

## **RUTELINAE. Characteristics**

Form elongate oval. Labrum produced weakly beyond apex of clypeus (except in *Anomalacra* [Anomalini]). Antenna with 9 or 10 segments, antennal club with 3 segments. Scutellum exposed. Anterior coxae transverse. Mesotibial apex with 2 spurs; spurs mesad, adjacent (not separated by basal metatarsal segment). Tarsal claws on all legs independently movable, claws unequal in length or size and frequently weakly split at apex, 1 claw of each pair greatly reduced (1 claw lacking on all legs in *Leptohoplia* [Anomalini]). Onychium laterally flattened. Pygidium exposed beyond apices of elytra. References: Ohaus 1934, Machatschke 1957, Machatschke 1965.

## **Classification Status**

MacLeay (1819) proposed the family Rutelidae for taxa previously included in the genus *Scarabaeus* Linnaeus. Since Blanchard (1851) the group has been referred to as a subfamily of Scarabaeidae. Some workers regard the group as a family or as a subfamily of Melolonthidae. We follow Machatschke (1972) and Lawrence and Newton (1995) and regard the Rutelinae as a subfamily of the Scarabaeidae. Tribal classification of the subfamily is stable, but some tribes may be paraphyletic (i.e., Rutelini [see Jameson 1998]). The ruteline tribe Anomalini is occasionally regarded as a subfamily of Scarabaeidae (i.e., Potts 1974, 1977a, 1977b) or a subfamily of Melolonthidae (i.e., Sabatinelli 1991). In addition, *Hoplia* and its congeners have occasionally been included as a tribe (Hopliini) and included the Rutelinae (i.e., Baraud 1985). Subtribal classification of the subfamily is, in many cases, based on diverse assemblages of taxa, and many subtribes are not monophyletic. Phylogenies for the Scarabaeoidea hypothesize three differing views for the relationship of the Rutelinae: 1) that the subfamily Dynastinae is ancestral to the Rutelinae, 2) that the Dynastinae and Rutelinae are sister groups, or 3) that the subfamilies are possible sister groups and that their relationships remain unresolved (Endrödi 1966; Howden 1982; Iablokoff-Khnzorian 1977; Meinecke 1975; Scholtz and Chown 1995).

## **Distribution**

The subfamily Rutelinae is composed of approximately 200 genera and 4,100 species that are distributed worldwide (Machatschke 1972), although many taxa remain to be described. The subfamily is divided into six tribes, five of which occur in the New World. The tribe Spodochlamyini is found only in Central and South America; the tribe Anoplognathini occurs in the Australia and western Central and South America; the tribe Geniatini is distributed in Central and South America; the tribe Rutelini is widely distributed but is most speciose in the Neotropics; the tribe Anomalini is widely distributed and is most speciose in the Old World. The tribe Adoretini is exclusively distributed in the Old World. In the New World, the subfamily includes about 95 genera. Keys to genera and species: Casey 1915; Cooper 1983; Jameson 1990, 1997. Keys to larvae: Ritcher 1966; Jameson et al. 1994, Jameson 1997. United States catalog: Hardy 1991. Mexico, Central and South America catalog: Blackwelder 1944. World catalog: Machatschke 1972.

## **New World Tribes**

Anomalini  
Anoplognathini  
Geniatini  
Rutelini  
Spodochlamyini

## **TRIBE ANOMALINI**

**Characteristics:** Labrum horizontally produced with respect to the clypeus. Antennae with 9 segments. Protibiae bidentate (rarely unidentate or tridentate), inner protibial spur subapical (lacking in *Leptohoplia*); foretarsomeres not enlarged or densely setose ventrally. Elytra with membranous border at lateral margin. Terminal spiracle not positioned in pleural suture.

The tribe Anomalini includes one of the largest genera in the Animal Kingdom: the genus *Anomala*, which includes approximately 1,000 species worldwide. Adult anomalines feed primarily on flowers and floral parts. Larvae feed primarily on plant roots. One introduced member of the tribe, *Popillia japonica* Newman, causes economic damage to agricultural crops and ornamental plants. Despite the agricultural importance of some members, the tribe is poorly known taxonomically and in desperate need of revisionary studies. The tribe includes 11 genera in the New World. Keys: Cooper 1983; Potts 1974, 1977a, 1977b. Key to larvae: Ritcher 1966.

## **TRIBE ANOPLIGNATHINI**

**Characteristics:** Labrum vertically produced with respect to the clypeus, with apicomedial projection. Mentum lacking apical tooth or projection. Antennae with 9 or 10 segments. Terminal spiracle positioned in pleural suture.

The tribe Anoplognathini is distributed in the southern hemisphere. Members are found in Australia (some members are commonly called Christmas beetles) and from central Mexico to southern South America. In the New World, the tribe includes five genera (*Aulacopalpus*, *Brachysternus*, *Hylamorpha*, *Phalangogonia*, and *Platycoelia*). Keys: Smith 2003.

## **TRIBE GENIATINI**

**Characteristics:** Labrum vertically produced with respect to the clypeus, with apicomedial projection. Antennae with 10 segments. Protibiae tridentate, inner protibial spur apical; foretarsomeres usually enlarged in males and/or females and densely setose ventrally. Elytral margin chitinous or membranous. Terminal spiracle positioned in pleural suture.

The tribe Geniatiini is exclusively a Neotropical group of beetles. Little is known of the natural history of the group. Members inhabit deciduous forests and cloud forests, and some adults are attracted to lights at night. In the new World, the tribe includes about 12 poorly studied genera. Keys: Machatschke 1965; Villatoro and Jameson 2001; Jameson and Hawkins 2005.

## **TRIBE RUTELINI**

**Characteristics:** Labrum horizontally produced with respect to the clypeus. Antennae with 10 segments (8 or 9 in Parachrysinina). Protibiae tridentate, inner protibial spur apical; foretarsomeres not enlarged or densely setose ventrally. Elytral margin entirely chitinous. Terminal spiracle positioned in pleural suture.

The tribe Rutelini is distributed worldwide but is most speciose in the Neotropics. A wide array of morphological forms is exhibited by members of the tribe including taxa with enlarged, horn-like mandibles (*Fruhstorferia* from Asia), backward-projecting thoracic horns (*Peperonota* from Asia), enlarged hind femora (*Heterosternus* and *Chrysinina* from the New World), and strikingly-colored, metallic silver and gold beetles (*Plusiotis* from the New World). Exemplar genera in the tribe include *Pelidnota*, *Macraspis* (both of which are most diverse in Central and South America), and *Parastasia* (most diverse in the Old World with one species in the New World). The tribe includes over 70 genera in the New World. Keys: Cooper 1983; Jameson 1990; Jameson in prep. Keys to larvae: Ritcher 1966; Jameson et al. 1994; Jameson 1997. Catalog to *Pelidnota* and related genera. Overview to *Heterosternina*.

## **TRIBE SPODOCHLAMYINI**

**Characteristics:** Labrum vertically produced with respect to the clypeus, lacking apicomedial projection. Antennae with 10 segments. Protibiae tridentate, inner protibial spur apical; foretarsomeres not enlarged or densely setose ventrally. Elytral margin entirely chitinous. Terminal spiracle positioned in pleural suture.

The tribe Spodochlamyini is a small, Neotropical group that includes four genera. Members of the group are distributed primarily in cloud forest habitats in northern South America. Adults are attracted to lights at night. Keys: Machatschke 1965.

## **Ecology**

Adult rutelines are phytophagous and feed on leaves, flowers, or flower parts. Larvae feed on roots, compost, and decaying vegetation. Some taxa, such as *Popillia japonica* Newman and *Anomala* species (both Anomalini), are agricultural pests. The common name of the subfamily, the shining leaf chafers, reflects the fact that many members of the subfamily are brightly colored, beautifully patterned, and often brilliantly metallic leaf-feeding beetles. Others in the subfamily, such as the genus *Anomala*, are small, obscure beetles. Adults may aid in pollination of plants.

## **Larvae**

Despite the potential agricultural importance of some rutelines, few ruteline larvae have been described. Larvae typically feed on decaying wood, compost, or roots. Ritcher (1966) characterized the North American ruteline larvae as follows: Mandibles with stridulatory area consisting of transverse ridges. Maxilla with row of anteriorly directed, sharp, pointed, stridulatory teeth; lacinia with 1-3 unci. Epipharynx with haptomerum, with or without plegmata, without proplegmata, two nesia usually present; haptomerum with two or more prominent heli (beak-like or mound-like) and with 15 or more prominent spine-like setae. Dorsal surface of abdominal segments 9 and 10 never fused. Raster with or without palidia; anal slit transverse, slightly curved. Claws each bearing 2 setae. Keys to genera: Jameson et al. 1994.

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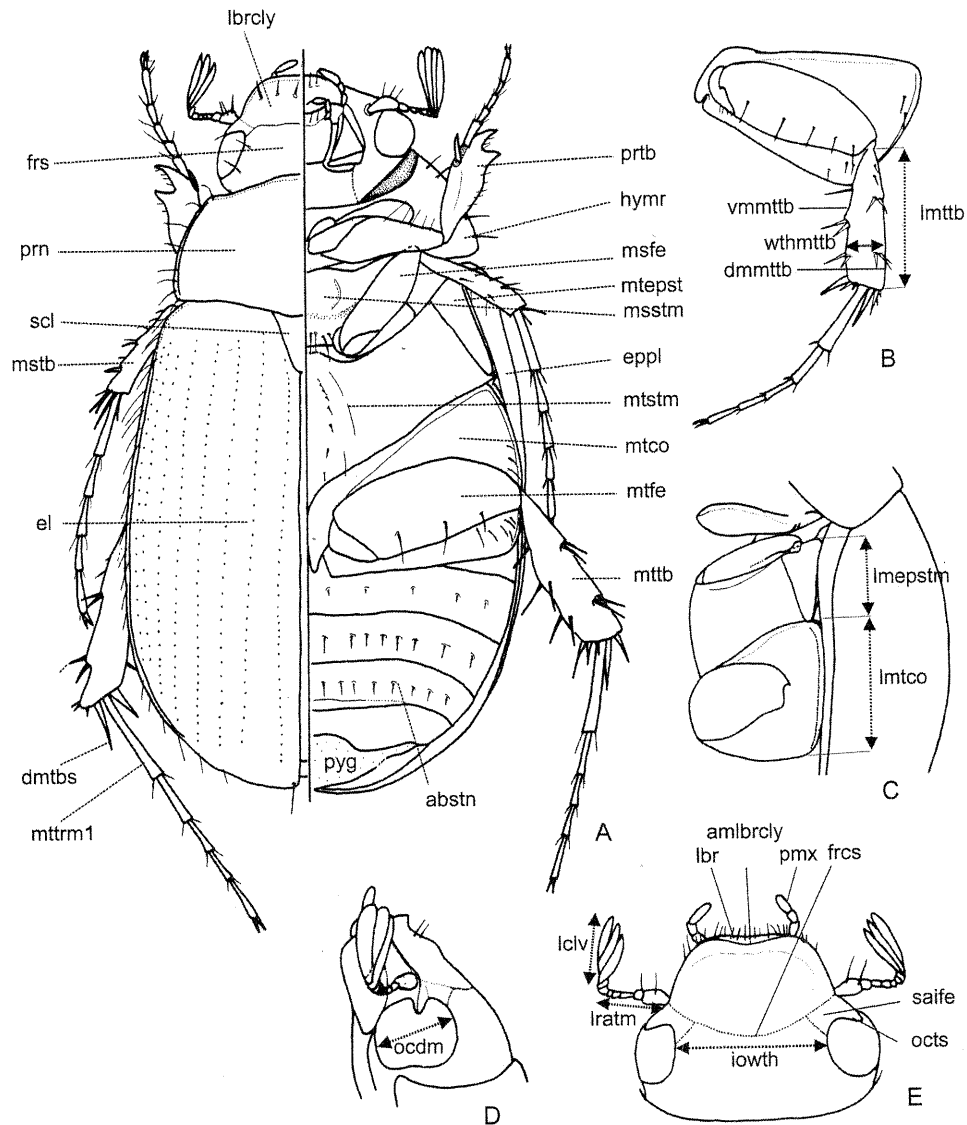
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## Dorsal and ventral details of adults



**A:** Body. Left: Dorsal view of left side. Right: Ventral view of left side; **B:** Posterior leg; **C:** Thorax, lateral view; **D:** Head, lateral view; **E:** Head, dorsal view.

**Abbreviations:** *abstn* abdominal sternite; *amlc* anterior margin of labroclypeus; *clv* clavus; *cly* clypeus; *dmmttb* dorsal margin of metatibia; *dmtbs* dorsal apical metatibial spur; *el* elytron; *eppl* epipleuron; *frcs* frontoclypeal suture; *frs* frons; *gl* galea; *hymr* hypomeron; *lowth* interocular width; *lbr* labrum; *lbrcly* labroclypeus/ or clypeus; *mamtco* medial apophysis of metacoxa; *mepstn* metepisternum; *msco* mesocoxa; *msfe* mesofemur; *msstm* mesosternum; *mstb* mesotibia; *mstrm* mesotarsomere; *mt* mentum; *mtco* metacoxa; *mtepst* metepisternum; *mtfe* metafemur; *mtstm* metasternum; *mttb* metatibia; *mttrm* metatarsomere; *octs* ocular canthus; *pmx* maxillary palpus (palpus maxillaris); *prmt* prementum; *prn* pronotum; *prt* protibia; *pyg* pygidium; *scl* scutellum; *tr* trochanter; *vmmttb* ventral margin of metatibia.

**Key to Tribes of Rutelinae (Scarabaeidae)**  
(Jameson 2000. After Jameson 1990)

1. Labrum horizontally produced with respect to clypeal apex (Fig. 1), distinctly separated from clypeus ..... 2

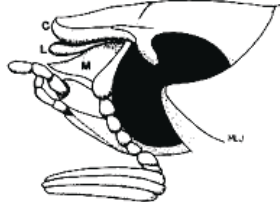


Figure 1. Head, lateral view, with labrum horizontally produced with respect to the clypeus. C=clypeus, L, =labrum, M=mandible.

1'. Labrum vertically produced with respect to clypeal apex (Fig.2) and more or less fused to clypeus ..... 3

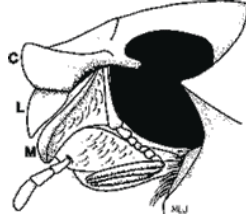


Figure 2. Head, lateral view, with labrum vertically produced with respect to the clypeus. C=clypeus, L, =labrum, M=mandible.

2(1). Margin of elytra with membranous border. Antenna 9-segmented ..... Anomalini

2'. Margin of elytra without membranous border. Antenna 10-segmented (except in Parachrysa (Areodina), Eremophagus (Pelidnotina), and female Pseudogeniates richterianus (Pelidnotina)] ..... Rutelini

3(1). Mentum and labrum each with median, apical tooth or projection (Fig. 3) ..... 5

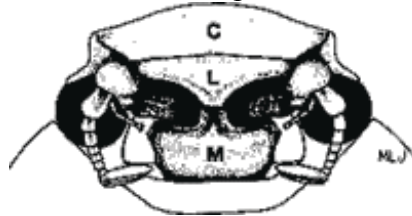
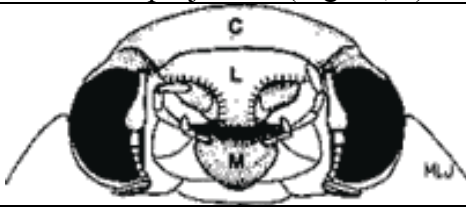
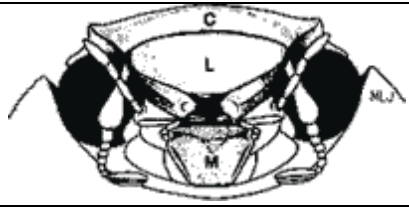
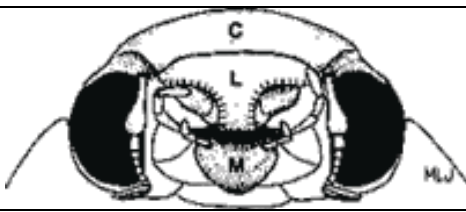
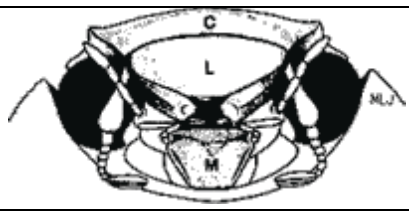


Figure 3. Head (frontral view) showing labrum and mentum with median, apical tooth (Geniatini and Anoplognathini). C=clypeus, L=labrum, M=mentum.



3'. Mentum lacking median, apical tooth or projection; labrum with or without median, apical tooth or projection (Figs. 4, 5) ..... 4

	
<p>Figure 4. Head (frontal view) showing labrum and mentum with median, apical tooth; mentum lacking tooth (Adoretini).</p>	<p>Figure 5. Head (frontal view) showing labrum and mentum lacking median, apical tooth (Spodochlamyini).</p>
<p>C=clypeus, L=labrum, M=mentum</p>	

4(3). Labrum with median, apical projection; apex overhanging mentum (Fig.4) ..... Adoretini  
 4'. Labrum and mentum both simple, lacking median, apical projection (Fig. 5) ..... Spodochlamyini

	
<p>Figure 4. Head (frontal view) showing labrum and mentum with median, apical tooth; mentum lacking tooth (Adoretini).</p>	<p>Figure 5. Head (frontal view) showing labrum and mentum lacking median, apical tooth (Spodochlamyini).</p>
<p>C=clypeus, L=labrum, M=mentum</p>	

5 (3). Protarsomeres dorsoventrally flattened and expanded apically in males and/or males and females (Fig. 6) ..... Geniatiini  
 5'. Protarsomeres simple, not dorsoventrally flattened and expanded apically in males or females (Fig. 7) ..... Anoplognathini

	
<p>Figure 6. Dorsal view of protarsomeres of Geniatiini.</p>	<p>Figure 7. Dorsal view of protarsomeres of Anoplognathini.</p>



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# The Neotropical Scarab Beetle Tribe Anatistini (Coleoptera: Scarabaeidae: Rutelinae)

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**Abstract.** The leaf chafer tribe Anatistini (Coleoptera: Scarabaeidae: Rutelinae), formerly known as the Spodochlamyini, is exclusively Neotropical and includes 21 species and four genera. Species in the group are restricted to forested regions from Honduras in the north to Mato Grosso, Brazil in the south. The highest area of diversity for the group is Colombia with 45% of the species. Based on examination of type specimens, *Chalcochlamys noblis* Ohaus is a **new junior synonym** of *Chrysina diversa* Ohaus, and *Spodochlamys popayana* Ohaus is a **new junior synonym** of *S. poultoni* Shipp. Five **new species** are described: *Spodochlamys ancistrospina* Jameson and Ratcliffe from Colombia, *S. letiranti* Jameson and Ratcliffe from Colombia, *S. marahuaca* Jameson and Ratcliffe from Venezuela, *S. neblina* Jameson and Ratcliffe from Venezuela, and *S. neitai* from Colombia. We provide a monographic revision of the genera and species of Anatistini and include a key (in English and Spanish), species diagnoses, distributions, and illustrations.

**Resumen.** La tribu Anatistini (Coleoptera: Scarabaeidae: Rutelinae), conocida anteriormente como Spodochlamyini, es exclusivamente Neotropical e incluye 21 especies y cuatro géneros. Las especies en el grupo están restringidas a las regiones boscosas, desde Honduras en el norte hasta Mato Grosso, Brasil en el sur. El área con mayor diversidad para el grupo es Colombia con 45% de las especies. En base a la examinación de los especímenes tipo, *Chalcochlamys noblis* Ohaus es un **sinónimo junior nuevo** de *Chrysina diversa* Ohaus, y *Spodochlamys popayana* Ohaus es un **sinónimo junior nuevo** de *S. poultoni* Shipp. Se describen cinco **especies nuevas**: *Spodochlamys ancistrospina* Jameson y Ratcliffe de Colombia, *S. letiranti* Jameson y Ratcliffe de Colombia, *S. marahuaca* Jameson y Ratcliffe de Venezuela, *S. neblina* Jameson y Ratcliffe de Venezuela, y *S. neitai* Jameson y Ratcliffe de Colombia. Presentamos una revisión monográfica de los géneros y especies de Anatistini e incluimos una clave (en inglés y en español), diagnosis de especies, distribuciones e ilustraciones.





1. *Anatista lafertei*, male



2. *Anatista macrophylla*, male



3. *Spodochlamys ancistrospina*, male



4. *Spodochlamys caesarea*, male



5. *Spodochlamys caesarea*, female



6. *Spodochlamys cupreola*, male

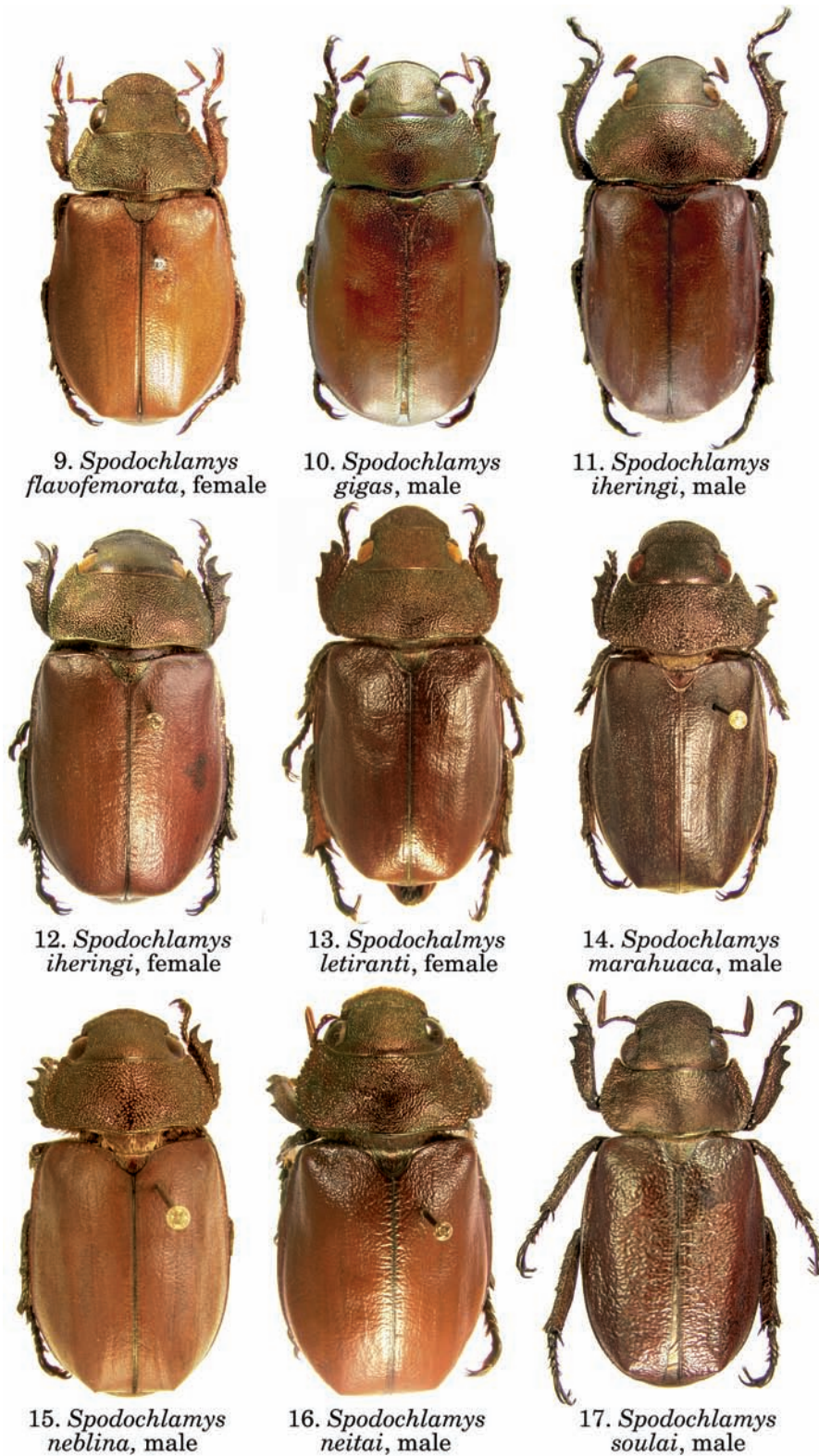


7. *Spodochlamys feyeri*, male



8. *Spodochlamys feyeri*, female

Figs. 1–8. Dorsal habitus images of species of (1–2) *Anatista* and (3–8) the *Spodochlamys caesarea* group (in part).



