused, forming a deep gutter surrounding median lobe (fig. 356). Basal strut with perpendicular keel.

Female. Last sternite without impression.



33. *Paleoacanthoscelides gilvus*

DIAGNOSIS

Paleoacanthoscelides differs from all other genera of *Acanthoscelidini* in having basal part of median lobe tape-like and completely fused gutter-like lateral lobes.

HOST PLANT

Papilionoideae: *Hedysareae*: *Onobrychis* sp.

DISTRIBUTION

South Europe, Mediterranean Subregion, Asia Minor and Middle Asia.
Number of species: 2.
References: no further works.

Horridobruchus group

Body stout, deep. Pronotum with horn-like gibbosities. Hind femur bicarinate ventrally, external carina with blunt denticle, internal carina with sharp subapical spine. Hind tibia arcuate, carinate, mucro extremely long.

Genus: *Horridobruchus* Borowiec

Horridobruchus BOROWIEC, 1984: 116.

Type species: *Pseudopachymerus quadridentatus* PIC, 1923 (= *Horridibruchus corniger* BOROWIEC, 1984) (by automatic fixation).

The genus is characterized by following combination of characters:
- head elongate, with long postocular lobes
- pronotum with horn-like gibbosities
- elytra and pygidium with large gibbosities or tubercles
- hind femur bicarinate ventrally, external ventral margin with blunt denticle, internal ventral margin with large subapical spine
- hind tibia arcuate, carinate, mucro extremely long
- median lobe broad, ventral valve acute, internal sac without large sclerites
- lateral lobes flat, broadly divided, basal strut without keel.

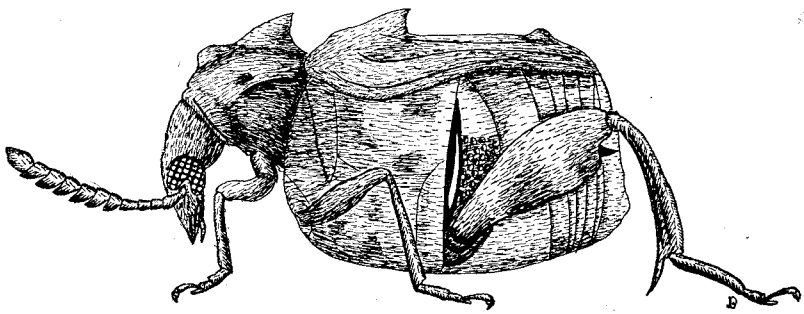
DESCRIPTION

Body length: 4.1–4.4 mm, width: 3.5–3.7 mm. Body stout, deep. Head elongate, not strongly constricted behind eye, postocular lobe elongate, equal to 1/4 eye length (fig. 88). Frons broad, equal to 2/3 eye length, with sharp median carina. Eyes rather flat, emarginate to half length. Gena about as long as width of antennal fossa. Anatennae short, probably not sexually dimorphic. Distal articles wider than long, subserrate (fig. 34). Pronotum campaniform, with strongly concave sides, without lateral carina (fig. 104). Gibbosities in the middle of pronotum forming two blunt tubercles anteriorly and two horns shaped like an acacia thorn, directed backwards. Scutellum square, bidentate apically. Prosternal process narrow, triangular, acute, separating procoxae for 0.8 their length. Metasternum convex, broadly rounded in profile. Elytra together subquadrate, disc concave. Striae deep, punctate, striae 3 and 4 with basal tubercle. Intervals 6–7 and 9 with apical

gibbosities. Striae 4 and 7, 5 and 6 closed posterad. Humeral callus extremely protruding, elongate into two horns similar to those on pronotum but slightly lower and blunter. Surface of intervals 5–9 and transverse fold between humeral callus and scutellum lying distinctly higher than surface of intervals 1–4. Front and middle legs slender. Hind femora moderately swollen with two sharp carinae ventrally. Ventral external carina incised before apex, forming broad, blunt denticle. Ventral internal carina with long, sharp spine, carina in front of and behind the spine smooth, with no minute spines. Hind tibia arcuate, carinate, lateral carina weaker developed than the lateroventral one. Mucro unusually long, reaching beyond the half of first tarsomere (fig. 210). Coronal denticles fine. Abdomen with fine gibbosities in upper part of sternites II–IV and in middle of sternite V. Pygidium with two gibbosities at tip. On sides of the middle of pygidium two small, shallow foveae, with hairs sparser than the rest of pygidium. Vestiture dense, variegated.

Male. Last abdominal sternite emarginate. Ventral lobe short and broad. Ventral valve triangular, internal sac with numerous needles, without large sclerites (fig. 381). Lateral lobes depressed, broadly incised to 2/3 their length. Basal strut without perpendicular keel (fig. 384).

Female. Unknown.



34. *Horridobruchus quadridentatus*

DIAGNOSIS

Stout, deep body, strongly developed gibbosities on pronotum and elytra, curved hind tibia, and short antennae near this genus to the gibbous genera of the *Gibbobruchus* group. It differs in the structure of hind femora with pecten reduced to one spine. The general similarity between *Horridobruchus* and New World gibbous genera is probably a result of evolutionary parallelism or *Horridobruchus* represents specialized line within the gibbous genera developing in Old World.

HOST PLANT

Unknown.

DISTRIBUTION

South China.
Number of species: 1.
References: no further works.

Callosobruchus group

Antennae long, sexually dimorphic. Pronotum conical or campaniform, without lateral carina. Hind femur bicarinate ventrally, both external and internal carina with subapical spine. Hind tibia straight, carinate, mucro longer than lateral coronal denticle. Pygidium vertical in males.

Genus: *Callosobruchus* Pic

Callosobruchus PIC, 1902: 6.

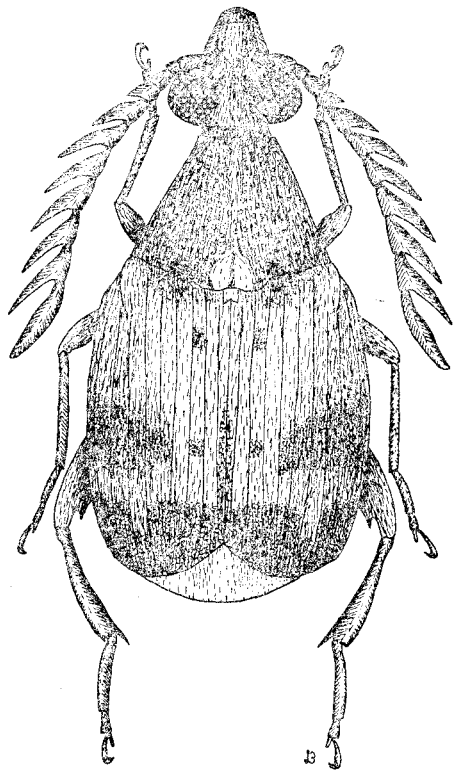
Type species: *Curculio chinensis* LINNAEUS, 1758 (designated by BRIDWELL, 1929: 40).

The genus is characterized by following combination of characters:
- antennae subserrate, serrate or pectinate
- frons with sharp median carina
- pronotum campaniform or conical, without lateral carina, usually with prominent praescutellar gibbosities
- elytra with or without basal tubercle
- hind femur moderately swollen, bicarinate ventrally, both external and internal carina with subapical spine or denticle
- hind tibia enlarged, straight, carinate, mucro longer than lateral coronal denticle
- pygidium vertical in males
- median lobe more or less elongate, ventral valve triangular, internal sac with or without large sclerites
- lateral lobes depressed, not modified apically, deeply divided.

DESCRIPTION

Body length: 1.5–3.0 mm, width: 1.1–2.1 mm. Body oval, stout. Head short, strongly constricted behind eyes, postocular lobes very short or absent. Eyes usually strongly bulging, deeply emarginate. Frons narrow, with sharp median carina. Antennae usually long, subserrate, serrate or pecti-

nate, sexually dimorphic. Pronotum conical or campaniform, without lateral carina. Disc convex, usually with distinct praescutellar gibbosities, sometimes disc gibbous in anterior half. Prosternal process narrow, triangular, acute. Scutellum square, bidentate apically. Elytral striae with or without basal tubercles. Hind femur moderately swollen, bicarinate ventrally. Both internal and external carina with subapical spine or denticle (in *C. analis* internal spine is reduced). Hind tibia enlarged, carinate, mucro longer than lateral coronal denticle (fig. 158). Abdomen telescoped, especially in male. Vestiture varying from scarce to dense, variegated.



35. *Callosobruchus chinensis*, male

Male. Antennae longer and more serrate, or pectinate. Eyes often more bulging. Abdomen strongly telescoped, pygidium vertical. Last sternite emarginate. Median lobe elongate, ventral valve triangular, internal sac in many species with strongly sclerotized dentate plates (figs. 361, 365). Lateral lobes depressed, not modified apically, deeply divided. Basal strut with or without median keel (fig. 362).

Female. Antennae shorter, subserrate or serrate, never pectinate. Eyes usually less bulging. Abdomen slightly telescoped, pygidium subvertical. Last sternite not emarginate.

DIAGNOSIS

Callosobruchus differs from all other genera of *Bruchinae* in presence of subapical spines in both external and internal carina of hind femur.

HOST PLANTS

Papilionoideae: *Glycine* sp., *Pueraria* sp., *Macrotyloma* sp., *Sphenostylis* sp., *Dolichos* sp., *Lablab* sp., *Physostigma* sp., *Vigna* sp., *Voandezia* sp., *Phaseolus* sp., *Cajanus* sp., *Vicia* sp., *Lathyrus* sp., *Lens* sp., *Pisum* sp., *Cicer* sp.; *Nymphyceae*: *Nelumbo* sp.

DISTRIBUTION

Warm parts of the world, in many countries as stored pests. In New World as natural emigrants or introduced.

Number of species: at least 10.

References: SOUTHGATE, HOWE and BRETT, 1957: 79–89; SOUTHGATE, 1958: 591–599.

Bruchidius group

Very heterogenous group. Antennae short to long, sexually dimorphic or not, subserrate or serrate, never pectinate. Pronotum campaniform or conical, without lateral carina. Elytral rows with or without basal tubercles. Hind femur without spines or with minute subapical spine. Hind tibia straight, usually with lateral carina, cornal denticles distinct, mucro varying from short to extremely long. Abdomen usually not telescoped.

Genus: *Bruchidius* Schilsky

Bruchidius SCHILSKY, 1905: B.
Bruchinus SCHILSKY, 1905: no. 38 (unvalid name, cited in synonymy).
Sparteus BRIDWELL, 1946: 55 (type species: *Bruchus ater* MARSHAM, 1802 = *Bruchus villosus* sensu BRIDWELL, 1946, missidentification).
Longebruchus PIC, 1953: 4 (type species: *Longebruchus clermonti* PIC, 1953), nomen dubium

Type species: *Bruchus quinqueguttatus* OLIVIER, 1795 (designated by BRIDWELL, 1932: 104).

The genus is characterized by following combination of characters:

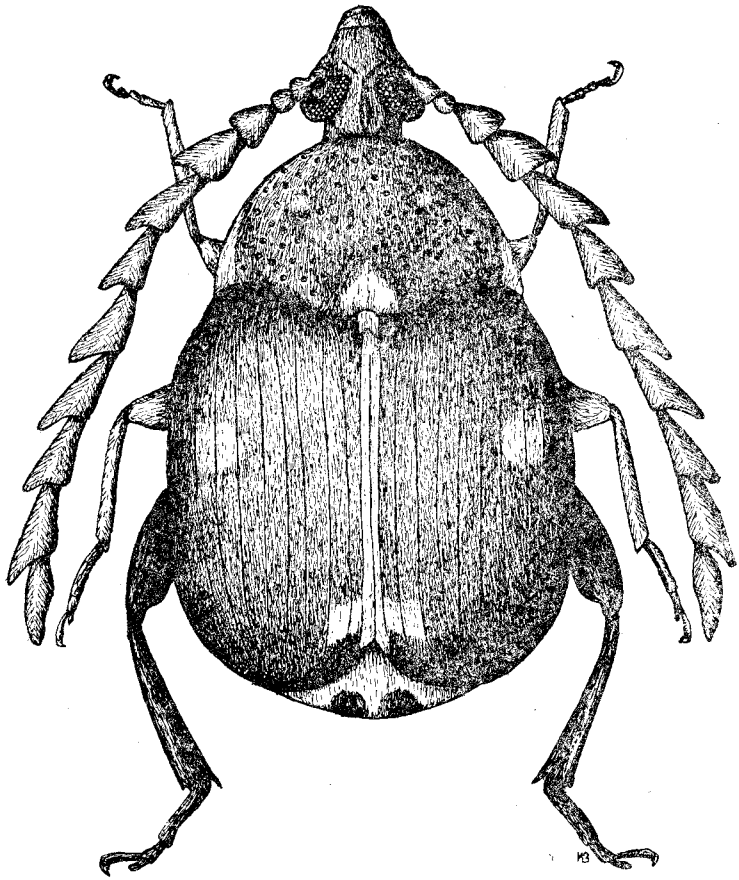
— antennae varying from short to extremely long, sexually dimorphic or not
— pronotum campaniform or conical, or transverse, without lateral carina
— elytral rows with or without basal tubercles
— hind femur without spines or with very minute spine
— hind tibia straight, with 2–4 carinae
— abdomen usually not telescoped, pygidium of female without foveae
— median lobe varying from short to extremaly long, ventral valve usually triangular, internal sac with or without large sclerites
— lateral lobes flat, or modified apically, more or less divided, basal strut with or without perpendicular keel.

DESCRIPTION

Body length: 1.0–4.1 mm, width: 0.7–2.8 mm. Head in most species short, strongly constricted behind eyes, postocular lobe usually short. Eyes more or less bulging, emarginate to $^1/_2$–$^3/_4$ length. Frons with of without median carina, or with median impunctate line. Pronotum conical, campaniform, or rarely semicircular or transverse, without lateral carina. Pronotal disc convex or flat without gibbosities, or with flat praescutellar gibbosity. Elytral striae regular, sometimes abbreviated by basal tubercles. Hind femur moderately swollen or slender, not channeled ventrally, carinate on ventral margin only or without carinae. Internal ventral margin with minute subapical spine or without spines. Hind tibia straight, more or less enlarged with 2–4 carinae, mucro varying from very short, almost obsolete, to extremely long, longer than lateral coronal denticle (figs. 213–215). Abdomen not strongly bulging, usually not telescoped. Vestiture varying from scarce, uniform, to dense, variegated. Sexual characters in most species strongly developed.

Male. In majority od species antennae longer and more serrate than in female. Eyes sometimes more bulging. In some species groups fore and mid tibia arcuate or enlarged (fig. 228), fore and mid tarsomeres with small spines or comblike structures (figs. 223–225), or basitarsus and third article enlarged (figs. 226–227). Last sternite emarginate. Median lobe varying from short to extremely long, base always spoonlike, internal sac with or without large sclerites, without hinge sclerites, ventral valve in most species triangular or subtriangular, acute (figs. 371, 374, 378). Lateral lobes in most species modified apically, sometimes strongly sclerotized, or tape-like, or depressed, divided at least to 1/5 their length. Basal strut with or without median keel (figs. 366–370, 372, 376, 377).

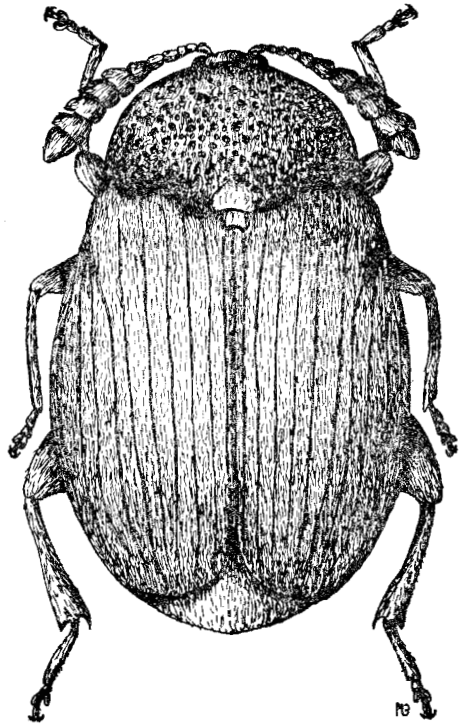
Female. Antennae usually shorter and less serrate. Eyes often less bulging. Tibiae and tarsi without sexual characters. Last sternite not emarginate.



36. *Bruchidius quinqueguttatus*, male

DIAGNOSIS

Bruchidius is the most differentiated genus within *Bruchinae* as far as both morphological characters and bionomy is concerned. Therefore it is impossible to present a unite genus diagnosis. On the other side however, it is also difficult to divide *Bruchidius* into smaller genera because some species are intermediate between species groups. Several species have also some characters in common with other Old World *Acanthoscelidini*. *Bruchidius* is presumedly an initial genus of the majority of other Old World *Acanthoscelidini* genera and the evolution of the group took a mosaic cours. However, it is possible to distinguish at least two developmental lines within *Bruchidius*. The first, more derived, contains the species of a poor sexual dimor-



37. *Bruchidius ater*

phism and with depressed lateral lobes, not modified apically, with a basal strut lacking median keel. A model species of the line is *Bruchidius ater* (MARSHAM, 1802), type species for *Sparteus* BRIDWELL, 1946. The second developmental line comprises all the species with a strongly expressed sexual dimorphism, strongly modified lateral lobes, and with basal strut possesing a median keel. Approximately 2/3 of the whole number of species belong to the line. The two groups are not decidelly separated, however, for there are some species with distinct secondary sexual characters but with plesiomorphic parameres. According to the present tendencies in *Bruchidae* taxonomy the separation of new genera is possible when we can find some morphological characters correlated with biological ones. Basing on that *Sulcobruchus*, *Conicobruchus*, *Megabruchidius*, *Kingsolverius*, *Decellebruchus* and *Salviabruchus* were separated from *Bruchidius*. Species included among those genera always have some correlated characters occuring in all the representatives although the single characters may be present also in some *Bruchidius*. The genus *Bruchidius* numbers presumedly hundreds of species and the process of its

differentiation is very intensive now. We can distinguish many more or less coherent species groups within the genus (see BOROWIEC, in print). The single groups may considerably differ, but many species have unique structures and they are very difficult to locate in any species group.

HOST PLANTS

Papilionoideae: *Aeschynomene* sp., *Alhagi* sp., *Argyrocytisus* sp., *Astragalus* sp., *Calicotoma* sp., *Calpurnia* sp., *Campylotropis* sp., *Chaemacytisus* sp., *Cicer* sp., *Coronilla* sp., *Cytisophyllum* sp., *Cytisus* sp., *Dalbergia* sp., *Desmodium* sp., *Galega* sp., *Genista* sp., *Glycyrrhiza* sp., *Halimodendron* sp., *Hedysarum* sp., *Hippocrepis* sp., *Indigofera* sp., *Lathyrus* sp., *Lens* sp., *Lotus* sp., *Laburnum* sp., *Lupinus* sp., *Medicago* sp., *Onobrychis* sp., *Ononis* sp., *Ornithopus* sp., *Petteria* sp., *Pisum* sp., *Pseudarthia* sp., *Robinia* sp., *Scorpiurus* sp., *Sesbania* sp., *Sophora* sp., *Spartium* sp., *Sphaerophysa* sp., *Tephrosia* sp., *Trifolium* sp., *Trigonella* sp., *Ulex* sp., *Vicia* sp., *Vigna* sp.; *Mimosoideae*: *Acacia* sp., *Albizia* sp., *Dichrostachys* sp., *Mimosa* sp.; *Caesalpinioideae*: *Gleditsia* sp., *Cassia* sp.; *Apiaceae*: *Eryngium* sp.; *Compositeae*: *Centaurea* sp.

DISTRIBUTION

Europe, Africa including Madagascar, Asia and Australia. Not known from the Papuan Subregion. Two species introduced and established in North America.

Number of species: probably several hundreds.

References: LUKJANOVITSH and TER-MINASSIAN, 1957: 112–170; ARORA, 1977: 41–85, KARAPETJAN, 1985: 68–137.

Genus: *Salviabruchus* Decelle

Salviabruchus DECELLE, 1982: 244.

Type species: *Mylabris retusa* BAUDI, 1887 (by monotypy).

The genus is characterized by following combination of characters:

— antennae not sexually dimorphic
— pronotum trapezial, without lateral carina
— elytral rows without basal tubercles
— hind femur without spines
— hind tibia straight, slender, with indistinct lateral carina, mucro obsolete
— ventral valve of median lobe strongly modified, with two large plates posteroventrally

— lateral lobes strongly sclerotized, divided to near base, basal strut with median keel
— feeds in seeds of *Labiaceae* (*Salvia* spp.).

DESCRIPTION

Body length: 2.3–2.7 mm, width: 1.2–1.5 mm. Body oval, stout. Head very short, strongly constricted behind eyes, postocular lobe short. Eyes moderately bulging, emarginate to 2/3 length. Frons without median carina. Pronotum trapezial, disc slightly convex, no lateral carina. Elytral striae regular, without basal tubercles, Hind femur moderately swollen, slightly bicarinate ventrally, internal ventral margin without spines. Hind tibia straight, moderately enlarged, with three carinae, lateral carina sometimes obsolete, coronal denticles very short, two lateral and one posterior, mucro almost obsolete (fig. 220). Abdomen not strongly bulging. Vestiture moderately dense, uniform.

Male. Last sternite emarginate. Median lobe moderately long, ventral valve strongly modified, with two large plates posteroventrally (figs. 386–388). Internal sac with many small sclerites. Lateral lobes strongly sclerotized, slightly expanded apically, divided to near base. Basal strut with perpendicular keel (fig. 389).

Female. Last sternite not emarginate.

DIAGNOSIS

Salviabruchus is very similar to *Bruchidius*; differs especially in structure of ventral valve in male genitalia. The structure of hind tibia is also unique; some species of *Bruchidius* (especially from *astragali* group) have mucro obsolete also, but they have large lateral coronal denticle. It is the only Old World genus developing in seeds of *Labiaceae*.

HOST PLANTS

Labiaceae: *Salvia* sp.

DISTRIBUTION

Syria, Lebanon, Israel, Turkey and Iraq.
Number of species: 1.
References: no further works.

Genus: *Sulcobruchus* Chûjô

Sulcobruchus Chûjô, 1937: 189.

Pygobruchidius Pic, 1951: 427 (type species: *Bruchus* (*Pygobruchidius*) *latiorithorax* Pic, 1951, designated by Bottimer, 1968: 1042) **n. syn.**

Tuberculobruchus Decelle, 1951: 179 (type species: *Bruchus natalensis* Pic, 1903, by original designation) **n. syn.**

Type species: *Bruchus sauteri* Pic, 1927 (by monotypy).

The genus is characterized by following combination of charcters:

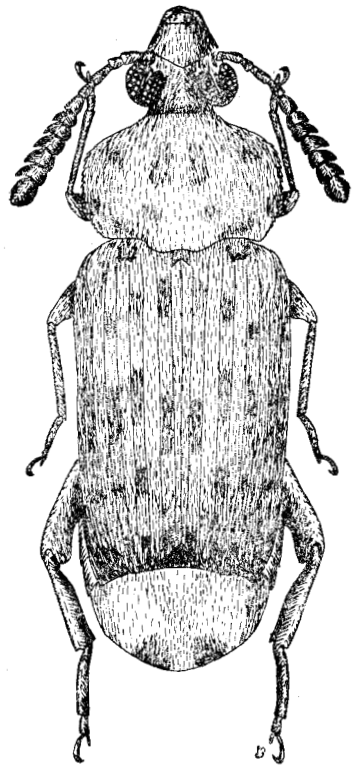
- antennae short or moderately long, not sexually dimorphic
- frons usually with glabrous, impunctate area before vertex
- pronotum transverse to campaniform, without lateral carina
- elytral striae 3 and 4 abbreviated at base by distinct tubercle
- hind femur bicarinate ventrally, in males usually deeply channeled on whole ventral margin or only apically, without spines or with minute subapical spine
- hind tibia strongly enlarged, with 3–4 carina, mucro varying from short to long
- median lobe short and broad, ventral valve usually broad, not acute, internal sac without or with large sclerites
- lateral lobes depressed, broadly and deeply divided, basal strut without keel.

Description

Body length: 2.3–4.8 mm, width: 1.6–3.2 mm. Body varying from elongate to oval. Head short, more or less constricted behind eyes, postocular lobe short. Eyes moderately bulging, rarely strongly bulging, in some species flat, emarginate usually to half length. Frons usually without sharp carina, but with impunctate median line widenest before vertex. Pronotum varying from transverse to campaniform, never conical, if transverse then disc rather flat, if campaniform then disc often with several depressions. Lateral carina absent, but sometimes lateral edge of pronotum sharp, serrulate or scabrous (especially in elongate South African species). Elytral striae regular, striae 3 and 4 always abbreviated by basal bidentate tubercle. Hind femur moderately swollen, bicarinate ventrally, shallowly or deeply channeled, especially in male. Internal ventral carina with very small subapical spine or without spines. Hind tibia straight, strongly enlarged, with 3–4 carinae, mucro varying form short, distinctly shorter than lateral coronal denticle, to long, distinctly longer than lateral coronal denticle (fig. 217). Abdomen strongly bulging, pygidium large, oblique. Vestiture varying from scarce to dense, usually variegated.

