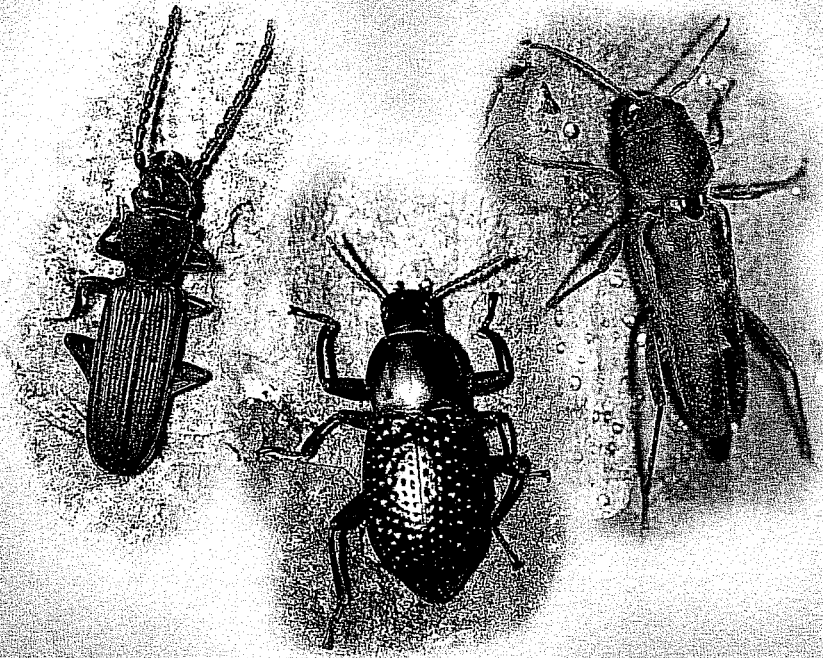


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VOLUME 1

# AMERICAN BEETLES

Archostemata, Myxophaga, Adephaga,  
Polyphaga: Staphyliniformia



Ross H. Arnett, Jr. • Michael C. Thomas

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## 18. AGYRTIDAE C.G. Thomson, 1859

by Stewart B. Peck

Common name: The primitive carrion beetles

Family synonyms: Silphidae, part; inc. Lyrosominae, Pterolominae

Members of the Agyrtidae are small- to medium-sized, light to dark brownish beetles, 4-14 mm long, and are often associated with decaying organic material. They have traditionally been considered as part of the silphid carrion beetles, but they have lately been recognized as a separate family, and more closely related to leiodids than silphids (Newton and Thayer, 1992). Agyrtid larvae are the most generalized known in Staphylinioidea (Newton, 1997). The ancient origin of the family is indicated by the fact that one of the earliest known fossil staphylinoids, the early Jurassic genus *Mesecanus* (= *Metagyrtes*), probably belongs here, although it was originally placed in Silphidae. These beetles are not frequently encountered, even by most collectors.

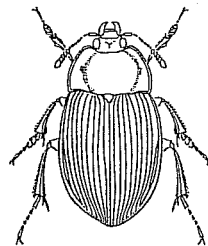


FIGURE 1.18. *Necrophilus hydrophiloides* Guérin-Ménéville abdominal sterna (always six (rarely seven) in the Silphidae).

Members of *Apteraloma* (Fig. 4.18) and *Pteroloma* are similar to carabids in general appearance and reside in cool moist habitats. Additional description, characters, or detailed distributions are given by Anderson and Peck (1985), Lawrence (1982), Lawrence and Newton (1982), and Newton (1997).

Head projecting or deflexed; eyes conspicuous, usually protruding; frontoclypeal suture distinct. Antennae usually ending in a distinct four- or five-segmented club, sometimes almost filiform or very weakly clubbed; antennal sensilla located in apical grooves (gutters) on the club segments in most genera; antennal insertions more or less exposed.

Thorax with pronotum larger than head. Pronotum with complete lateral edges, no costal suture distinct. Prosternum short in front of the coxae and bearing a narrow but complete intercoxal process. Procoxae transverse, projecting, and subconiculate, with large, exposed trochantins; procoxal cavities narrowly open posteriorly and open internally. Mesocoxae narrowly separated. Elytra completely covering the abdomen; punctation striate, as 9 or 10 longitudinal rows of punctures; epipleura well developed and complete, or extending to poste-

Acknowledgments. I thank A.F. Newton, Jr., for his generous sharing of specimens and research results over many years, and all others who have helped my study of these beetles. Jarmila Peck prepared the illustrations and shared collecting trips for 28 years.