Figs. 9–17. Dorsal habitus images of species of *Spodochlamys caesarea* group (in part).



18. *Spinochlamys macropus*, male



19. *Chalcochlamys dohrni*, male



20. *Spodochlamys curvibrachialis*, male



21. *Spodochlamys curvibrachialis*, female



22. *Spodochlamys latipes*, male



23. *Spodochlamys latipes*, female

**Figs. 18–23.** Dorsal habitus images of (18) *Chalcochlamys dohrni*, (19) *Spinochlamys macropus*, and (20–23) the *Spodochlamys poultoni* group (in part).



24. *Spodochlamys mirabilis*, male



25. *Spodochlamys mirabilis*, female



26. *Spodochlamys nazareti*, male



27. *Spodochlamys poultoni*, male



28. *Spodochlamys poultoni*, female

Figs. 24–28. Dorsal habitus images of the *Spodochlamys poultoni* group (in part).

### Tribe Anatistini Lacordaire, 1856

Anatistidae Lacordaire 1856: xi.

**Type genus:** *Anatista* Brême 1844: 305.

Spodochlamyini Ohaus 1918a: 166 (**synonym**).

**Type genus:** *Spodochlamys* Burmeister 1855: 528.

**Nomenclatural Remarks.** Based on the diagnostic adult characters (below), we regard the genera and species of Anatistini as comprising a monophyletic group. A number of characters are useful in diagnosing the Anatistini for taxonomic purposes. We emphasize that a *combination of characters* must be used in diagnosing the tribe. Sister group relationships have not been examined, nor have relationships of genera and species within the tribe been examined. For a key to tribes of Rutelinae, see Jameson (1990, 2005).

The family group name Anatistini pre-dates the family group name Spodochlamyini (Smith 2006), and it has nomenclatural priority.

**Diagnosis of Adults.** The following characters serve to distinguish species of Anatistini.

1. Labrum (Fig. 31) vertically and ventrally produced with respect to the clypeus and somewhat fused to the clypeus (labrum horizontally produced in tribes Rutelini and Anomalini; form of labrum is shared with the tribes Geniatini, Anoplognathini, and Adoretini).
2. Labrum with apex weakly triangulate (Fig. 31, 61–65), lacking apical projection that overhangs the mentum (Adoretini possess a median, apical projection).
3. Mentum lacking median, apical tooth or projection (Fig. 32) (Geniatini and Anoplognathini with median, apical tooth).
4. Maxillary teeth strongly developed and directed at approximately a 90° angle with respect to the maxillary base (Fig. 30).
5. Mandible with strongly developed molar region (Fig. 29).
6. Protarsomeres of males and/or females more or less cylindrical and lacking dense, ventral pilosity (Figs. 33) (protarsomeres of males and/or females dorsoventrally flattened, enlarged, and densely pilose ventrally in the tribe Geniatini; form of protarsomeres is shared with Anoplognathini, Adoretini, Rutelini, and Anomalini).
7. Protibia lacking apical spur (Fig. 34) (spur present in all other Rutelinae).
8. Margin of elytra with membranous border (Figs. 82–86) (membranous border lacking in Rutelini and Adoretini; form of elytral margin shared with Anomalini, Geniatini, and some Anoplognathini).
9. Hindwing (Fig. 35a–b) with dense setae anterior to RA<sub>3+4</sub> to apex; ScA with moderately dense, precostal pegs, and well developed proximal lobe with short, dense setae (Fig. 35b); AP<sub>3+4</sub> inflated at least in basal third; AA<sub>1+2</sub> shorter than AA<sub>3+4</sub>.
10. New World distribution only.

**Composition and Distribution.** Four genera and 21 species are found in cloud-forest and forested regions from Honduras in the north to Mato Grosso, Brazil in the south (Figs. 36–41).



## Key to Genera and Species of Anatistini (Males)

(Males of *S. letiranti* Jameson and Ratcliffe, n. sp. are not known)

1. Mesothorax produced beyond base of mesocoxae (Fig. 42) .....  
..... ***Chalcochlamys dorhni* Ohaus**
- 1'. Mesothorax not produced beyond base of mesocoxae (e.g., Figs. 43–45) .....2
2. Pronotum vertically elevated at anterior margin (Fig. 46, 50). Protarsomere 4 produced into elongate, spinose process (Fig. 68) .....  
..... ***Spinochlamys macropus* Benderitter**
- 2'. Pronotum not vertically elevated at anterior margin (e.g., Figs. 47–49). Protarsomere 4 not produced as an elongate, spinose process (e.g., Figs. 69–73) .....3
3. Antennal club subequal to or nearly 2 times length of antennal segments 2–7. Clypeal apex parabolic, broadly rounded, or with reflexed tooth (Figs. 59–60) ..... ***Spodochlamys* (4)**
- 3'. Antennal club at least 3 times length of antennal segments 2–7 (Figs. 57–58). Clypeal apex elongate rectangular or pentagonal (Figs. 57–58) .....  
..... ***Anatista* (19)**
4. Head and pronotum greenish in color (with magnification and illumination) (Figs. 20–28). Elytral epipleuron (ventral view) with short, dense setae. Elytral surface with minute setae .....15
- 4'. Head and pronotum brown, black, or cupreous, occasionally with metallic green reflections (with magnification and illumination) (Figs. 3–17). Elytral epipleuron (ventral view) lacking short, dense setae. Elytral surface lacking minute seta .....5
5. Pronotum vaulted in lateral view (Figs. 45, 48). Protibia greatly elongate and bowed (Fig. 71). Elytra with waxy bloom ..... ***S. iheringi* Ohaus**
- 5'. Pronotum regularly convex in lateral view (e.g., Fig. 43–44, 47). Protibia simple, not elongate and not bowed (e.g., Fig. 69). Elytra with or without bloom .....6
6. Clypeal apex strongly narrowed to a recurved, acute, bi-emarginate tooth (Fig. 59). Elytra with waxy bloom ..... ***S. caesarea* Burmeister**
- 6'. Clypeal apex rounded, lacking strong attenuation (e.g., Fig. 60). Elytra without waxy bloom .....7
7. Pygidial disc protuberant in lateral view (Fig. 82) .....8
- 7'. Pygidial disc evenly convex in lateral view, not appreciably produced posteriorly (e.g., Fig. 83) .....12
8. Inner claws (all legs) simple (Fig. 74). Apical umbone of elytra rounded, lacking spinose projection (Fig. 82) ..... ***S. flavofemorata* Ohaus**
- 8'. Inner claw of meso- and metathoracic legs split, prothoracic leg with claw weakly split (e.g., Fig. 75) or simple. Apical umbone of elytra with spinose projection or tubercle (Figs. 84, 86) .....9
9. Posterior margin of metafemur not narrowly laminate, not produced posteriorly .....10
- 9'. Posterior margin of metafemur narrowly laminate and produced posteriorly .....11
10. Inner metatibial spur strongly hooked (Fig. 78). Male parameres as in Fig. 90 ..... ***S. ancistrospina* Jameson and Ratcliffe, n. sp.**
- 10'. Inner metatibial spur not hooked (e.g., Fig. 79). Parameres as in Fig. 105 ...  
..... ***S. soulai* Curoe**

11. Apical umbone of elytra with well developed, spinose projection (Fig. 84). Male parameres as in Fig. 94 ..... ***S. feyeri* Ohaus**
- 11'. Apical umbone of elytra tuberculate. Parameres as in Fig. 103 .....  
..... ***S. neitai* Jameson and Ratcliffe, n. sp.**
12. Apex of labrum acutely angulate (Fig. 65). Parameres as in Fig. 96 .....  
..... ***S. gigas* Murray**
- 12'. Apex of labrum obtusely angulate (Fig. 64). Parameres not as in Fig. 96 13
13. Inner claw split at apex on all legs (*e.g.*, Fig. 77). Male parameres as in Fig. 92 ..... ***S. cupreola* Bates**
- 13'. Inner claw of prothoracic leg simple; claw split or not on meso- and metathoracic legs. Male parameres not as in Fig. 92..... 14
14. Elytral color dark brown, opaque. Surface of clypeus (frontal view at middle) convex. Parameres as in Fig. 99 .....  
..... ***S. marahuaca* Jameson and Ratcliffe, n. sp.**
- 14'. Elytral color reddish brown with waxy bloom. Surface of clypeus (frontal view at middle) weakly concave. Parameres as in Fig. 102..... ***S. neblina* Jameson and Ratcliffe, n. sp.**
15. Pronotum greatly vaulted in lateral view (*e.g.*, Fig. 49); in dorsal view, with basolateral margins greatly explanate (*e.g.*, Fig. 52). Anterior margin of profemur with well developed, forward projecting spine at subapex (Fig. 72–73) ..... 16
- 15'. Pronotum regularly convex in lateral view (*e.g.*, Fig. 47); in dorsal view, with basolateral margins not greatly explanate (*e.g.*, Figs. 51, 53, 55, 56). Anterior margin of profemur lacking forward projecting spine at subapex ..... 17
16. Anterior margin of elytra with weak, external tooth. Mesotibia at apex acutely produced on external edge (Fig. 81). Metatibia not greatly flattened in lateral view ..... ***S. mirabilis* Waterhouse**
- 16'. Anterior margin of elytra without external tooth. Mesotibia at apex quadrate, not produced on external edge (Fig. 80). Metatibia greatly flattened in lateral view ..... ***S. latipes* Arrow**
17. Pronotum on lateral margin near middle rounded, lacking sharp angulation (Fig. 55). Pronotal surface rugopunctate ..... ***S. nazareti* Arnaud**
- 17'. Pronotum on lateral margin near middle with sharp angle (Fig. 56). Pronotal surface densely punctate ..... 18
18. Inner margin of protibia weakly curved (Fig. 70). Mentum with median, longitudinal, parallel-sided depression that extends from apex to base (Fig. 66). Parameres as in Fig. 93 ..... ***S. curvibrachialis* Ohaus**
- 18'. Inner margin of protibia straight, not weakly curved. Mentum with median depression that extends from apex to mid-disc. Parameres as in Fig. 104....  
..... ***S. poultoni* Shipp**
19. Clypeus elongate, subrectangular (Fig. 57) ..... ***A. lafertei* Brême**
- 19'. Clypeus pentagonal (Fig. 58) ..... ***A. macrophylla* Ohaus**

### Key to Genera and Species of Anatistini (Females)

(Females of *Spinochlamys macropus*, *A. lafertei*, *A. macrophylla*, *S. ancistrospina*, *S. marahuaca*, *S. nazareti*, and *S. neblina* are unknown)

1. Mesothorax produced beyond base of mesocoxae (Fig. 42) .....  
..... ***Chalcochlamys dorhni* Ohaus**
- 1'. Mesothorax not produced beyond base of mesocoxae (*e.g.*, Figs. 43–45) ..... 2



2. Head and pronotum greenish in color (with magnification and illumination) (*e.g.*, Figs. 18–28). Elytral epipleuron (ventral view) with short, dense setae. Elytral surface with minute setae.....11
- 2'. Head and pronotum brown, black, or cupreous, occasionally with metallic green reflections (with magnification and illumination) (*e.g.*, Figs. 1–17). Elytral epipleuron (ventral view) lacking short, dense setae. Elytral surface lacking minute setae.....3
3. Pygidial disc horizontally protuberant in lateral view (Fig. 85).....***S. feyeri* Ohaus**
- 3'. Pygidial disc evenly rounded in lateral view, not distinctly protuberant (*e.g.*, Fig. 83).....4
4. Apex of labrum acutely angulate (Fig. 65).....***S. gigas* Murray**
- 4'. Apex of labrum obtusely angulate (Fig. 64).....5
5. Clypeus in frontal view longer at middle than at sides (*e.g.*, Fig. 63).....10
- 5'. Clypeus in frontal view with apical and basal margins subparallel (*e.g.*, Fig. 64).....6
6. Metatarsal claws widely split (Fig. 77).....***S. cupreola* Bates**
- 6'. Metatarsal claws narrowly split (*e.g.*, Fig. 76).....7
7. Elytra with waxy bloom.....***S. iheringi* Ohaus**
- 7'. Elytra without waxy bloom.....8
8. Pronotal apical bead lacking at middle.....***S. flavofemorata* Ohaus**
- 8'. Pronotal apical bead complete, at least at middle and laterally.....9
9. Mentum on apical third strongly declivous.....***S. letiranti* Jameson and Ratcliffe, n. sp.**
- 9'. Mentum on apical third not noticeably declivous, instead with triangular depression on disc.....***S. soulai* Curoe**
10. Elytra with waxy bloom.....***S. caesarea* Burmeister**
- 10'. Elytra without waxy bloom.....***S. neitai* Jameson and Ratcliffe, n. sp.**
11. Anterior angle of pronotum attenuate (Fig. 54).....12
- 11'. Anterior angle of pronotum rounded, not attenuate (*e.g.*, Figs. 51, 55, 56).....13
12. Surface of pygidium finely, densely punctate, with setae short throughout.....***S. latipes* Arrow**
- 12'. Surface of pygidium densely, confluent punctate with setae short at base to long at subapex and apex.....***S. mirabilis* Waterhouse**
13. Mentum with median, longitudinal, parallel-sided depression from apex to base (Fig. 66). Pygidium with setae short on base to moderately long on apex, setae not curly at apices.....***S. curvibrachialis* Ohaus**
- 13'. Mentum with V-shaped depression from apex to base (wider at apex than at base) (Fig. 67). Pygidium with setae short on base to moderately long on apex, setae not curly at apices.....***S. nazareti* Arnaud**
- 13''. Mentum with depression at apex only. Pygidium with setae moderately long on base to long on mid-disc and apex, setae often curly at apices.....***S. poultoni* Shipp**

### Clave para los Géneros y Especies de Anatistini (Machos)

(Se desconocen los machos de *S. letiranti* Jameson and Ratcliffe, n. sp.)

1. Mesotórax sobresale más allá de la base de la mesocoxa (Fig. 42).....***Chalcochlamys dorhni* Ohaus**
- 1'. Mesotórax no sobresale más allá de la base de la mesocoxa (*e.g.*, Figs. 43–45).....2

2. Pronoto elevado verticalmente en el margen anterior (Fig. 46, 50). Protarsómero 4 proyectado en un proceso alargado, espinoso (Fig. 68) .....  
 ..... ***Spinochlamys macropus* Benderitter**
- 2'. Pronoto no elevado verticalmente en el margen anterior (e.g., Figs. 47–49). Protarsómero 4 no proyectado en un proceso alargado, espinoso (e.g., Figs. 69–73) ..... 3
3. Club antenal es subigual a, o cerca de, 2 veces el largo de los segmentos antenales 2–7. Ápice del clípeo parabólico, ampliamente redondeado, o con un diente elevado (Figs. 59–60) ..... ***Spodochlamys* (4)**
- 3'. Club antenal por lo menos 3 veces el largo de los segmentos antenales 2–7 (Figs. 57–58). Ápice del clípeo alargado rectangular o pentagonal (Figs. 57–58) ..... ***Anatista* (19)**
4. Cabeza y pronoto de color verdoso (con ampliación e iluminación) (Figs. 20–28). Epipleuron elitral (en vista ventral) con setas cortas y densas. Superficie elitral con setas diminutas ..... 15
- 4'. Cabeza y pronoto café, negro, o cobrizo, ocasionalmente con reflejos metálicos (con ampliación e iluminación) (Figs. 3–17). Epipleuron elitral (vista ventral) sin setas cortas y densas. Superficie elitral sin setas diminutas ..... 5
5. Pronoto encorvado en vista lateral (Figs. 45, 48). Protibia ampliamente alargada y arqueada (Fig. 71). Élitros con pelusa cerosa ..... ***S. iheringi* Ohaus**
- 5'. Pronoto regularmente convexo en vista lateral (e.g., Figs. 43–44, 47). Protibia simple, no alargada ni arqueada (e.g., Fig. 69). Élitros con o sin pelusa ..... 6
6. Ápice clipeal fuertemente estrecho hacia un diente recurvado, agudo, biemarginado (Fig. 59). Élitros con pelusa cerosa ..... ***S. caesarea* Burmeister**
- 6'. Ápice del clípeo redondeado, sin atenuación fuerte (e.g., Fig. 60). Élitros sin pelusa cerosa ..... 7
7. Disco pigidial protuberante en vista lateral (Fig. 82) ..... 8
- 7'. Disco pigidial regularmente convexo en vista lateral, no apreciablemente protuberante posteriormente (e.g., Fig. 83) ..... 12
8. Uñas internas (de todas las patas) simples (Fig. 74). Élitros con umbones apicales redondeados, sin proyección espinosa (Fig. 82) .....  
 ..... ***S. flavofemorata* Ohaus**
- 8'. Uñas internas divididas en las patas meso y metatorácicas, pata protorácica con uña débilmente dividida (e.g., Fig. 75) o simple. Élitros con umbones apicales con proyección espinosa o tubérculo (Figs. 84, 86) ..... 9
9. Margen posterior del metafémur no angostamente laminar, no proyectado posteriormente ..... 10
- 9'. Margen posterior del metafémur angostamente laminar y proyectado posteriormente ..... 11
10. Espolón metatibial interno fuertemente ganchudo (Fig. 78). Parámetros del macho como en la Fig. 90 .....  
 ..... ***S. ancistrospina* Jameson and Ratcliffe, n. sp.**
- 10'. Espolón metatibial interno no ganchudo (e.g., Fig. 79). Parámetros como en la Fig. 105 ..... ***S. soulai* Curoe**
11. Umbón apical de los élitros con proyección bien desarrollada, espinosa (Fig. 84). Parámetros del macho como en la Fig. 94 ..... ***S. feyeri* Ohaus**
- 11'. Umbón apical de los élitros tuberculado. Parámetros como en la Fig. 103 .....  
 ..... ***S. neitai* Jameson and Ratcliffe, n. sp.**

12. Ápice del labrum con forma de ángulo agudo (Fig. 65). Parámetros como en la Fig. 96 ..... ***S. gigas* Murray**
- 12'. Ápice del labrum con forma de ángulo obtuso (Fig. 64). Parámetros no como en la Fig. 96 ..... 13
13. Uña interna dividida en el ápice en todas las patas (*e.g.*, Fig. 77). Parámetros del macho como en la Fig. 92 ..... ***S. cupreola* Bates**
- 13'. Uña interna simple de la pata protorácica; uña dividida o no en las patas meso- y metatorácicas. Los parámetros del macho no como en la Fig. 92 ..... 14
14. Élitros de color café oscuro, opacos. Superficie del clípeo (vista frontal a la mitad) convexa. Parámetros como en la Fig. 99 .....  
..... ***S. marahuaca* Jameson and Ratcliffe, n. sp.**
- 14'. Élitros de color café rojizo con pelusa cerosa. Superficie del clípeo (vista frontal a la mitad) débilmente cóncava. Parámetros como en la Fig. 102 .....  
..... ***S. neblina* Jameson and Ratcliffe, n. sp.**
15. Pronoto ampliamente encorvado en vista lateral (*e.g.*, Fig. 49); en vista dorsal con márgenes basolaterales ampliamente explanados (*e.g.*, Fig. 52). Margen anterior del profémur con espina bien desarrollada, proyectada hacia el frente en el subápice (Fig. 72–73) ..... 16
- 15'. Pronoto regularmente convexo en vista lateral (*e.g.*, Fig. 47); en vista dorsal con márgenes basolaterales no ampliamente explanados (*e.g.*, Figs. 51, 53, 55, 56). Margen anterior del profémur sin espina proyectada hacia el frente en el subápice ..... 17
16. Margen anterior de los élitros con diente externo débil. Ápice de la mesotibia agudamente proyectado en el borde externo (Fig. 81). Metatibia no muy aplanada en vista lateral ..... ***S. mirabilis* Waterhouse**
- 16'. Margen anterior de los élitros sin diente externo. Ápice de la mesotibia cuadrado, no proyectado en el borde externo (Fig. 80). Metatibia muy aplanada en vista lateral ..... ***S. latipes* Arrow**
17. Pronoto redondeado cerca de la mitad del margen lateral, sin angulación aguda (Fig. 55). Superficie del pronoto rugopunteada ***S. nazareti* Arnaud**
- 17'. Pronoto con ángulo agudo cerca de la mitad del margen lateral (Fig. 56). Superficie del pronoto densamente punteada ..... 18
18. Margen interno de la protibia débilmente curvado (Fig. 70). Mento con depresión longitudinal, medial, de lados paralelos que se extiende desde el ápice hasta la base (Fig. 66). Parámetros como en la Fig. 93 .....  
..... ***S. curvibrachialis* Ohaus**
- 18'. Margen interno de la protibia recto, no débilmente curvado. Mento con depresión medial que se extiende desde el ápice hasta la mitad del disco. Parámetros como en la Fig. 104 ..... ***S. poultoni* Shipp**
19. Clípeo alargado, subrectangular (Fig. 57) ..... ***A. lafertei* Brême**
- 19'. Clípeo pentagonal (Fig. 58) ..... ***A. macrophylla* Ohaus**

### Clave para los Géneros y Especies de Anatistini (Hembras)

(Se desconocen las hembras de *Spinochlamys macropus*, *A. lafertei*, *A. macrophylla*, *S. ancistroskina*, *S. marahuaca*, *S. nazareti*, y *S. neblina*)

1. Mesotórax que sobresale más allá de la base de la mesocoxa (Fig. 42) .....  
..... ***Chalcochlamys dorhni* Ohaus**
- 1'. Mesotórax que no sobresale más allá de la base de la mesocoxa (por ejemplo, Figs. 43–45) ..... 2