Male. Hind femur deeply channeled ventrally, especially in apical part (in several species from Africa this channel is very shallow, indistinct). Pygidium more convex. Basisternum often with bare depression or pit. Last abdominal sternite more or less emarginate. Median lobe short, broad, ventral valve broad, not acute in most species, internal sac without, or rarely with large sclerites (fig. 394). Lateral lobes depressed, broadly and deeply divided, basal strut without keel (fig. 393).

Female. Hind femur shallowly channeled or without channel. Pygidium less convex. Last sternite not emarginate.



38. *Sulcobruchus* sp. (South Africa)

DIAGNOSIS

The genus *Sulcobruchus* hasn't been well defined till now. DECELLE (1951) excluded some species from *Bruchidius* to a new genus *Tuberculobruchus.* However, in several papers after 1951 he described some new species and put them in *Bruchidius* although they evidently belong to *Tuberculobruchus* (*rubicundus* group). The genus *Tuberculobruchus* however is a synonym of

Pygobruchidius PIC, 1951 (the *Pygobruchidius* description comes from July 6th and that of *Tuberculobruchus* from December 22nd). DECELLE (1951) included in *Tuberculobruchus* only the species of an elongate body shape so he didn't notice that *Bruchus sauteri* PIC, which was separated to a new genus *Sulcobruchus* by CHÛJÔ (1937), is congeneric with African species of *Tuberculobruchus*. So then, the names *Pygobruchidius* and *Tuberculobruchus* are synonyms of *Sulcobruchus*. The genus differs from *Bruchidius* in channeled hind femora in male, base of elytron always with tubercle and broad male genitalia with ventral valve not triangular. At the first sight *Sulcobruchus* (especially elongate species from Africa) resembles *Mimosestes*. Both of them are also strongly connected with *Mimosoideae*. But the exterior similarity is presumedly a result of the evolutionary parallelism. The two genera distinctly differ in the hind femur structure, because *Mimosestes* generally has three subapical femoral spines.

HOST PLANTS

Caesalpinioideae: *Cassieae*: *Dialium* sp.; *Mimosoideae*: *Acacieae*: *Acacia* sp.; *Ingenae*: *Albizia* sp., *Pithecollobium* sp.

DISTRIBUTION

Paleotropical Region, East Palaearctic, the Middle East and Egypte.

Number of species: at least 15. Probably many tropical species described as *Bruchus* belongs to *Sulcobruchus*.

References: no further works.

Genus: *Megabruchidius* Borowiec

Megabruchidius BOROWIEC, 1984: 121.

Type species: *Bruchus dorsalis* FAHRAEUS, 1839 (= *Megabruchidius bifoveolatus* BOROWIEC, 1984 **n. syn.**) (by automatic fixation).

The genus is characterized by following combination of characters:

- pronotum campaniform, without lateral carina
- antennae short, not sexually dimorphic
- elytral striae 4–5 or 4–6 with basal tubercles
- hind femur with very fine spine on internal ventral margin
- hind tibia straight, with 3–4 carinae, mucro longer than lateral coronal denticle
- female pygidium with oval, bare apical foveae
- first abdominal sternite in male with depression or patch of dense hair

— median lobe moderately long, ventral valve broad, not triangular, internal sac strongly folded, forming lateral pockets, without large sclerites
— lateral lobes depressed, broadly and deeply divided.

DESCRIPTION

Body length: 4.3–4.8 mm, width: 2.8–3.2 mm. Body stout, oval. Head short, strongly constricted behind eyes. Postocular lobe very short but sharply limited from vertex. Eyes moderately bulging, incised to about half length. Frons with flat and broad median carina, or with impunctured median line widened on vertex. Antennae short, reaching at most to humeral callus, not sexually dimorphic. Distal articles subserrate or slightly eccentric. Pronotum campaniform, with slightly convex sides, without lateral carina. Pronotal disc with shallow depressions. Prosternal process short, narrow, acute. Scutellum transverse, bidentate apically. Elytral striae 4–5 or 4–6 with flat basal tubercle. Front and middle legs slender, not sexually dimorphic. Hind femur moderately swollen, bicarinate and slightly sulcate ventrally. Internal ventral carina with very small subapical spine. Hind tibia straight with set of carinae or with lateroventral carina partly reduced (fig. 211, 212). Mucro distinctly longer than lateral coronal denticle. Vestiture moderately dense or dense, variegated.

Male. Basisternum with shallow depression or/and with patch of dense hair. Last sternite emarginate, pygidium without foveae. Median lobe moderately long, ventral valve broad, not triangular, broadly rounded or broadly cut at apex, internal sac strongly folded, forming lateral pockets, without large sclerites (fig. 391). Lateral lobes depressed, broadly and deeply divided. Basal strut without median keel (fig. 392).

Female. First abdominal sternite without depression, uniformly pubescent. Last sternite not emarginate. Pygidium with two large, bare subapical foveae (fig. 127).

DIAGNOSIS

The genus is very similar to *Sulcobruchus*; differs in hind femora not channeled ventrally and female pygidium with large foveae. May be *Megabruchidius* is the only species group within *Sulcobruchus*. Before the revision of the *Sulcobruchus* I kept generic status for *Megabruchidius*. The large foveae on female pygidium distinguished *Megabruchidius* from *Bruchidius*, especially from the species with antennae not sexually dimorphic.

HOST PLANTS

Caesalpinioideae: *Gleditsia* sp.

DISTRIBUTION

Japan, China, India and Indochina.
Number of species: 2.
References: no further works.

Conicobruchus group

Antennae more or less sexually dimorphic. Pronotum conical with distinctly concave sides. Elytra without basal tubercles. Hind femur slender bicarinate ventrally, without spines or with very minute spine. Hind tibia straight, slender, carinae often obsolete, anterolateral carina always absent.

Genus: *Conicobruchus* Decelle

Conicobruchus DECELLE, 1951: 181.
Cornutobruchus DECELLE, 1975: 181 (type species: *Cornutobruchus veddarum* DECELLE, 1975) **n. syn.**

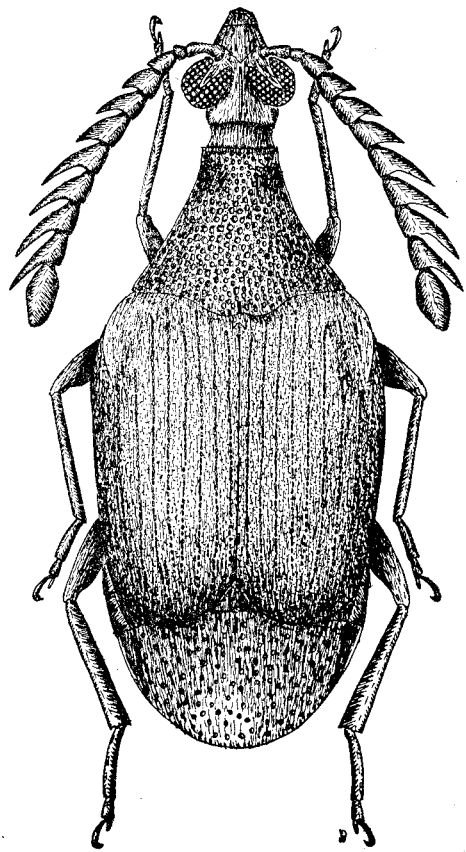
Type species: *Bruchus strangulatus* FAHRAEUS, 1839 (by original designation).

The species is charcaterized by following combination of characters:
— antennae clavate, subserrate, serrate or pectinate
— frons with median carina
— pronotum conical with distinctly concave sides
— elytron without basal tubercles
— hind femur slender, bicarinate ventrally, without spines or with very small subapical spine
— hind tibia straight, slender, carinae often obsolete, anterolateral carina always absent
— median lobe moderately long, ventral valve triangular, internal sac with or without large sclerites
— lateral lobes depressed, not modified apically, basal strut without median keel.

DESCRIPTION

Body length: 2.2–4.3 mm, width: 1.4–2.8 mm. Body oval. Head more or less elongate, constricted behind eyes. Postocular lobe short, sharply emarginate, the emargination sometimes extending to vertex and forming high,

strong carina or horns along hind margin of vertex. Eyes moderately bulging, deeply emarginate. Frons narrow, with distinct median carina. Antennae moderately long to long, extending at most to half body length, clavate, subserrate, serrate or pectinate, sexually dimorphic (fig. 39). Pronotum conical with more or less concave sides (fig. 110). Disc convex, without gibbosities or depressions. Prosternal process narrow, triangular, acute. Scutellum small, square or slightly elongate, bidentate apically. Elytral striae regular, without basal tubercles. Hind femur slender, bicarinate ventrally, internal ventral carina without spines or with minute subapical spine (fig. 221). Hind tibia slender, lateral carinae often obsolete, coronal denticles small, mucro usually not longer than lateral coronal denticle. Abdomen not modified. Vestiture in most species scarce, uniform.



39. *Conicobruchus strangulatus*, male

Male. Antennae longer and more serrate or pectinate. Horns or carinae on vertex stronger. Last abdominal sternite emarginate. Median lobe moderately long, ventral valve triangular, internal sac with or without large sclerites (figs. 395, 396). Lateral lobes depressed, not modified apically, basal strut without median keel (figs. 398, 399).

Female. Antennae shorter and less serrate. Horns or carinae on vertex feebly developed. Last sternite not emarginate.

DIAGNOSIS

Conicobruchus is very similar to *Bruchidius* and differs only in structure of pronotum which sides are distinctly concave. The other features given in the genus characteristics may be present also in *Bruchidius* but never all at the same time. DECELLE (1975) described *Cornutobruchus* from Ceylon basing on sharp carinae on vertex, forming a kind of horns. But the males of *Conicobruchus strangulatus*, the type species of *Conicobruchus*, have such carinae although they are a little lower and not so sharp. More or less distinct carinae on vertex occure also in some other African species which I studied. It is a rule, that the larger species have also more distinct carinae. Therefore I think that separating *Cornutobruchus* is causeless. The other characters listed in the *Cornutobruchus* description occure also in most of *Conicobruchus* species. The individual species of *Conicobruchus* are extraordinary varied in their body coloration while the male genitalia of the related species are generally unite in structure.

HOST PLANTS

Papilionoideae: *Cyamopsis* sp., *Crotolaria* sp., *Indigofera* sp.

DISTRIBUTION

Tropical Africa and India.
Number of species: at least 8.
References: ARORA, 1977: 33–36; KINGSOLVER, 1982: 845–848.

Kingsolverius group

Body stout, abdomen in male telescoped. Frons with sharp median carina. Antennae long, serrate to pectinate, sexually dimorphic. Pronotum campaniform to conical, without lateral carina. Hind tibia straight, carinate, mucro longer than lateral coronal denticle.

Genus: *Kingsolverius* gen. nov.

Type species: *Kingsolverius gibbicollis* n. sp.

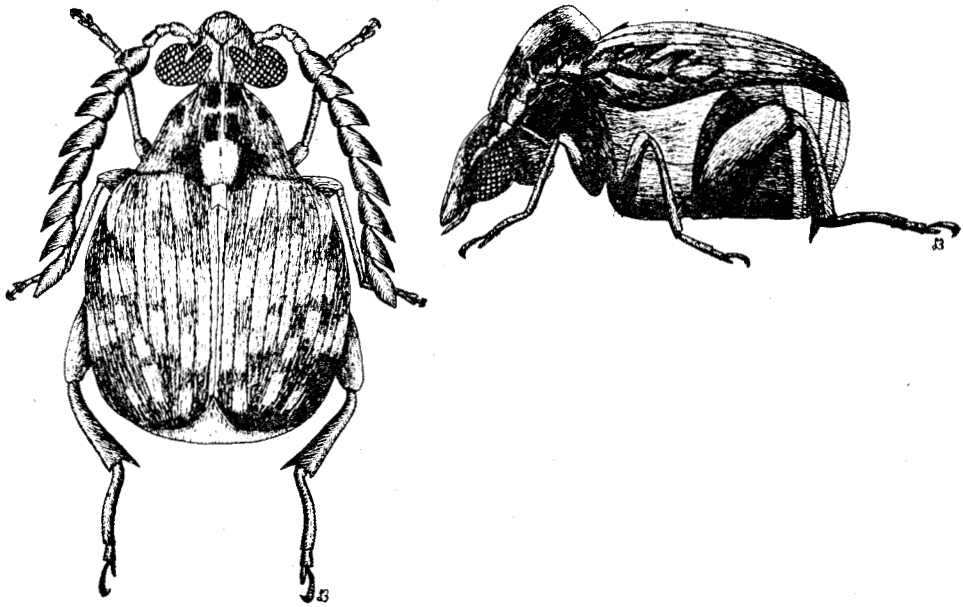
The genus is characterized by following combination of characters:

- antennae long, serrate
- frons with sharp median carina
- pronotum campaniform, extremely gibbous before scutellum, without lateral carina
- scutellum about 1.5 times longer than wide
- elytron without basal tubercles
- hind femur moderately swollen, bicarinate ventrally, internal carina with small subapical spine
- hind tibia straight, enlarged, carinate, mucro longer than lateral coronal denticle
- median lobe very long, ventral valve not triangular, internal sac with several groups of small sclerites
- lateral lobes very long, tape-like, divided to 2/5 length.

DESCRIPTION

Kingsolverius gibbicollis n. sp.

Body length: 2.6 mm, width: 1.6 mm. Black, apical half of profemora, protibiae and protarsi, apices of mid femora and mid tibiae, mid tarsi, basal three antennal articles and article 11, and three distal articles of hind tarsi reddish. Antennal articles 4–10 infuscate. Vestiture scarce, greyish and brownish, only praescutellar gibbosity, scutellum, pygidium, last three sternites and hind angles of metasternum covered by extremely dense, chalk-white hair. Grey and brown hair on pronotum and elytra forming distinct pattern (fig. 40). Head short, strongly constricted behind eyes, without postocular lobe (fig. 91). Eyes bulging, deeply emarginate. Frons narrow, with sharp median carina extending from clypeal suture to end of vertex. Antennae extending to 2/3 body length, serrate, article 3 longer than 2 (fig. 75). Pronotum campaniform, with slightly convex sides, without lateral carina. Disc before scutellum strongly gibbous, the praescutellar gibbosities are placed oblique to elytral disc (fig. 41). Scutellum elongate, about 1.5 times longer than wide, bidentate apically (fig. 125). Apical dents are slightly curved upwards, and well visible in profile. Elytra together quadrate. Striae regular, without basal tubercles, but striae 3 and 4 almost closed anterad. Striae 2 and 3, and 6 and 8 closed posterad, striae 4 and 5 abbreviated apically. Intervals flat, with irregular rows of large punctures. Pro- and mesolegs slender. Hind femur swollen, bicarinate ventrally, internal carina with minute subapical spine.



40–41. *Kingsolverius gibbicollis*

Hind tibia straight, enlarged, with complete set of carinae, mucro more than twice longer than lateral coronal denticle (fig. 219). Abdomen short, telescoped, last sternite emarginate up to base, pygidium vertical.

Male. Median lobe extremely long, ventral valve triangular, internal sac with group of dense spines anteriorly, several spines medially, and two groups of dense needles posteriorly (fig. 357). Lateral lobes very long, depressed, tape-like in basal 2/3 length, slightly expanded apically, pubescent ventrally, divided to 2/5 length. Basal strut with perpendicular keel (fig. 358).

Female. Unknown.

DIAGNOSIS

Kingsolverius differs from all other genera of *Bruchinae* in extremely high basal gibbosity on pronotal disc. Other characters near this genus to *Decellebruchus* and *Callosobruchus*. *Callosobruchus* differs in presence of subapical femoral spines in both internal and external margin, *Decellebruchus* differs in antennae in male pectinate and quadrate scutellum.

HOST PLANTS

Unknown.

DISTRIBUTION

Holotype ♂, Viet-Nam, Saigon, Botanic Garden, 6 XI 1949, leg. J. Barbier; paratype ♂, Tonkin, Region de Hoa-Binh, 1934, leg. A. De Cooman (both in coll. Muséum National d'Histoire Naturelle, Paris).

Number of species: 1.

The new genus is dedicated to Dr. John M. KINGSOLVER, the best specialist in New World *Bruchidae*.

Genus: *Decellebruchus* gen. nov.

Type species: *Bruchus walkeri* PIC, 1912.

The genus is characterized by following combination of characters:

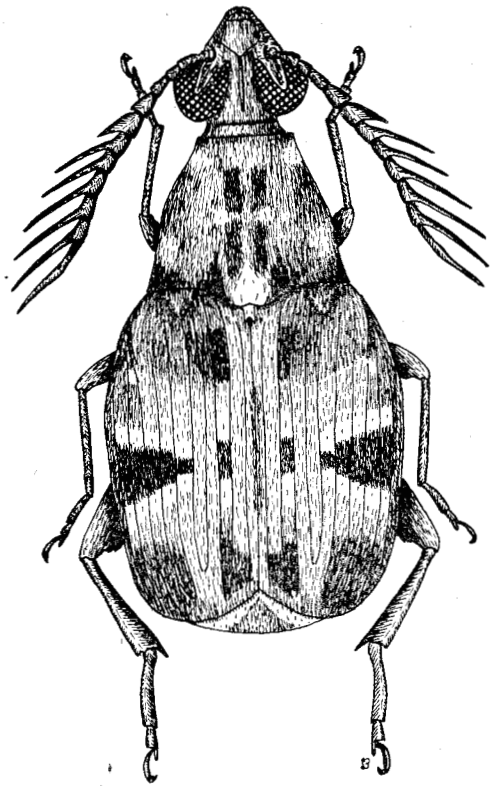
- antennae in male pectinate in female serrate
- frons with sharp median carina
- pronotum subconical, without lateral carina
- elytral striae 3 and 4, or 4 and 5 with basal tubercle
- hind femur moderately swollen, bicarinate ventrally, internal carina with small subapical spine, often followed by two smaller spines
- hind tibia straight, enlarged, carinate, mucro longer than lateral coronal denticle
- median lobe moderately long, ventral valve triangular, internal sac without large sclerites, but with many spines or needles
- lateral lobes expanded apically, divided at least to half length.

DESCRIPTION

Body length: 2.2–2.8 mm, width: 1.3–1.8 mm. Body oval, stout. Head short, strongly constricted behind eyes, postocular lobe very short. Eyes bulging, deeply emarginate. Frons narrow, with sharp median carina. Antennae long, serrate or pectinate. Pronotum subconical, without lateral carina. Disc convex, slightly gibbous before scutellum and with shallow median channel. Prosternal process narrow, triangular, acute. Scutellum square, bidentate apically. Elytral striae regular. Striae 3 and 4, or 4 and 5 abbreviated basally by tubercle. Striae 4 and 5 abbreviated apically, striae 2 and 3, or 6 and 7 often closed posterad. Hind femur moderately swollen, bicarinate ventrally. Internal ventral carina with small subapical spine, often followed by two smaller spines. Hind tibia straight, enlarged, with complete set of carinae, mucro longer than lateral coronal denticle (fig. 218). Abdomen more or less telescoped, pygidium subvertical or vertical. Vestiture moderately dense or dense, variegated.

Male. Antennae pectinate from 4th or 5th article. Eyes more bulging. Pygidium vertical. Last sternite emarginate. Median lobe moderately long, ventral valve triangular, internal sac with many small spines or needles, without large sclerites (fig. 397). Lateral lobes elongate, expanded apically, apices bended ventrally, forming a short gutter. Basal strut with perpendicular keel (fig. 400).

Female. Antennae serrate. Eyes less bulging. Pygidium subvertical. Last sternite not emarginate.



42. *Decellebruchus walkeri*, male

DIAGNOSIS

Decellebruchus is similar to *Rhipibruchus*, *Bruchidius*, *Callosobruchus* and *Kingsolverius*. It differs from *Rhipibruchus* in male antennae less pectinate, abdomen less telescoped and median lobe with sclerites of different type. From *Callosobruchus* it differs in external ventral margin of hind femora

without spine, from *Bruchidius* in male antennae pectinate, and from *Kingsolverius* in scutellum not elongate.

HOST PLANTS

Papilionoideae: *Phaseolinae*: *Vigna* sp.

DISTRIBUTION

Tropical Africa and Oriental Region.

Number of species: at least 3.

The genus is dedicated to Dr. J. DECELLE, the best specialist in paleotropical *Bruchidae*.

KEY TO THE SEED-BEETLE GENERA

1. Hind trochanters extremely large (fig. 135). Body always metallic . . . . . *Rhaebus*
—. Hind trochanters small (fig. 137). Body black, red, yellow or brown, only occasionally with metallic tint . . . . . 2.
2. Hind tibia with two long, sharp apical calcaria (fig. 139 . . . . . 3.
—. Hind tibia without apical calcaria, occasionally with one or two minute apical spines (figs. 138, 144) . . . . . 5.
3. Eyes emarginate at most to 1/3 length (fig. 92). Metathorax with parasutural rows on either side of pleural cleft. Procoxae well separated by prosternal process (fig. 117) . . . . . *Amblycerus*
—. Eyes emarginate at least to half length (fig. 11). No parasutural rows present. Procoxae contiguous or separated only by a thin vertical lamella (fig. 118) . . . . . 4.
4. Anterior end of lateral carina of pronotal margin meeting or nearly meeting short, horizontal, supracoxal carina on an angulate lobe partly concealing posterior margin of eye when head is in repose (fig. 83). Tenth stria extending nearly to apex of elytron . . . . . *Spermophagus*
—. Supracoxal carina absent (fig. 84). Tenth stria extending only halfway to apex of elytron . . . . . *Zabrotes*
5. Mesoepimeral plate attaining coxal cavity with nearly its middle width (fig. 52) . . . . . 6.
—. Mesoepimeral plate attains the coxal cavity very narrowly (fig. 53) . . 19.
6. Hind femur with spiny pecten (figs. 140–146) . . . . . 8.
—. Hind femur without spiny pecten (figs. 137, 156) . . . . . 7.
7. Pygidium, and one or two tergites exposed behind elytra (fig. 13). Hind tibia without apical spine. Hind femur narrower than coxa . . *Kytorhinus*
—. Pygidium covered at base by elytra (fig. 12). Hind tibia with small apical spine (fig. 138). Hind femur wider than coxa . . . . . *Eubaptus*

8. Pronotum semicircular, its hind margin semicircularly produced between the elytra (fig. 8). Head elongate, eyes emarginate to half length (fig. 93) . . . . . 9.
—. Pronotum trapezial or square, not produced semicircularly between the elytra (fig. 6). Head usually short, eyes emarginate at most to 1/4 length (fig. 90) . . . . . 11.
9. Lateral carina of pronotum narrow but distinct. Elytral intervals in female without polished areas . . . . . 10.
—. Lateral carina of pronotum obsolete. Elytral interval 9 in female with polished area . . . . . *Diegobruchus*
10. Prosternal process long, completetly separating front coxa. Hind femur without large spines before pecten (fig. 130) . . . . . *Protocaryopemon*
—. Prosternal process short, separating front coxa at most to half length. Hind femur with large spines before pecten (fig. 131) . . . *Caryopemon*
11. Pronotal lateral carina complete (fig. 6) . . . . . 12.
—. Pronotal lateral carina obsolete or visible only in posterior half of lateral margin (fig. 7) . . . . . *Caryedon*
12. Hind tibia with two small apical spines (in dry specimens they are often broken). Antennae serrate from fourth article. Hind femur with one large and 10–16 smaller spines, without spines or tubercles before pecten (fig. 142). Hind tibia without subbasal tubercle . . . . . *Caryoborus*
—. Hind tibia without spines . . . . . 13.
13. Prosternal process long and broad (fig. 54). Basal tarsal article widened (fig. 6) . . . . . 14.
—. Prosternal process shortened (fig. 55), or long but narrow (fig. 116). Basal tarsal article not widened (fig. 7) . . . . . 16.
14. Antennae serrate from fourth article. Hind tibia without subbasal tubercle (fig. 142) . . . . . *Caryobruchus*
—. Antennae serrate from fifth article. Hind tibia with subbasal tubercle (fig. 140) . . . . . 15.
15. Hind femur with one large and several smaller spines (fig. 140) . . . . . *Pachymerus*
—. Hind femur with an irregular row of spines approximately equal in length (fig. 141) . . . . . *Butiobruchus*
16. Hind tibia with subbasal tubercle (fig. 145) . . . . . *Exoctenophorus*
—. Hind tibia without subbasal tubercle (fig. 146) . . . . . 17.
17. Prosternal process separating procoxae to half their length. Elytral rows 2 and 9, and 3 and 8 opened posterad . . . . . *Caryotrypes*
—. Prosternal process separating procoxae at least to 2/3 their length. Elytral rows 2 and 9, and 3 and 8 closed posterad . . . . . 18.
18. Body short, stout (fig. 63). Elytral interval 10 in female with large polished area at humerus . . . . . *Afroredon*
—. Body elongate (fig. 61). Elytral interval 10 in female without polished area . . . . . *Mimocaryedon*

19. Pronotum square or trapezial, usually with lateral denticle (figs. 94–96). Hind femur with blunt or sharp denticle on external ventral margin (fig. 155). Mid tibia in male with apical spines or plates (figs. 150–152) . . . . . *Bruchus*

—. Pronotum usually campaniform, conical or concave, rarely transverse, always without lateral denticle (figs. 97–103). Hind femur without denticles or spines, or with spines on internal ventral margin, or with spines and/or denticles on both internal and external margins (figs. 160, 210, 216). Mid tibia usually not sexually dimorphic . . . . . 20.