Description: Adult members of the family can be recognized by their oval to oblong-elongate, slightly flattened shape; generally small to medium (4-14 mm) size; brownish, usually shiny, nine- or ten-striate non-truncate elytra, which cover the entire abdomen; antennae filiform to gradually clavate, never with the eighth antennomere smaller than the seventh and ninth antennomeres; and there are five (rarely six) visible

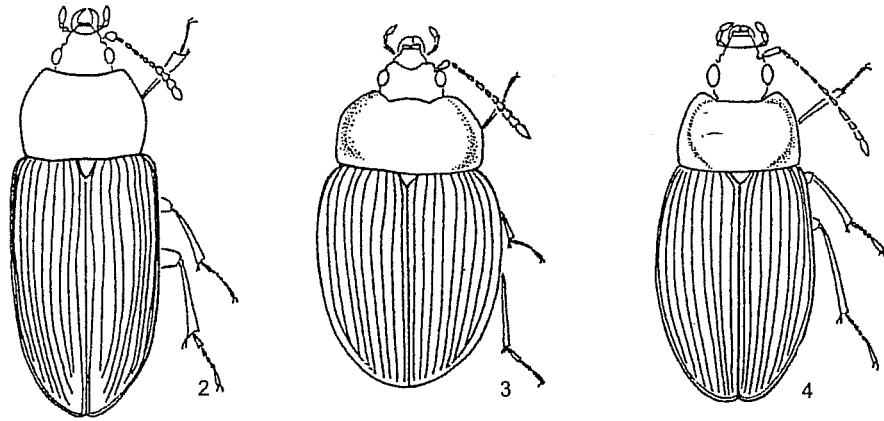
rior four fifths. Metacoxae barely excavate mesally, contiguous, extending laterally to meet the elytra. Hindwing with a large, discrete jugal lobe, four anal veins, and simple, concave and convex, transverse folds; occasionally absent.

Abdomen with five (or rarely six) visible abdominal sterna; lateral portions of sternum 2 present beneath the metacoxae. Intersegmental areas lacking a pattern of microsclerites. Several basal terga membranous. Aedeagus may or may not have a separate basal piece; the parameres may be vestigial, fused, or absent.

Larvae (see Newton 1991) campodeiform; with moderately sclerotized terga and sterna; mandibles bearing several apical teeth; prosthea narrow and acute, associated with a brush of hairs; mandibles possessing a large and tuberculate molar part with dorsal and ventral rows of denticles; maxilla with distinct galea and lacinia; galea usually fringed; labium with strongly bilobed ligula; six ocelli on each side of head; urogomphi two-segmented, often with a multiannulate apical segment. Spiracles placed in posterolateral emarginations of the terga. Abdomen segment ten elongate and cylindrical, with eversible membranous lobes bearing numerous minute hooks.

Habits and habitats. What little is known of the biology of these beetles indicates that adults are scavengers of dead or decaying organic material. Habitat associations vary, but most species are found in moist or wet habitats, particularly along or under rocks at the margins of mountain streams or near high altitude snowfields (where they appear to scavenge on wind-blown insects), in leaf litter, and in association with some fungi in the soil or under bark. They seem to be cold-adapted and are primarily active in the cooler months of fall, winter, and spring. Larval habits are inadequately known, but are probably similar to those of the adults.

In contrast to silphids, agyrtids are rarely collected and are often difficult to find. Adults of some species, especially *Necrophilus*, will come to small carrion baits or carrion-baited traps in the cooler months or in cool cave entrances. However, most members of the family are rarely trapped, and are usually only hand-collected. Sifting fungi or material under rotting bark occasionally yields species of *Agyrtes* (Fig. 2.18) and *Ipelates* (Fig. 3.18). Species of *Apteraloma* (Fig. 4.18) and *Pteroloma* are found among gravel and moss on the banks of mountain streams, in washed-up river or beach debris,



FIGURES 2.18 - 4.18. Fig. 2.18, *Agyrtus longulus* (LeConte), habitus. Fig. 3.18, *Ipelates latus* (Mannerheim), habitus. Fig. 4.18, *Apteroloma tenuicornis* (LeConte), habitus (From Peck 1990).

and, in the case of *Apteroloma*, on high altitude snowfields or under rocks at the edges of snowfields, where they scavenge on dead insects. *Lyrosoma* seemingly lives in Alaskan beach wrack. All species are night active. Many of the species are flightless. The group is of little economic importance.