2. Cabeza y pronoto de color verdoso (con ampliación e iluminación) (*e.g.*, Figs. 18–28). Epipleuron elitral (vista ventral) con setas cortas, densas. Superficie elitral con setas diminutas ..... 11
- 2'. Cabeza y pronoto de color café, negro o cobrizo, ocasionalmente con reflejos verdes metálicos (con ampliación e iluminación) (*e.g.*, Figs. 1–17). Epipleuron elitral (vista ventral) sin setas cortas ni densas. Superficie elitral sin setas diminutas ..... 3
3. Disco pigidial horizontalmente protuberante en vista lateral (Fig. 85) ..... ***S. feyeri* Ohaus**
- 3'. Disco pigidial regularmente redondeado en vista lateral, no claramente protuberante (*e.g.*, Fig. 83) ..... 4
4. Ápice del labrum en forma de ángulo agudo (Fig. 65) ..... ***S. gigas* Murray**
- 4'. Ápice del labrum en forma de ángulo obtuso (Fig. 64) ..... 5
5. Clípeo en vista frontal más largo en la mitad que en los lados (*e.g.*, Fig. 63) ..... 10
- 5'. Clípeo en vista frontal con márgenes apicales y basales subparalelos (*e.g.*, Fig. 64) ..... 6
6. Uñas metatarsales ampliamente divididas (Fig. 77) ..... ***S. cupreola* Bates**
- 6'. Uñas metatarsales estrechamente divididas (*e.g.*, Fig. 76) ..... 7
7. Élitros con pelusa cerosa ..... ***S. iheringi* Ohaus**
- 7'. Élitros sin pelusa cerosa ..... 8
8. Margen apical del pronoto ausente en la mitad ... ***S. flavofemorata* Ohaus**
- 8'. Margen apical del pronoto completo, por lo menos en la mitad y lateralmente ..... 9
9. Tercio apical del mento fuertemente en declive ..... ***S. letiranti* Jameson and Ratcliffe, n. sp.**
- 9'. Tercio apical del mento no notoriamente en declive, en su lugar con una depresión triangular en el disco ..... ***S. soulai* Curoe**
10. Élitros con pelusa cerosa ..... ***S. caesarea* Burmeister**
- 10'. Élitros sin pelusa cerosa ..... ***S. neitai* Jameson and Ratcliffe, n. sp.**
11. Ángulo anterior del pronoto atenuado (Fig. 54) ..... 12
- 11'. Ángulo anterior del pronoto redondeado, no atenuado (*e.g.*, Figs. 51, 55, 56) ..... 13
12. Superficie del pigidio finamente y densamente punteada, con setas cortas en toda la superficie ..... ***S. latipes* Arrow**
- 12'. Superficie del pigidio densamente y confluentemente punteada, con setas cortas en la base a largas en el subápice y ápice ..... ***S. mirabilis* Waterhouse**
13. Mento con depresión medial, longitudinal, de lados paralelos desde el ápice a la base (Fig. 66). Pigidio con setas cortas en la base a moderadamente largas en el ápice, setas no rizadas en los ápices ..... ***S. curvibrachialis* Ohaus**
- 13'. Mento con depresión en forma de V desde el ápice a la base (más amplia en el ápice que en la base) (Fig. 67). Pigidio con setas cortas en la base a moderadamente largas en el ápice, setas no rizadas en los ápices ..... ***S. nazareti* Arnaud**
- 13''. Mento con depresión solamente en el ápice. Pigidio con setas moderadamente largas en la base a largas en la mitad del disco y ápice, setas frecuentemente rizadas en los ápices ..... ***S. poultoni* Shipp**



42. *Chalcochlamys dorhni*



43. *Spodochlamys caesarea*




44. *Spodochlamys cupreola*



45. *Spodochlamys iheringi*

**Figs. 42–45.** Lateral habitus of Anatistini showing mesometathorax produced beyond base of mesocoxae (42, *Chalcochlamys dorhni*) or not (43–45, *Spodochlamys caesarea*, *S. cupreola*, *S. iheringi*, respectively) and pronotum vaulted (45, *S. iheringi*) or not (42–44, *C. dorhni*, *S. caesarea*, *S. cupreola*).

46. *Spinochlamys macropus*47. *Spodochlamys curvibrachialis*48. *Spodochlamys iheringi*49. *Spodochlamys mirabilis*

**Fig. 46–49.** Lateral view of head and pronotum showing pronotum vertically elevated at anterior margin (46, *Spinochlamys macropus*, male and 49, *Spodochlamys mirabilis*, male), pronotum regularly convex in lateral view (47,  female), or pronotum vaulted in lateral view (48, *S. iheringi*, male).



50. *Spinochlamys macropus*



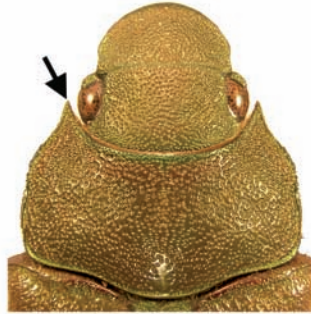
51. *Spodochlamys curvibrachialis*, female



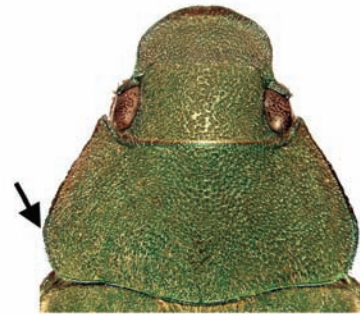
52. *Spodochlamys latipes*



53. *Spodochlamys marahuaca*



54. *Spodochlamys mirabilis*, female

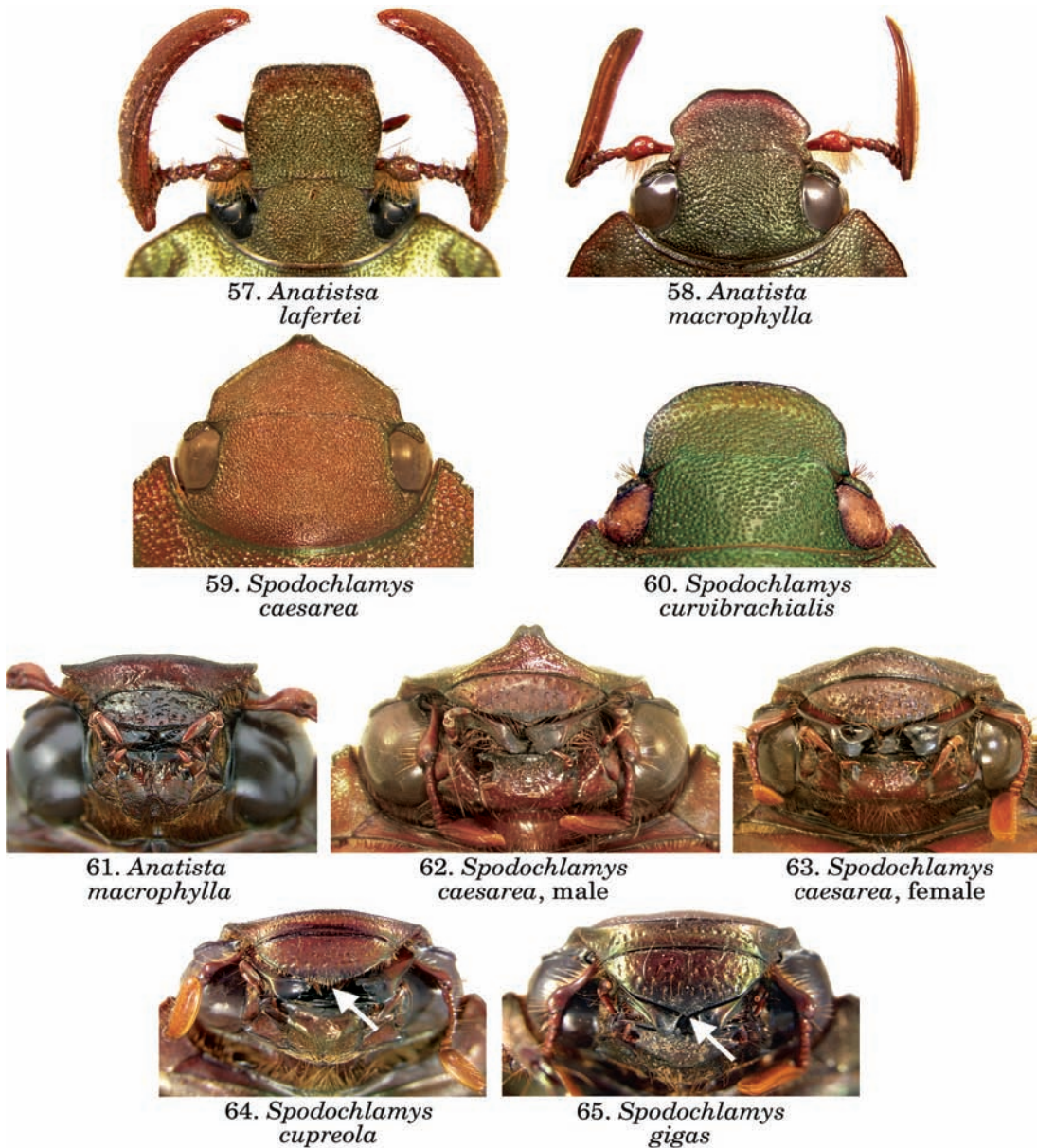



55. *Spodochlamys nazareti*



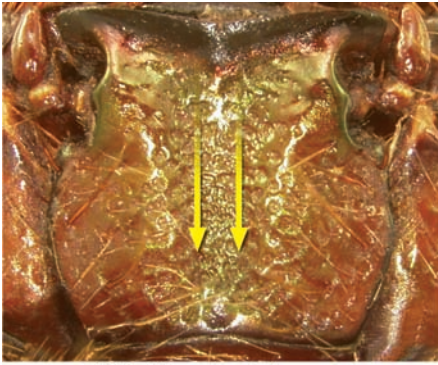
56. *Spodochlamys poultoni*

**Figs. 50–56.** Dorsal view of head and pronotum showing form of pronotum at lateral margin near middle and at anterolateral corner. Lateral margin near middle rounded (51, *Spodochlamys curvibrachialis*, female) or (53, *Spodochlamys marahuaca*) or (55, *Spodochlamys nazareti*), with basolateral margins greatly explanate (52, *Spodochlamys latipes*), with sharp angulation (56, *Spodochlamys poultoni*). Anterolateral corner of pronotum (female) acute (54, *Spodochlamys mirabilis*) or rounded (51, *Spodochlamys curvibrachialis*, female).

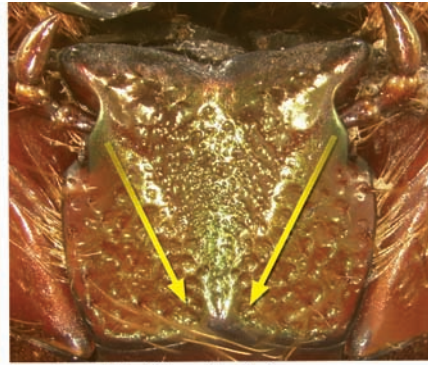


**Figs. 57–65.** Dorsal view of head showing form of clypeus and antennae (57–60) and ventral view of head showing form of clypeus, labrum, and mentum (61–65). Antennal club at least 3 times length of segments 2–6 (57–58, *Anatista*) and clypeal apex elongate rectangular (57, ) or pentagonal (58, *A. macrophylla*), with recurved, acute, bi-emarginate tooth (59, *Spodochlamys caesarea*), or parabolic or broadly rounded (60, *S. curvibrachialis*). Form of labrum vertically and ventrally produced with respect to the clypeus and somewhat fused to the clypeus (61–65). Form of clypeus (frontal view) simple (61, *A. macrophylla*; 64, *S. cupreola*; 65, *S. gigas*), with bi-emarginate tooth (62, *S. caesarea*, male), or with apex widest at the middle and narrower towards the margins (63, *S. caesarea*, female). Form of labrum at apex narrowly angulate (65, *S. gigas*) or broadly angulate (64, *S. cupreola*).





66. *Spodochlamys curvibrachialis*



67. *Spodochlamys nazareti*

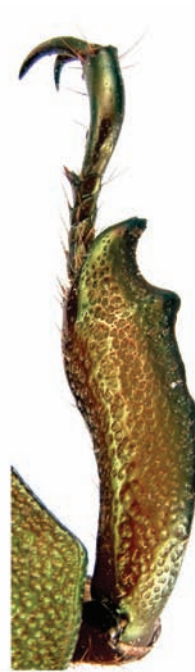
**Figs. 66–67.** Ventral view of the mentum showing form. Mentum with complete median, longitudinal furrow (66, □□□□□□□□ □□□□, □□, □□□□□□) or with V-shaped, median furrow (67, *S. nazareti*).



68. *Spinochlamys macropus*



69. *Spodochlamys cupreola*



70. *Spodochlamys curvibrachialis*



71. *Spodochlamys iheringi*

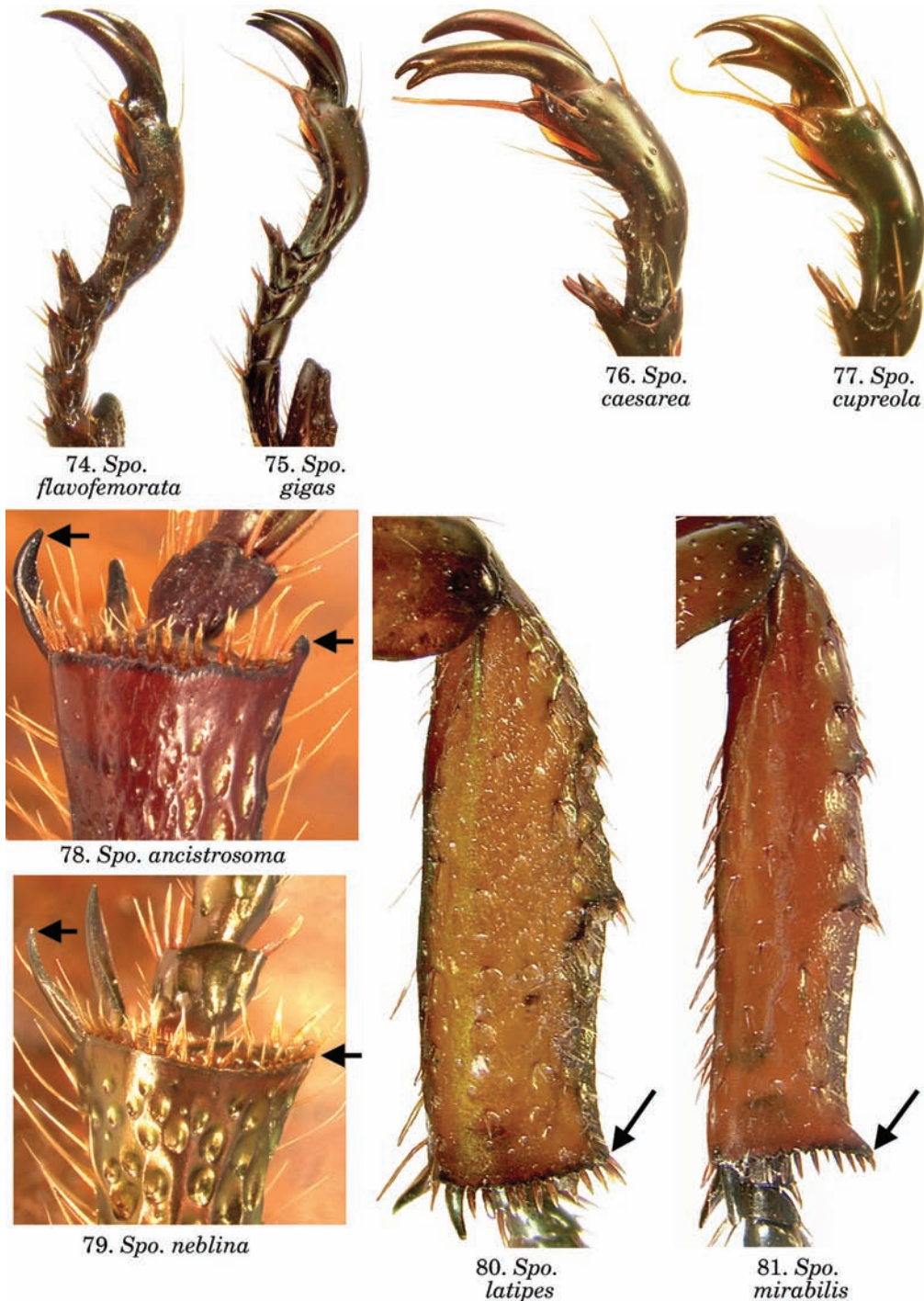


72. *Spodochlamys latipes*

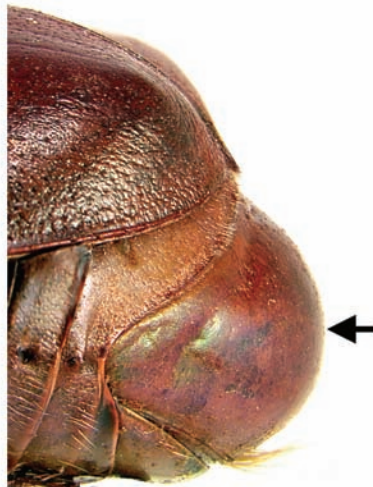


73. *Spodochlamys mirabilis*

**Figs. 68–73.** Dorsal view of prothoracic leg showing form of femur, tibia, protarsomeres, and claws. Protarsomere 4 produced into elongate, spinose process (68, *Spinochlamys macropus*) or not. Protibia with inner margin simple, not elongate and not bowed (69, *Spodochlamys cupreola*), weakly bowed (70, *S. curvibrachialis*), greatly elongate and bowed (71, *S. iheringi*) or greatly bowed and slender in basal half (72, *S. latipes*; 73, *S. mirabilis*). Anterior margin of profemur with well developed, forward projecting spine at subapex (72, *S. latipes*; 73, *S. mirabilis*) or not.



**Figs. 74–81.** Form of protarsomeres (74–75) and claws (76–77). Protarsomere 5 with well developed median tooth (74, □□□□□□□□ □□□□□□ □ □□) or lacking (75, *S. gigas*). Inner claws of protarsus simple (74, *S. flavofemorata*) or narrowly split (75, *S. gigas*). Metatarsal claws narrowly split (76, *S. caesarea*) or widely split (77, *S. cupreola*). Form of the metatibial apex (78–79) and mesotibia (80–81). Apex of metatibia with inner spur strongly recurved at apex (78, *S. ancistrosoma*) or weakly recurved at apex (79, *S. neblina*). Mesotibia with apex externally quadrate, not produced (80, *S. latipes*) or with apex externally acutely produced (81, *S. mirabilis*).



82. *Spodochlamys flavofemorata*



83. *Spodochlamys gigas*



84. *Spodochlamys feyeri*, male



85. *Spodochlamys feyeri*, female

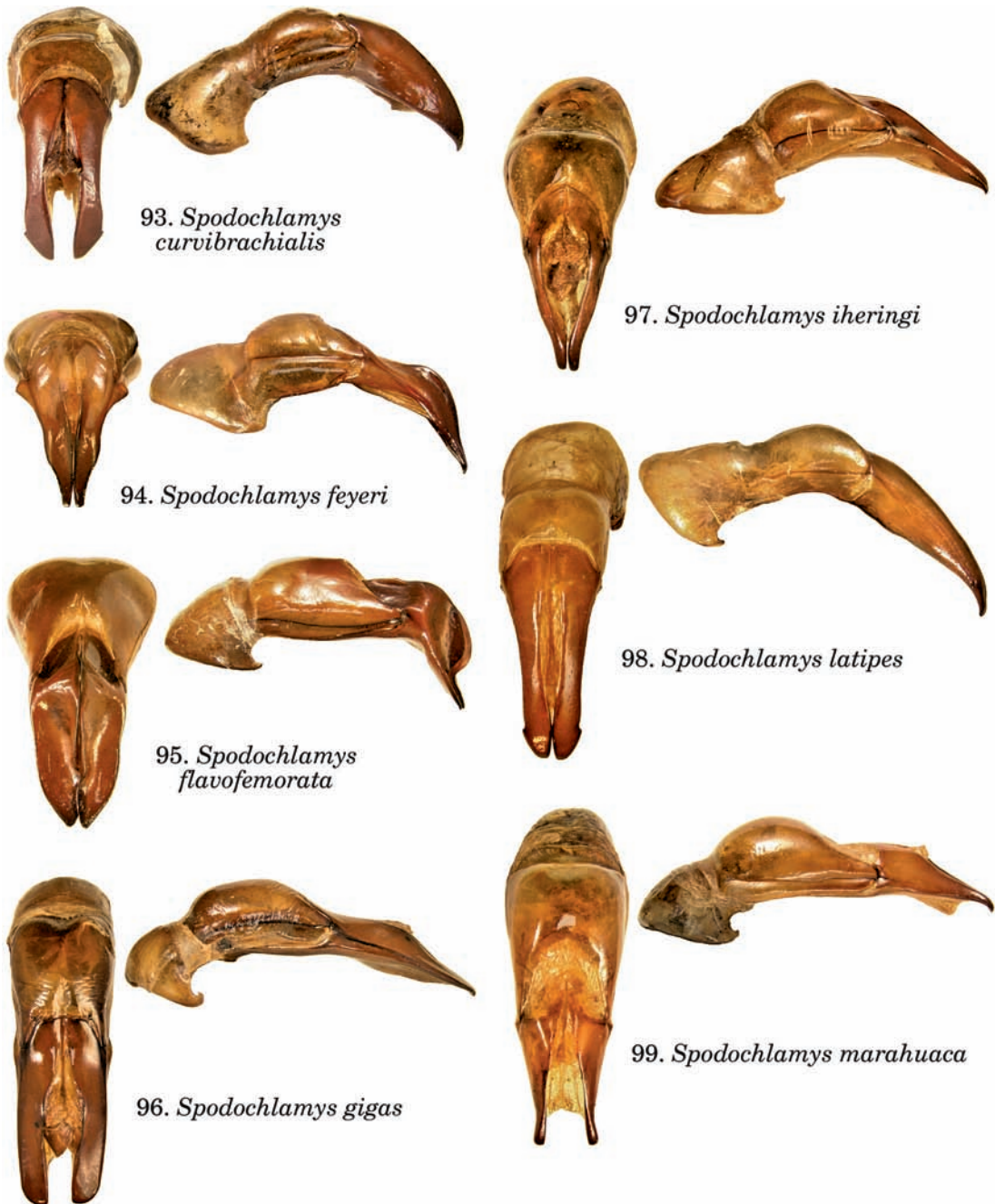


86. *Spodochlamys neblina*

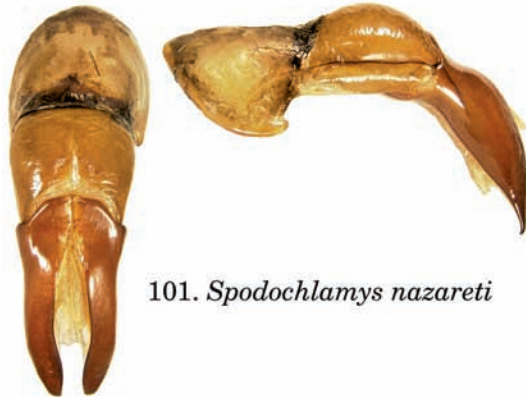
**Figs. 82–86.** Lateral view of elytra and pygidium showing form of elytral margin (with a membranous border), form of pygidial disc, and form of apical umbone of elytra. Pygidial disc protuberant (82, *Spodochlamys* □□□□□□ □ □□), evenly convex (83, *S. gigas*), or horizontally protuberant (85, □□□□□□ □ female). Apical umbone of elytra with a spinose projection (84, □□□□□□ □ male) or tubercle (86, *S. neblina*, male).