20. Pygidium and one or two tergites exposed behind elytra (fig. 13). Antennae in male pectinate or strongly serrate, in female serrate . . *Kytorhinus*

—. Pygidium covered at base by elytra . . . . . 21.

21. Tenth elytral stria shortened, extending to half length of elytron . . . . . *Megacerus*

—. Tenth elytral stria extending nearly to apex of elytron . . . . . 22.

22. Hind femur with spine or denticle on both internal and external ventral margins (fig. 158) . . . . . *Callosobruchus*

—. Hind femur with spines on internal ventral margin only, or with sharp spine on internal and obtuse denticle on external ventral margin (fig. 210), or without spines . . . . . 23.

23. Hind femur without spines, or with simple subapical spine; hind margin of the spine sometimes serrulate (fig. 184) . . . . . 24.

—. Hind femur with at least two subapical spines . . . . . 44.

24. Pronotum with two large thorn-like gibbosities (fig. 103). Hind femur with large, sharp subapical spine, hind tibia arcuate, mucro extremely long (fig. 210) . . . . . *Horridobruchus*

—. Pronotum without thorn-like gibbosities . . . . . 25.

25. External surface of hind tibia serrate (fig. 216). Basal part of elytral intervals deeply impressed. Hind femur with large, sharp subapical spine. Antennae extremely long, in male extending to apex of elytron, in female to 2/3 of body length . . . . . *Acanthobruchidius*

—. External surface of hind tibia not serrate . . . . . 26.

26. Pronotal sides concave (fig. 110). Hind femur slender, without spines or with simple, minute spine. Hind tibia slender without lateral carinae, or they are indistinct (fig. 221) . . . . . *Conicobruchus*

—. Pronotal sides straight or convex . . . . . 27.

27. Pronotum with distinct lateral carina, especially in posterior half o lateral margin (fig. 109) . . . . . 28.

—. Pronotum without lateral carina . . . . . 32.

28. Hind femur with distinct subapical spine (fig. 198); hind margin of the spine sometimes serrulate (fig. 206) . . . . . 29.

—. Hind femur with very minute spine or without spine . . . . . 30.

29. Hind tibia enlarged, usually with distinct lateral carinae (fig. 198). Hind margin of femoral spine not serrulate . . . . . *Stator*

—. Hind tibia slender, without carinae (fig. 206). Hind margin of femoral spine serrulate . . . . . *Bonaerius*

30. Fore tibia in male enlarged, spatulate (fig. 207) . . . *Spatulobruchus*

—. Hind tibia in male not enlarged . . . . . 31.

31. Maxillary palpi in female extremely long, about twice longer than in male (fig. 67, 68). Pronotum transverse, sides broadly rounded (fig. 111) . . . . . *Palpibruchus*

—. Maxillary palpi in both sexes of equal length. Pronotum subcampaniform, sides slightly convex (fig. 27) . . . . . *Lithraeus*

32. Pronotum with distinct gibbosities (fig. 129) . . . . . 33.

—. Pronotum without gibbosities . . . . . 34.

33. Pronotum with large gibbosity before scutellum (fig. 107). Scutellum about 1.5 times longer than wide . . . . . *Kingsolverius*

—. Pronotum with pair of gibbosities before scutellum and pair in anterior part of disc (fig. 129). Scutellum about as long as wide . . . *Neltumius*

34. Hind femur with large subapical spine, hind margin of the spine sometimes serrate (fig. 184). Antennae not sexually dimorphic . . . . . 35.

—. Hind femur without spines or with minute subapical spine; if spine large then antennae strongly sexually dimorphic . . . . . 38.

35. Internal sac of median lobe without hinge sclerites (figs. 319, 341) . 36.

—. Internal sac of median lobe with hinge sclerites (figs. 325, 326) . . . 37.

36. Hind tibia with lateral carina, mucro distinct (fig. 184). Body stout . . . . . *Althaeus*

—. Hind tibia without carinae, mucro obsolete (fig. 204). Body elongate (fig. 26) . . . . . *Cosmobruchus*

37. Base of intervals 3–6 with minute spine. Mucro distinctly longer than lateral coronal denticle (fig. 197) . . . . . *Megasennius*

—. Base of intervals 3–6 without spines. Mucro not longer or insignificantly longer than lateral coronal denticle (fig. 193) . . . . . *Sennius*

38. Ventral surface of hind femora with shallow channel, especially in male, both external and internal margin carinate (fig. 217). Antennae always not sexually dimorphic, elytron always with basal tubercles . . . . . *Sulcobruchus*

—. Ventral surface of hind femora not channelled, usually only internal ventral margin carinate. Antennae often sexually dimorphic, elytron often without basal tubercles . . . . . 39.

39. Ventral valve of median lobe with large lateral plates (fig. 387). Mucro obsolete (fig. 220). Attacking seeds of *Lamiaceae* . . . *Salviabruchus*

—. Ventral valve of median lobe without lateral plates (figs. 371, 391, 397). Mucro usually distinct (figs. 211, 212). Attacking seeds of *Leguminosae*, *Apiaceae* or *Compositae* . . . . . 40.

40. Pygidium of female with two supapical pits or foveae (fig. 127). Usually larger than 4.0 mm. Antennae not sexually dimorphic . . . . . *Megabruchidius*

—. Pygidium of female without pits or foveae. Usually smaller than 4.0 mm. Antennae often sexually dimorphic . . . . . 41.

41. Body stout, abdomen in male telescoped, pygidium vertical. Antenna in male pectinate, in female serrate . . . . . *Decellebruchus*

—. Body varying from stout to elongate, abdomen usually not telescoped, pygidium usually subvertical or oblique. Antennae in both sexes serrate or subserrate . . . . . 42.

42. Hind tibia slender, without carinae (fig. 203). Antennae not sexually dimorphic . . . . . *Dahlibruchus*

—. Hind tibia more or less enlarged, with at least two carinae. Antennae often sexually dimorphic . . . . . 43.

43. Old World genus . . . . . *Bruchidius**

—. New World genus . . . . . *Acanthoscelides**

44. Hind femur strongly incrassate with at least four spines; if only three spines then hind tibia arcuate . . . . . 45.

—. Hind femur moderately incrassate, with at most three spines; if four spines then hind tibia straight . . . . . 51.

45. Surface of pronotum with gibbosities . . . . . 46.

—. Surface of pronotum without gibbosities . . . . . 48.

46. Pygidium or abdominal sternites with polished areas (fig. 16) . . . . . *Gibbobruchus*

—. Pygidium and abdominal sternites without polished areas . . . . 47.

47. Hind femur with 4–6 spines (fig. 160). Lateral lobes fused, tape-like (fig. 294) . . . . . *Caryedes*

—. Hind femur with 7–16 spines (fig. 167). Lateral lobes depressed, divided at least to half length (fig. 304) . . . . . *Ctenocolum*

48. Abdominal sternites with polished areas. Ventral sulcus of hind femora polished . . . . . 49.

—. Abdominal sternites without polished areas. Ventral sulcus of hind femora not polished . . . . . 50.

49. Elytral rows indistinctly punctured. Elytral striae 3 and 4 deeply impressed basally. Median lobe with lateral processes (fig. 302) . . . . . *Pygiopachymerus*

—. Elytral rows distinctly punctured. Elytral striae 3 and 4 not impressed basally. Median lobe without lateral processes (fig. 303) . . *Penthobruchus*

50. Elytral vestiture dense, variegated. Median lobe short, ventral valve broadly rounded or cut at apex (fig. 307). Lateral lobes deeply divided (fig. 310) . . . . . *Merobruchus*

—. Elytral vestiture scarce, uniform or with a few spots of dense hair. Median lobe elongate, ventral valve often strongly modified (figs. 293, 298, 299). Lateral lobes fused, tape-like (fig. 297) . . . . . *Meibomeus*

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* see discussion on pages 89 and 136.

51. Antennae extremely long, serrate, in male extending to apex of elytron, in female to hind coxa . . . . . *Stylantheus*

—. Antennae shorter, in both sexes not extending to hind coxa; if antennae longer then pectinate . . . . . 52.

52. Pygidium with polished area . . . . . *Specularius*

—. Pygidium without polished area . . . . . 53.

53. Antennae in male pectinate, in female serrate or subpectinate. Eyes sexually dimorphic . . . . . 54.

—. Antennae in both sexes serrate or subserrate. Eyes usually not sexually dimorphic . . . . . 56.

54. Scutellum about twice longer than wide, quadridentate apically (fig. 124). Mucro shorter than lateral coronal denticle (fig. 200) . . . . . *Pectinibruchus*

—. Scutellum at most 1.5 times longer than wide, bidentate apically. Mucro longer than lateral coronal denticle (fig. 202) . . . . . 55.

55. Abdomen strongly telescoped. Antennae of male more pectinate (fig. 24). Internal sac of median lobe with thumb-tack-like sclerites (fig. 338). New World genus . . . . . *Rhipibruchus*

—. Abdomen less telescoped. Antennae of male less pectinate (fig. 42). Internal sac without thumb-tack-like sclerites (fig. 397). Old World genus . . . . . *Decellebruchus*

56. Scutellum elongate, about twice longer than wide (fig. 123) . . . . 57.

—. Scutellum short, at most 1.5 times longer than wide . . . . . 58.

57. Basisternum of male with pit. Female pygidium without pits or sulci. Median lobe with perpendicular keel (fig. 332) . . . . *Scutobruchus*

—. Basisternum of male without pit. Female pygidium with two subapical pits or sulci (fig. 23). Median lobe without keel (fig. 336) . . *Algarobius*

58. Pronotum with distinct lateral carina (fig. 109). Internal sac with large sclerites (fig. 309). . . . . *Pseudopachymerina*

—. Pronotum without lateral carina; if carina present than internal sac without large sclerites . . . . . 59.

59. Head with glabrous area on vertex. Hind femora of males usually channelled on the ventral surface. Ventral valve of median lobe not articulated or absent (fig. 308) . . . . . *Mimosestes*

—. Head usually without glabrous area on the vertex. Hind femur not channelled ventrally. Ventral valve articulated . . . . . 60.

60. Last sternite not emarginate in both sexes. Lateral lobes completely fused, forming a gutter (fig. 356) . . . . . *Paleoacanthoscelides*

—. Last sternite in male usually emarginate. Lateral lobes deeply divided, never gutter-like . . . . . 61.

61. Body stout, deep. Pronotum with distinct impressions. Elytra subquadrate, flat. Old World genus . . . . . *Specularius*

—. Body varying from stout to elongate, not very deep. Pronotum without distinct impressions. Elytra usually convex. New World genus . . . . . *Acanthoscelides*

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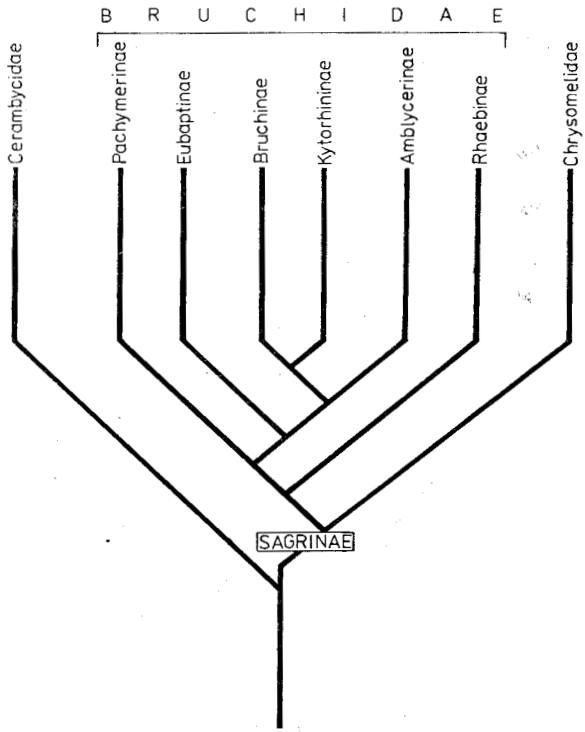
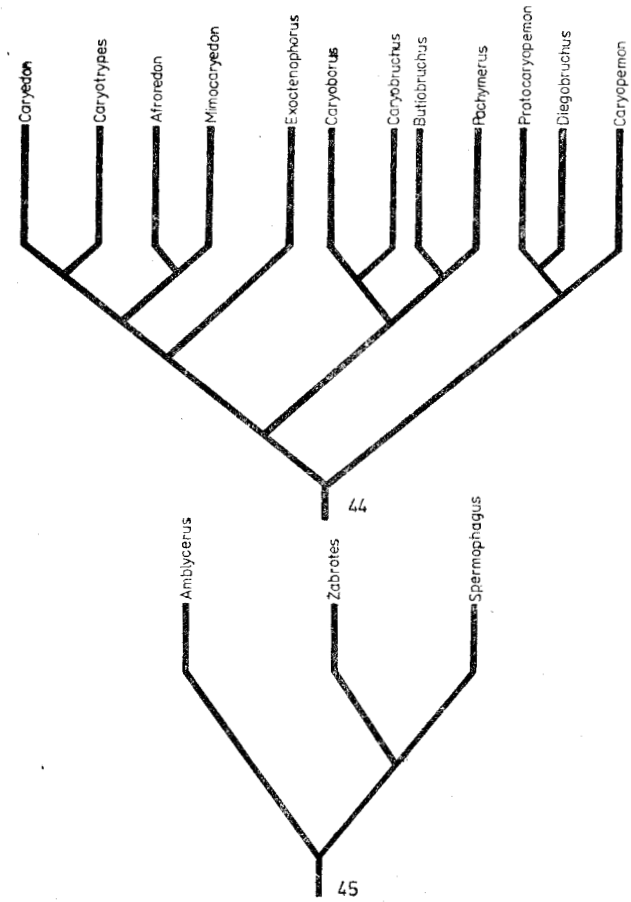
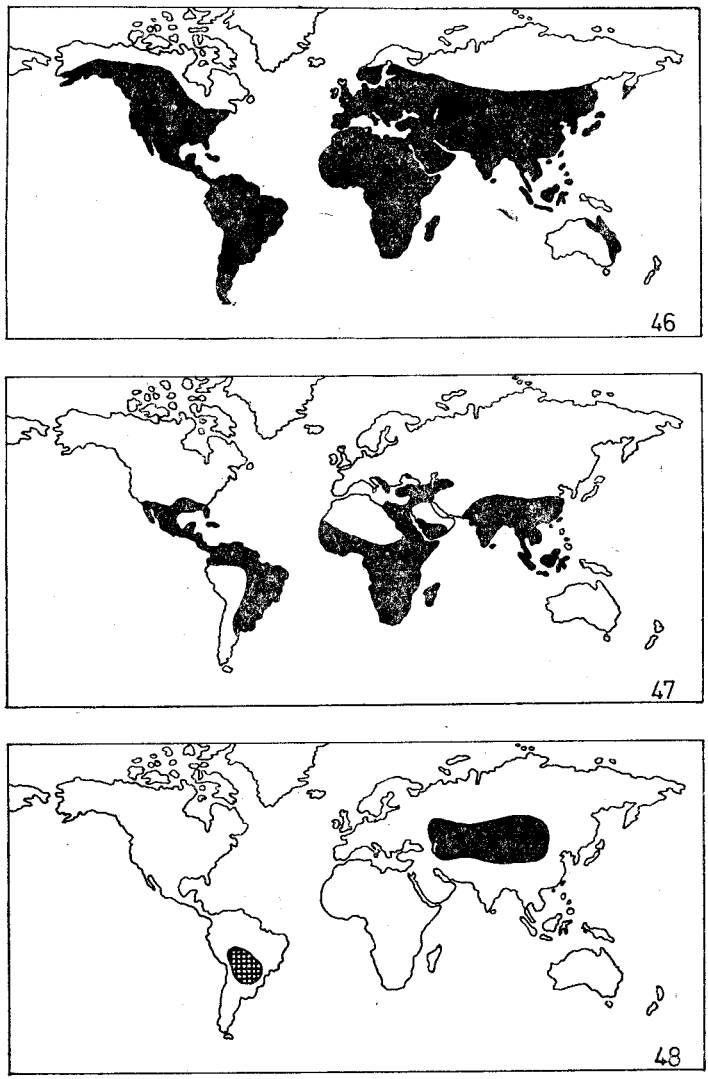
* An asterisk means the works which have been unavailable to the author.



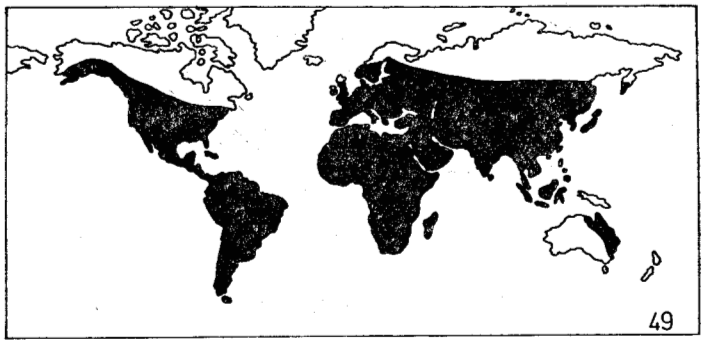
43. Phylogenetic tree of *Bruchidae*

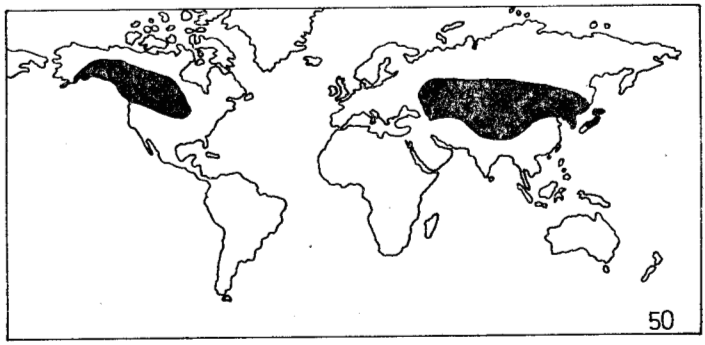


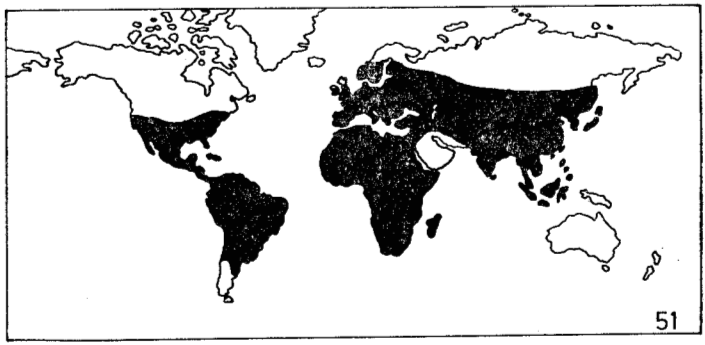
44. Phylogenetic tree of *Pachymerinae*, 45. Phylogenetic tree of *Amblycerinae*



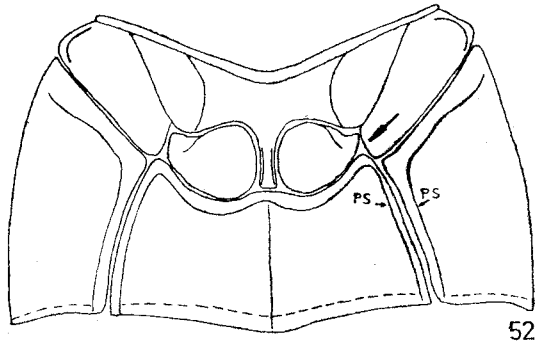
46-48. Geographic distribution of: 46 — *Bruchidae*, 47 — *Pachymerinae*, 48 — *Rhaebinae* (black area) and *Eubaptinae* (chequered area)







49-51. Geographic distribution of: 49 — *Bruchinae*, 50 — *Kytorhininae*, 51 — *Amblycerinae*



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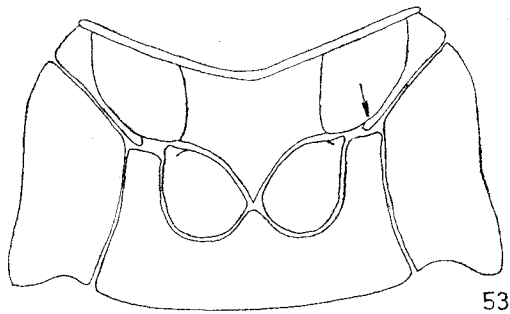

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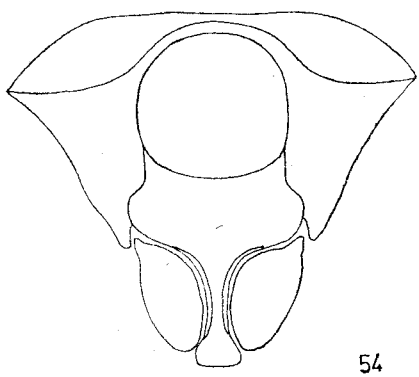

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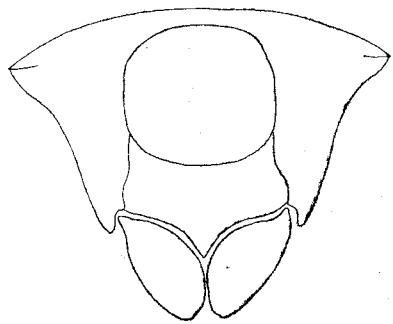