Status of the classification. The North American species were first revised by Horn (1880) and subsequently reviewed by Hatch (1957), Miller and Peck (1979), Anderson and Peck (1985), and Peck (1990). The world subfamily ranking has been revised by Newton (1997).

Distribution. There are eight genera and 61 species worldwide (Newton 1997). They are almost all north temperate in distribution in North America, Europe, and Asia, but some extend southward to cool-temperate regions of high mountains on the Mexican Plateau, the Himalayan area, and Japan. Two disjunct relict species of *Zaenecrophilus* occur in New Zealand.

At present, six genera and 11 species are known in North America, north of Mexico; eight of these have distributions extending into Canada and Alaska. All are found in western North America except the one eastern *Necrophilus* species. Keys to species and details of biology and distribution are in Anderson and Peck (1985), Peck and Miller (1993), and Peck (1990).

KEY TO THE NEARCTIC GENERA

- 1. Mandible without preapical teeth (Fig. 5.18); antenna with 2, or more, preapical antennomeres each with an apical groove containing a dense concentration of sensory setae (Fig. 9.18) ..... 2
- Mandible with 1 or 2 large preapical teeth on inner margin (Fig. 6.18); antenna with all antennomeres lacking apical sensory grooves (Fig. 10.18) ..... 5
- 2(1). Elytron at middle with 10 rows of strongly punctate striae; dorsal ridge of elytral epipleuron depressed behind shoulder (Fig. 13.18); maxilla with last

- palpomere conspicuously swollen (Fig. 8.18) ..... *Agyrtus*
- Elytron at middle with 9 rows of weakly or strongly punctate striae; dorsal ridge of elytral epipleuron evenly rounded behind shoulder (Fig. 14.18); maxilla with last palpomere weakly or not swollen, subcylindrical or cylindrical (Fig. 7.18) ..... 3
- 3(2). Body form elongate; pronotum heart-shaped, widest in anterior one-half, much narrower than elytra at base (Fig. 11.18) ..... *Lyrosoma*
- Body form ovoid; pronotum not heart-shaped, almost as wide as elytra at base ..... 4
- 4(3). Length greater than 8 mm; pronotum with lateral margins widely flattened (Fig. 1.18) ..... *Necrophilus*
- Length less than 8 mm; pronotum with lateral margins only narrowly flattened (Fig. 3.18) ..... *Ipelates*
- 5(1). Pronotum with distinct rounded depressions at middle of base and in posterior corners (Fig. 12.18) ..... *Pteroloma*
- Pronotum lacking such distinct basal depressions (Fig. 4.18) ..... *Apteroloma*

CLASSIFICATION OF THE NEARCTIC GENERA

Pterolomatinae Thomson 1862

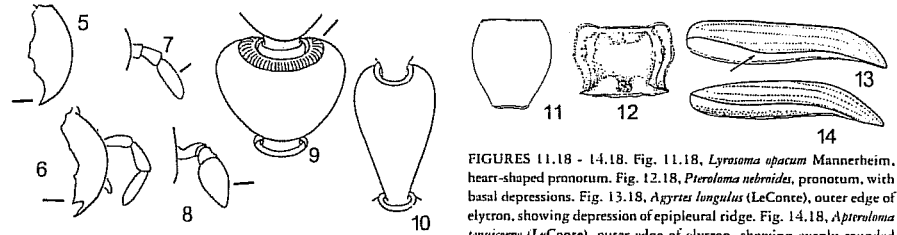
*Apteroloma* Hatch 1927, 4 spp., British Columbia to California and Arizona; other species mountains of Mexico; U.S. species key in Anderson and Peck (1985).

*Alloloma* Semenov-Tian-Shanskij 1932.

*Garytes* Mroczkowski 1966.

*Pterolorica* Hlisnikovsky 1968.

*Pteroloma* Gyllenhal 1827, 1 sp., *P. nebrionides* Brown 1935, Alberta, British Columbia, Montana.