87. *Anatista lafertei*90. *Spodochlamys ancistrospina*88. *Anatista macrophylla*91. *Spodochlamys caesarea*89. *Spinochlamys macropus*92. *Spodochlamys cupreola*

Figs. 87–92. Dorsal and lateral views of male parameres of Anatistini (in part).



Figs. 93–99. Dorsal and lateral views of male parameres of Anatistini (in part).

100. *Spodochlamys mirabilis*101. *Spodochlamys nazareti*102. *Spodochlamys neblina*103. *Spodochlamys neitai*104. *Spodochlamys poultoni*105. *Spodochlamys soulai*

**Figs. 100–105.** Dorsal and lateral views of male parameres of Anatistini (in part).

OVERVIEW OF GENERA

- 1. Process (projection) in the middle of the anterior edge of the upper lip wide, sharply pointed; its middle deeply canoe-shaped and its edges strongly curved upwards.....  
Scaphorhinadoretus Ohaus
- 1'. Process (projection) in the middle of the anterior edge of the upper lip more slender; the edges not curved upwards and the middle not deeply canoe-shaped.....2
- 2. The projection in the middle of the anterior edge of the upper lip evenly curved, the upper side flat <smooth>, the tip rounded or truncate.....3
- 2'. The projection shaped like a hawk's bill; its sides pressed together.....  
Rhynchadoretus Ohaus *West Africa*
- 3. Sides of the <sup>snout</sup> projection crenate.....4
- 3'. Sides of the projection not crenate, even.....8
- 4. One mesosternal process present, although <even if> formed only into a knob.....5
- 4'. One mesosternal process completely missing.....7
- 5. Mesosternal process extends beyond the front of the middle coxae.....  
Adoroletus Brenske *Isle de France*
- 5'. Mesosternal process small, knob-shaped.....6
- 6. Prosternal process shaped like a plowshare, its tip reaching between the anterior coxae.....  
Adorodocia Brenske *Madagascar*
- 6'. Prosternal process forms a behind and under reaching peg <cone>.....  
Metadorodocia Machatschke *Madagascar*
- 7. Body elongate, with almost parallel sides, medium to small, covered with fine hairs or small scales <?> can be strewn between the larger, often upstanding setae <I had considerable difficulty here>.....  
Adoretus Laporte
- 7'. Body ovoid, larger. Between the fine hair on the elytra scales are strewn, long, wide at the beginning, rapidly narrowing to the tip.....  
Paradorodocia Machatschke *Madagascar*



8. Projection on the basis of the upper lip sharply angularly  
<crookedly> placed and here always with a powerful tooth...

Pseudadoretus Semenov *Transcaucasica*  
*Aralik*

8'. Projection on the basis of the upper lip not sharply,  
angularly <crookedly> placed and here without teeth.....

Lissadoretus Arrow

SUBGENERA OF ADORETUS

1. Upper side of body adorned only by thin <downy> hair.....2

1'. Longer or shorter scales on the upper side of the body....

Lepadoretus Reitter

2. Hairy covering of the elytra consists only of fine  
homogeneous small hairs.....

Adoretus

2'. Hairy covering of the elytra irregular; between the short  
hairs are longer setae, often thicker or differently  
colored.....

Chactadoretus Ohaus

## ANOMALINI: Characteristics

The size of anomalines ranges between 5 and 40 mm, and their coloration has a wide range of tones, including metallic green, testaceous, and black. The characteristics are: labrum horizontally produced with respect to the clypeus; antennae with 9 segments; protibiae bidentate (rarely unidentate or tridentate), inner protibial spur subapical (lacking in *Leptohoplia*); foretarsomeres not enlarged or densely setose ventrally; elytra with membranous border at lateral margin; terminal spiracle not positioned in pleural suture.

## Classification Status

Blanchard (1851) first created the group name Anomalitae that included the genera *Anisoplia*, *Tropiorhynchus*, *Callirhinus*, *Rhinyptia*, *Phyllopertha*, *Epectinaspis*, *Anomala*, *Mimela*, *Callistethus*, *Popillia*, *Pharaonus*, *Pachystethus*, and *Strigoderma*. In 1886, Bates classified the group as a subfamily of Rutelidae. In 1902, Peringuey designated Anomalini as a tribe of Rutelinae and published a key to the tribes of Rutelinae of South Africa. Although members of this group are agriculturally important, there are few resources that allow for identification of the species in the New World. Paucar-Cabrera (2003) provided a key to all New World genera and conducted a phylogenetic analysis of some genera with an emphasis on the genus *Epectinaspis*. Publications with the taxonomic information about Anomalini are the Coleopterorum Catalogus (Ohaus 1918; Machatschke 1972), the Genera Insectorum (Machatschke 1957), and Blackwelder's (1944) checklist.

## Distribution

The tribe Anomalini in the New World includes 17 genera and about 310 described species. In the New World, anomalines occur from southern Canada to southern South America. Species of the tribe inhabit almost every habitat of the New World except the high Andes of South America.

## New World Genera Profiles (click on species names)

<a href="#">Anomala</a>	<a href="#">Leptohoplia</a>
<a href="#">Anomalacra</a>	<a href="#">Mazahuapertha</a>
<a href="#">Anomalorhina</a>	<a href="#">Nayarita</a>
<a href="#">Balanogonia</a>	<a href="#">Phyllopertha</a>
<a href="#">Callirhinus</a>	<a href="#">Popillia</a>
<a href="#">Callistethus</a>	<a href="#">Rugopertha</a>
<a href="#">Chelilabia</a>	<a href="#">Strigoderma</a>
<a href="#">Dilophochila</a>	<a href="#">Yaaxkumukia</a>
<a href="#">Epectinaspis</a>	..

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- OHAUS, F. 1918.** Scarabaeidae: Euchirinae, Phaenomerinae, Rutelinae. *Coleopterorum Catalogus* 20: 1-241.
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- PERINGUEY, L. A. 1902.** Descriptive Catalogue of the Coleoptera of South Africa (Lucanidae: Scarabaeidae). *Trans. S. Afr. Philos. Soc.* 12: 564-920.

## Key to the New World Genera of Anomalini

(after Paucar-Cabrera 2003)

(*Phyllopertha latitarsis* Nonfried is *incertae sedis* and was omitted from the key)

1. Protibial spur absent (Fig. 10). Maxilla reduced, with 2 or fewer teeth (Fig. 13) ..... 2
- 1'. Protibial spur present (Fig. 9). Maxilla not reduced, with more than 2 teeth (Figs. 11-12, 14)
- .....3



Figure 9. Foreleg in dorsal view of *Anomala chrysanthe*.



Figure 10. Foreleg in dorsal view of *Lepthoplia testaceipennis*



Figure 11. Left maxilla in ventral view of *Anomala chrysanthe*



Figure 12. Left maxilla in ventral view of *Dilophochila bolacoides*



Figure 13. Left maxilla in ventral view of *Lepthoplia testaceipennis*



Figure 14. Left maxilla in ventral view of *Mazahuapertha tolucana*

- 2(1). Mesepimeron not visible in dorsal view (e.g., Fig. 6). Clypeus with lateral margins at base straight (forming a right angle with frontoclypeal suture). Maxilla with last segment of palpus 2 times wider than width of third segment (Fig. 13). Dorsal color testaceous ... ***Lepthoplia*** Saylor
- 2'. Mesepimeron visible in dorsal view (e.g., Figs. 3-5). Clypeus with lateral margins at base oblique (forming an acute angle with frontoclypeal suture). Maxilla with last segment of palpus subequal in width to third segment (Fig. 14). Dorsal color of head, pronotum, and pygidium castaneous with greenish reflections, elytron testaceous with castaneous, longitudinal markings
- ..... ***Mazahuapertha*** Morón and Nogueira



Figure 3. Mesepimeron of *Epectinaspis*



Figure 4. Mesepimeron of *Strigoderma*



Figure 5. Mesepimeron of *Popillia*



Figure 6. Mesepimeron of *Anomala*



Figure 13. Left maxilla in ventral view of *Leptohoplia testaceipennis*

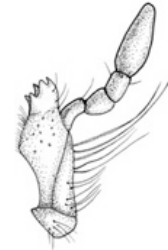


Figure 14. Left maxilla in ventral view of *Mazahuapertha tolucana*

3(1'). Labrum projecting anteriorly beyond apex of clypeus (Fig. 15). Apex of labrum deeply emarginate (Fig. 15, 18) ..... **Chelilabia** Morón and Nogueira

3'. Labrum hidden or partially hidden, only apex exposed beyond apex of clypeus (Figs. 16, 17).  
Apex of labrum quadrate, rounded, sinuate (Fig. 19), or emarginate (Fig. 20) ..... 4



Figure 15. Head of *Chelilabia piniphaga*

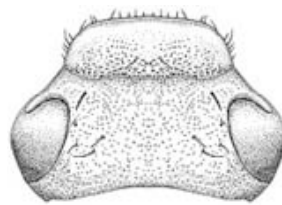


Figure 16. Head of *Anomala chrysanthe*

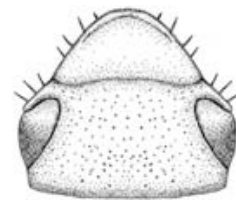


Figure 17. Head of *Anomalacra clypealis*



Figure 18. Labrum in ventral view of *Chelilabia piniphaga*



Figure 19. Labrum in ventral view of *Anomala chrysanthe*

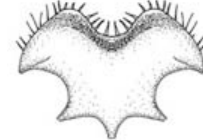


Figure 20. Labrum in ventral view of *Dilophochila bolacoides*

4(3'). Anterior border of clypeus emarginate, lobed either side of emargination (Fig. 21)

..... *Dilophochila* Bates

4'. Anterior border of clypeus quadrate (Fig. 16), rounded, parabolic (Fig. 17), or produced anteriorly (Figs. 22a-b, 23a-c) ..... 5

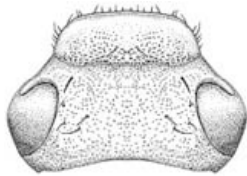


Figure 16. Head of *Anomala chrysanthe*

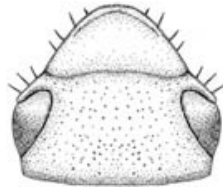


Figure 17. Head of *Anomalacra clypealis*

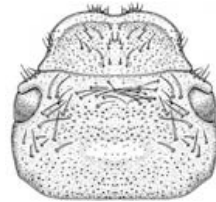
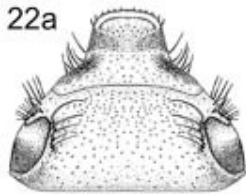
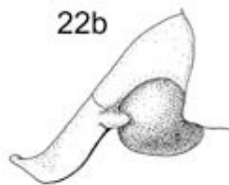


Figure 21. Head of *Dilophochila bolacoides*

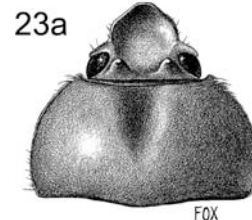


22a

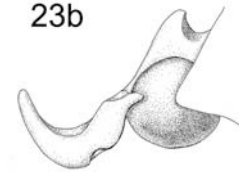


22b

Figure 22. Head of *Callirhynchus metallescens*  
a) dorsal view, b) lateral view



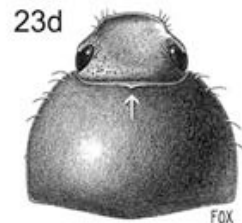
23a



23b



23c



23d

Figure 23a-d. Heads of: *Anomalorhina turrialbana*: 23a) male head and pronotum in dorsal view; 23b) male head in lateral view. *Anomalorhina osaensis*: 23c) male head and pronotum; 23d) female head and pronotum.

5(4'). Frontoclypeal suture incomplete (obsolete at middle, poorly defined at margin) (Fig. 23a).

Sides of clypeus elevated at base of canthus (Fig. 23b). Males with pronotal disc with depression

(23a, 23c). Females with apical margin of pronotum with bead produced posteriorly at middle (V-

shaped) (Fig. 23d) ..... *Anomalorhina* Jameson, Paucar-Cabrera, and Solís

5'. Frontoclypeal suture complete (Fig. 16, 17). Sides of clypeus weakly elevated or flat at base of

canthus (Fig. 16). Males with pronotal disc evenly rounded (without fovea). Females with apical

margin of pronotum with bead not produced posteriorly ..... 6

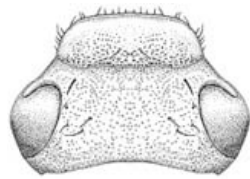


Figure 16. Head of *Anomala chrysanthe*

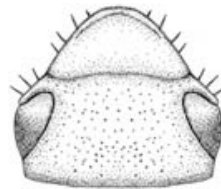
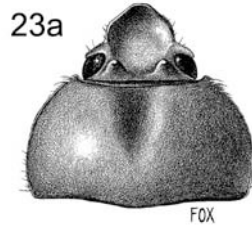
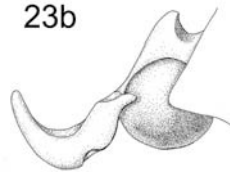


Figure 17. Head of *Anomalacra clypealis*



23a

FOX

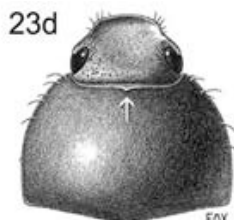


23b



23c

FOX



23d

FOX

Figure 23a-d. Heads of: *Anomalorhina turrialbana*: 23a) male head and pronotum in dorsal view; 23b) male head in lateral view. *Anomalorhina osaensis*: 23c) male head and pronotum; 23d) female head and pronotum.

6(5'). Clypeus abruptly reflexed and snout-like, apex abruptly constricted (Figs. 22a-b)

..... **Callirhinus** Blanchard

6'. Clypeus not abruptly reflexed and snout-like, apex quadrate, rounded, or parabolic (e.g., Figs.

16-17) ..... 7

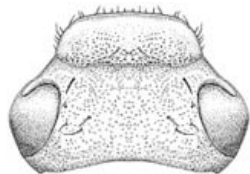


Figure 16. Head of *Anomala chrysanthe*

22a

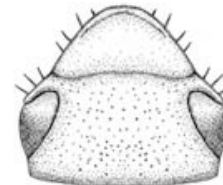


Figure 17. Head of *Anomalacra clypealis*

22b

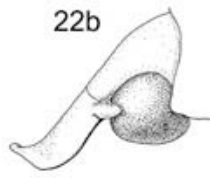
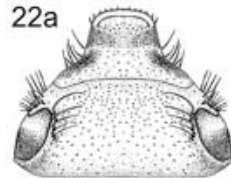


Figure 22. Head of *Callirhinus metallescens*  
a) dorsal view, b) lateral view

7(6'). Clypeus parabolic (Fig. 17).....**Anomalacra** Casey

7'. Clypeus rounded or quadrate (Fig. 16) ..... 8

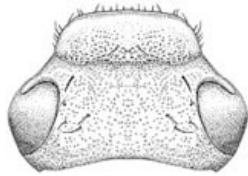


Figure 16. Head of *Anomala chrysanthe*

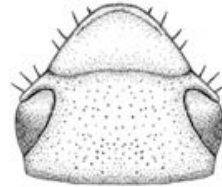


Figure 17. Head of *Anomalacra clypealis*

8. Pronotum suboval (Fig. 26), with anterior angles not acute (Fig. 31), not covering posterior portion of eye (Fig. 31). Hind wing with region anterior to RA3+4 without setae.

..... **Balanogonia** Paucar-Cabrera

8'. Pronotum sub-quadrate (Figs. 27, 28), with anterior angles acute (Fig. 32), covering posterior 1/3-1/6 portion of eye (Fig. 32) or pronotum sub-trapezoidal (Fig. 29), with anterior angles not acute, not covering posterior portion of eye. Hind wing with region anterior to RA 3+4 with setae

..... 9



Figure 26. Pronotum in dorsal view of *Balanogonia freudei*



Figure 27. Pronotum in dorsal view of *Epectinaspis moreletiana*

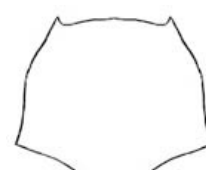


Figure 28. Pronotum in dorsal view of *Strigoderma vestita*



Figure 29. Pronotum in dorsal view of *Yaaxkumukia ephemera*

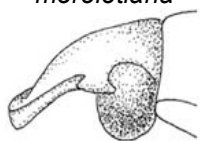


Figure 31. Head in lateral view of *Balanogonia freudei*

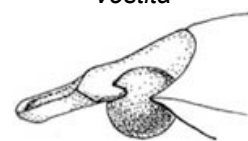


Figure 32. Head in lateral view of *Epectinaspis moreletiana*

- 9(8'). Mesepimeron partially visible anterior to base of elytron in dorsal view (Figs. 3-5) .. 10  
 9'. Mesepimeron concealed by base of elytron in dorsal view (Fig. 6) ..... 13



Figure 3. Mesepimeron of *Epectinaspis*



Figure 4. Mesepimeron of *Strigoderma*



Figure 5. Mesepimeron of *Popillia*



Figure 6. Mesepimeron of *Anomala*

- 10(9). Base of pronotum tri-emarginate (Fig. 5). Mesometasternum produced anteriorly beyond base of mesocoxae (Fig. 33) ..... **Popillia** DeJean  
 10'. Base of pronotum rounded posteriorly (e.g., Figs. 26-29). Mesometasternum not produced anteriorly beyond base of mesocoxae (Figs. 34, 35) ..... 11



Figure 5. Mesepimeron of *Popillia*

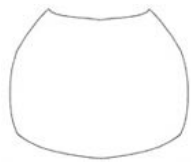


Figure 26. Pronotum in dorsal view of *Balanogonia freudei*



Figure 27. Pronotum in dorsal view of *Epectinaspis moreletiana*



Figure 28. Pronotum in dorsal view of *Strigoderma vestita*



Figure 29. Pronotum in dorsal view of *Yaaxkumukia ephemera*

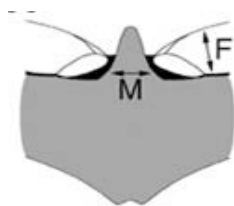


Figure 33. Mesosternum of *Popillia japonica*



Figure 34. Mesosternum of *Anomala autogramma*



Figure 35. Mesosternum of *Epectinaspis*

- 11(10'). Pronotal surface finely rugopunctate. Elytral surface finely rugopunctate, lacking punctate striae or raised longitudinal ridges ..... **Rugopertha** Machatschke  
 11'. Pronotal surface punctate. Elytral surface with punctate striae, raised longitudinal ridges, or entirely smooth ..... 12



12(11'). Mesosternal intercoxal region subequal in width to base of mesofemur (Fig. 36).  
 Mesepimeron subrectangular, well-exposed (Fig. 4). Clypeus of male narrowly reflexed at apex.  
 Dorsal surface of elytron flat ..... **Strigoderma** Burmeister

12. Mesosternal intercoxal region less than 1/4 width of base of mesofemur (Fig. 35).  
 Mesepimeron subtriangular, partially exposed (Fig. 3). Clypeus of male broadly reflexed at apex.  
 Dorsal surface of elytron evenly rounded ..... **Epectinaspis** Blanchard



Figure 3. Mesepimeron of *Epectinaspis*



Figure 4. Mesepimeron of *Strigoderma*



Figure 35. Mesosternum of *Epectinaspis opacicollis*



Figure 36. Mesosternum of *Strigoderma rutelina*

13(9'). Mesosternal intercoxal region subequal in width to base of mesofemur or 1/2 width of base of mesofemur (Fig. 37). Mesometasternum produced anteriorly beyond base of mesocoxae (Fig. 37) ..... 14

13'. Mesosternal intercoxal region less than 1/4 width base of mesofemur (Fig. 34).  
 Mesometasternum not produced anteriorly beyond base of mesocoxae (Fig. 34)  
 ..... **Anomala** Samouelle



Figure 34. Mesosternum of *Anomala autogramma*



Figure 37. Mesosternum of *Callistethus specularis*

- 14(13') Height of clypeal apex in frontal view about 1/2 length of clypeus in dorsal view (Fig. 24).  
 Maxilla with 5 teeth ..... **Nayarita** Morón and Nogueira
- 14'. Height of clypeal apex in frontal view about 1/3-1/4 length of clypeus in dorsal view (Fig. 25).  
 Maxilla with 6 teeth ..... 15

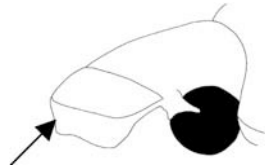


Figure 24. Head in frontolateral view of *Nayarita*

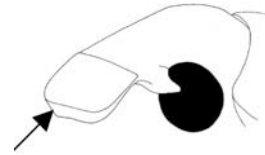


Figure 25. Head in frontolateral view of *Yaaxkumukia*

- 15(14'). Last abdominal spiracle tuberculiform in male (Fig. 38). Pronotum with apical margin not beaded ..... **Yaaxkumukia** Morón and Nogueira
- 15'. Last abdominal spiracle simple, not tuberculiform in male or female (Fig. 39). Pronotum with apical margin beaded ..... **Callistethus** Blanchard

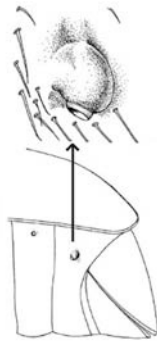


Figure 38. Last spiracle in lateral view of *Yaaxkumukia ephemera*



Figure 39. Last spiracle in lateral view of *Callistethus specularis*

Paucar-Cabrera, A. 2003. Systematics and phylogeny of the genus *Epectinaspis* Blanchard (Coleoptera: Scarabaeidae: Rutelinae) and description of a new genus of Anomalini from Mexico. Coleopterists Society Monographs 2:1-60.

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Anomalini/Anomalini-Key/AnomaliniK.html>

## Clave para los géneros de Anomalini del nuevo mundo

(Basada en Paucar-Cabrera 2003))

(*Phyllopertha latitarsis* Nonfried es *incertae sedis* y se omitió de esta clave)

1. Espina protibial ausente (Fig. 10). Maxila reducida, con 2 o menos dientes (Fig. 13) ... 2  
 1'. Espina protibial presente (Fig. 9). Maxila no reducida, con más de 2 dientes (Figs. 11,  
 12) ..... 3



Figure 9. Pata delantera en vista dorsal *Anomala chrysanthe*.