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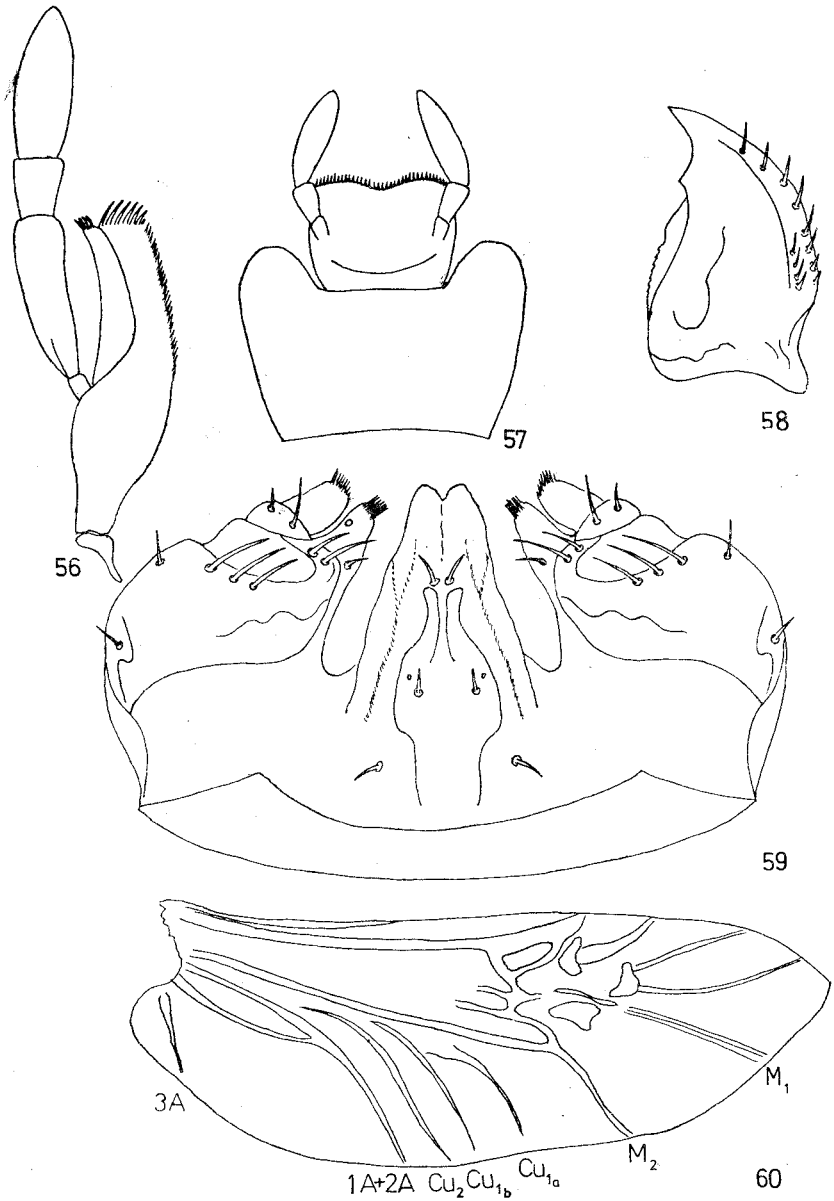
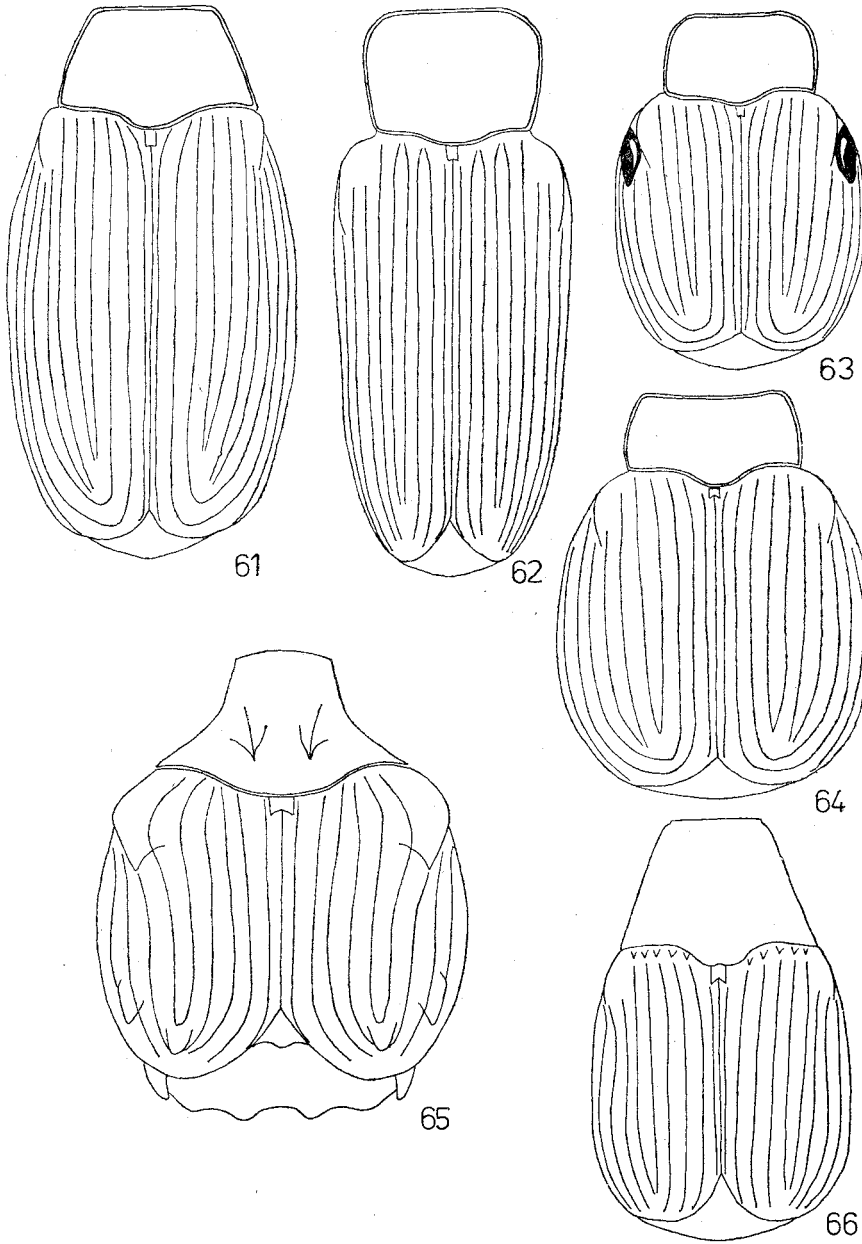
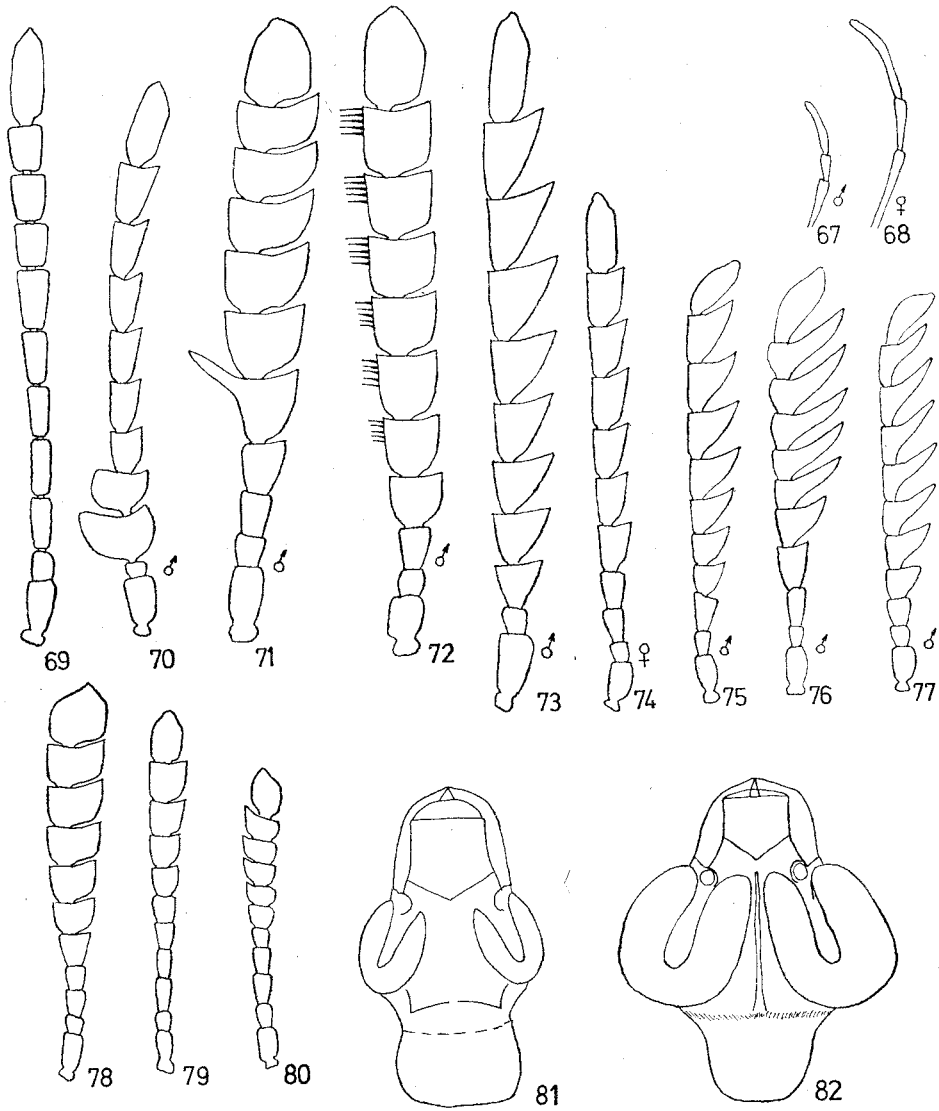
52–53. Meso- and metathorax: 52 — *Pachymerinae* (ps — parasutural rows), 53 — *Bruchinae*, 54–55. Prothorax in anteral view: 54 — *Pachymerus* sp., 55 — *Caryedon* sp.



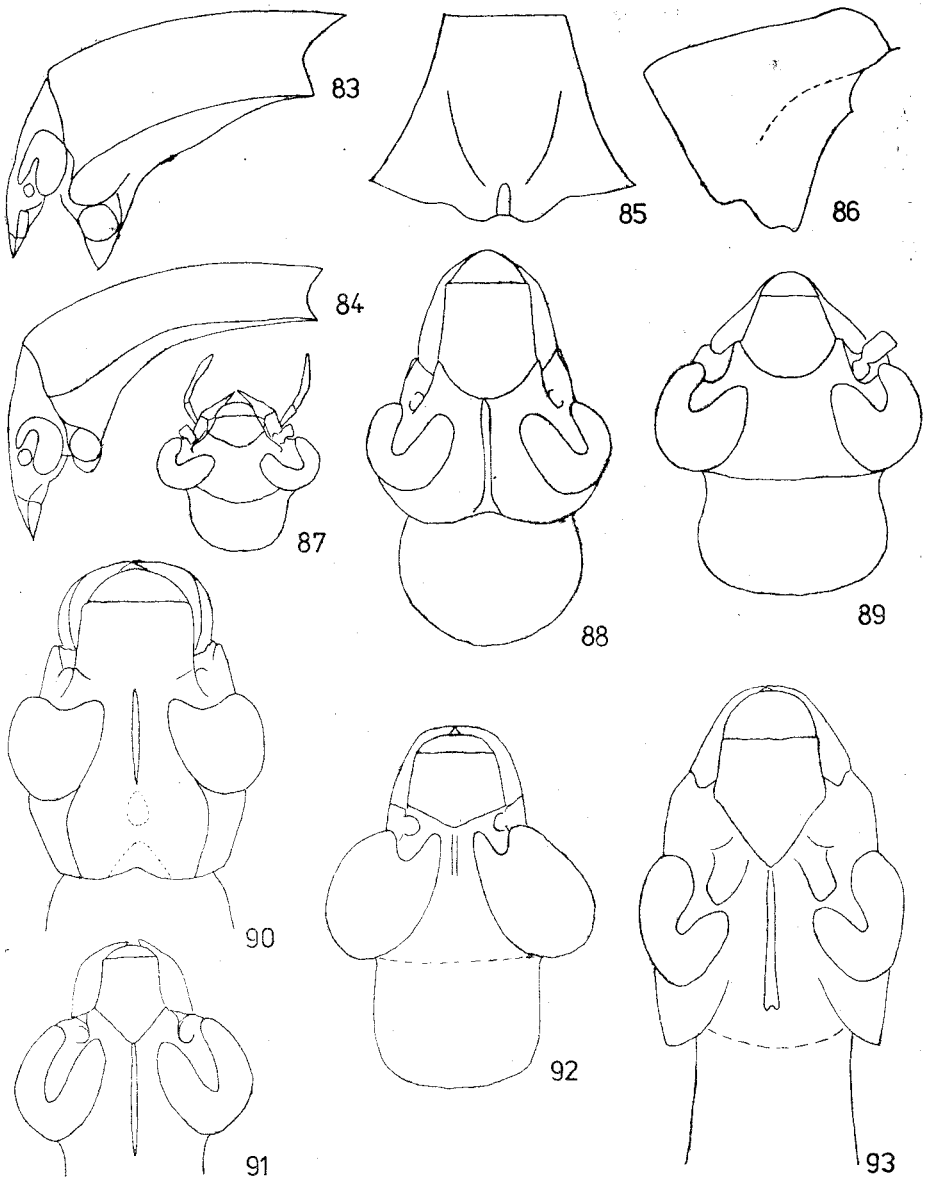
56–58. *Bruchus pisorum*: 56 — maxilla, 57 — labium, 58 — mandible, 59–60. *Rhaebus mannerheimi*: 59 — labium of the second stage larva, 60 — wing (59, 60 after KINGSOLVER and PFAFFENBERGER)



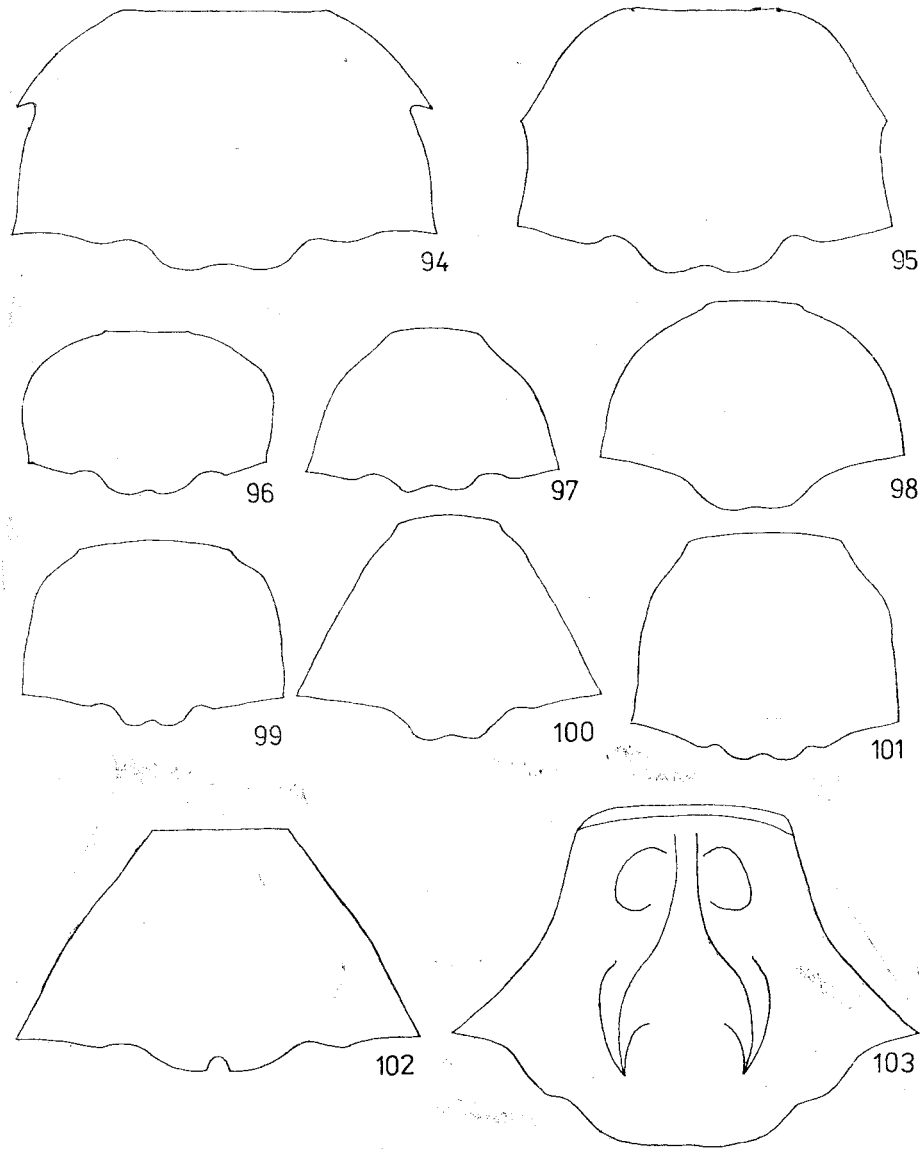
61–66. Body outline: 61 — *Mimocaryedon freyi*, 62 — *Caryotrypes pandani*, 63 — *Afroredon africanus*, female, 64 — *Exoctenophorus deflexicollis*, 65 — *Horridobruchus quadridentatus*, 66 — *Megasennius muricatus*



67–68. *Palpibruchus longipalpis*, maxillary palpi, 69–80. Antennae: 69 — *Rhaebus mannerheimi*, 70 — *Bruchidius bythinocerus*, male, 71 — *Bruchus hamatus*, male, 72 — *Spermophagus albomaculatus*, male, 73–74 — *Bruchidius quinqueguttatus*: 73 — male, 74 — female, 75 — *Kingsolverius gibbicollis*, male, 76 — *Protocaryopemon archetypus*, male, 77 — *Callosobruchus chinensis*, male, 78 — *Bruchus* sp., 79 — *Dahlibruchus sharpianus*, 80 — *Palpibruchus longipalpis*, 81–82. Head: 81 — *Conicobruchus veddarum*, 82 — *Rhipibruchus picturatus*, male



83–84. Pronotum in lateral view: 83 — *Spermophagus* sp., 84 — *Zabrotes* sp., 85–86. Pronotum of *Caryedes brasiliensis*: 85 — dorsal, 86 — lateral, 87–93. Head: 87 — *Palpibruchus longipalpis*, female, 88 — *Horridobruchus quadridentatus*, 89 — *Megabruchidius dorsalis*, 90 — *Caryedon longivertex*, 91 — *Kingsolverius gibbicollis*, 92 — *Amblycerus* sp., 93 — *Protocaryopemon archetypus*



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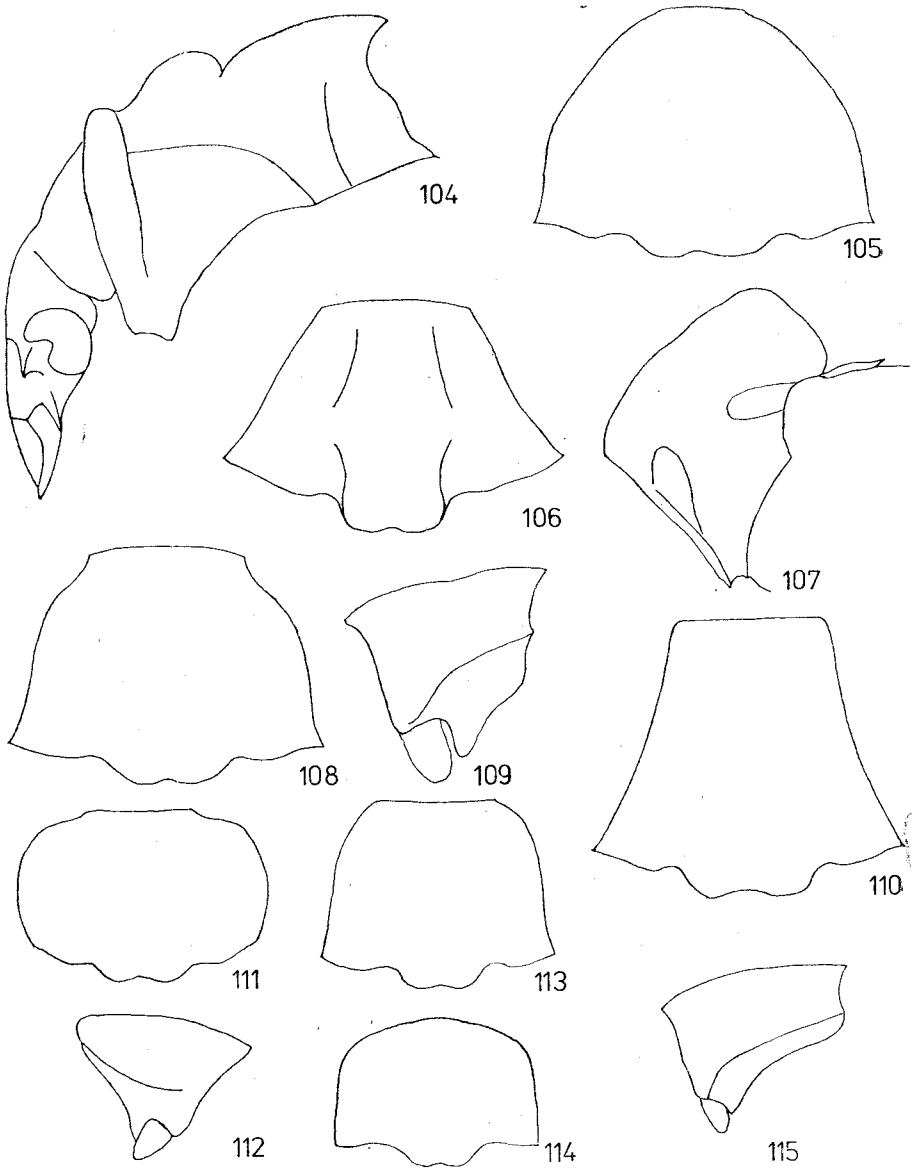

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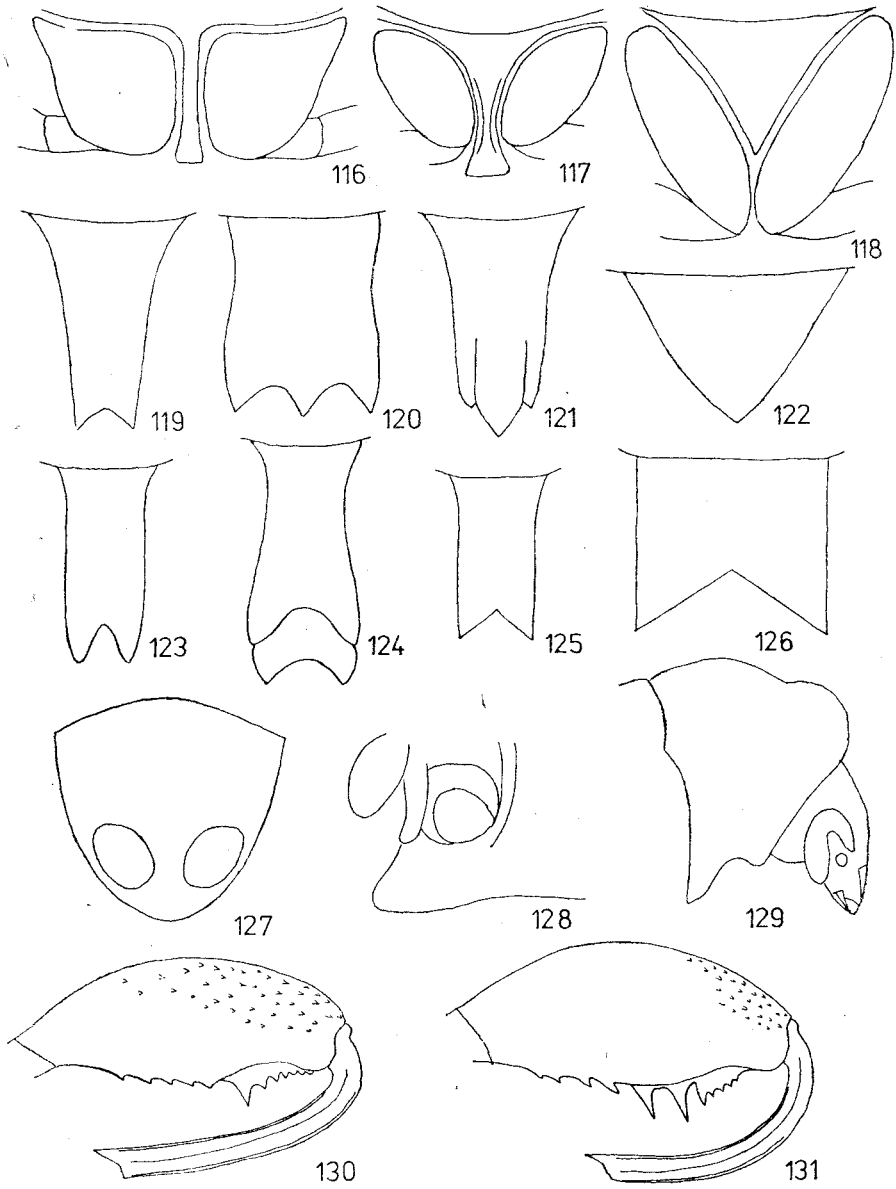

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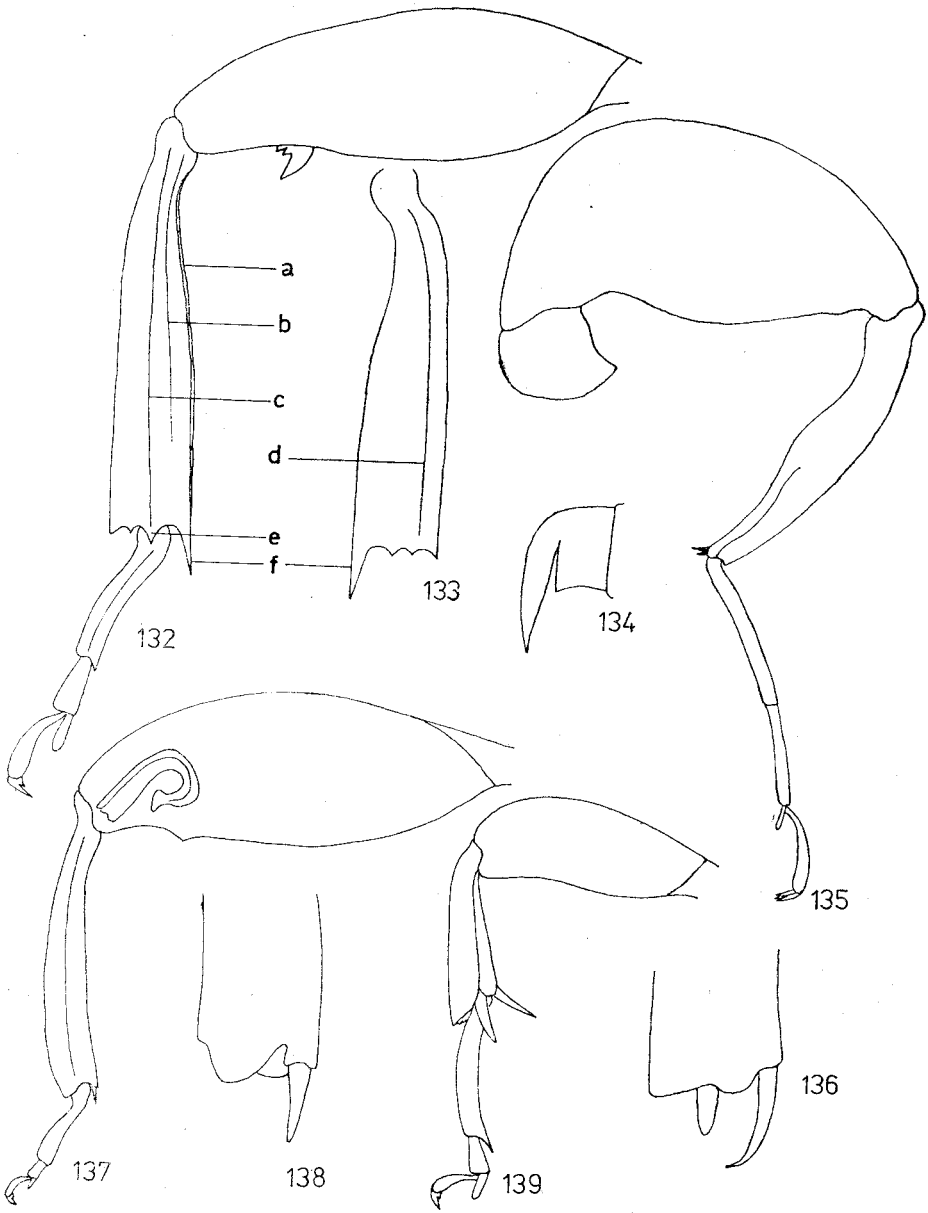