FIGURES 5.18 - 10.18. Fig. 5.18, *Necrophilus hydrophiloides* Guérin-Méneville, dorsal view of mandible. Fig. 6.18, *Pteroloma nebrionides* Brown, dorsal view of mandible. Fig. 7.18, *Ipelates latus* (Mannerheim), maxillary palpus, last segment normal. Fig. 8.18, *Agyrtus longulus*, maxillary palpus, last segment swollen. Fig. 9.18, *Necrophilus hydrophiloides*, antennomere 9 with groove containing sensory structures. Fig. 10.18, *Pteroloma nebrionides*, antennomere 9 without groove containing sensory structures.

FIGURES 11.18 - 14.18. Fig. 11.18, *Lyrosoma opacum* Mannerheim, heart-shaped pronotum. Fig. 12.18, *Pteroloma nebrionides*, pronotum, with basal depressions. Fig. 13.18, *Agyrtus longulus* (LeConte), outer edge of elytron, showing depression of epipleural ridge. Fig. 14.18, *Apteroloma tenuicornis* (LeConte), outer edge of elytron, showing evenly rounded epipleural ridge.

*Adolus* Fischer 1828.

*Holocnemis* Schilling 1829.

Agyrtinae Thomson 1859

*Agyrtus* Frölich 1799, 2 spp., Pacific Coast; Alaska to Idaho to California; species key in Peck (1974), Anderson and Peck (1985).

*Lendomus* Casey 1924.

subgenus *Agyrtus* Frölich 1799.

subgenus *Agyrtacanus* Reitter 1901.

*Ipelates* Reitter 1884, 1 sp., *I. latus* (Mannerheim) 1852, Alaska to California.

*Pelates* Horn 1888, not Cuvier and Valenciennes 1829.

*Sphaeroloma* Portevin 1905.

*Pelatinet* Cockerell 1906.

*Brachyoloma* Portevin 1914, not Chambers 1878.

*Necrophilodes* Champion 1933; Hatch 1927 (subseq. missp. as *Necrophiloides*).

*Lyrosoma* Mannerheim 1853, 1 sp., *L. opacum* Mannerheim 1853, Alaska (Aleutian and Pribilof Islands).

Necrophilinae Newton 1997

*Necrophilus* Latreille 1829, 2 spp., *N. hydrophiloides* Guérin-Méneville 1835, Alaska to California, winged; *N. pettitii* Horn 1880, s. Ontario to n. Florida, west to Louisiana and Missouri, flightless.

*Necrophilus* Gistel 1834.

*Paranecrophilus* Shibata 1969.

*Pseudosilpha* Schawaller 1978.

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19. LEIODIDAE Fleming, 1821

by Stewart B. Peck

Common name: The round fungus beetles, including the small carrion beetles and mammal nest beetles

Family synonyms: Anisotomidae Stephens, 1829; Liodidae Reitter, 1884, incl. Camiaridae Jeannel, 1911; Caropidae Thomson, 1859; Cholevidae Kirby, 1837; Colonidae Horn, 1880; Lepriniidae LeConte, 1866; Leptodiridae Harch, 1933; Platysyllidae Ritsema, 1869; Sogdiidae Lopatin, 1961

Most of these beetles are best distinguished by their eighth antennomere, which is usually notably smaller than the seventh and ninth. Many also have a rather thin integument (and break easily), and frequently have a granular surface, or transverse striations on the thorax and elytra, or elytra with punctate striae, or are smooth and glossy.

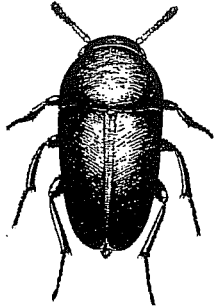


FIGURE 1.19. *Ptomaphagus consobrinus* (LeConte) (From Peck 1990).

**Description:** Shape broadly ovate to elongate, strongly convex to slightly flattened, and glabrous or clothed with decumbent or occasionally erect hairs; color pale brownish to brown to black, rarely with colored areas; body 1-8 mm (usually 1.5-4 mm) in length.

Head sometimes constricted posteriorly, forming a neck; frontoclypeal suture occasionally distinct. Antennae usually ending in a more or less distinct, interrupted five-segmented club, most often antennomere 8 is smaller than either 7 or 9; club occasionally with 3 or 4 antennomeres and not interrupted;

periarticular gutters and usually one or more internal vesicles open on the distal surfaces of two or three apical segments; antennal insertions almost always exposed. Apical palpomere of maxilla often acute, occasionally much narrower than the preapical palpomere, and rarely enlarged.