Figure 10. Pata delantera en vista dorsal *Leptohoplia testaceipennis*



Figure 11. Maxilla izquierda vista ventral de *Anomala chrysanthe*



Figure 12. Maxilla izquierda vista ventral de *Dilophochila bolacoides*



Figure 13. Maxilla izquierda vista ventral de *Leptohoplia testaceipennis*

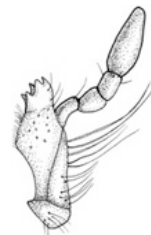


Figure 14. Maxilla izquierda vista ventral de *Mazahuapertha tolucana*

- 2(1). Mesepímero no visible en vista dorsal (e.g., Fig. 6). Clípeo con los márgenes laterales rectos en la base (formando un ángulo recto con la sutura frontoclipeal). Maxila con el último segmento del palpo 2 veces más ancho que la anchura del tercer segmento (Fig. 13). Dorso de color amarillo pajizo ..... ***Leptohoplia*** Saylor  
 2'. Mesepímero visible en vista dorsal (e.g., Figs. 3-5). Clípeo con los márgenes laterales oblicuos en la base (formando un ángulo agudo con la sutura frontoclipeal). Maxila con el último segmento del palpus casi igual a la anchura del tercer segmento (Fig. 14). Dorso de

la cabeza, pronoto y pigidio de color café rojizo con reflejos verdosos, élitros de color amarillo pajizo con marcas longitudinales café rojizas ..... **Mazhuapertha** Morón and Nogueira



Figure 3. Mesepimero de *Epectinaspis*



Figure 4. Mesepimero de *Strigoderma*



Figure 5. Mesepimero de *Popillia*



Figure 6. Mesepimero de *Anomala*



Figure 13. Maxilla izquierda vista ventral de *Leptohoplia testaceipennis*

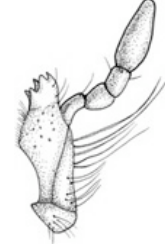


Figure 14. Maxilla izquierda vista ventral de *Mazhuapertha toluicana*

3(1'). Labro proyectado anteriormente debajo del ápice del clipeo (Fig. 15). Apice del labro profundamente emarginado (Fig. 15, 18) ..... **Chelilabia** Morón and Nogueira

3'. Labro oculto o parcialmente oculto, solo el ápice esta expuesto debajo del ápice del clipeo (Figs. 16, 17). Apice del labro cuadrado, redondeado, sinuoso (Fig. 19) o

emarginado (Fig. 20) ..... 4



Figure 15. Cabeza de *Chelilabia piniphaga*

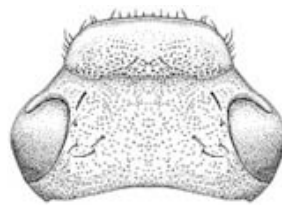


Figure 16. Cabeza de *Anomala chrysanthe*

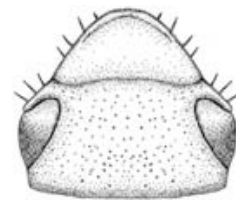


Figure 17. Cabeza de *Anomalacra clypealis*



Figure 18. Labro en vista ventral de *Chelilabia piniphaga*



Figure 19. Labro en vista ventral de *Anomala chrysanthe*

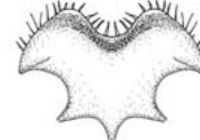


Figure 20. Labro en vista ventral de *Dilophochila bolacoides*

- 4(3'). Borde anterior del clípeo emarginado, lobulado a cada lado de la emarginación (Fig. 21) ..... *Dilophochila* Bates
- 4'. Borde anterior del clípeo cuadrado (Fig. 16), redondeado, parabólico (Fig. 17) o proyectado anteriormente (Figs. 22a-b, 23a-c) ..... 5

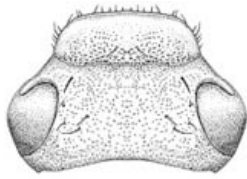


Figure 16. Cabeza de *Anomala chrysanthe*

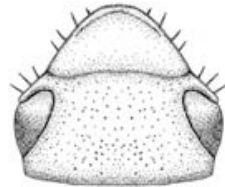


Figure 17. Cabeza de *Anomalacra clypealis*

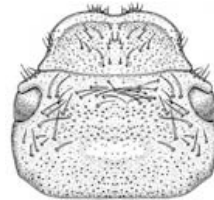
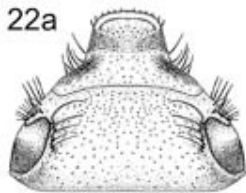
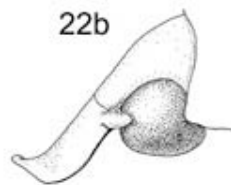


Figure 21. Cabeza de *Dilophochila bolacoides*



22a



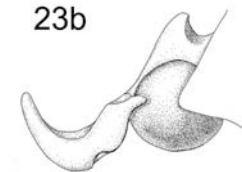
22b

Figure 22. Cabeza de *Callirhinus metallescens*  
a) vista dorsal, b) vista lateral

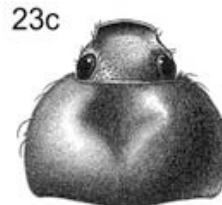


23a

FOX

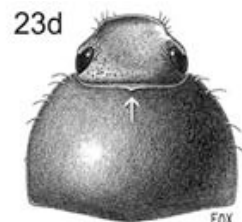


23b



23c

FOX



23d

FOX

Figure 23a-d. Cabezas de: *Anomalorhina turrialbana*: 23a) cabeza y pronoto del macho en vista dorsal; 23b) cabeza del macho en vista lateral. *Anomalorhina osaensis*: 23c) cabeza y pronoto del macho; 23d) cabeza y pronoto de la hembra.

- 5(4'). Sutura frontoclipeal incompleta (obsoleta en la región media, pobremente definida en el margen) (Fig. 23a). Lados del clípeo elevados en la base del canto (Fig. 23b). Machos con el disco del pronoto con una depresión (Figs. 23a, 23c). Pronoto de las hembras con el área media del margen anterior proyectado posteriormente en forma de V (Fig. 23d) ..... *Anomalorhina* Jameson, Paucar-Cabrera, and Solís
- 5'. Sutura frontoclipeal completa (Fig. 16, 17). Lados del clípeo débilmente elevados o planos en la base del canto (Fig. 16). Machos con el disco del pronoto uniformemente convexo (sin fovea). Pronoto de las hembras con el área media del margen anterior no

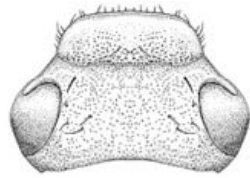


Figure 16. Cabeza de *Anomala chrysanthe*

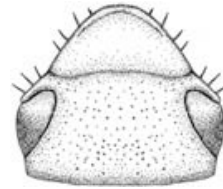
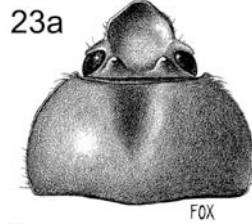
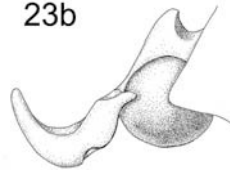


Figure 17. Cabeza de *Anomalacra clypealis*



23a

FOX



23b



23c

FOX



23d

FOX

Figure 23a-d. Cabezas de: *Anomalorhina turrialbana*: 23a) cabeza y pronoto del macho en vista dorsal; 23b) cabeza del macho en vista lateral. *Anomalorhina osaensis*: 23c) cabeza y pronoto del macho; 23d) cabeza y pronoto de la hembra.

6(5'). Clípeo abruptamente elevado, en forma de nariz respingada, ápice puntiagudo (Figs.

22a-b) ..... **Callirhinus** Blanchard

6'. Clípeo no abruptamente elevado, ni en forma de nariz respingada, ápice cuadrado, redondeado o parabólico (e.g., Figs. 16-17) .....

7

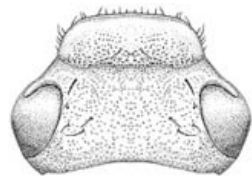


Figure 16. Cabeza de *Anomala chrysanthe*

22a

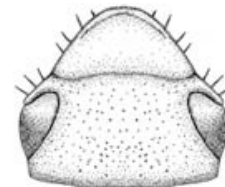
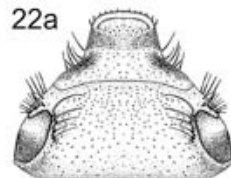


Figure 17. Cabeza de *Anomalacra clypealis*

22b

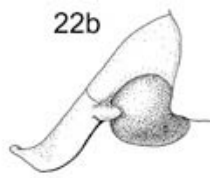


Figure 22. Cabeza de *Callirhinus metallescens*  
 a) vista dorsal, b) vista lateral

- 7(6'). Clípeo parabólico (Fig. 17).....**Anomalacra** Casey  
 7'. Clípeo redondeado o cuadrado (Fig. 16) ..... 8

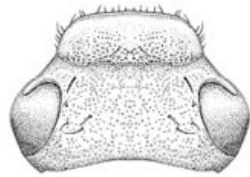


Figure 16. Cabeza de *Anomala chrysanthe*

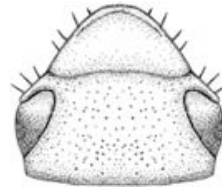


Figure 17. Cabeza de *Anomalacra clypealis*

- 8(7'). Pronoto suboval (Fig. 26), con ángulos anteriores no agudos (Fig. 31), que no cubren la porción posterior del ojo (Fig. 31). Ala membranosa con la region anterior a RA3+4 sin setas ..... **Balanogonia** Paucar-Cabrera

- 8'. Pronoto sub-cuadrado (Figs. 27, 28), con ángulos anteriores agudos (Fig. 32), que cubren 1/3-1/6 de la porción posterior del ojo (Fig. 32) o pronoto sub-trapezoidal (Fig. 29), con ángulos anteriores no agudos, que no cubren la porción posterior del ojo. Ala membranosa con la región anterior a RA 3+4 con setas

..... 9



Figure 26. Pronoto en vista dorsal de *Balanogonia freudei*



Figure 27. Pronoto en vista dorsal de *Epectinaspis moreletiana*

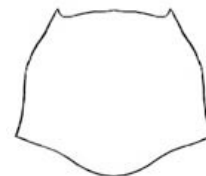


Figure 28. Pronoto en vista dorsal de *Strigoderma vestita*



Figure 29. Pronoto en vista dorsal de *Yaaxkumukia ephemera*

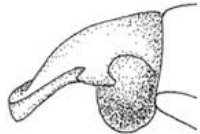


Figure 31. Cabeza en vista lateral de *Balanogonia freudei*

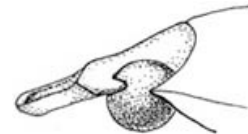


Figure 32. Cabeza en vista lateral de *Epectinaspis moreletiana*

- 9(8'). Mesepímero parcialmente visible anterior a la base del élitro en vista dorsal (Figs. 3-5)

..... 10

9'. Mesequímero oculto bajo la base del élitro en vista dorsal (Fig. 6) ..... 13



Figure 3. Mesequímero de *Epectinaspis*



Figure 4. Mesequímero de *Strigoderma*



Figure 5. Mesequímero de *Popillia*

Figure 6. Mesequímero de *Anomala*

10(9). Base del pronoto triemarginada (Fig. 5). Mesometasterno proyectado anteriormente sobrepasando la base de la mesocoxa (Fig. 33) ..... **Popillia** DeJean

10'. Base del pronoto redondeada posteriormente (e.g., Figs. 26-29). Mesometasterno no proyectado anteriormente, ni sobrepasando la base de la mesocoxa (Figs. 34, 35) ..... 11



Figure 5. Mesequímero de *Popillia*



Figure 26. Pronoto en vista dorsal de *Balanogonia freudei*

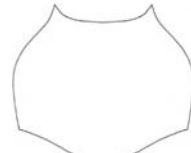


Figure 27. Pronoto en vista dorsal de *Epectinaspis moreletiana*



Figure 28. Pronoto en vista dorsal de *Strigoderma vestita*



Figure 29. Pronoto en vista dorsal de *Yaaxkumukia ephemera*

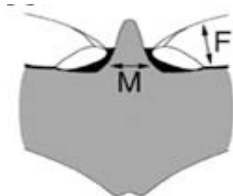


Figure 33. Mesosterno de *Popillia japonica*



Figure 34. Mesosterno de *Anomala autogramma*



Figure 35. Mesosterno de *Epectinaspis*

11(10'). Superficie del pronoto finamente rugopunteada. Superficie del élitro finamente rugopunteada, carente de estrías o elevaciones estrechas longitudinales

..... **Rugopertha** Machatschke

11'. Superficie del pronoto punteada. Superficie del élitro con estrías punteadas, con elevaciones estrechas longitudinales, o superficie enteramente lisa ..... 12



12(11'). Ancho de la región intercoxal del mesosterno casi igual a la base del mesofémur (Fig. 36). Mesepimero subrectangular, expuesto (Fig. 4). Clípeo subtrapezoidal. Clípeo del macho estrecho y ligeramente elevado en el ápice. Superficie dorsal del élitro plana ..... **Strigoderma** Burmeister

12. Ancho de la región intercoxal del mesosterno menos de 1/4 de la anchura de la base del mesofémur (Fig. 35). Mesepimero subtriangular, parcialmente expuesto (Fig. 3). Clípeo cuadrado. Clípeo del macho ampliamente elevado en el ápice. Superficie dorsal del élitro uniformemente convexo ..... **Epectinaspis** Blanchard



Figure 3. Mesepimero de *Epectinaspis*



Figure 4. Mesepimero de *Strigoderma*



Figure 35. Mesosterno de *Epectinaspis opacicollis*



Figure 36. Mesosterno de *Strigoderma rutelina*

13(9'). Ancho de la región intercoxal del mesosterno casi igual a la anchura de la base del mesofémur o 1/2 de la anchura de la base del mesofémur (Fig. 37). Mesometasterno proyectado anteriormente sobrepasando la base de la mesocoxa (Fig. 37) ..... 14

13'. Ancho de la región intercoxal del mesosterno menor a 1/4 de la anchura de la base del mesofémur (Fig. 34). Mesometasterno no proyectado anteriormente ni sobrepasando la base de la mesocoxa (Fig. 34) ..... **Anomala** Samouelle



Figure 34. Mesosterno de *Anomala*



Figure 37. Mesosterno de *Callistethus*

14(13') Altura del ápice del clípeo en vista frontal casi igual a 1/2 del largo del clípeo en vista dorsal (Fig. 24). Maxila con 5 dientes ..... **Nayarita** Morón and Nogueira

14'. Altura del ápice del clípeo en vista frontal casi igual a 1/3-1/4 del largo del clípeo en vista dorsal (Fig. 25). Maxila con 6 dientes ..... 15

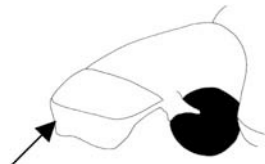


Figure 24. Cabeza en vista frontolateral de *Nayarita*

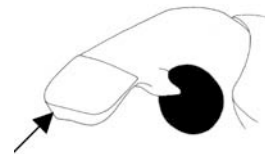


Figure 25. Cabeza en vista frontolateral de *Yaaxkumukia*

15(14'). Ultimo espiráculo tuberculiforme en machos (Fig. 38). Ápice del pronoto sin margen ..... **Yaaxkumukia** Morón and Nogueira

15'. Ultimo espiráculo simple, no tuberculiforme en machos o hembras (Fig. 39). Apice del pronoto con margen ..... **Callistethus** Blanchard

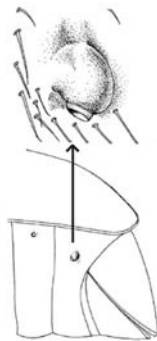


Figure 38. Ultimo espiráculo en vista lateral de *Yaaxkumukia ephemera*



Figure 39. Ultimo espiráculo en vista lateral de *Callistethus specularis*

Paucar-Cabrera, A. 2003. Systematics and phylogeny of the genus *Epectinaspis* Blanchard (Coleoptera: Scarabaeidae: Rutelinae) and description of a new genus of Anomalini from Mexico. Coleopterists Society Monographs 2:1-60.

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Anomalini/Anomalini-Key/AnomaliniK.html>

SUBTRIBE ANISOPLIINA

Key to the genera

- 1. (4) Between the middle coxae is a small mesosternal projection , obtuse tubercule ..... 2
- 2. (3) The dorsal surface, with exception the pygidium, bare ..... Callirhinus Blanchard
- 3. (2) The head, the pronotal-disk and the pygidium entirely setose..... Tropiorhynchus Blanchard
- 4. (1) Mesosternal projection absent ..... 3
- 5. (6) The clypeus strongly narrowed anteriorly ending in a reflexed elongated, narrow, acuminate tip, or wide and truncate, or parabolic. The front-corners to the side not angular dilated. The dorsal surface bare..... Rhinyptia Burmeister
- 6. (5) The clypeus more trapezoidal, the front margin reflexed wide truncate and the front-corners to the side angular dilated. The body densely, often shaggy hairy, sometimes appearing bare..... Anisoplia Serville

Genus RHINYPTIA Burmeister

Key to the Subgenera and species-groups:

1. (6) The outer claw of the middle legs in the male un-forked. The upper apical tooth of the maxilla narrow, with both following on the base not concealed. The middle of the disk of the clypeus is from the front margin up to the base carinate, it descends towards the side roof-like down(?). Representatives the Oriental region.... Rhinyptia Burmeister
2. (5) The disk of the clypeus in the middle distinctly carinate, towards the side-margins roof-like fall(?)... 3
3. (4) The front margin of the clypeus elongated into a very narrow, forward projecting, snout..... Indica- group
4. (3) The front margin of the clypeus wider, not distinctly snout-like, truncate..... Nigrifrons- group
5. (2) The disk of the clypeus in the middle not carinate, the clypeus parabolic, anteriorly strongly reflexed, not snout-like elongated ..... Parabolica- group
6. (1) The outer claw of the middle legs is in both sexes forked. The upper apical tooth of the maxilla very wide on the base, it conceals the two following teeth. The middle of the disk of the clypeus is not carinate, or if a keel is present, it does not reach the base. The side not roof-like diclivos. Representatives of the Ethiopian Region..... Pararhinyptia Nov. Subgenus.
- 7.(10) The clypeus in the front wide, highly reflexed, more or less isolated, not elongated into a narrow snout. The parameres with the forceps slightly before the tip and with them solidly attached to the central-piece. Similarly formed also on the ventral external-margins. The forceps form thereby a closed tube ..... 8
8. (9) The hind-corners of the pronotum blunt-angular, little rounded, and shallow projecting forward .... Infuscata-group
9. (8) The hind-corners of the pronotum rounded in a shallow arc, not uneven..... Acrorhina- group
- 10.(7) The clypeus in the front wide, deeply emarginate, two-lobed..... Schizorhina- group
11. The clypeus in the front elongated into a narrow, reflexed snout. The parameres with the forceps at most on the base fused above, their ventral external-margins free. The central-piece clearly unsegmented..... Carinulata- group

## 2. SUBTRIBE POPILLIINA

## Key to the genera:

1. (26) The side the pronotum and the elytra not in a rounded line; little to medium sized species..... 2
2. (25) The meta-coxae on the base not elongated posteriorly into a thorn-like process ..... 3
3. (24) The front-tibia on the outer margin with 2 teeth..... 4
4. (23) The body short, the teeth on the outer margin the front-tibia not through a deep incision separated, this only shallow ..... 5
5. (10) The mesosternal projection extends beyond from the angle in front of the middle coxae..... 6
6. (9) The elytra shorten, they don't cover entirely the propygidium..... 7
7. (8) The dorsal surface bare .....Popillia Serville
8. (7) Only the elytra bare, everywhere else densely bristly haired..... Trichopopillia Ohaus
9. (6) The propygidium is entirely covered by the elytra. The base of the pronotum before the scutellum not emarginate, but truncate..... Ischnopopillia Kraatz
10. (5) The mesosternal projection little, it doesn't extend beyond the middle coxae..... 11
11. (22) The mesosternal projection little, round, knob-like ..... 12
12. (15) The front-tibia on the inside without spur..... 13
13. (14) The front-tibia with two sharp teeth on the outer margin. The clypeus in the male narrowly tapering anteriorly, its apex highly reflexed and with indented front margin. The side-angles pointed. In the female the clypeus of normal form, in the front virtually straight ..Dicranoplia Reitter
14. (13) The front-tibia with three large, sharp teeth on the outer margin; the clypeus in both sex similar ..... Tribopertha Reitter
15. (12) The front-tibia on the inside with a spur; the abdominal segments with elevated middle transverse-ridge ..... 16

- 16.(19) The maxilla with six well-formed teeth..... 17
- 17.(18) The large claw on the front- and middle legs is in both sexes forked..... **Nannopopillia** Kolbe
- 18.(17) Only the large claw of the front-legs is in both sex forked, that of the middle legs un-forked.....  
..... **Pharaonus** Blanchard
- 19.(16) The maxilla bears only three teeth or it is entirely toothless..... 20
- 20.(21) The maxilla has only in the basal row three distinct formed teeth, the other rows are fused and chisel-like or scoop-like formed ..... **Gnatholabis** Erichson
- 21.(20) The maxilla is entirely toothless, with only bristles present..... **Anodontopopillia** Ohaus
- 22.(11) The mesosternal projection cylindrical; it comes anteriorly from a weakly curved transverse marginal ridge ..... **Malaia** Heller
- 23.(4) The body long-attenuate; the teeth on the front-tibia separated clearly by a deep incision .....  
..... **Dactylopopillia** Arrow
- 24.(3) The front-tibia on the outer margin only with one distinct tooth. The tarsi long and slender. The hind corners of the pronotum sharp, nearly pointed-angular .....  
..... **Spilopopillia** Kraatz
- 25.(2) The hind tarsi on the base posteriorly thorn-like elongated..... **Callistopopillia** Ohaus
- 26.(1) The side the pronotum and the elytra in a rounded line; large species..... **Macropopillia** Ohaus

## **ANOPLOGNATHINI: Characteristics**

Form elongate oval. Labrum vertically produced with respect to the clypeus; clypeus and mentum often with apicomedial projections. Antennae with 9 or 10 segments. Protarsomeres not dorsoventrally flattened and expanded apically; protarsus with claw usually enlarged and often split in males, usually with medial tooth in females. Elytral margin chitinous or membranous.