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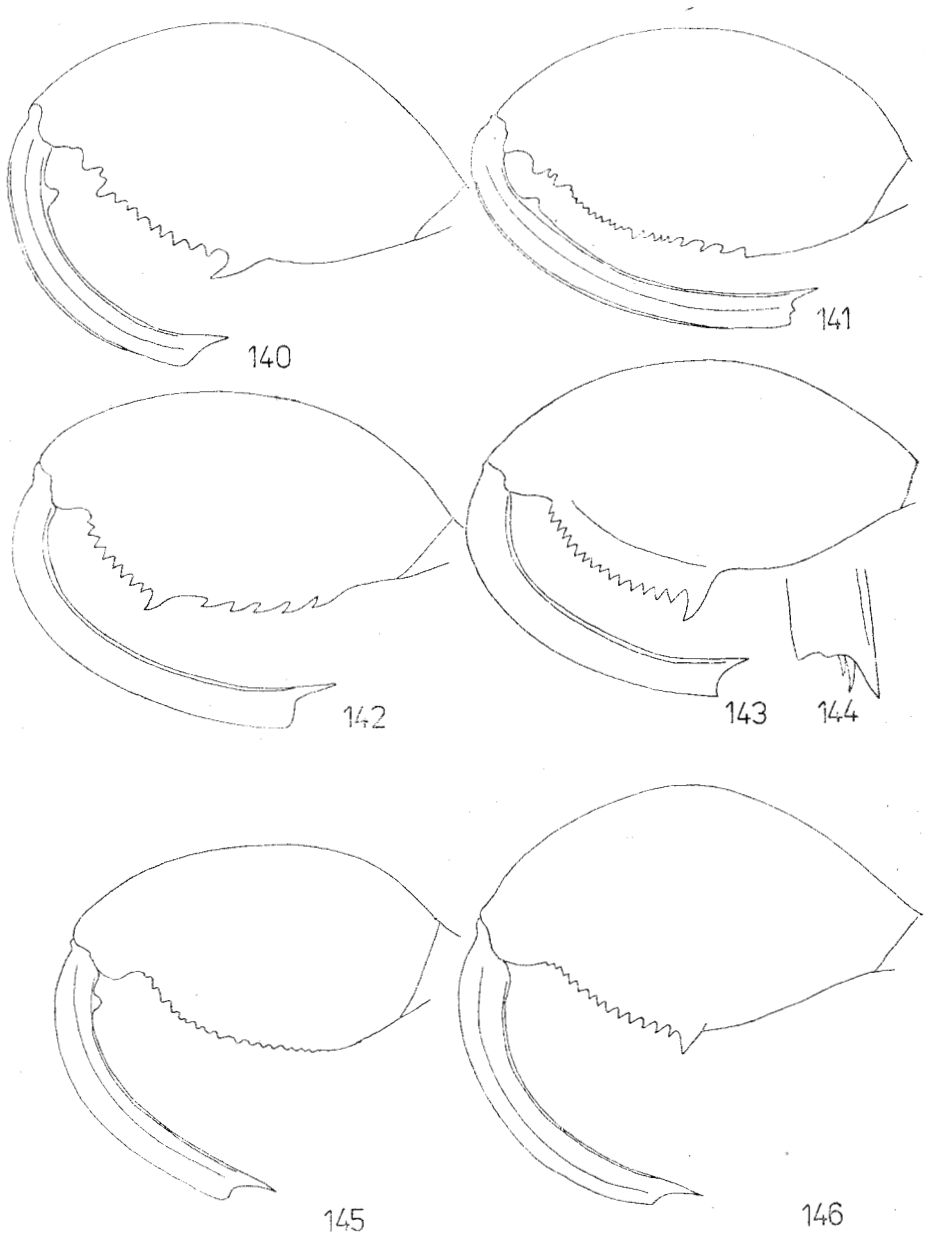

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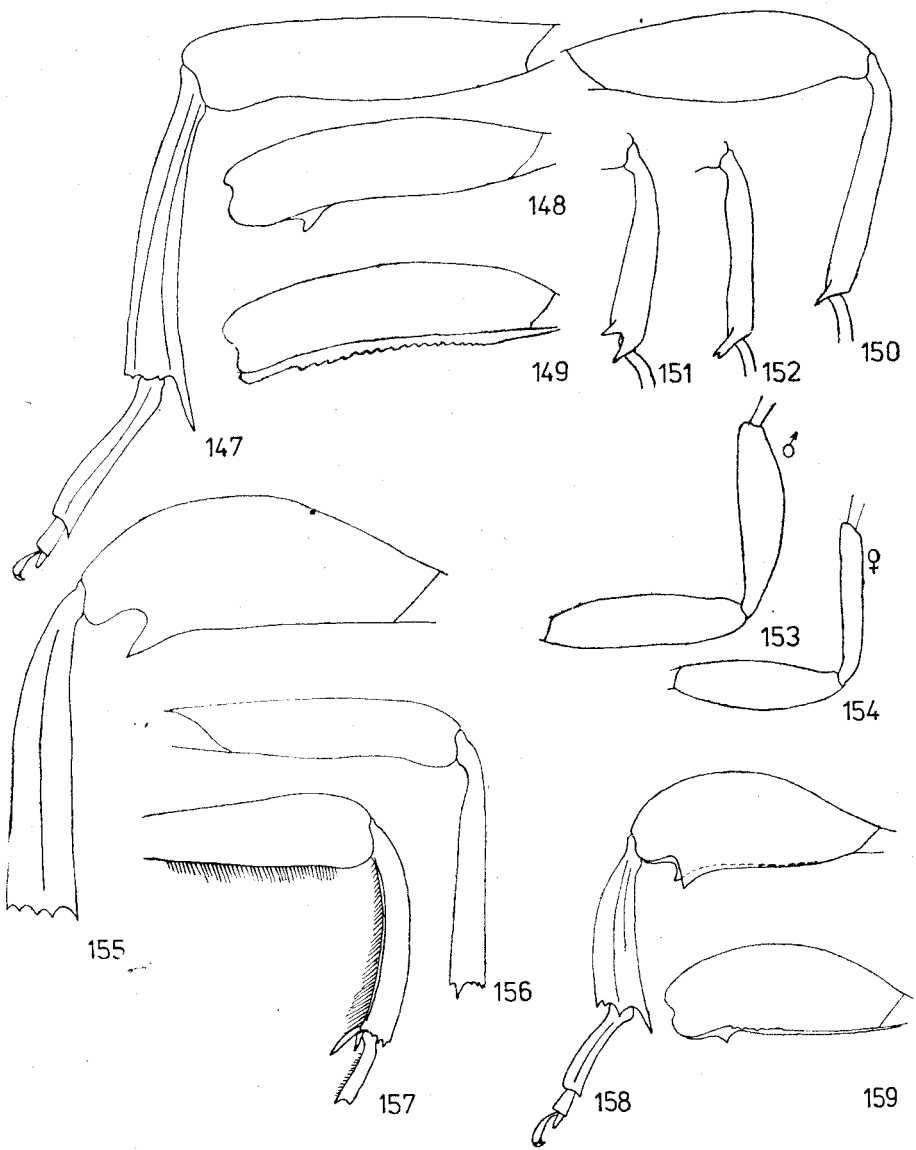

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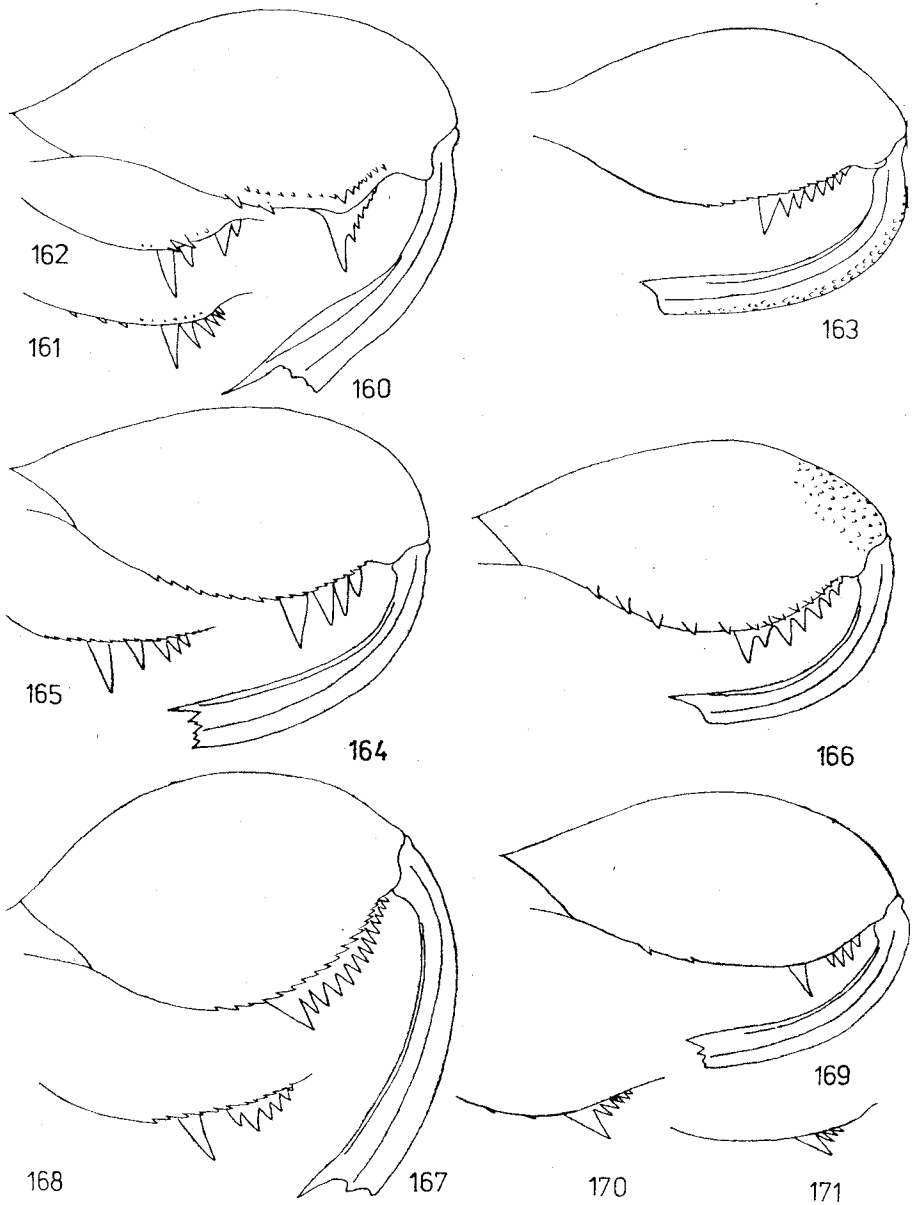

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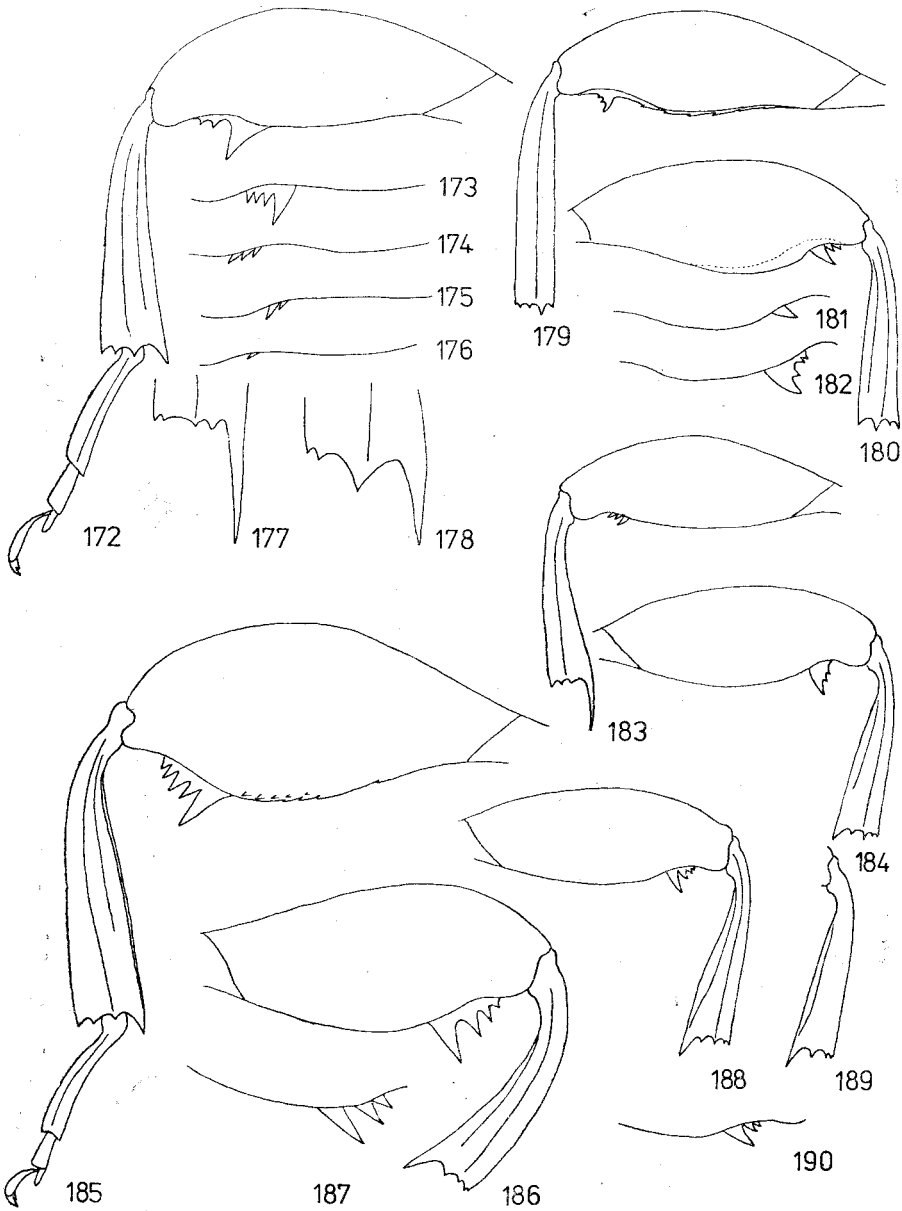

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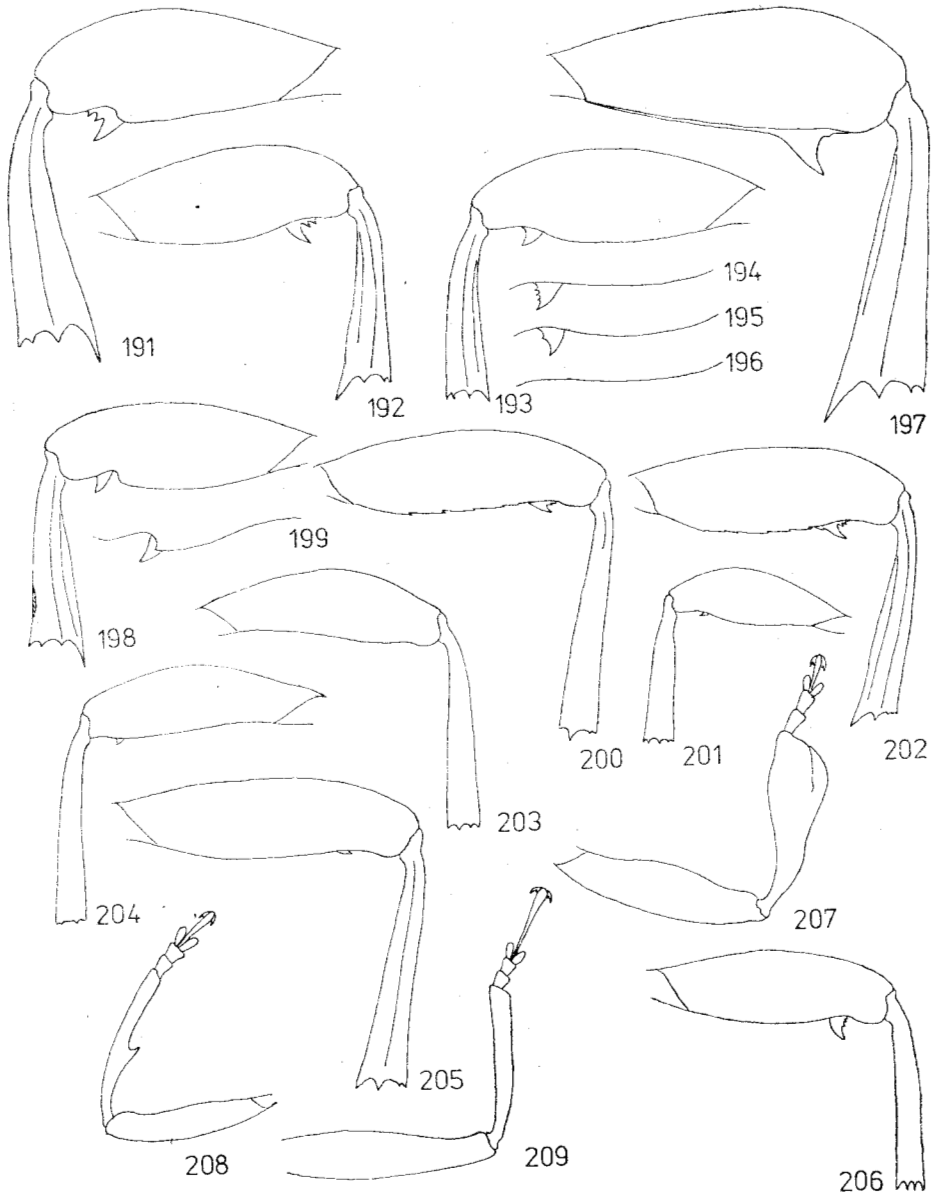

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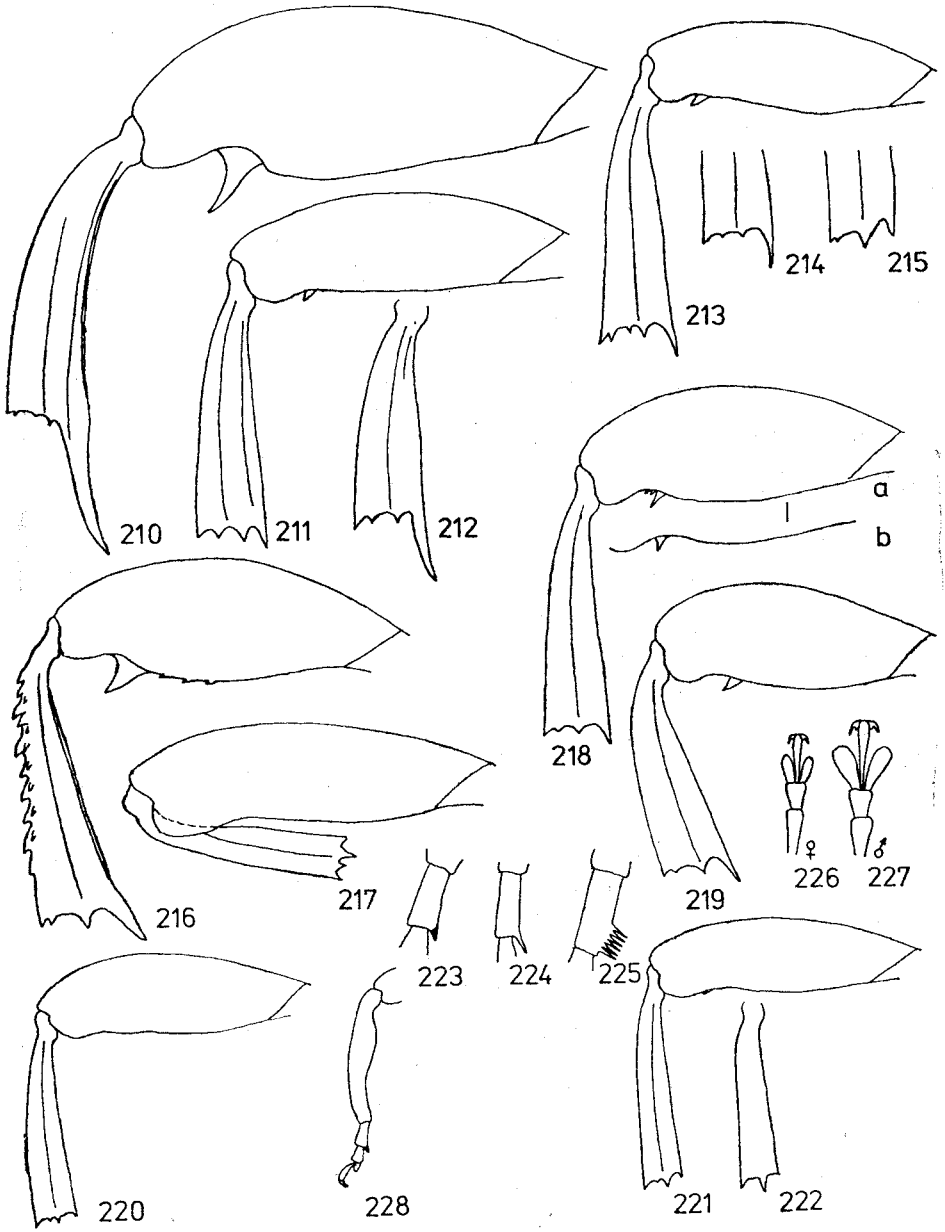

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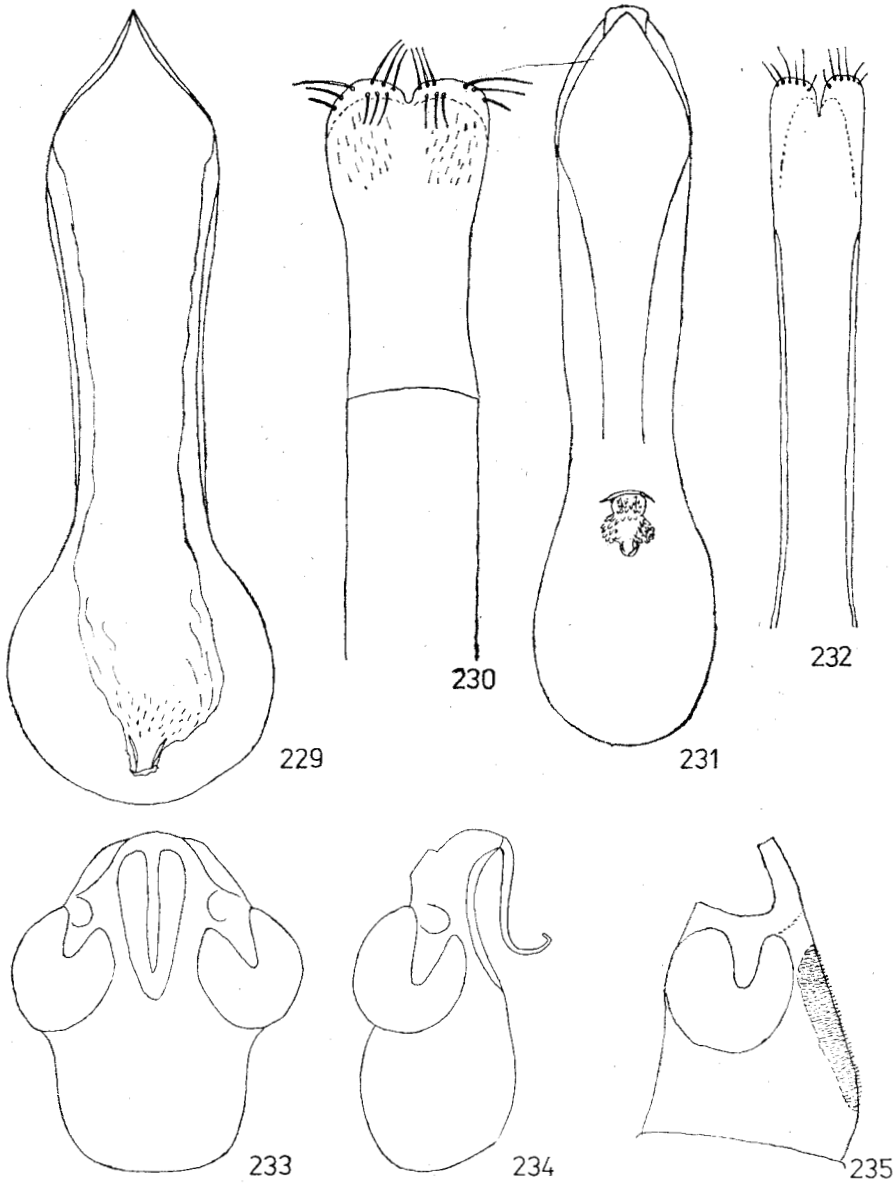