Prothorax lateral edges almost always complete. Procoxae more or less contiguous, and trochantins either exposed or concealed, their cavities widely to narrowly open posteriorly and usually closed internally. Mesocoxae narrowly separated in most species. Elytra almost entire, concealing the abdomen completely, occasionally one or two abdominal terga exposed; epipleura usually well-developed but seldom complete. Metepisterna sometimes concealed by elytral epipleura. Metacoxae usually contiguous, either not excavate or with very slight plates mesally; sometimes the posterior face vertical, so that the metasternum and abdomen are on different planes; metacoxae usually extending

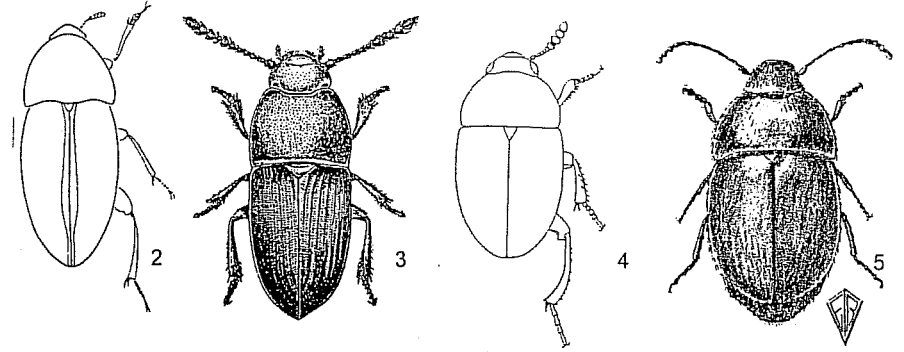
**Acknowledgments.** I thank A.F. Newton, Jr., for his generous sharing of specimens and research results over many years, and all others who have helped my study of these beetles. Jarmila Peck prepared the illustrations and shared collecting trips for 28 years.

laterally to meet elytra. Tarsi variable; usually 5-5-5; sometimes 4-4-4, 3-3-3, or heteromerous (5-5-4, 5-4-4). Basal tarsomeres of protarsi usually expanded in males, and narrow in females.

Abdomen usually with six visible sterna, occasionally five or four; first two rarely connate. Intersegmental areas without a pattern of microsclerites, several of the basal tergites membranous. Aedeagus sometimes with parameres attached to a separate basal piece.

Larvae (see Newton 1991a, 1991b) lightly to moderately sclerotized dorsally, occasionally short, broad, and heavily sclerotized; often clothed with modified setae. Ocelli often absent, but usually three on each side, occasionally five, two, or one. Mandibles usually with two or three apical teeth; prosthema usually slender, often well-developed and tuberculate or asperate, with dorsal and ventral tubercles or rows of denticles; mola occasionally reduced. Maxillae usually with apically distinct galea and lacinia; galea usually fringed. Urogomphi often with a multiannulate apical segment; in rare cases they may be absent.

**Habits and habitats.** Many leiodids, especially members of the Cholevininae (the small carrion beetles), are scavengers in leaf litter and moist decaying matter. Some occur in mammal or bird nests and burrows, tortoise burrows, in caves, and with harvester ants. Most can be trapped with dung or carrion baits. Several Leiodinae (the round fungus beetles) feed on spores or other tissue of various fungi, including Myxomycetes, Gasteromycetes, and Ascomycetes, while others, such as *Colan*, *Catopocerus*, and *Leiodes*, seemingly specialize in subterranean fungi (Newton 1984). The highly modified *Glaciavicula* has been found only in ice caves in northwestern North America. The Platysyllinae (the mammal nest beetles) are scavengers or ectoparasites on some rodents and insectivores and may be found on the bodies or in the nests of their hosts (beavers, mountain beavers, shrews, moles, and various voles and mice). Various genera are flightless and eyeless or blind (most cave-inhabiting *Ptomaphagus*, all Platysyllinae, all Caropocerinae). Others have reduced eyes and no flight wings and occur in deep soil and litter habitats, often at higher elevations. The winged species are best caught with baited traps or large area flight-intercept traps (Peck and Davies 1980), and these may measure seasonal activity and species diversity (Peck and



FIGURES 2.19-5.19 (not to same scale). Fig. 2.19, *Colan bidentatum* Sahlberg, habitus; Fig. 3.19, *Catopocerus appaluchianus* Peck, habitus; Fig. 4.19, *Leiodes assimilis* (LeConte), habitus (after Baranowski, 1993); Fig. 5.19, *Leptinus americanus* (LeConte), habitus (Figs. 2.19-3.19 from Peck 1990).