## **Classification Status**

Anoplognathini is one of six tribes (Rutelini, Anomalini, Spodochlamyini, Geniagini, Adoretini, and Anoplognathini) currently recognized in the subfamily Rutelinae (Coleoptera: Scarabaeidae). Anoplognathines have long been recognized as a distinct group within the Scarabaeoidea. MacLeay (1819) was the first to erect the family group names Rutelinae (as Rutelidae) and Anoplognathini (as Anoplognathidae), but each had a very different composition from their current concepts. MacLeay's Rutelidae consisted of the modern tribe Rutelini while his Anoplognathidae consisted of the modern Anoplognathini, Geniagini, and *Apogonia* Kirby (a Melolonthinae genus). Burmeister (1844) was the first to classify Anoplognathini in the modern sense. His "Anoplognathidae" contained all of the taxa currently considered to be in the group and that were known at the time. Burmeister also classified the anoplognathines in the "Phyllophaga Metallica" with the rest of the taxa now considered to be in the subfamily Rutelinae. Ohaus (1918) was the first to divide the subfamily Rutelinae into two groups based on the form of the labrum: the Rutelinae homalochilidae (Anomalini and Rutelini) with a labrum parallel to the clypeus, and the Rutelinae orthochilidae (Adoretini, Anoplognathini, Geniagini, and Spodochlamyini) with the labrum perpendicular to the clypeus. Ohaus (1904a, 1904b, 1905, 1918) also did a major taxonomic overhaul on the Anoplognathini, dividing the tribe into the five currently recognized subtribes: Anoplognathina, Schizognathina, Brachysternina, Phalangogoniina, and Platycœliina. The Australian subtribes of Anoplognathini were later reviewed by Carne (1954, 1955, 1956, 1957, 1958). Carne (1958) mentioned some problems with Ohaus' classification scheme in the context of Australian Rutelinae but did not make any changes to Rutelinae classification above the generic level. Machatschke (1965, 1972) mimicked Ohaus' classification scheme in the most recent world catalogs of the subfamily Rutelinae, but was critical of Ohaus' division of Rutelinae tribes into multiple subtribes because many of these groups were based on a single character. All three of the Neotropical subtribes have recently been revised (Brachysternina by Jameson and Smith [2002], Ratcliffe and Ocampo [2002], and Smith [2002]; Phalangogoniina by Smith and Morón [2003]; and Platycœliina by Smith [2003]).

## **Phylogeny**

A preliminary phylogenetic research on the tribe Anoplognathini has supported the monophyly of the Neotropical subtribes of Anoplognathini (Brachysternina, Phalangogoniina, Platycœliina), but not the Australian subtribes (Anoplognathina, Schizognathina). Preliminary molecular phylogenetics results of the phytophagous scarabs place serious doubt on the monophyly of the tribe Anoplognathini. The Brachysternina and the Australian taxa do seem to form a monophyletic clade but the Phalangogoniina and Platycœliina are quite divergent and will probably need to be reclassified somehow within the Rutelinae.

## **Distribution**

The tribe Anoplognathini is endemic to the Australian and Neotropical realms. The five subtribes are distributed as follows: Anoplognathina (Australia and New Guinea), Schizognathina (Australia), Brachysternina (Chile, Argentina), Phalangogoniina (México and Central America), and Platycœliina (Neotropics, mainly in the Andes Mountains and montaine areas of Central America).

## **Genera Profiles** (click on species names)

*Aulacopalpus*

*Brachysternus*

*Hylamorpha*

*Phalangogonia*

*Platycœlia*

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**Key to the Neotropical Genera of Anoplognathini (Scarabaeidae: Rutelinae)**  
(modified from Smith 2002)

1. Elytral margin with clear, membranous border (best seen at apex of elytra). Central Chile and Argentina to Tierra del Fuego (Brachysternina) ..... 2
- 1'. Elytral margin without clear membranous border. Central México to northern Argentina ..... 4
- 2(1). Unguitractor plate with 3 or more setae. Elytron bearing white, scale-like setae (sometimes absent due to abrasion). Claws simple. Tarsomere 5 with ventromedial tooth ..... *Hylamorpha*
- 2'. Unguitractor plate with 2 setae. Elytron glabrous or bearing white to orange, hair-like, slender or thick setae. Claws split, toothed, or simple (if simple, then tarsomere 5 without tooth). Tarsomere 5 with or without ventromedial tooth ..... 3
- 3(2). Dorsal color green. Pygidium and abdominal sternites with distinct thick, white setae (especially laterally at base) when viewed without magnification. Apex of female terminal abdominal sternite moderately to deeply emarginate. Male paramere with ventral and lateral sclerites ..... *Brachysternus*
- 3'. Dorsal color brown to olive green. Pygidium and abdominal sternites usually with hair-like, slender, inconspicuous setae when viewed without magnification. Apex of female terminal abdominal sternite rounded. Male paramere lacking ventral and lateral sclerites ..... *Aulacopalpus*
- 4(1). Protibial spur absent. Mesotibia and metatibia robust, similar in thickness to femora. Tarsomeres robust, thickened, often wider than long. Central México to Panamá. (Phalangoniina) ..... *Phalangonia*
- 4'. Protibial spur present. Mesotibia and metatibia slender in comparison with femora. Tarsomeres not thickened, often longer than wide. Central México to northern Argentina. (Platycoeliina) ..... *Platycoelia*

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeoidea/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Anoplognathini/Anoplognathini-Key/AnoplognathiniK.html>

## GENIATINI: Characteristics

Form elongate oval. Labrum vertically produced with respect to the clypeus; clypeus and mentum with apicomedial projections; antennae with 9 or 10 segments; protibiae tridentate (bidentate in *Microchilus*), inner protibial spur apical; foretarsomeres usually enlarged in males and/or females and densely setose ventrally (except in *Geniatosoma*); elytral margin chitinous or membranous; and terminal spiracle positioned in pleural suture.

## Classification Status

Burmeister (1844) first created the group name "Geniatidae" that included the genera *Bolax*, *Leucothyreus*, *Evanos*, and *Geniates*. In 1918, Ohaus designated the Geniatini as a tribe within the Rutelinae. This group is poorly known taxonomically. Revisions and keys to species are needed in all the genera, and the taxonomic position of some genera and species needs clarification. The only publications dealing with the tribe as a whole are the Coleoptera Catalogous (Ohaus 1918; Machatschke 1972,1974), the Genera Insectorum (Machatschke 1965), and Blackwelder's (1944) catalog.

## Distribution

The tribe Geniatini includes 13 genera and 323 described species. They inhabit semideciduous and cloud forests exclusively in the Neotropics. They occur from Mexico to northern Argentina and Brazil and only one species (*Geniates leptopus* Ohaus) is known from Chile.

## Genera Profiles (click on the species names)

<a href="#">Bolax</a>	<a href="#">Lobogeniates</a>
<a href="#">Eunanus</a>	<a href="#">Microchilus</a>
<a href="#">Evanos</a>	<a href="#">Mimogeniates</a>
<a href="#">Geniates</a>	<a href="#">Rhizogeniates</a>
<a href="#">Geniatosoma</a>	<a href="#">Trizogeniates</a>
<a href="#">Heterogeniates</a>	<a href="#">Xenogeniates</a>
<a href="#">Leucothyreus</a>	

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**Key to the Genera of Geniatini (Scarabaeidae: Rutelinae)**

By Mary Liz Jameson and Shauna Hawkins 2005

*Males*: Protarsomeres dorsoventrally flattened, densely setose ventrally (Figs. 30-31, 33-34); terminal sternite with margin emarginated; abdominal sternites in lateral view appearing concave or flat. *Females*: Protarsomeres dorsoventrally flattened or not, with or without dense ventral setae; terminal sternite with margin entire or rounded, not emarginated; abdominal sternites in lateral view appearing convex.

1. Mentum with apicomedial, tooth-like projection (Fig. 16, 41) ..... 3

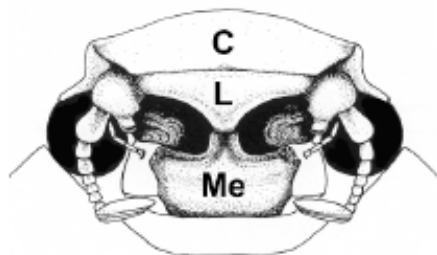


Figure 16



*Trizogeniates foveicollis*  
Figure 41

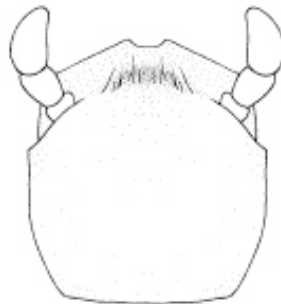
**Figure 16.** Geniatini and Anoplognathini with labrum and mentum (each) possessing median, apical tooth or projection. **Figure 41.** *Trizogeniates foveicollis* (clypeal apex with apicomedial tooth-like projection).

1'. Mentum without apicomedial, tooth-like projection (Figs. 38-40) ..... 2



*Mimogeniates margaridae*

Figure 38



*Rhizogeniates antennatus*

Figure 39



*Rhizogeniates carbonarius*

Figure 40

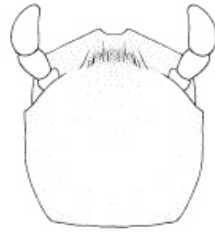
**Figures 38-40.** Clypeus of: **38)** *Mimogeniates margaridae* (apex quadrate and crenulate, lacking apicomedial tooth), **39)** *Rhizogeniates antennatus* (weakly emarginate apically, lacking apicomedial tooth), **40)** *Rhizogeniates carbonarius* (weakly emarginate apically, lacking apicomedial tooth).

2(1). Apex of mentum with medial notch, not crenulate (Figs. 39-40). All claws simple on all legs ..... *Rhizogeniates* Ohaus

2'. Apex of mentum crenulate (Fig. 38). Modified claw moderately split on all legs ..... *Mimogeniates* Martínez



*Mimogeniates margaridiae*  
Figure 38



*Rhizogeniates antennatus*  
Figure 39

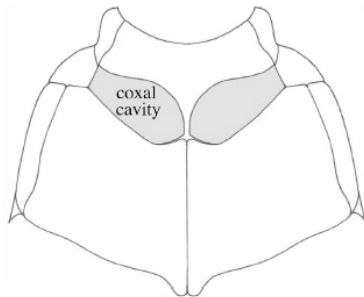


*Rhizogeniates carbonarius*  
Figure 40

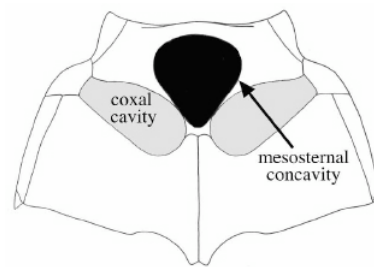
**Figures 38-40.** Clypeus of: **38)** *Mimogeniates margaridiae* (apex quadrate and crenulate, lacking apicomedial tooth), **39)** *Rhizogeniates antennatus* (weakly emarginate apically, lacking apicomedial tooth), **40)** *Rhizogeniates carbonarius* (weakly emarginate apically, lacking apicomedial tooth).

3(1). Mesosternum anterior to mesocoxae strongly concave (Fig. 52)  
..... *Xenogeniates* Villatoro & Jameson

3'. Mesosternum anterior to mesocoxae flat or slightly convex, not strongly concave (Fig. 51) ..... 4



*Bolax magna*  
Figure 51

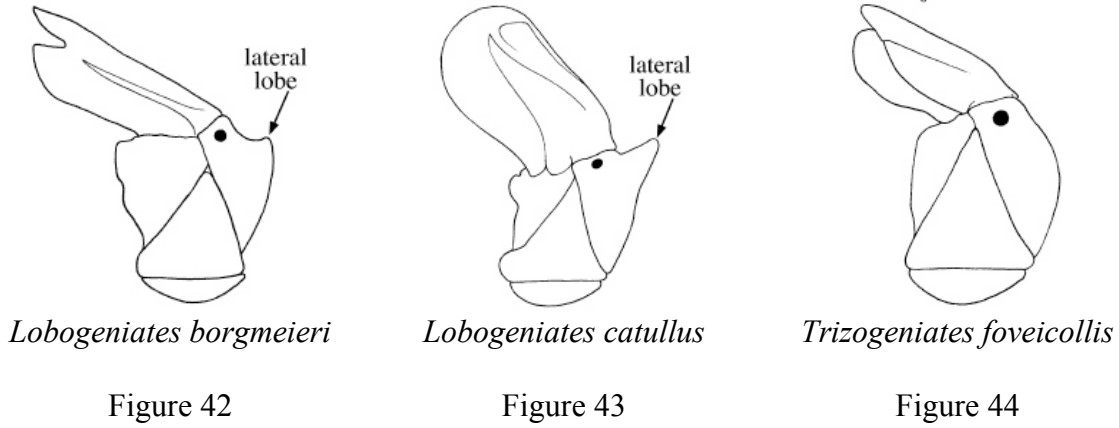


*Xenogeniates martinezi*  
Figure 52

**Figure 51-52.** Thorax in ventral view showing: **51)** Mesosternum without invagination (*Bolax magna*) and **52)** Mesosternum with invagination in black (*Xenogeniates martinezi*).

4(3). Stipes of maxilla produced, with well-developed lateral lobe (Fig. 43) or lateral angle (Fig. 42) ..... *Lobogeniates* Ohaus

4'. Stipes of maxilla not produced, instead rounded or broadly rounded (Fig. 44) ..... 5



*Lobogeniates borgmeieri* Figure 42      *Lobogeniates catullus* Figure 43      *Trizogeniates foveicollis* Figure 44

**Figure 42-44.** Maxilla (ventral view) showing: **42)** *Lobogeniates borgmeieri* (stipes produced, with lateral angle), **43)** *Lobogeniates catullus* (stipes produced, with well-developed lateral lobe), **44)** *Trizogeniates foveicollis* (not produced, instead rounded or broadly rounded).

5(4). Mandible with rounded, recurved, apical lobe (Fig. 20). Dorsal surface with abundant, decumbent, white setae. Antennal club of male twice length of segments 2-7; antennal club of female subequal to segments 2-7 ..... *Eunanus* Ohaus

5'. Mandible lacking rounded, recurved, apical tooth; instead simple (e.g., Fig. 19). Dorsal surface with or without sparse setae. Antennal club of male and female subequal to or slightly longer than segments 2-7 ..... 6



*Bolax rutila*

Figure 19



*Eunanus murinus*

Figure 20

**Figures 19-20.** Head in dorsal view showing form of clypeus, mouthparts, and eye size in: **19)** *Bolax rutila*, **20)** *Eunanus murinus*.

6(5). Length of antennal club half or less than half length of first antennal segment (Figs. 5, 23). Clypeal apex (in lateral view) sloped 45° with respect to dorsal plane of clypeus (Figs. 23, 36). Male tarsomeres simple, not flattened and dilated (Fig. 32)

..... *Geniatosoma* Costa Lima

6'. Length of antennal club more than half length of first antennal segment. Clypeal apex (in lateral view) sloped 60-90° with respect to dorsal plane of clypeus (Fig. 37). Male tarsomeres dorsoventrally flattened and dilated (e.g., Fig. 34) ..... 7



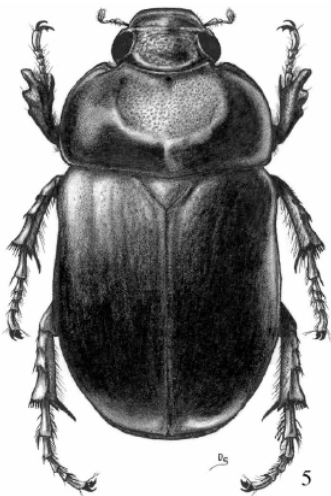
Figure 23



Figure 32



Figure 34



*Geniatosoma nigrum*

Figure 5

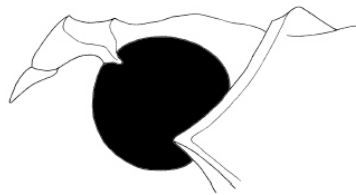


Figure 36

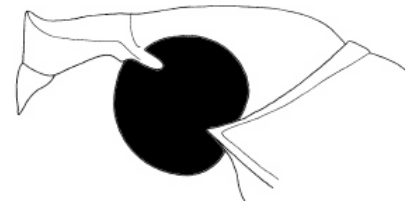


Figure 37

**Figure 23.** Head in dorsal view showing form of clypeus, mouthparts, and eye size in *Geniatosoma lindemanna*. **Figures 32, 34.** Male forelegs (dorsal view) showing comparison of tibial apex, protarsomeres, and claws of: **32)** *Geniatosoma lindemanna*, **34)** *Trizogeniates temporalis*. **Figure 5.** *Geniatosoma nigrum* (male). **Figures 36-37.** Head and apex of thorax in lateral view showing: **36)** Clypeal apex sloped 45° with respect to dorsal plane of clypeus in *Geniatosoma lindemanna* (male) and **37)** Clypeal apex sloped 60–90° with respect to dorsal plane of clypeus in *Trizogeniates tibialis*.

7(6). Form of clypeus parabolic, apex not reflexed (Fig. 24). Mandible exposed, apex narrowly rounded (Fig. 24). Male with all claws appearing simple on all legs ..... *Heterogeniates* Ohaus

7'. Form of clypeus not parabolic (instead rounded, quadrate), apex reflexed (e.g., Figs. 19-20, 22, 25-26). Mandible exposed or not, apex broadly rounded (e.g., Figs. 19, 23, 25). Male with claws obviously toothed on some or all legs ..... 8



*Bolax rutila*

Figure 19



*Eunanus murinus*

Figure 20



*Geniates borellii*

Figure 22



*Geniatosoma lindemanna*

Figure 23



*Heterogeniates bonariensis*

Figure 24



*Leucothyreus kirbyanus*

Figure 25



*Trizogeniates tibialis*

Figure 26

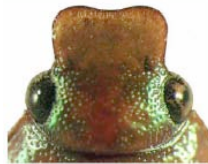
**Figures 19-26.** Head in dorsal view showing form of clypeus, mouthparts, and eye size in: **19)** *Bolax rutila*, **20)** *Eunanus murinus*, **22)** *Geniates borellii*, **23)** *Geniatosoma lindemanna*, **24)** *Heterogeniates bonariensis* (male), **25)** *Leucothyreus kirbyanus*, **26)** *Trizogeniates tibialis*.

8(7). Length of protarsomeres 2-4 subequal in length to protarsomere 5 (Fig. 31). Clypeus of male with lateral margins expanded, apex quadrate (Fig. 21); clypeus of female with lateral margins parallel, apex quadrate ..... *Evanos* Ohaus

8'. Length of protarsomeres 2-4 greater than length of protarsomere 5 (Figs. 30, 33-34). Clypeus of male and female with lateral margins constricted, apex rounded or trapezoidal (e.g., Figs. 19, 22, 25-28) ..... 9



*Bolax*  
Figure 19



*Evanos*  
Figure 21



*Geniates*  
Figure 22



*Leucothyreus*  
Figure 25



*Trizogeniates*  
Figure 26



*Geniates borellii*  
Figure 27



*Geniates cornutus*  
Figure 28



*Bolax*  
Figure 30



*Evanos*  
Figure 31



*Microchilus*  
Figure 33



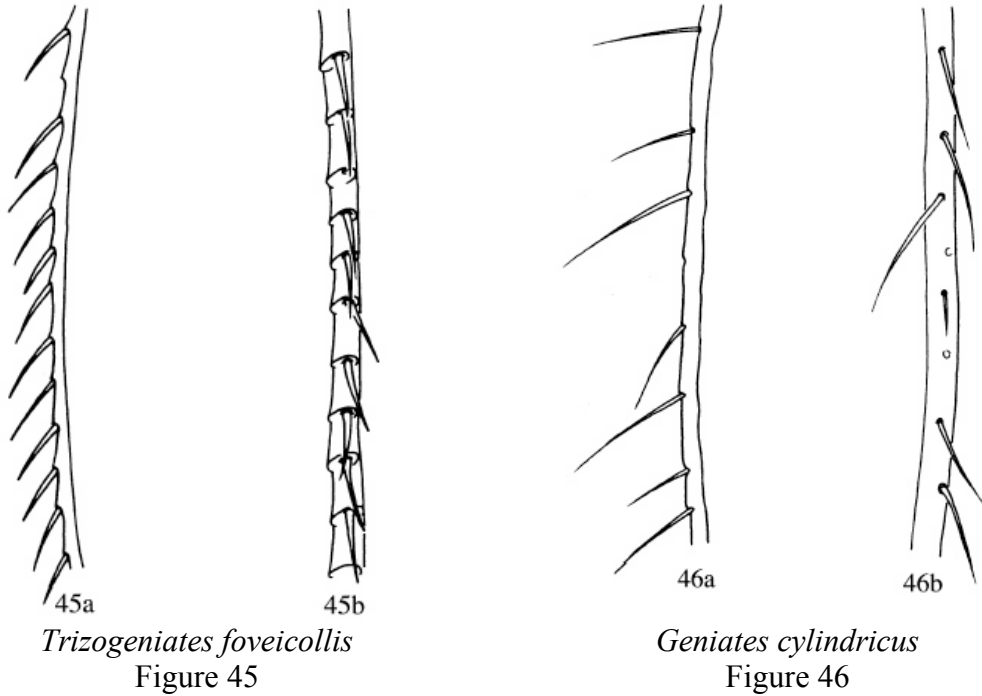
*Trizogeniates*  
Figure 34

**Figures 19-26.** Head in dorsal view showing form of clypeus, mouthparts, and eye size in: **19)** *Bolax rutila*, **21)** *Evanos villatus* (male), **22)** *Geniates borellii*, **25)** *Leucothyreus kirbyanus*, **26)** *Trizogeniates tibialis*. **Figures 27-28.** Head and pronotum in dorsal view showing form in: **27)** *Geniates borellii*, male (head lacking tubercle, pronotum lacking concavity), **28)** *Geniates cornutus*, male (head with tubercle, pronotum with concavity). **Figures 30-34.** Male forelegs (dorsal view) showing comparison of tibial apex, protarsomeres, and claws of: **30)** *Bolax magna*, **31)** *Evanos villatus*, **33)** *Microchilus lineatus*, and **34)** *Trizogeniates temporalis*.



9(8). Elytral margin with deep, setose punctures on lateral edge from apex of metepisternum to apex of elytra (Figs. 45a-b, 46a-b) ..... 10

9'. Elytral margin without deep, setose punctures on lateral edge from apex of metepisternum to apex of elytra ..... 11



**Figures 45-46.** Left elytral epipleuron showing: **45)** dorsal view of stridulatory ridge in *T. foveicollis* (**a**) and ventral view of stridulatory ridge in *T. foveicollis* (**b**), **46)** dorsal view of elytral epipleuron without stridulatory ridge in *G. cylindricus* (**a**) and ventral view of elytral epipleuron without stridulatory ridge in *G. cylindricus* (**b**).

10(9). Elytral margin with well-developed stridulatory ridge and with rigid stridulatory setae (Fig. 45a-b). Apex of metafemur (dorsal view) with stridulatory patch (Fig. 35)  
 ..... *Trizogeniates* Ohaus

10'. Elytral margin lacking stridulatory ridge and without rigid stridulatory setae (Fig. 46a-b). Apex of metafemur (dorsal view) lacking stridulatory patch..... *Geniates* Ohaus

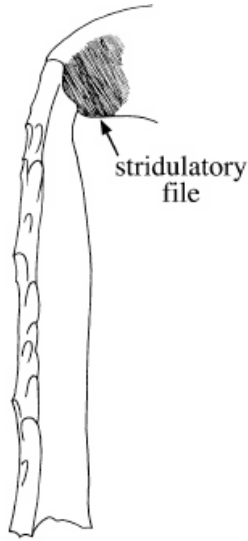


Figure 35

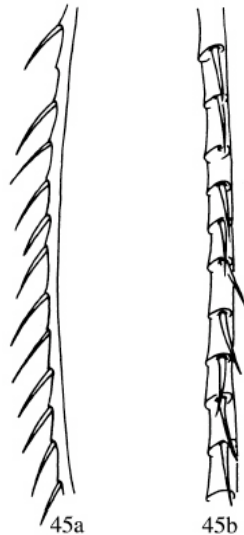


Figure 45



Figure 46

**Figure 35.** Hind leg (dorsal view) of *Trizogeniates temporalis* showing location of stridulatory file at the apex of the metafemur. **Figures 45-46.** Left elytral epipleuron showing: **45)** dorsal view of stridulatory ridge in *T. foveicollis* (**a**) and ventral view of stridulatory ridge in *T. foveicollis* (**b**), **46)** dorsal view of elytral epipleuron without stridulatory ridge in *G. cylindricus* (**a**) and ventral view of elytral epipleuron without stridulatory ridge in *G. cylindricus* (**b**).