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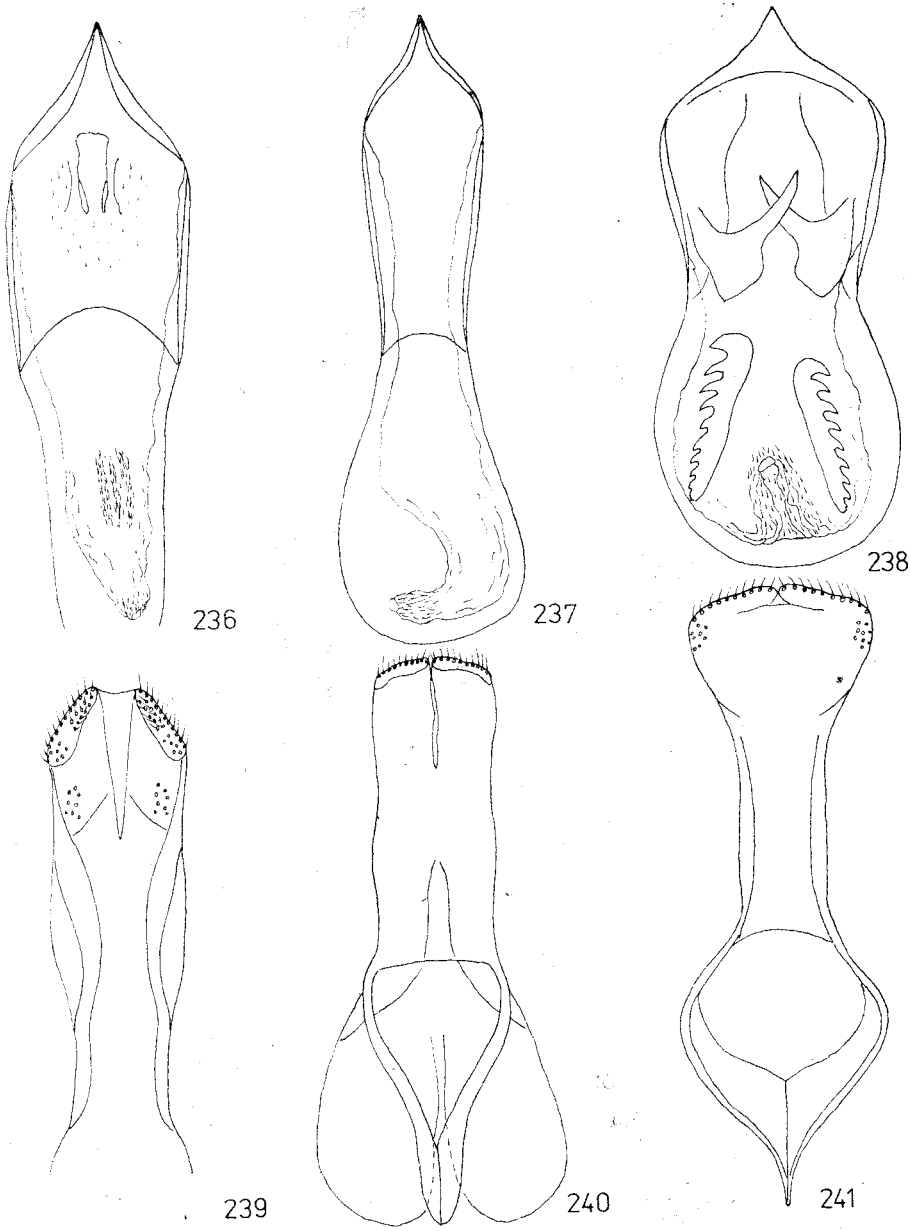

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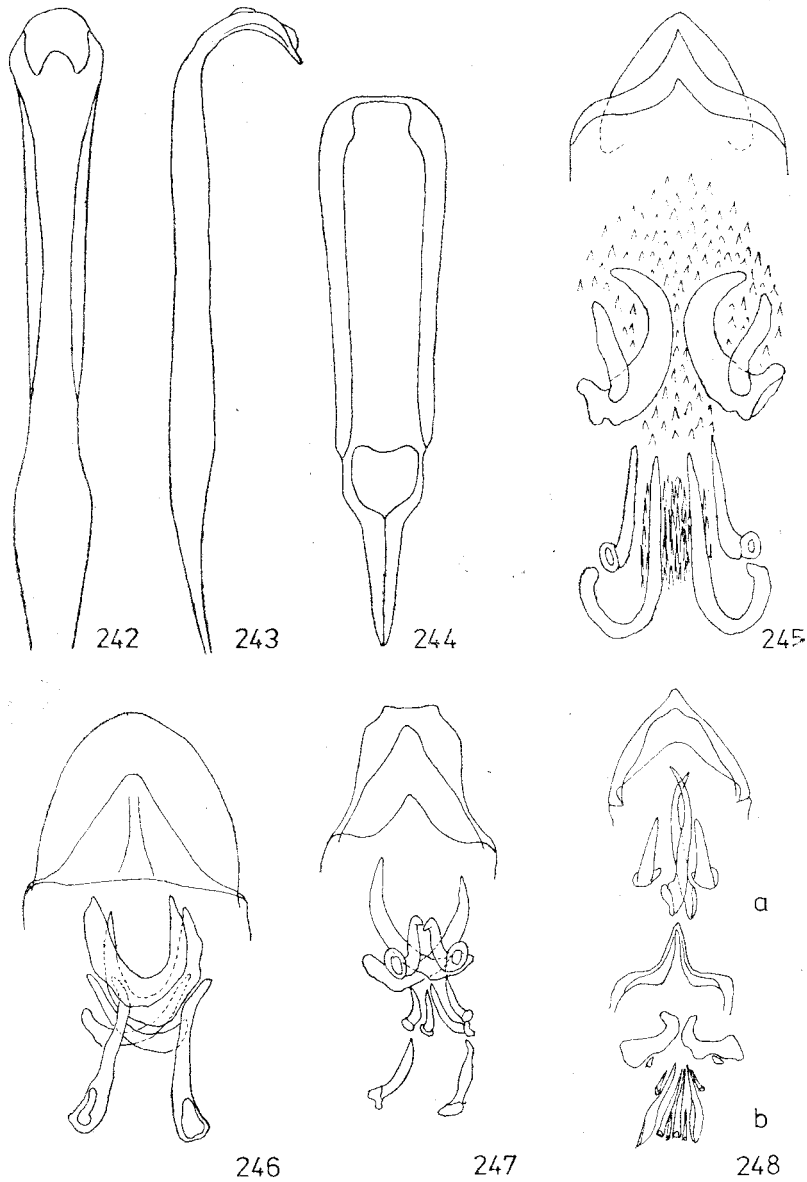

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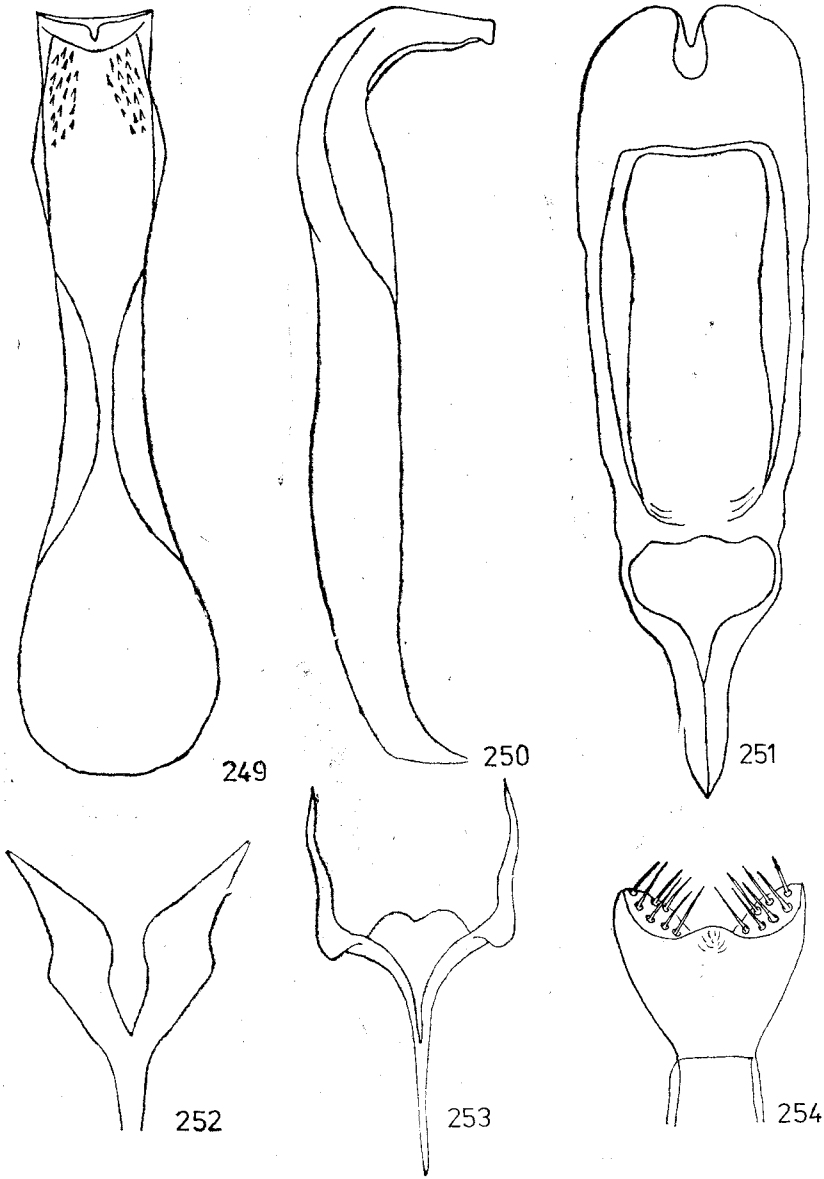

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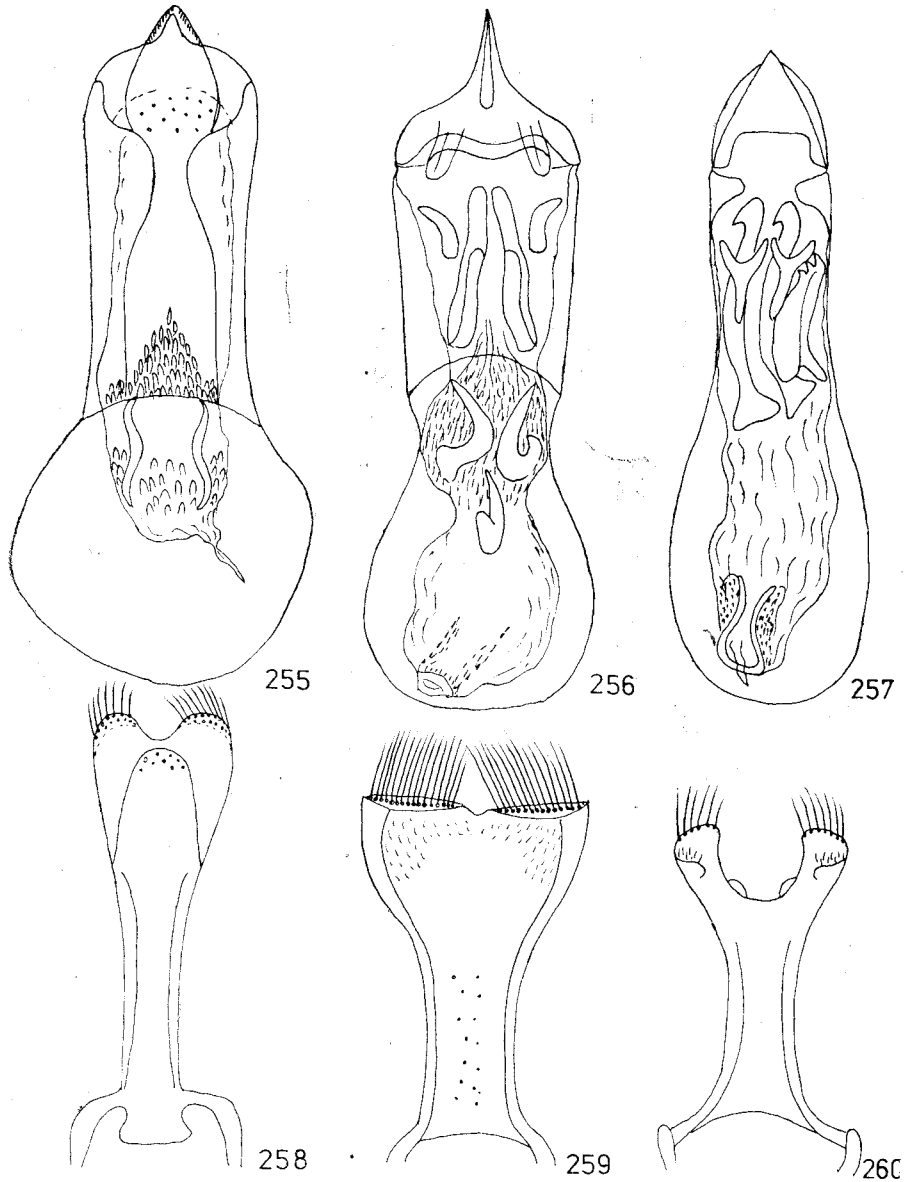

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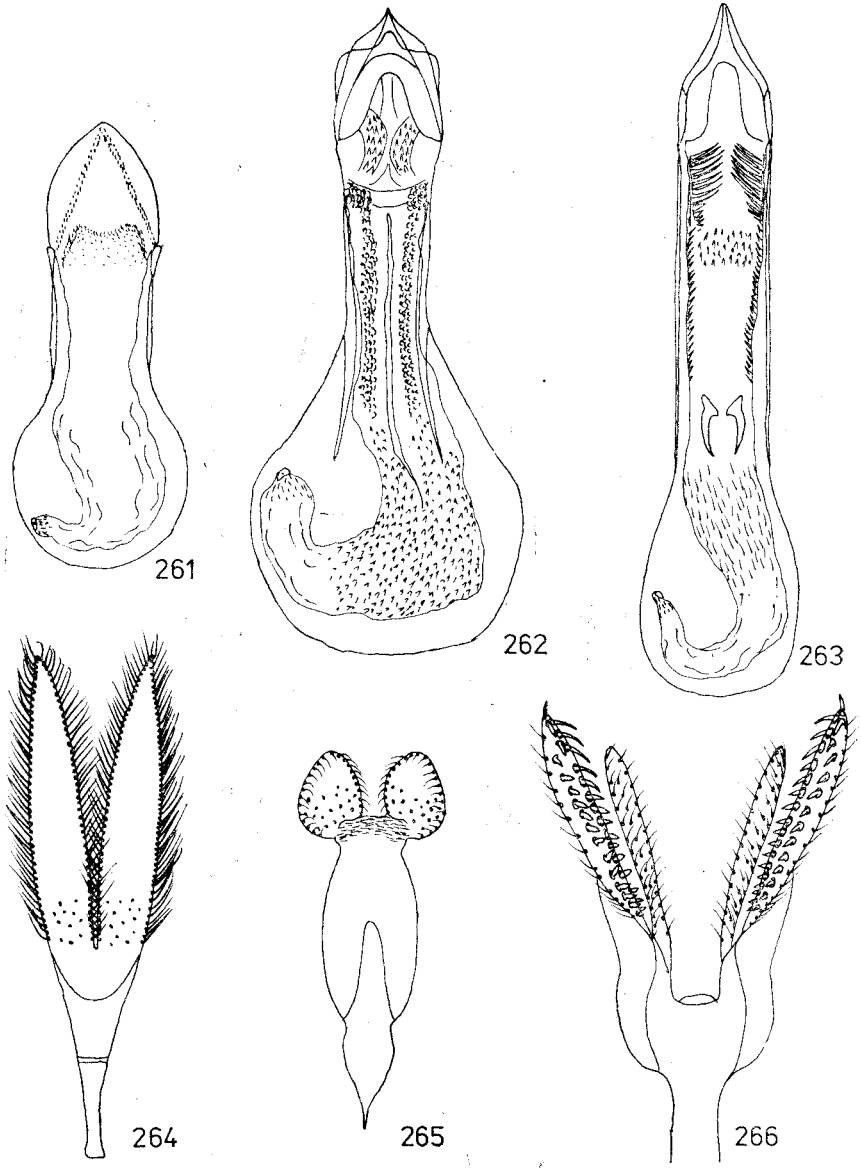

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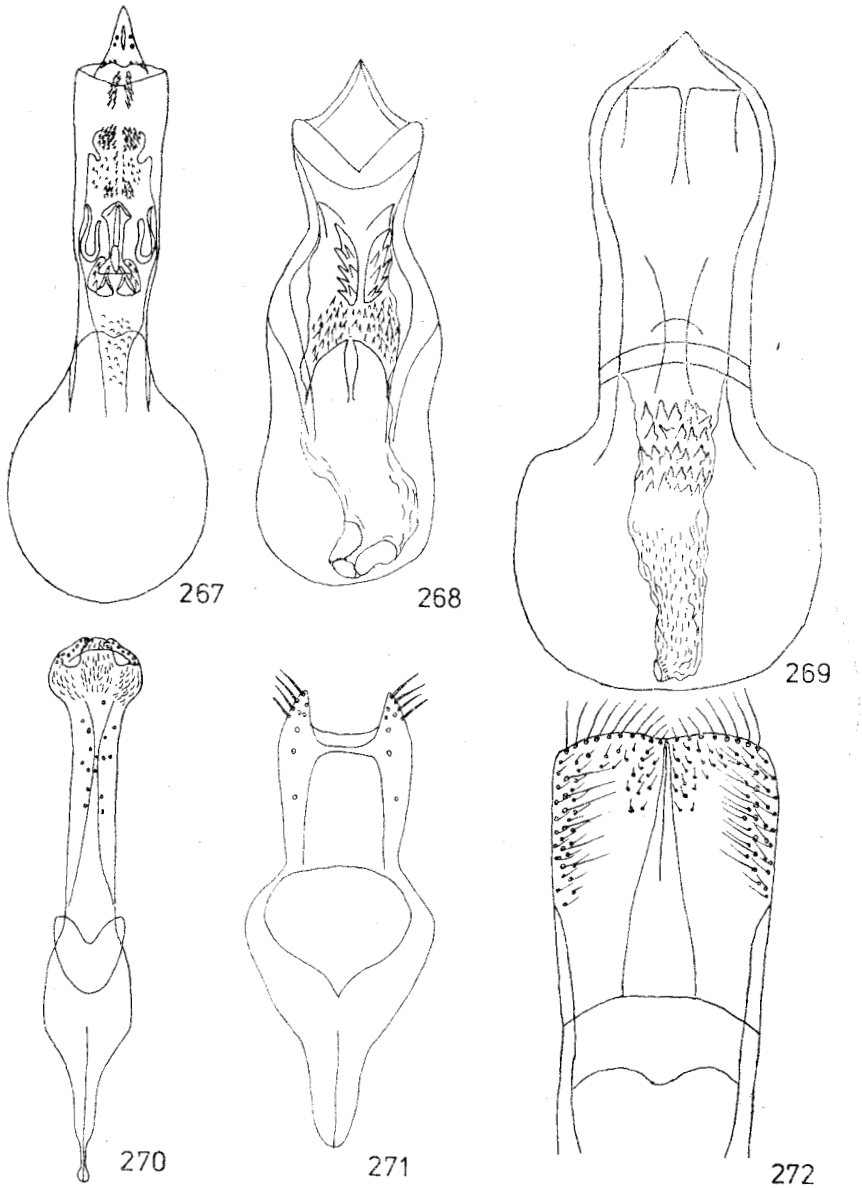

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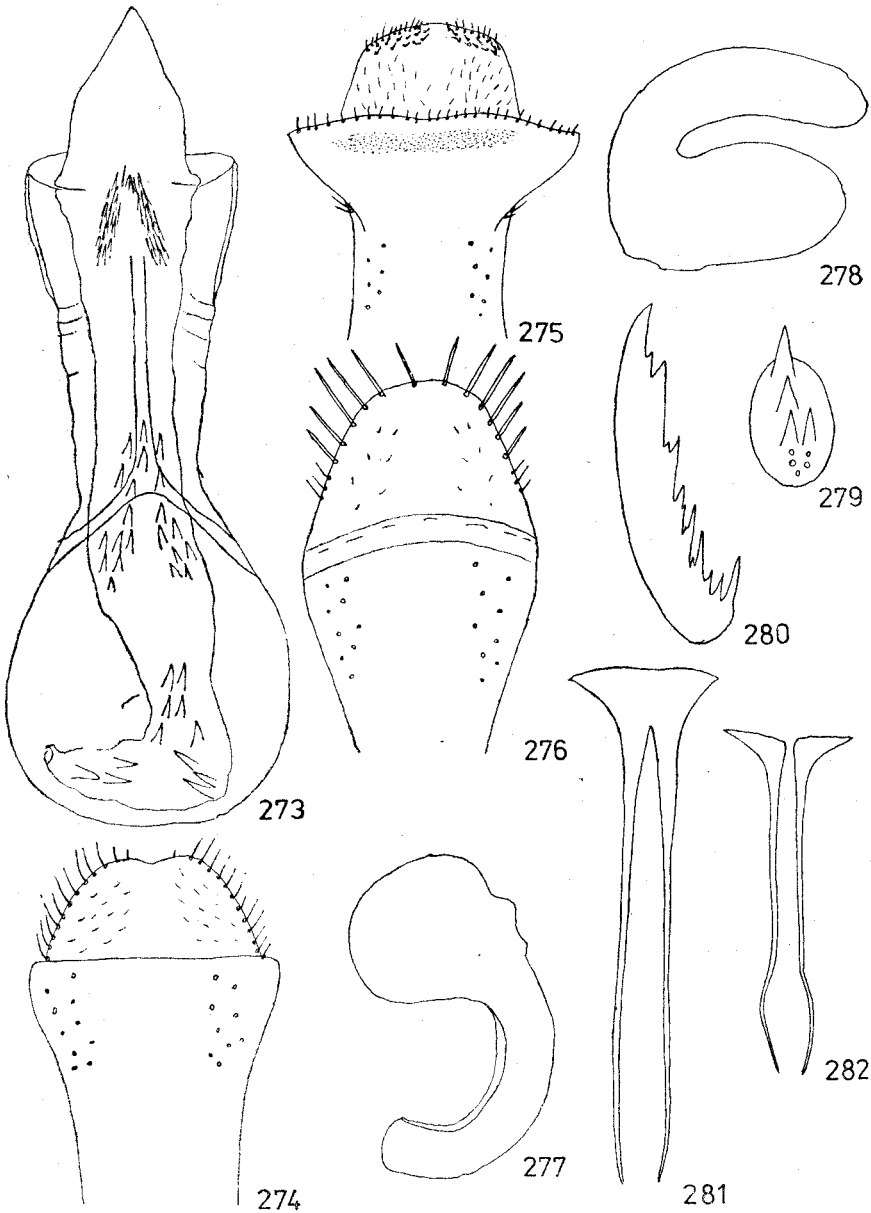

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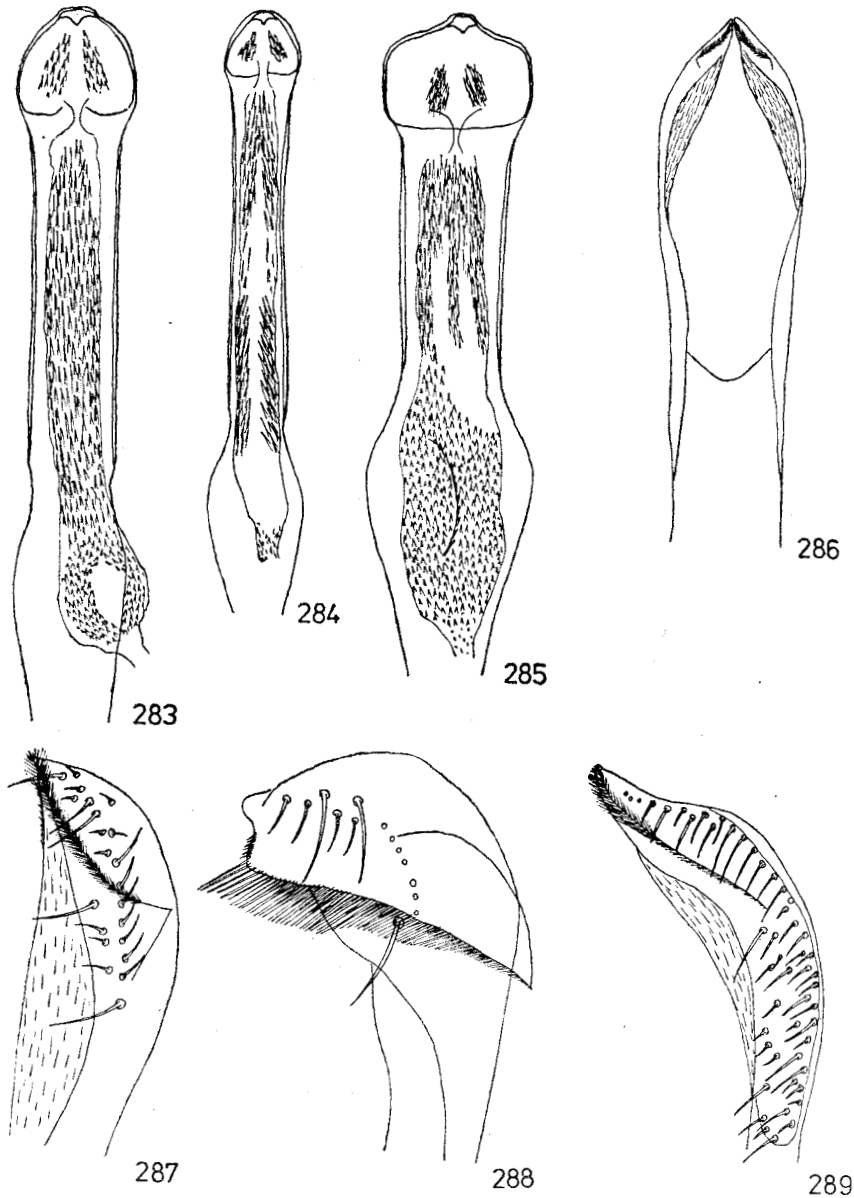