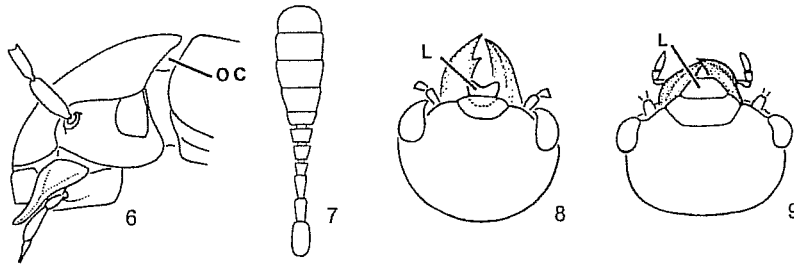
Anderson 1985; Chandler and Peck 1992). The flightless ones are taken by Tullgren (Berlese) funnel extraction of sifted litter. The antennal periarticular gutters (also in Agyrtidae) and internal vesicles seemingly give increased sensory ability in food finding. The beetles are of little economic interest but of great ecological and evolutionary diversity.

**Status of classification.** This family is used here in the broad sense of Crowson (1981), Lawrence and Newton (1982), Newton (1998), and Peck (1990) to include groups often placed in up to six separate families, or included in the old and much broader concept of Silphidae. Many groups treated as tribes here are treated by other authors as subfamilies (see discussion and tribal classification in Newton and Thayer (1992)). A defining and shared derived character for the family (but difficult to see) is the presence of complex "vesicles" or sensilla-filled invaginations in the 2 or 3 preapical antennomeres (Peck 1977a). The distinct body forms and surface microsculpture of the subfamilies were the principal characters used to define these groups as families.

**Distribution.** This family (= Anisotomidae; Camiaridae; Caropidae; Colonidae; Cholevidae; Lepriniidae; Leptodiridae) contains about 250 genera and 3000 species worldwide (Newton 1998), which are usually placed in 6 to 8 subfamilies. All subfamilies occur in the Nearctic, except for Camiarinae, which occurs in south temperate countries. Caropocerinae are predominantly a Nearctic subfamily. The very diverse litter- and cave-inhabiting tribe of the Palearctic, the Leptodirini, with over 725 species in 161 genera, contains only one genus and three species in the Nearctic. In America north of Mexico there are now 30 recognized genera and 324 species, with 128 species in Canada and Alaska (Peck 1991). Keys to genera and some species have been presented in Peck (1990), and in various recent revisions (see bibliography). Several North American genera are now being revised and generic limits and species composition will change somewhat as a consequence. The Neotropical fauna is summarized in Peck *et al.* (2000) and that of Mexico in Peck (2000).