11(9). Eyes small, interocular width greater than 6 transverse eye diameters (e.g., Fig. 19)  
 ..... 12

11'. Eyes larger, interocular width less than 5 transverse eye diameters (e.g., Fig. 25)  
 ..... *Leucothyreus* MacLeay



*Bolax*  
 Figure 19



*Leucothyreus*  
 Figure 25

**Figures 19, 25.** Head in dorsal view showing form of clypeus, mouthparts, and eye size in: **19)** *Bolax rutila*, **25)** *Leucothyreus kirbyanus*,

12(11). Protarsomere 5 dorsoventrally flattened, width more than half length (Fig. 30).  
Length of body from apex of clypeus to apex of elytra more than 9.0 mm  
..... *Bolax* Fischer von Waldheim



**Figure 30.** Male foreleg (dorsal view) showing comparison of tibial apex, protarsomeres, and claws of *Bolax magna*.

12'. Protarsomere 5 dorsoventrally flattened or not; if flattened, then width less than half length. Length of body from apex of clypeus to apex of elytra less than 9.0 mm  
..... *Microchilus* Blanchard

Modified from: Jameson, M. L. and S. J. Hawkins. 2005. Synopsis of the genera of Geniatini (Coleoptera: Scarabaeidae: Rutelinae) with an annotated catalog of species. Zootaxa 874: 1-76.

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeoidea/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Geniatini/Geniatini-Key/GeniatiniK.html>

**Clave para los géneros de Geniatiini (Scarabaeidae: Rutelinae)**

Por Mary Liz Jameson y Shauna Hawkins 2005

*Machos:* Protarsómeros dorsoventralmente aplanados, ventralmente densamente setosos (Figs. 30-31, 33-34); esternito terminal con el margen emarginado; esternitos abdominales de apariencia cóncava o aplanada en vista lateral.

*Hembras:* Protarsómeros dorsoventralmente aplanados o no; ventralmente densamente setosos o no; esternito terminal con margen entero o redondeado, no emarginado; esternitos abdominales de apariencia convexa en vista lateral.

1. Mentón sin una proyección media tipo diente (Fig. 16, 41) ..... 3

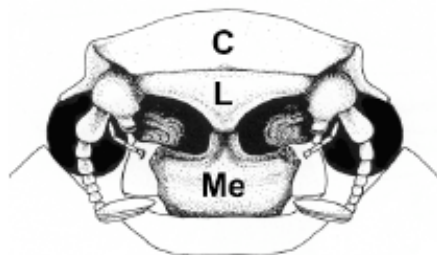


Figure 16



*Trizogeniates foveicollis*  
Figure 41

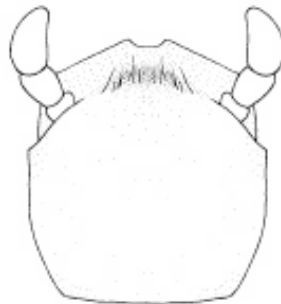
**Figure 16.** Labrum y mentum de Geniatiini and Anoplognathini con proyección o diente apical en el medio. **Figure 41.** *Trizogeniates foveicollis* (ápice del clipeo con proyección a manera de diente en el centro del ápice [diente apicomedial]).

1'. Mentón con una proyección media tipo diente (Figs. 38-40) ..... 2



*Mimogeniates margaridae*

Figure 38



*Rhizogeniates antennatus*

Figure 39



*Rhizogeniates carbonarius*

Figure 40

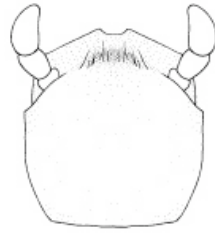
**Figures 38-40.** Clipeo de: **38)** *Mimogeniates margaridae* (ápice cuadrado o crenulado, carece de diente apicomedial), **39)** *Rhizogeniates antennatus* (ápice tenuemente emarginado, carece de diente apicomedial), **40)** *Rhizogeniates carbonarius* (ápice tenuemente emarginado, carece de diente apicomedial).

2(1). Mentón con ápice redondeado o ligeramente triangular (Figs. 39-40). Uñas simples en todas las patas ..... *Rhizogeniates* Ohaus

2'. Mentón con ápice cuadrado (Fig. 38). Uña modificada levemente bifurcada en todas las patas ..... *Mimogeniates* Martínez



*Mimogeniates margaridae*  
Figure 38



*Rhizogeniates antennatus*  
Figure 39

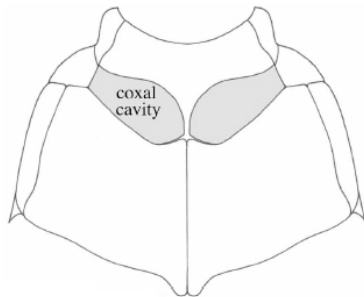


*Rhizogeniates carbonarius*  
Figure 40

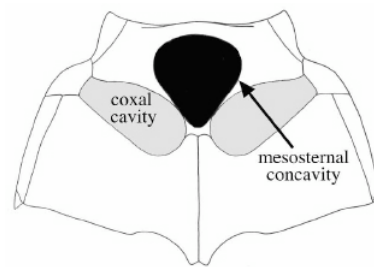
**Figures 38-40.** Clípeo de: **38)** *Mimogeniates margaridae* (ápice cuadrado o crenulado, carece de diente apicomedial), **39)** *Rhizogeniates antennatus* (ápice tenuemente emarginado, carece de diente apicomedial), **40)** *Rhizogeniates carbonarius* (ápice tenuemente emarginado, carece de diente apicomedial).

3(1). Mesoesternón anterior a las mesocoxas fuertemente cóncavo (Fig. 52)  
..... *Xenogeniates* Villatoro & Jameson

3'. Mesoesternón anterior a las mesocoxas plano o ligeramente convexo, no fuertemente cóncavo (Fig. 51) ..... 4



*Bolax magna*  
Figure 51

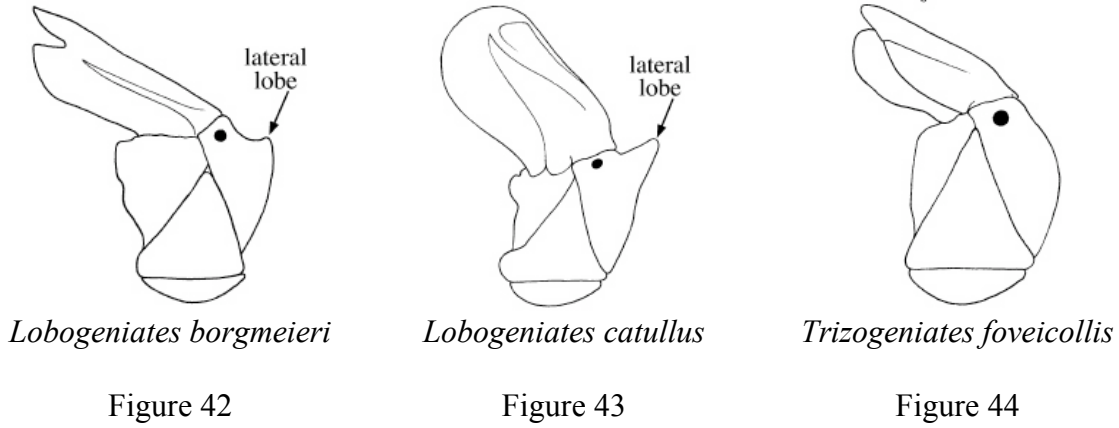


*Xenogeniates martinezi*  
Figure 52

**Figure 51-52.** Tórax en vista ventral mostrando: **51)** Mesoesternón sin invaginación (*Bolax magna*) y **52)** Mesoesternón con invaginación en negro (*Xenogeniates martinezi*).

4(3). Estipite de la maxila con un lóbulo lateral bien desarrollado (Fig. 43) o con un ángulo lateral (Fig. 42) ..... **Lobogeniates** Ohaus

4'. Estipite de la maxila redondeado o ampliamente redondeado (Fig. 44) ..... 5



**Figure 42-44.** Maxila (vista ventral) mostrando: **42)** *Lobogeniates borgmeieri* (estipite saliente, con ángulo lateral), **43)** *Lobogeniates catullus* (estipite saliente, con lóbulo lateral bien desarrollado), **44)** *Trizogeniates foveicollis* (no saliente, redondeado o ampliamente redondeado).

5(4). Mandíbula con diente apical redondeado y recurvado (Fig. 20). Largo de la clava antenal en el macho el doble del largo de los segmentos 2-7; largo de la clava antenal en la hembra menor al largo de los segmentos 2-7..... **Eunanus** Ohaus

5'. Mandíbula sin diente apical redondeado y recurvado (*e.g.*, Fig. 19). Largo de la clava antenal en el macho y la hembra menor o ligeramente mayor que el largo de los segmentos 2-7 ..... 6



*Bolax rutila*

Figure 19



*Eunanus murinus*

Figure 20

**Figures 19-20.** Cabeza en vista dorsal mostrando la forma del clipeo, piezas bucales, y el tamaño del ojo de: **19)** *Bolax rutila*, **20)** *Eunanus murinus*.

6(5). Largo de la clava antenal igual o menor que la mitad del largo del primer segmento antenal (Figs. 5, 23). Ápice del cípeo (en vista lateral) inclinado  $45^\circ$  con respecto al plano dorsal del cípeo (Fig. 23, 26). Machos con tarsómeros simples, no aplanados o expandidos lateralmente (Fig. 32) ..... *Geniatosoma* Costa Lima

6'. Largo de la clava antenal mayor que la mitad del largo del primer segmento de la antena. Cípeo con ápice (en vista lateral) inclinado  $60-90^\circ$  con respecto al plano dorsal del cípeo (Fig. 37). Machos con tarsómeros aplanados dorsoventralmente y expandidos lateralmente (e.g., Fig. 34) ..... 7



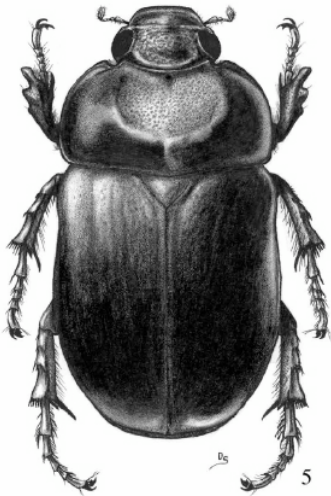
Figure 23



Figure 32



Figure 34



*Geniatosoma nigrum*  
Figure 5

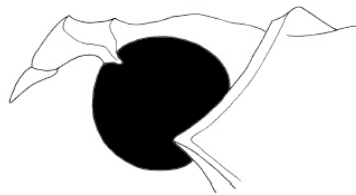


Figure 36

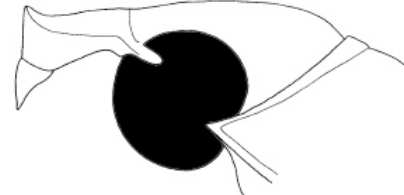


Figure 37

**Figure 23.** Cabeza en vista dorsal mostrando la forma del cípeo, piezas bucales, y el tamaño del ojo de *Geniatosoma lindemanna*. **Figures 32, 34.** Patas anteriores de los machos (vista dorsal) comparando el ápice tibial, protarsómeros, y uñas de: **32)** *Geniatosoma lindemanna*, **34)** *Trizogeniates temporalis*. **Figure 5.** *Geniatosoma nigrum* (macho). **Figures 36-37.** Cabeza y ápice del tórax en vista lateral mostrando: **36)** ápice del cípeo con pendiente de  $45^\circ$  con respecto al plano dorsal del cípeo en *Geniatosoma lindemanna* (macho) and **37)** ápice del cípeo con pendiente de  $60-90^\circ$  con respecto al plano dorsal del cípeo en *Trizogeniates tibialis*.

7(6). Clípeo con forma parabólica, ápice no flexionado (Fig. 24). Mandíbula expuesta con borde lateral lobulado (Fig. 24). Macho con las uñas simples en todas las patas ..... *Heterogeniates* Ohaus

7'. Clípeo con forma redondeada, cuadrada, o rectangular, ápice flexionado (e.g., Figs. 19-20, 22, 25-26). Mandíbula no expuesta sin borde lateral lobulado (e.g., Figs. 19, 23, 25). Macho sin uñas simples en todas las patas ..... 8



*Bolax rutila*

Figure 19



*Eunanus murinus*

Figure 20



*Geniates borellii*

Figure 22



*Geniatosoma lindemanna*

Figure 23



*Heterogeniates bonariensis*

Figure 24



*Leucothyreus kirbyanus*

Figure 25



*Trizogeniates tibialis*

Figure 26

**Figures 19-26.** Cabeza en vista dorsal mostrando la forma del clípeo, piezas bucales, y el tamaño del ojo de: **19)** *Bolax rutila*, **20)** *Eunanus murinus*, **22)** *Geniates borellii*, **23)** *Geniatosoma lindemanna*, **24)** *Heterogeniates bonariensis* (macho), **25)** *Leucothyreus kirbyanus*, **26)** *Trizogeniates tibialis*.

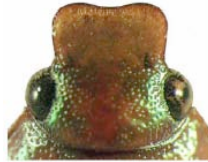


8(7). Largo de los protarsómeros 2-4 igual que el largo del protarsómero 5 (Fig. 31). Clípeo del macho cuadrado (Fig. 21); clípeo de la hembra con bordes laterales paralelos, ápice cuadrado ..... *Evanos* Ohaus

8'. Largo de los protarsómeros 2-4 mayor que el largo del protarsómero 5 (Figs. 30, 33-34). Clípeo del macho y hembra redondeado o rectangular, nunca cuadrado (e.g., Figs. 19, 22, 25-28) ..... 9



*Bolax*  
Figure 19



*Evanos*  
Figure 21



*Geniates*  
Figure 22



*Leucothyreus*  
Figure 25



*Trizogeniates*  
Figure 26



*Geniates borellii*  
Figure 27



*Geniates cornutus*  
Figure 28



*Bolax*  
Figure 30



*Evanos*  
Figure 31



*Microchilus*  
Figure 33

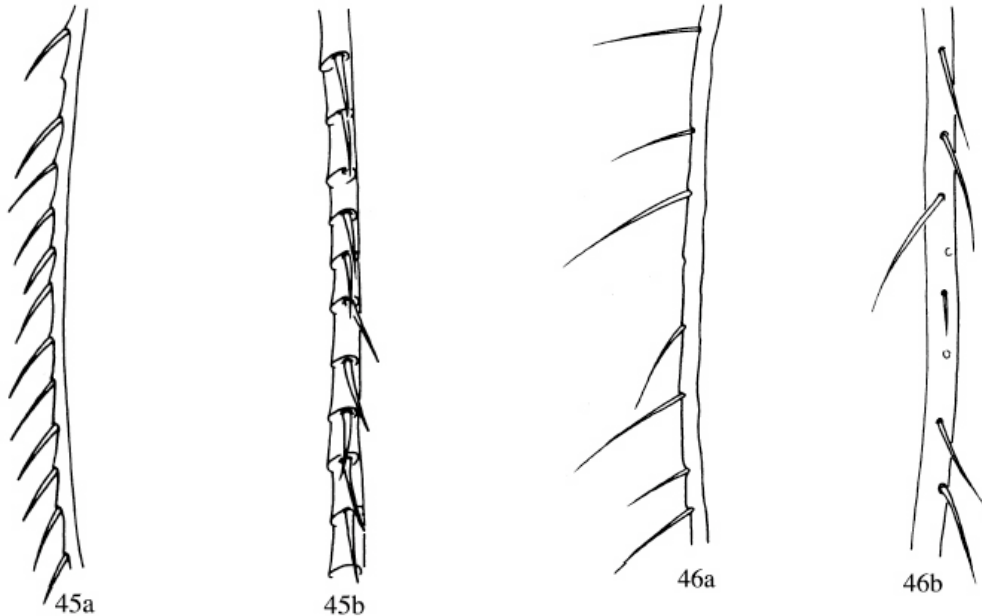


*Trizogeniates*  
Figure 34

**Figures 19-26.** Cabeza en vista dorsal mostrando la forma del clípeo, piezas bucales, y el tamaño del ojo de: **19)** *Bolax rutila*, **21)** *Evanos villatus* (macho), **22)** *Geniates borellii*, **25)** *Leucothyreus kirbyanus*, **26)** *Trizogeniates tibialis*. **Figures 27-28.** Cabeza y pronoto en vista dorsal mostrando la forma en: **27)** *Geniates borellii*, macho (cabeza sin tubérculo, pronoto sin concavidad), **28)** *Geniates cornutus*, macho (cabeza con tubérculo, pronoto con concavidad). **Figures 30-34.** Patas delanteras de machos (vista dorsal) comparando el ápice de la tibia, los protarsómeros, y uñas de: **30)** *Bolax magna*, **31)** *Evanos villatus*, **33)** *Microchilus lineatus*, y **34)** *Trizogeniates temporalis*.

9(8). Epipleura elitral con puntos profundos y setosos en el borde lateral desde el ápice del metaepisterno hasta el ápice del élitro (Fig. 45a-b, 46a-b) ..... 10

9'. Epipleura elitral sin puntos profundos y setosos en el borde lateral ..... 11



*Trizogeniates foveicollis*  
Figure 45

*Geniates cylindricus*  
Figure 46

**Figures 45-46.** Epipleura del élitro izquierdo mostrando: **45)** vista dorsal del puente estridulatorio de *T. foveicollis* **(a)** vista ventral del puente estridulatorio de *T. foveicollis* **(b)**, **46)** vista dorsal del epipleura del élitro sin del puente estridulatorio en *G. cylindricus* **(a)** vista ventral del epipleuron del élitro sin del puente estridulatorio en *G. cylindricus* **(b)**.

10(9). Margen de los élitros con una cresta estridulatoria y con cerdas estridulatorias rígidas (Fig. 34a-b). Lima estridulatoria presente en la superficie interno-lateral del meso- y metafémur (Fig. 35) ..... *Trizogeniates* Ohaus

10'. Margen de los élitros sin una cresta estridulatoria y sin cerdas estridulatorias rígidas (Fig. 46a-b). Lima estridulatoria ausente en la superficie interno-lateral del meso- y metafémur ausente ..... *Geniates* Ohaus

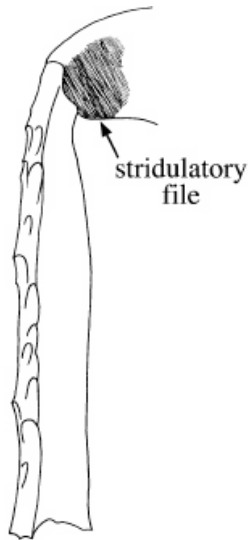


Figure 35

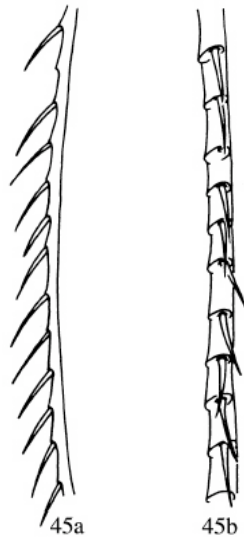


Figure 45



Figure 46

**Figure 35.** Pata posterior (vista dorsal) de *Trizogeniates temporalis* mostrando localización de el área estridulatoria en el metafémur. **Figures 45-46.** Epipleura del élitro izquierdo mostrando: **45)** vista dorsal del puente estridulatorio de *T. foveicollis* (**a)** vista ventral del puente estridulatorio de *T. foveicollis* (**b)**, **46)** vista dorsal del epipleura del élitro sin del puente estridulatorio en *G. cylindricus* (**a)** vista ventral del epipleuron del élitro sin del puente estridulatorio en *G. cylindricus* (**b)**.

11(9). Ojos pequeños, ancho interocular mayor que 6 diámetros oculares (e.g., Fig. 19) ..... 12

11'. Ojos más grandes, ancho interocular menor que 5 diámetros oculares (e.g., Fig. 25) ..... *Leucothyreus* MacLeay



*Bolax*  
Figure 19



*Leucothyreus*  
Figure 25

**Figures 19, 25.** Cabeza en vista dorsal mostrando la forma del clipeo, piezas bucales, y el tamaño del ojo de: **19)** *Bolax rutila*, **25)** *Leucothyreus kirbyanus*,

12(11). Quinto protarsómero aplanado dorsoventralmente, su ancho mayor que la mitad de su largo (Fig. 30). Largo del cuerpo (desde el ápice del clipeo al ápice de los élitros) mayor a 9.0 mm ..... ***Bolax*** Fischer von Waldheim



**Figure 30.** Patas delanteras de machos (vista dorsal) comparando el ápice de la tibia, los protarsómeros, y uñas de *Bolax magna*.

12'. Quinto protarsómero aplanado dorsoventralmente o no, si está aplanado, entonces su ancho es menor que la mitad de su largo. Largo del cuerpo (desde el ápice del clipeo al ápice de los élitros) menor a 9.0 mm ..... ***Microchilus*** Blanchard

Modificado de: Jameson, M. L. and S. J. Hawkins. 2005. Synopsis of the genera of Geniatini (Coleoptera: Scarabaeidae: Rutelinae) with an annotated catalog of species. Zootaxa 874: 1-76.

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeoidea/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Geniatini/Geniatini-Key/GeniatiniK.html>

**Key to the Subtribes of Rutelini (Scarabaeidae: Rutelinae)**

(Jameson 2000. Modified from Jameson 1990). Subtribes in quotes are hypothesized to be paraphyletic [see Jameson 1998].)

- 1. Frontoclypeal suture complete, separating frons from clypeus [obsolete medially in *Paracotalpa deserta* (Areodina)] ..... 2
- 1'. Frontoclypeal suture obsolete medially or lacking ..... 3
- 2(1). Mandibles externally broadly rounded, without a well-developed, preapical tooth ..... **Areodina**
- 2. Mandibles externally with a well-developed, preapical tooth (Fig. 8) .. **Heterosternina**



Figure 8. Dorsal view of head showing mandible with preapical tooth.