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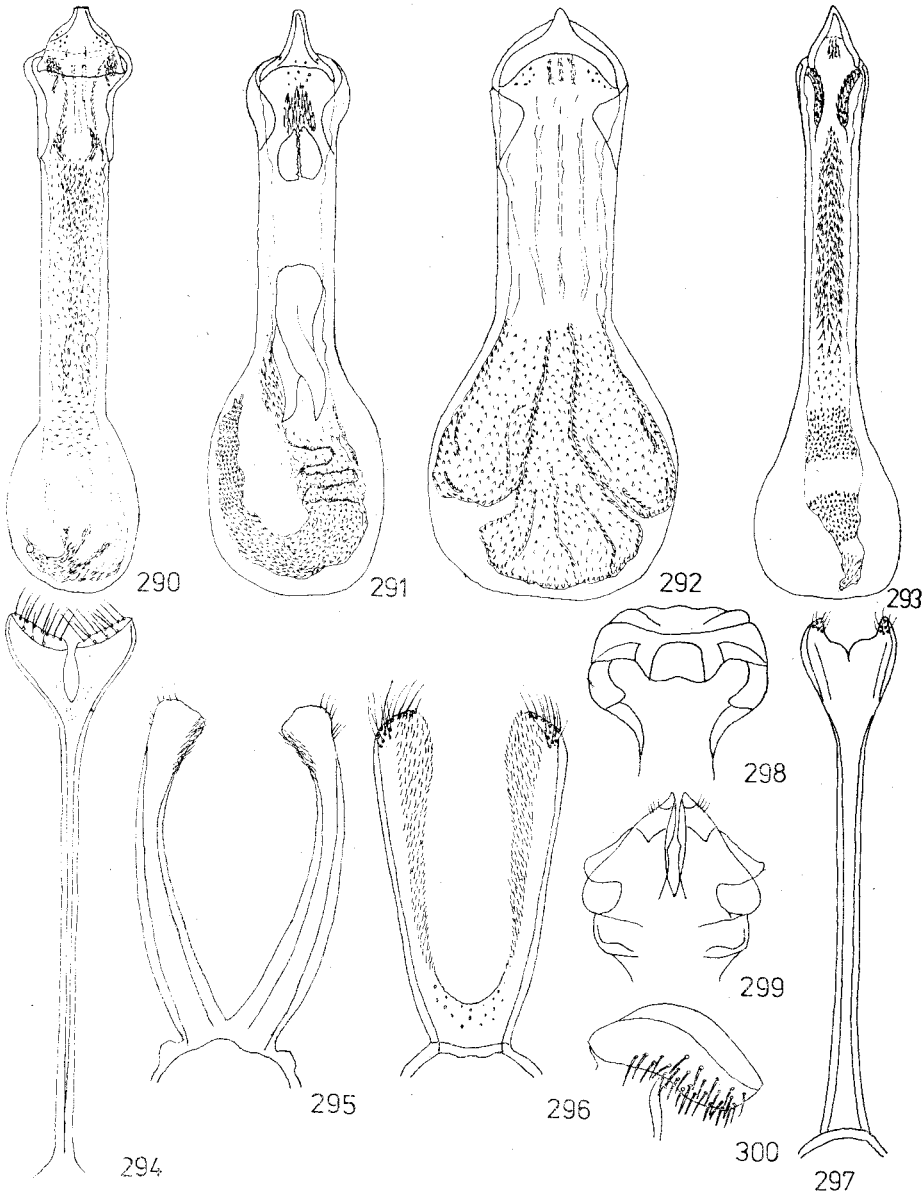

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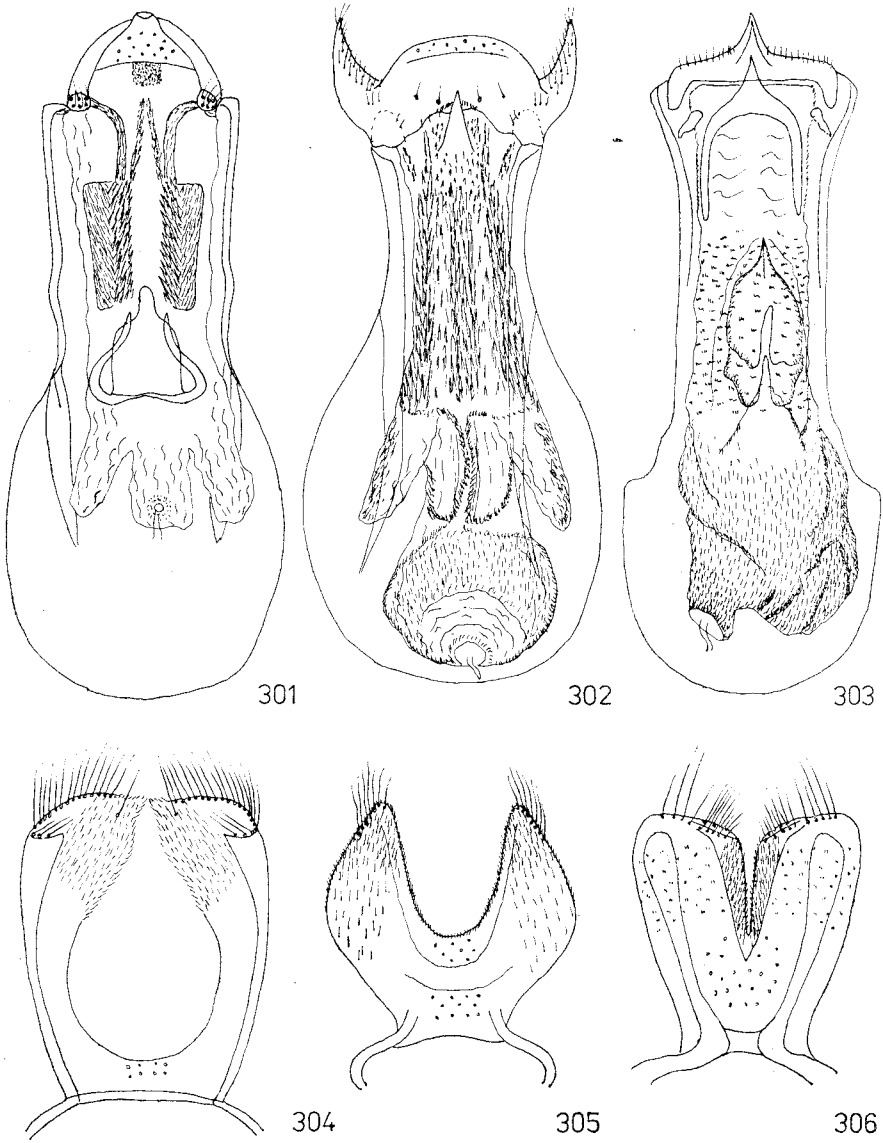

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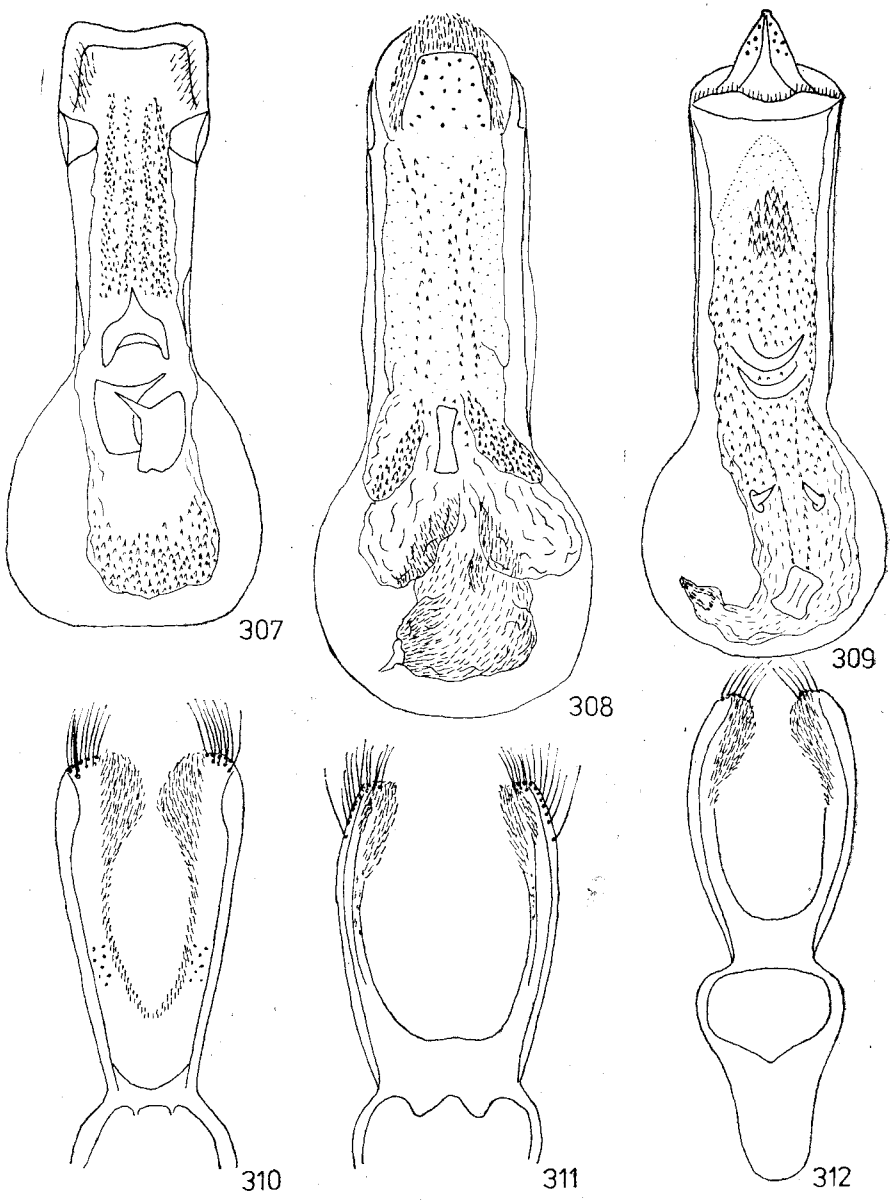

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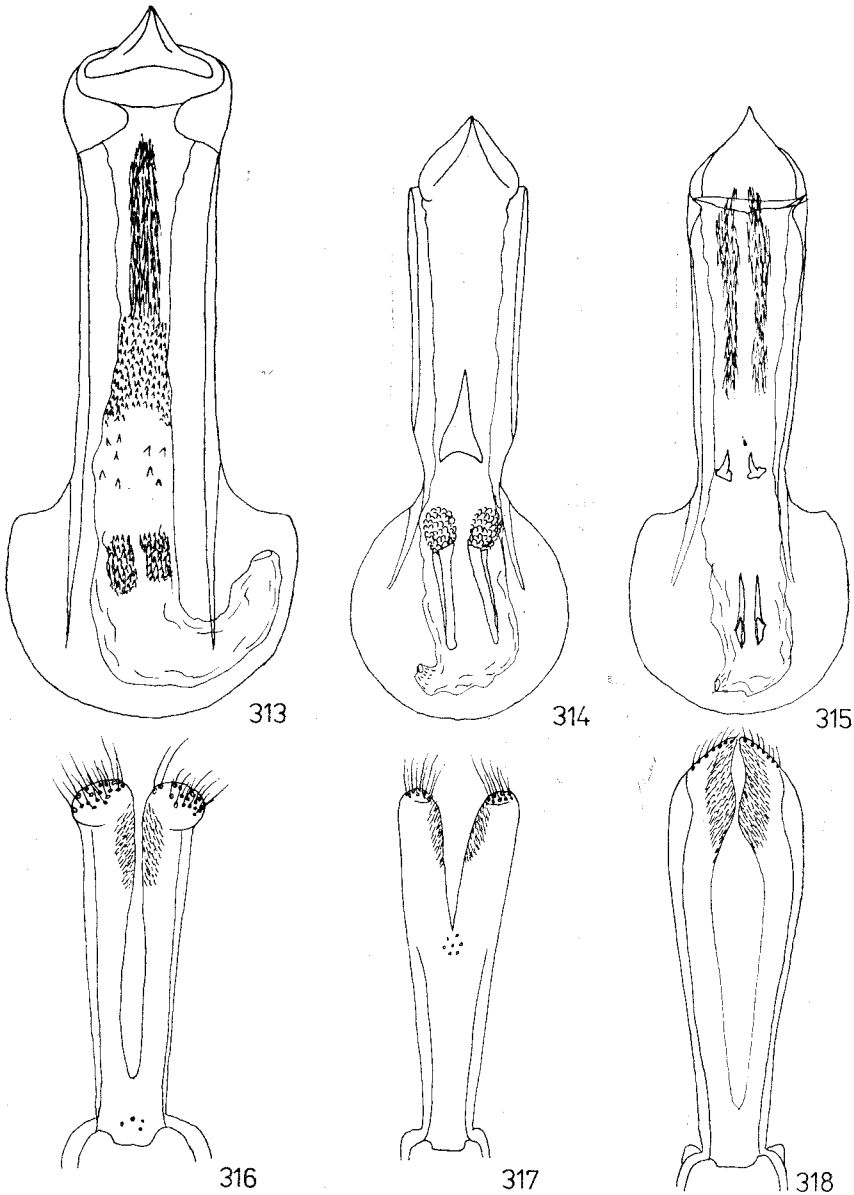

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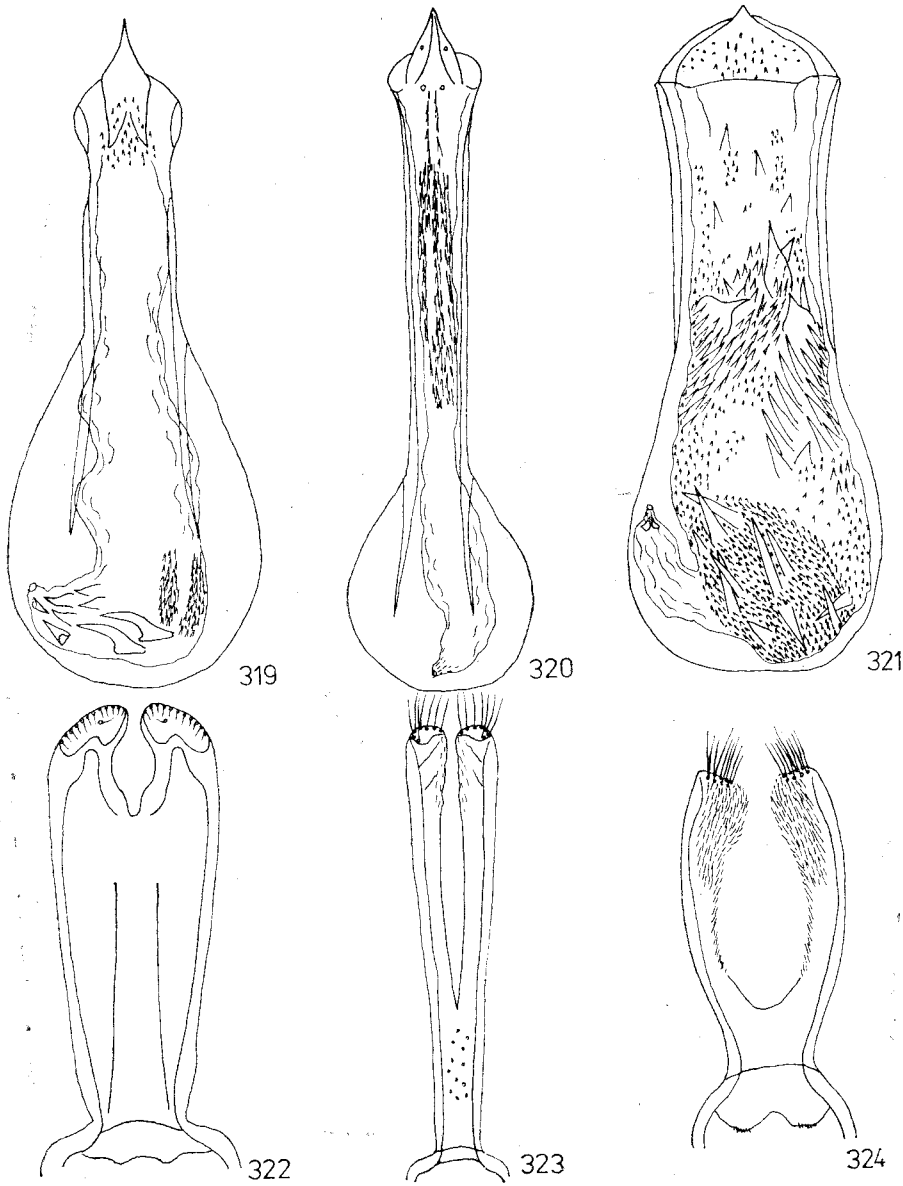

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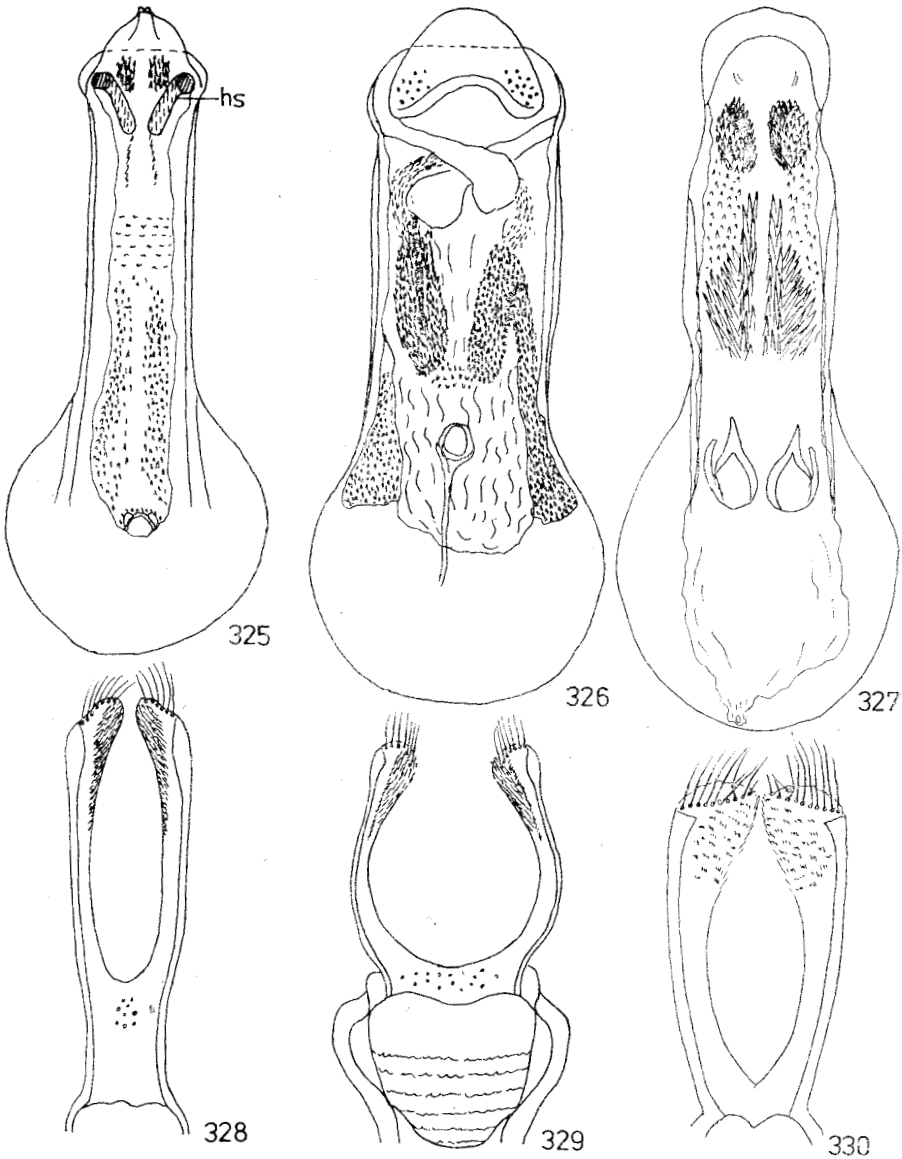

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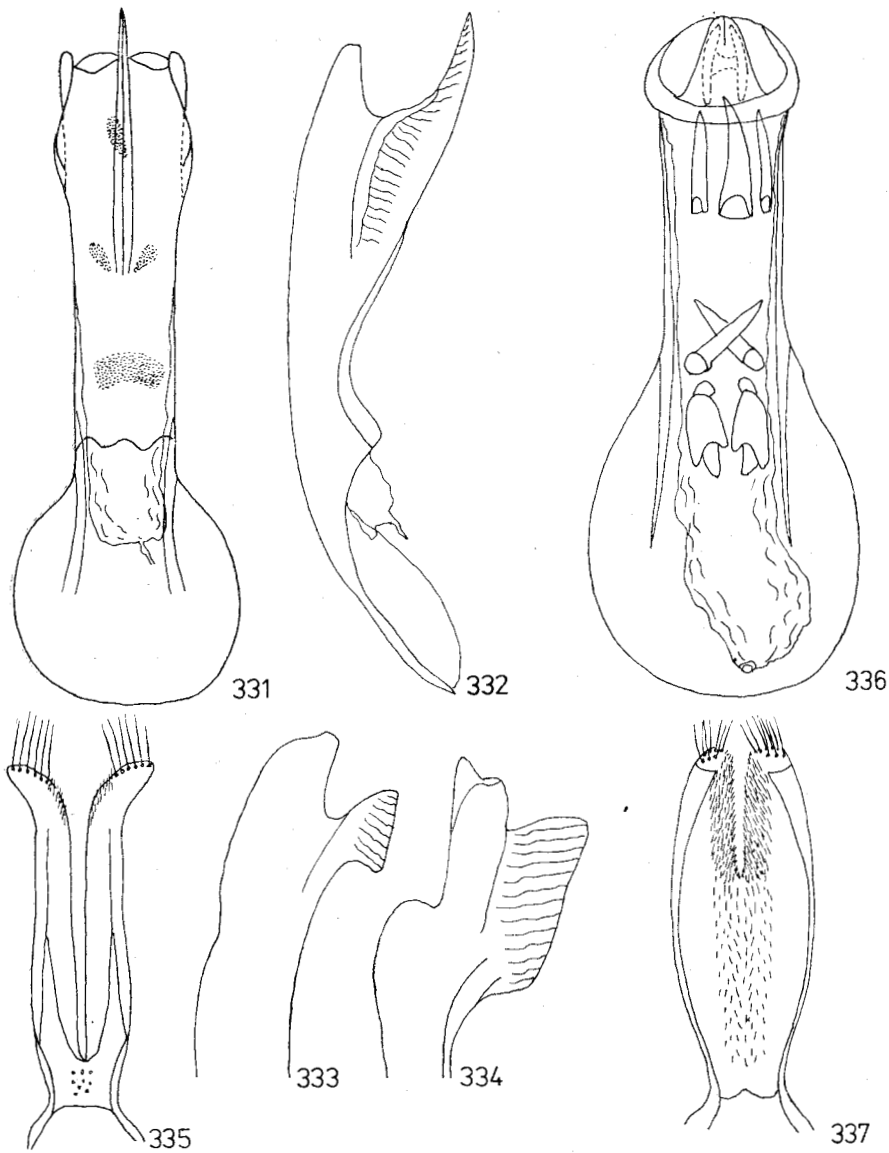