- 3(2). Pronotum with basal bead complete (obsolete in *Pelidnota polita*) ..... 4
- 3'. Pronotum with basal bead medially effaced or completely lacking ..... 5
- 4(3). Claws simple on all legs ..... "**Pelidnotina**"
- 4'. Larger claw cleft on all legs ..... **Lasiocalina**
- 5(4). Frontoclypeal suture obsolete medially, elevated laterally ..... "**Parastasiina**"
- 5'. Frontoclypeal suture lacking or nearly obsolete, not laterally elevated ..... 6

6(5). Apex of metatibia without emargination on ventrolateral edge (Fig. 9) ... "**Rutelina**"

6'. Apex of metatibia with emargination on ventrolateral edge (Fig. 10) .... "**Antichirina**"

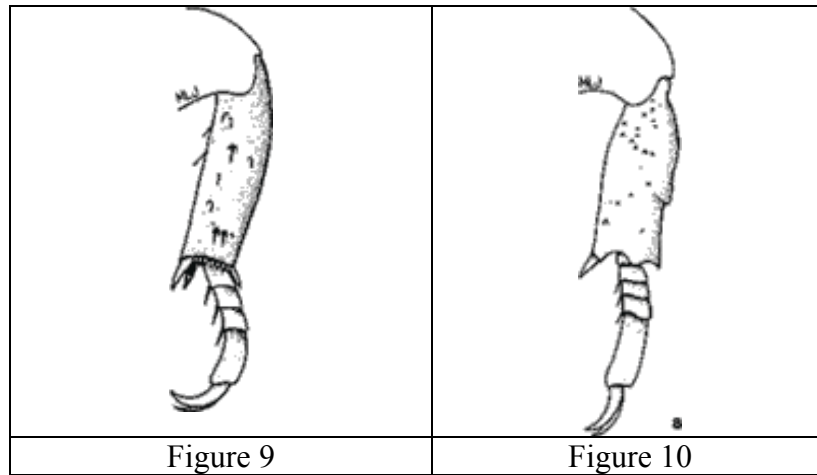


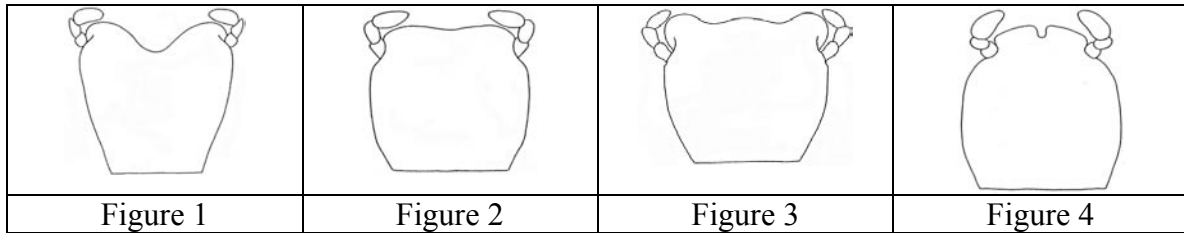
Figure 9-10. Metatibia ventral view in (9) subtribe "Rutelina" and (10) subtribe "Antichirina".

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeoidea/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Rutelini/Rutelini-Key/RuteliniK.html>

**Key to the Genera of Areodina (Scarabaeidae: Rutelinae: Rutelini)**  
(By Jameson 2001. Modified from Jameson 1990.)

- 1. Apex of metatibia with more than 10 spinules. Mandibles entirely rounded, not sickle-shaped. North America to South America ..... 2
- 1'. Apex of metatibia with fewer than 10 spinules. Mandibles sickle-shaped. Africa  
..... *Xenoproctis*
- 2(1). Antenna 10-segmented ..... 3
- 2'. Antenna 8- or 9-segmented ..... *Parachrysinia*
- 3(2). Mesosternum with keel extending anteriorly beyond mesocoxae ..... 4
- 3'. Mesosternum without keel extending anteriorly beyond mesocoxae ..... 5
- 4(3). Clypeus in ventral view extending past labrum; weakly trilobed apically in male, rounded apically in female ..... *Oplognathus*
- 4'. Clypeus in ventral view not extending past labrum, rounded apically in male and female ..... *Areoda*
- 5(4). Antenna with club twice as long as segments 2-7 combined ..... *Byrsopolis*
- 5'. Antenna with club shorter than or subequal to segments 2-7 combined ..... 6
- 6(5). Terminal segment of maxillary palpus as long or longer than antennal club  
..... *Pseudocotalpa*
- 6'. Terminal segment of maxillary palpus shorter than antennal club (nearly as long as antennal club in *Cotalpa consobrina*) ..... 7

- 7(6). Apex of mentum sinuate or bisinuate or emarginate (Figs. 1-3) ..... 8  
 7'. Apex of mentum notched (Fig. 4) ..... 9



Figures 1-4. Apex of the mentum. 1) deeply sinuate, 2) weakly sinuate, 3) bisinuate, 4) notched.

8(7). Pronotum glabrous. Clypeus subrectangular, angles narrowly rounded. Large claw of at least metatarsus cleft in males; all claws simple in females ..... ***Cotalpa***

8'. Pronotum setose, at least in places. Clypeus semicircular (widest at base), angles broadly rounded (*P. deserta* with subrectangular clypeus). Claws simple in males and females ..... ***Paracotalpa***

9(7). Males metallic green; females metallic green, dark brown, or black. Parameres rounded apically. Central Mexico to Honduras ..... ***Viridimicus***

9'. Males and females reddish-brown, brown, or black. Parameres truncate apically. Southern Arizona to central Mexico ..... ***Parabyrsopolis***

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeoidea/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Rutelini/Areodina/Areodina-Key/AreodinaK.html>



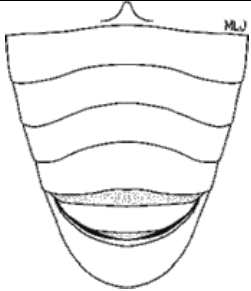


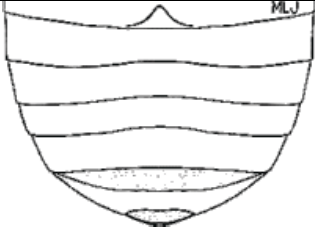


**Key to the Genera of Heterosternina (Scarabaeidae: Rutelinae: Rutelini)**  
(By Jameson 2000. Modified from Morón 1987.)

1. Pronotum with basal bead absent, only lightly impressed near the posterior angles .. 6

1'. Pronotum with basal bead present, complete or nearly complete (occasionally interrupted at middle) ..... 2

2(1). Sternites 2-4 with posterior border deeply sinuate (Fig. 11). Pygidial disc of male (in lateral view) strongly, acutely protuberant (Fig. 12). Elytral epipleuron of female weakly arcuate at metacoxae (ventral view) (Fig. 13) ..... ***Heterosternus***

2'. Sternites 2-4 with posterior border straight or weakly sinuate (Fig. 14). Pygidial disc of male (in lateral view) not protuberant (Fig. 15). Elytral epipleuron of female straight or notched, not arcuate at metacoxa (ventral view) (Fig. 16) ..... 3

		
Figure 11	Figure 12	Figure 13
		
Figure 14	Figure 15	Figure 16
<p>Figures 11-16. (11) Ventral view of sternites of <i>Heterosternus</i>. (12) Lateral view of abdomen and pygidium of <i>Heterosternus</i>. (13) Ventral view of epipleuron of female of <i>Heterosternus</i>. (14) Ventral view of sternites of <i>Mesosternus</i>. (15) Lateral view of abdomen and pygidium of <i>Mesosternus</i>. (16) Ventral view of epipleuron of female of <i>Homioisternus</i>.</p>		

3(2). Mesosternal process with apex rounded. Sternum with dense setae. Dorsal color yellow-brown or yellow-orange ..... 4

3'. Mesosternal process with apex acute. Sternum with scarce setae. Dorsal color dark red or mahogany with margins of the pronotum and elytral yellow ..... ***Paraheterosternus***

4(3). Mentum with anterior border sinuate (Fig.17). Sexual dimorphism not distinct. Posterior border of metafemur (male) without medial spine ..... 5



Figure 17. Ventral view of mentum of *Homoio sternus*

4'. Mentum with anterior border emarginate (Fig. 18). Sexual dimorphism distinct. Posterior border of metafemur (male) with medial spine ..... ***Plesiosternus***

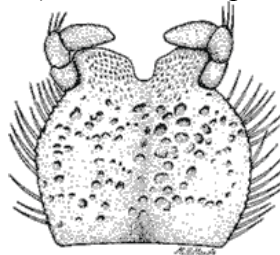






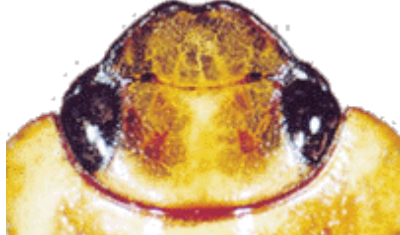
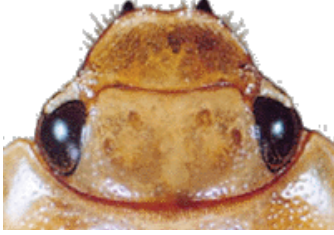



Fig. 18. Ventral view of mentum of *Plesiosternus*

5(4). Metatibia of male with dense setae on the inner margin (Fig. 19). Parameres fused at mid-base. Females with elytral epipleuron parallel throughout, not convergent at apex (ventral view) (Fig.20). Mountains of Chiapas (Mexico) and Guatemala .... ***Mesosternus***

5'. Metatibia of male with scarce setae on the inner margin (Fig. 21). Parameres not fused at mid-base. Females with elytral epipleuron convergent at apex (ventral view) (Fig. 22). Mountains of Durango, Nayarit, and Jalisco (Mexico) ..... ***Homoio sternus***

			
Figure 19	Figure 20	Figure 21	Figure 16
Fig. 19. Ventral view of metatibia <i>Mesosternus</i> (male). Fig. 20. Ventral view of epipleuron of female of <i>Mesosternus</i> . Fig. 21. Ventral view of metatibia of <i>Homoio sternus</i> (male). Fig. 16. Ventral view of epipleuron of female of <i>Homoio sternus</i> .			

- 6(1). Anterior border of clypeus sinuate (Fig. 22, Fig. 23, Fig. 24, Fig. 25) ..... 7
- 6'. Anterior border of clypeus rounded (Fig. 26) ..... *Macropoides*

		
Figure 22. Head of <i>Elcarmeniella</i>	Figure 23. Head of <i>Parisoleoides</i>	Figure 24. Head of <i>Parisolea</i>
		
Figure 25. Head of <i>Macropoidelimus</i>	Figure 26. Head of <i>Macropoides</i>	

7(6). Dorsal color green or olive-green without longitudinal markings. Metacoxae of male with long, apical spine (Fig. 27) ..... *Macropoidelimus*



Figures 27. Posteroventral view of *Macropoidelimus* (male) showing metacoxal spine.

7'. Dorsal color tan, cream, or yellowish with or without longitudinal markings. Metacoxae of male without apical spine ..... 8

8(7). Metatibia of male with long, inner spine. Body length 30-35 mm . *Promacropoides*

8'. Metatibia of male without inner spine. Body length 15-20 mm ..... 9

9(8). Metatrochanter with apex not produced beyond posterior border of femur (Fig. 28). Metatibia of male straight (Fig. 29) ..... 10

9'. Metatrochanter with apex weakly spine-like and produced beyond posterior border of femur (Fig. 30). Metatibia of male curved (Fig. 31) ..... *Elcarmeniella*

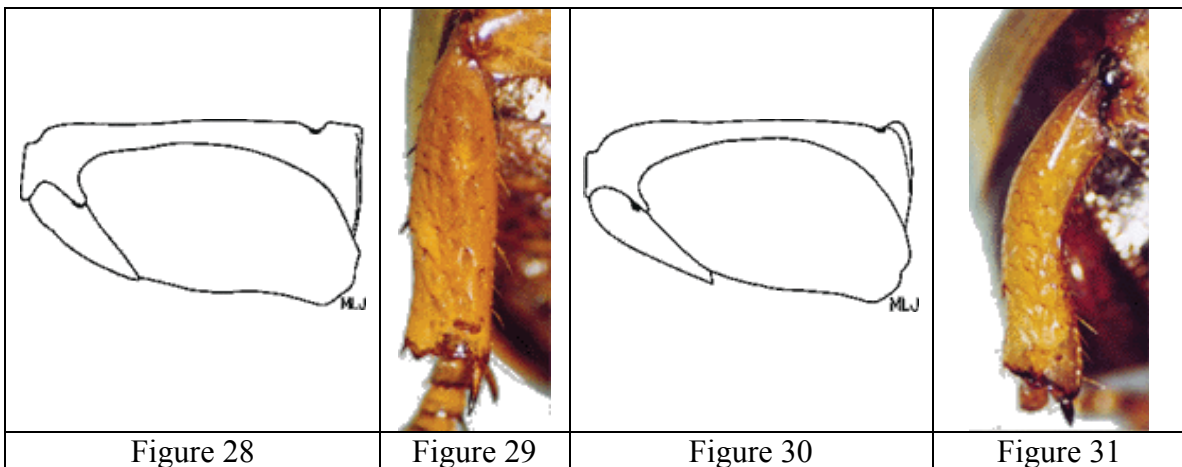


Fig. 28. Metatrochanter of *Parisolea*. Fig. 29. Metatibia *Parisolea* or *Parisoleoides*.  
 Fig. 30. Metatrochanter of *Elcarmeniella*. Fig. 31. Metatibia of *Elcarmeniella*.

10(9). Clypeus near apex punctostriate (Fig. 23). Mesotarsomeres of male thickened and foreshortened (Fig. 32). Modified mesotarsal claw of male wider than modified protarsal claw; apex bulbous and widely split (Fig. 32) ..... *Parisoleoides*

10'. Clypeus near apex punctate or rugopunctate (Fig. 24). Mesotarsomeres of male not thickened and foreshortened (Fig. 33). Modified mesotarsal claw of male subequal in width to modified protarsal claw; apex not bulbous and widely split (Fig. 33) .. *Parisolea*

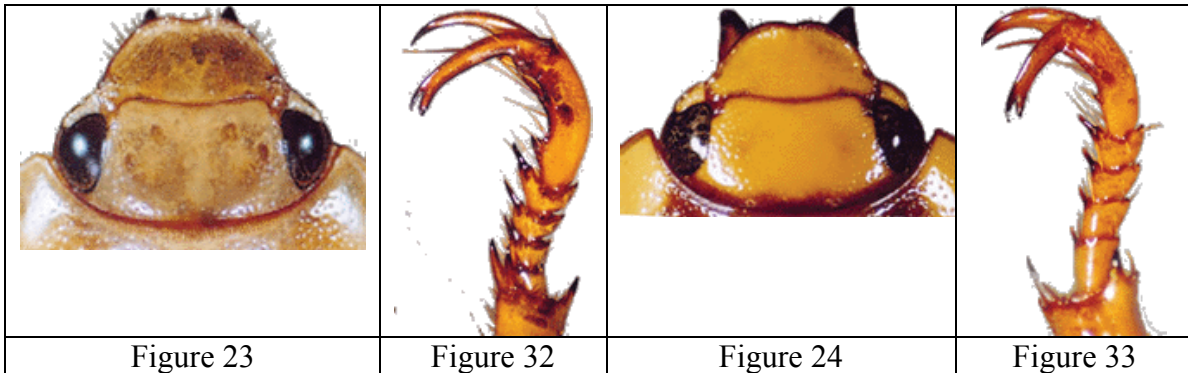


Fig 23. Head of *Parisoleoides*. Fig. 32. Modified mesotarsal claw of male *Parisoleoides*.  
 Fig. 24. Head of *Parisolea*. Fig. 33. Modified mesotarsal claw of male *Parisolea*.

URL: <http://www-museum.unl.edu/research/entomology/Guide/Scarabaeoidea/Scarabaeidae/Rutelinae/Rutelinae-Tribes/Rutelini/Heterosternina/Heterosternina-Key/HeterosterninaK.html>

**Key to genera of Anticheirina**  
(Paucar-Cabrera and Jameson)

1. Dorsum and legs completely covered with medium-sized yellowish-white setae. Venter covered with dense, long and yellowish-red setae, velvety surface ..... *Crathoplus*
- 1'. Dorsum and venter with scarce setae, shiny surface ..... 2
2. Apex of metatibia straight and with many spinose setae. Mandibles rounded on external edge. Base of scutellum planar and extending anteriorly beneath pronotum ..... *Calomacraspis* Burmeister
- 2'. Apex of metatibia bi-emarginate, with or without corbel (Fig.51). Mandible bidentate on external edge. Base of scutellum entirely declivous or declivous laterally and planar medially ..... 3
3. Clypeus apicomediaally with v-shaped emargination ..... 4
- 3'. Clypeus apicomediaally rounded, parabolic, or quadrate ..... 5
4. Sternites and dorsal surgance of hind femur with stridulatory ridges ..... *Lagochile* Hoffmanssegg
- 4'. Sternites and hind femur smooth, lacking stridulatory ridges ..... *Chasmodia* MacLeay
5. Posterior border of pronotum anterior to scutellum produced anteriorly (Fig?) 6
- 5'. Posterior border of pronotum anterior to scutellum produced posteriorly (Fig. 53, 54) or straight ..... 8
6. Mandibles falcate, external edge lacking teeth ..... *Pseudomacraspis* Ohaus
- 6'. Mandibles bidentate on external edge ..... 7
7. Sternites and dorsal surgance of hind femur with stridulatory ridges ..... *Macraspis* MacLeay
- 7'. Sternites and hind femur smooth, lacking stridulatory ridges ..... *Anticheira* Eschscholtz
8. Clypeus with apical margin quadrate, dorsal surface produced posteriorly and weakly V-shaped (Fig. 55) ..... *Telaugis* Burmeister
- 8'. Clypeus with apical margin rounded or parabolic, dorsal surface not produced posteriorly (Fig. 56) ..... 9
9. Pronotum with basal bead effaced medially or complete ..... 10
- 9'. Pronotum with basal bead completely lacking ..... 12
10. Elytra costate ..... *Acraspedon* Arrow

10 <sup>2</sup> .	Elytra smooth or striate, lacking costae .....	11
11.	Elytral suture 3-4 times length of scutellum. Apex of elytra smooth .....	<i>Paratelaugis</i> Ohaus
11 <sup>2</sup> .	Elytral suture 5-7 times length of scutellum. Apex of elytra roughened .....	<i>Chlorota</i> Burmeister
12.	Elytra costate. Elytral suture 3-4 times length of scutellum ...	<i>Hypaspidius</i> Arrow
12 <sup>2</sup> .	Elytra smooth or striate, lacking costae. Elytral suture 5-7 times length of scutellum .....	13
13.	Length of scutellum at midline greater than width. Base of pronotum anterior to scutellum straight .....	<i>Ptenomela</i> Bates
13 <sup>2</sup> .	Length of scutellum at midline approximately equal to width. Base of pronotum anterior to scutellum gently produced posteriorly or produced posteriorly and with medial bulge (Figs. 53, 54) .....	14
14.	Base of pronotum anterior to scutellum produced posteriorly and with medial bulge (Fig. 53). Apex of elytral roughened .....	<i>Thyriochlorota</i> Ohaus
14 <sup>2</sup> .	Base of pronotum anterior to scutellum gently produced posteriorly (Fig. 54). Apex of elytra smooth, not roughened .....	<i>Thyridium</i> Burmeister

**Key to Genera (DRAFT)**  
**Generic Key for the “Pelidnotina”**  
**Mary Liz Jameson and Matt Moore**

- 1 Lateral edges of mandible without reflexed teeth.....2  
 1' Lateral edges of mandible with one or two reflexed teeth.....13
- 2(1) Apex of labrum extends beyond clypeal apex, visible from dorsal view.....  
 .....3  
 2' Apex of labrum does not extend beyond clypeal apex, not visible from dorsal  
 view.....5
- 3(2) Apex of fourth metatarsomere spiniform.....*Lasiocala*  
 3' Apex of fourth metatarsomere lacking attenuation.....4
- 4(3') Separate *Minilasiocala*  
 4' Separate *Eremophygus*
- 5(2') Lateral edge of protibia with two teeth.....6  
 5' Lateral edge of protibia with three teeth.....7
- 6(5) Apex of metatibia with outer margin lined with long setae. Base of 5<sup>th</sup>  
 metatarsomere with produced tooth.....  
 .....*Platyrutela*  
 6' Apex of metatibia with outer margin lined with short spines. Base of 5<sup>th</sup>  
 metatarsomere with out produced tooth.....  
 .....*Chipita*
- 7(5') Pronotum with apical bead obsolete or lacking medially.....8  
 7' Pronotum with apical bead complete medially.....9
- 8(7) Clypeus with apex subquadrate, emarginate.....*Parhoplognathus*  
 8' Clypeus with apex parabolic or rounded with or without emargination.....  
 .....*Chrysina*
- 9(7') Mesosternum appreciably produced beyond mesometasternal suture....10  
 9' Mesosternum not appreciably produced beyond mesometasternal  
 suture.....12
- 10(9) Disc of metasternum between divergent metasternal sutures with deep  
 longitudinal concavity. Apex of elytra in males with acute, spiniform projections.  
 Males without hind tibia enlarged.....11  
 10' Disc of metasternum between divergent metasternal sutures without deep  
 longitudinal concavity. Apex of elytra in males rounded. Males with hind tibia  
 enlarged.....*Chrysophora*
- 11(10) Apex of elytra with fringe of short, dense setae. Color metallic green. Males  
 without acute process on hind femur.....*Hoplopelidnota*  
 11' Apex of elytra without fringe of short, dense setae. Color tan. Males with acute  
 process on hind femur.....*Mesomerdon*
- 12(9') Pronotum with basal bead obsolete or lacking medially.....*Oogenius*



12'	Pronotum with basal bead complete medially.....	<i>Xenopelidnota</i>
13	Lateral edge of mandible with two reflexed teeth.....	14
13'	Lateral edge of mandible with one reflexed tooth.....	19
14(13)	Base of metatibia straight.....	15
14'	Base of metatibia notched.....	<i>Mecopelidnota</i>
15(14)	Mesosternum not appreciably produced beyond metamesosternal suture .....	16
15'	Mesosternum appreciably produced beyond metamesosternal suture..... .....	20
16(15)	Pronotum with apical bead complete medially.....	17
16'	Pronotum with apical bead lacking or obsolete medially..... .....	<i>Pseudochlorota</i>
17(16)	Apex of metatibia biemarginate.....	18
17'	Apex of metatibia straight.....	<i>Ectinoplectron</i>
18(17)	Lateral set of setae on apical edge of 3 <sup>rd</sup> metatarsomere of unequal length and width.....	<i>Homonyx</i>
18'	Lateral set of setae on apical edge of 3 <sup>rd</sup> metatarsomere of equal length and width.....	<i>Catoclastus</i>
19(13')	Lateral setae on apical edge of 3 <sup>rd</sup> metatarsomere of unequal length and width.....	<i>Pseudogeniates</i>
19'	Lateral setae on apical edge of 3 <sup>rd</sup> metatarsomere of equal length and width.....	<i>Parhomonyx</i>
20(15')	Apex of clypeus (work on language).....	20
20'	Apex of clypeus (work on language).....	<i>Pachacama</i>