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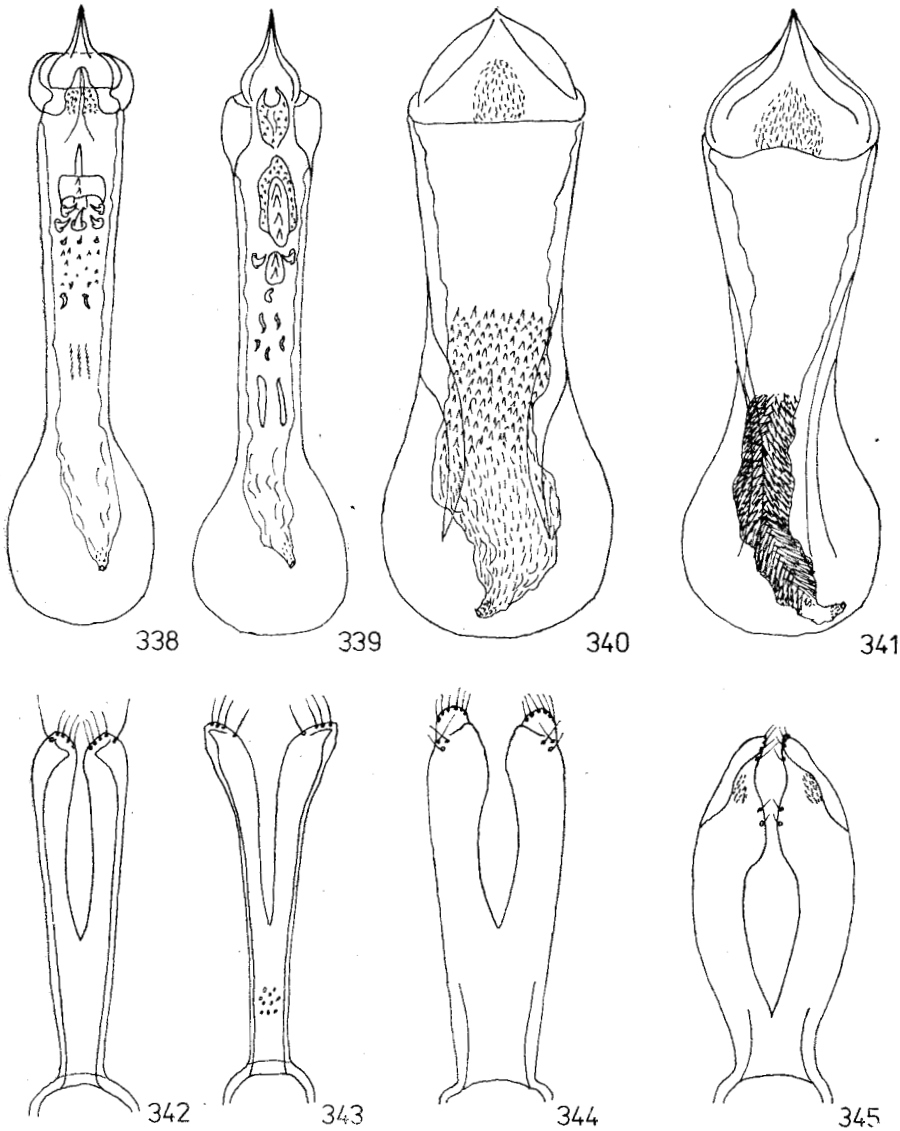

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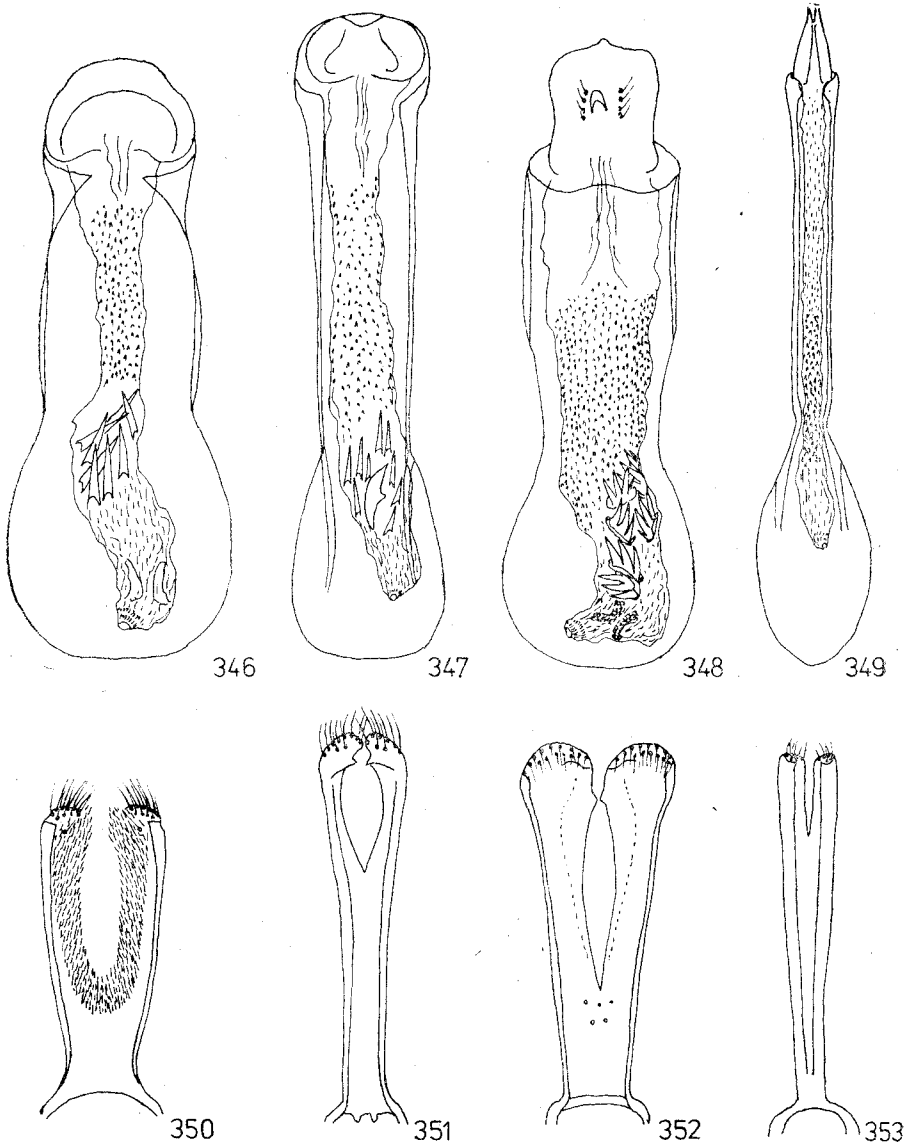

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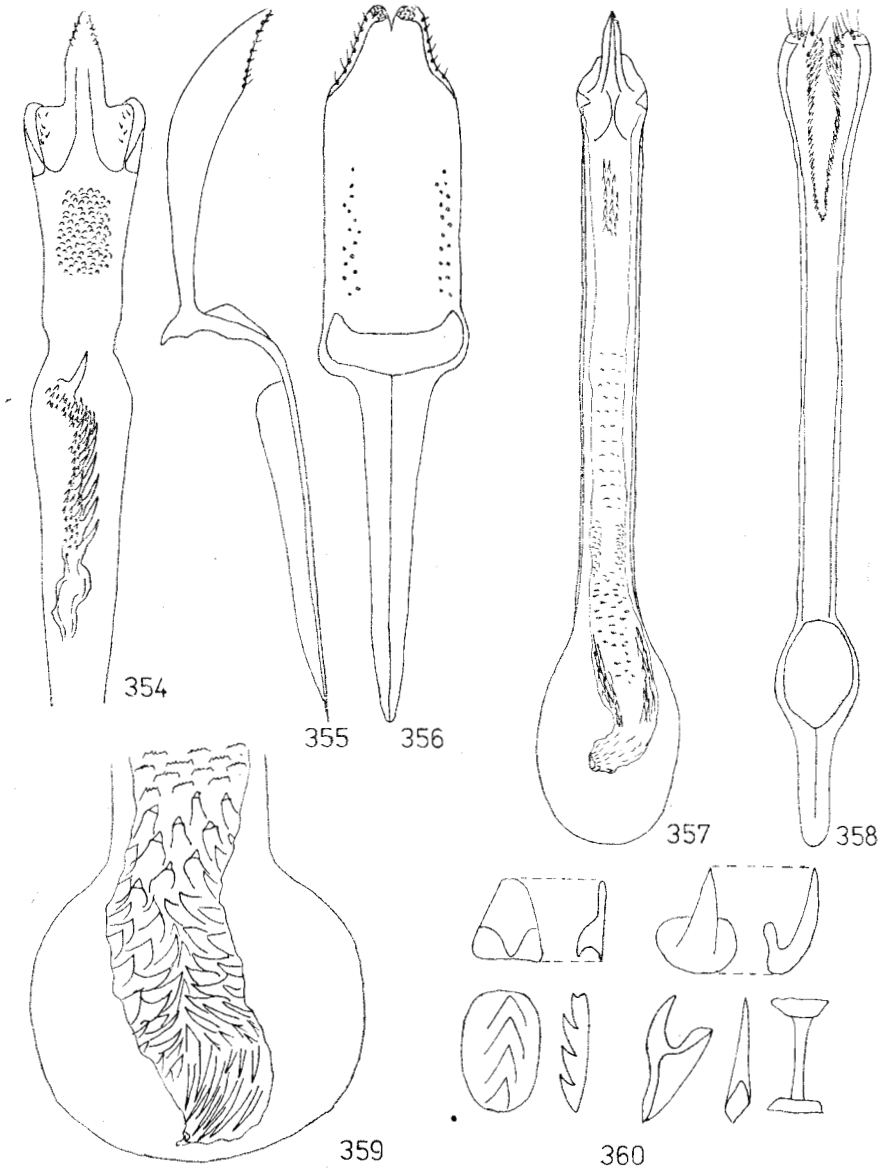

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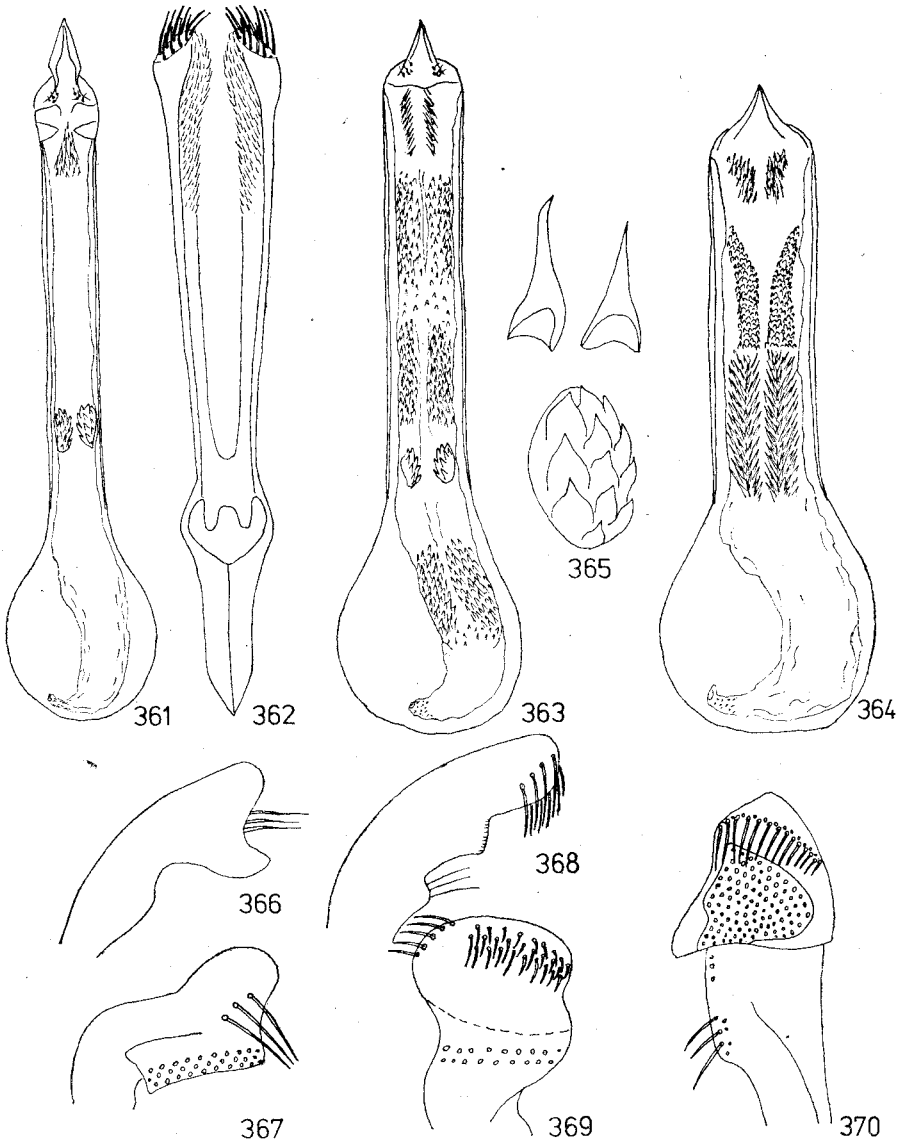

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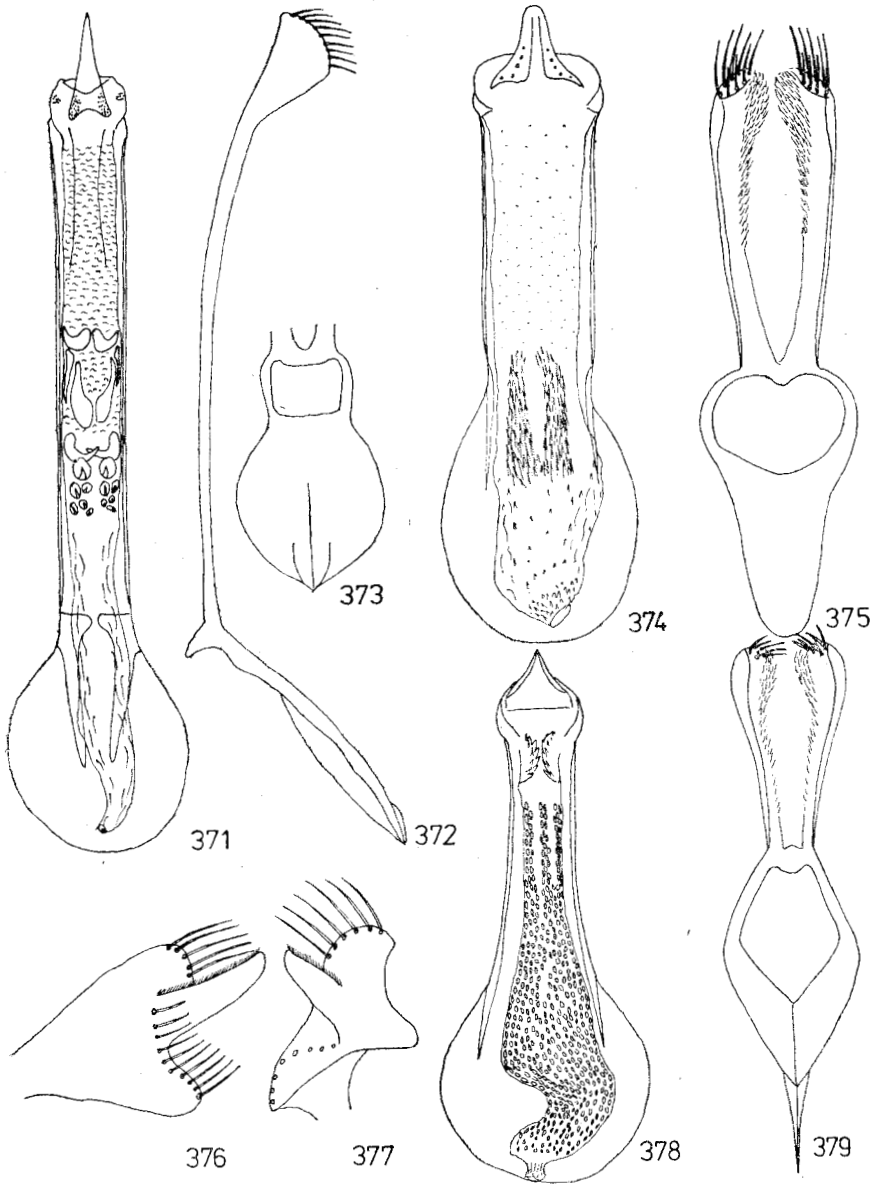

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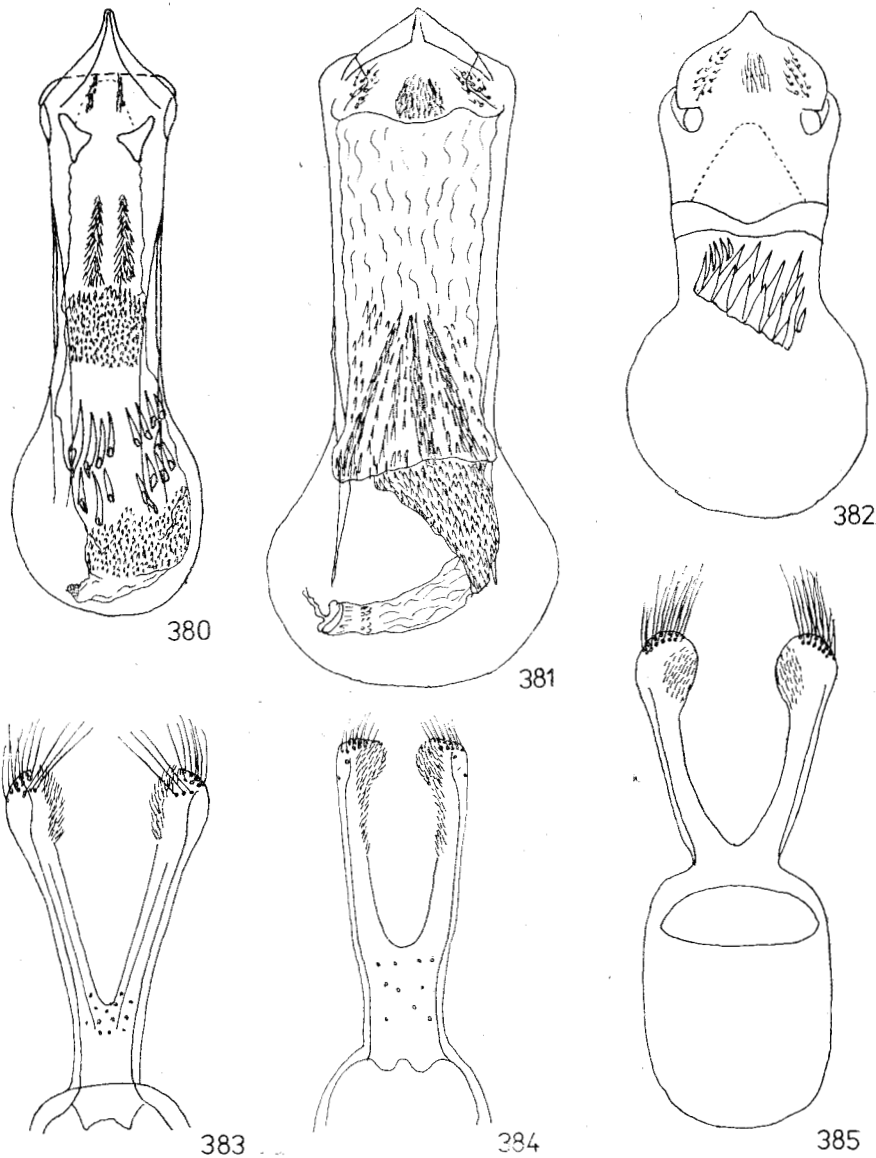

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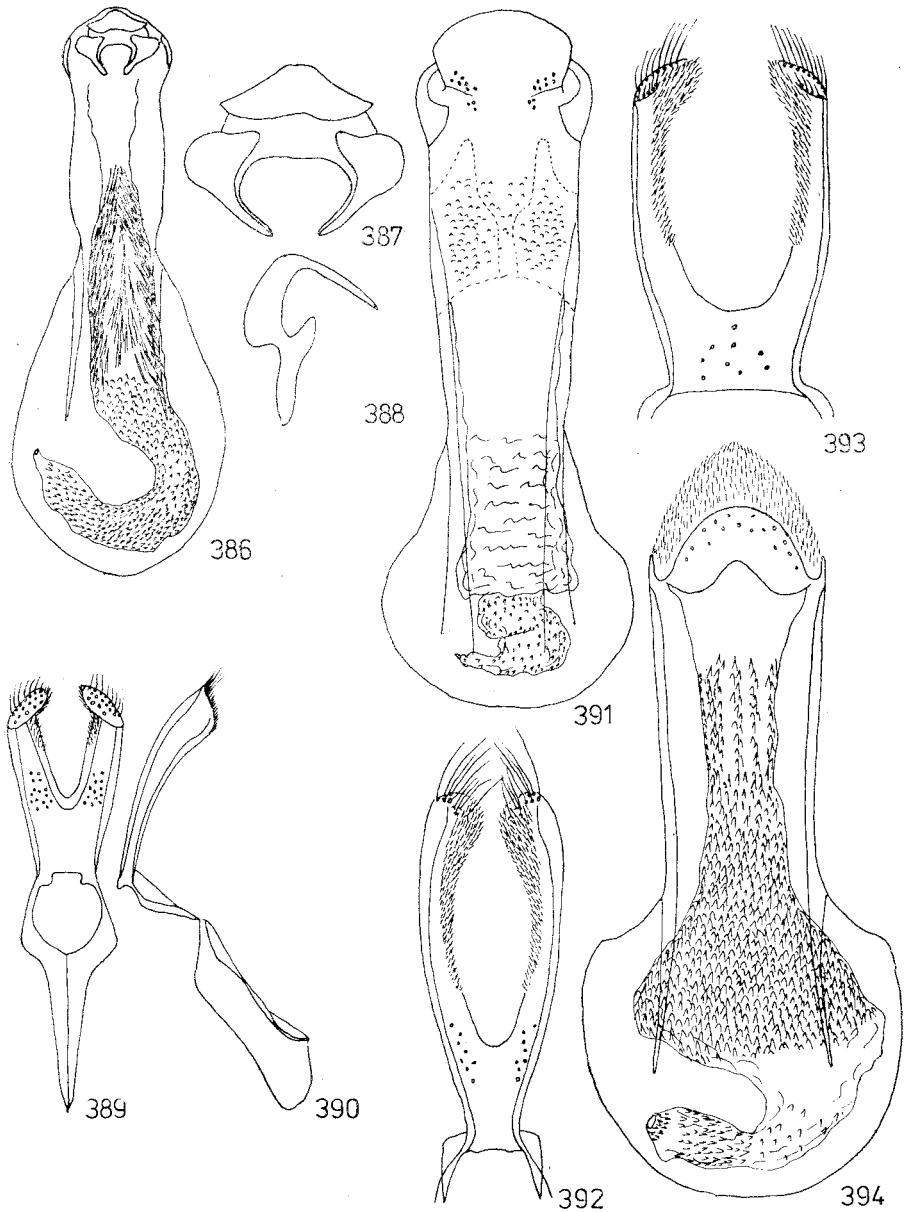

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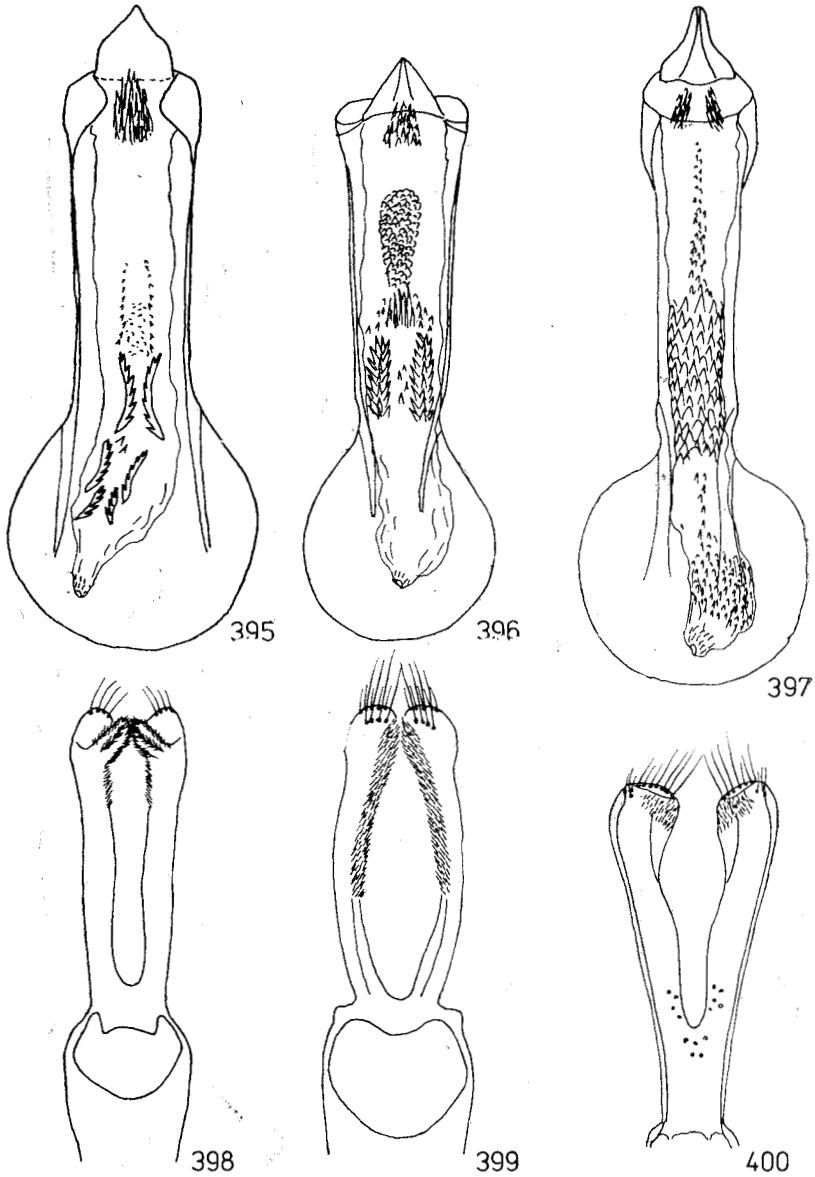

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