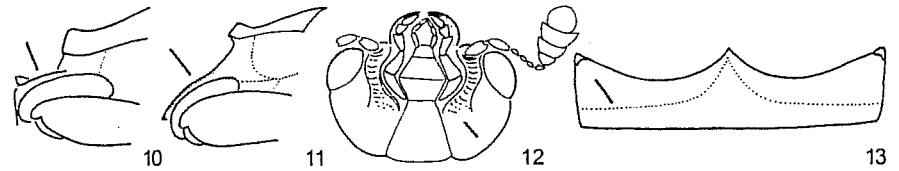
I. KEY TO THE NEARCTIC SUBFAMILIES

- 1. Head without occipital carina or crest ..... 2
- Head with occipital carina or elevated crest (Fig. 6.19, this may be hard to see if head is tightly retracted against pronotum; the crest is weak in *Platycholeus*, which has a tarsal formula of 5-5-5 in males and 4-5-5 in females) ..... 4
- 2(1). Antenna 10- or 11-segmented; club usually interrupted when 11-segmented (antennomere 8 usually smaller than 9 and 10 and without periarticular gutter or internal vesicles); cervical sclerites present; abdominal intersegmental membrane without minute sclerites; females with 5 or 6 visible abdominal sterna; body shape rounded or elongate ..... 3
- Antenna 11-segmented; club gradual, of three to four uninterrupted antennomeres, 8 not markedly smaller than 9-10 (Fig. 7.19) (and with periarticular gutter and internal vesicles); cervical sclerites absent, intersegmental membranes between abdominal sterna with brick-wall pattern of minute sclerites; female with four visible abdominal sterna; body shape elongated (Fig. 2.19) Coloninae ..... *Colan*
- 3(2). Hind coxae separated by about a third their width; prosternum in front of coxae longer than coxal width; always without eyes; (Key II); body shape usually flattened (Fig. 3.19) ..... Caropocerinae
- Hind coxae not separated; prosternum in front of coxae much shorter than coxal width; usually with eyes; body generally round or oval (Fig. 4.19) (Key III) ..... Leiodinae
- 4(1). Occipital crest overlapping pronotum when head is in repose; cervical sclerites absent, procoxal cavities internally open behind; body dorsoventrally flattened (Fig. 5.19); eyes reduced; associated with small mammals (Key IV) ..... Platysyllinae
- Occipital carina resting against front of pronotum when head is in repose (Fig. 6.19); cervical scler-



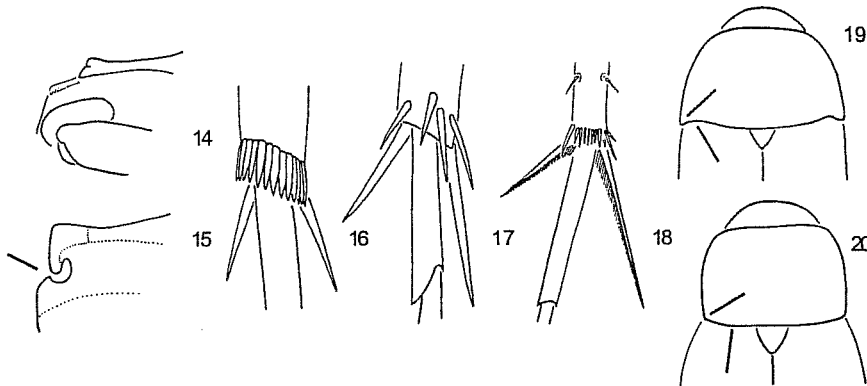
FIGURES 6.19-9.19. Fig. 6.19, Cholevinae, showing occipital carina (oc); Fig. 7.19, *Cyrtusa* sp., antenna with uninterrupted club; Fig. 8.19, *Hydnobius* sp., head with deeply emarginate labrum; Fig. 9.19, *Agathidium* sp., head without emarginate labrum (all from Peck 1990).

- ites present; procoxal cavities internally closed behind; body and eyes usually normal; usually not associated with mammals (Key V)..... Cholevinae
- II. KEY TO THE NEARCTIC TRIBES AND GENERA OF CATOPOCERINAE
1. Appendages short, body ovoid and flattened, pronotum and elytra of similar widths, (Fig. 3.19); in soil habitats (Tribe Catopocerini)..... *Catopocerus*
- Appendages conspicuously long, body elongate and rounded, pronotum much narrower than elytra; in northwestern caves (Tribe Glaciacavicolini)..... *Glaciacavicola*
- III. KEY TO THE NEARCTIC TRIBES AND GENERA OF LEIODINAE
1. Labrum deeply emarginate apically (obscure in *Cyrtusa* and some *Hydnobius*) (Fig. 8.19)..... 2
- Labrum shallowly or not at all emarginate apically (Fig. 9.19)..... 11
- 2(1). Tarsal formula 5-5-5 (Tribe Sogdini (= *Hydnobiini*))..... 3
- Tarsal formula 5-5-4 (Tribe Leiodini)..... 4
- 3(2). Antennal club with three antennomeres, antennomere 7 as small as 8..... *Triarthron*
- Antennal club with five antennomeres, antennomere 8 smaller than 7..... *Hydnobius*
- 4(2). Mesosternum vertical between the coxae (Fig. 10.19) (the *Cyrtusa* group)..... 5
- Mesosternum oblique between the coxae (Fig. 11.19) (the *Leiodes* group)..... 10
- 5(4). Antenna with 11 antennomeres, with interrupted 5-segmented club, antennomere 8 narrow and disc-shaped and sometimes hidden between 7 and 9..... 6
- Antenna with 10 antennomeres, with compact 3- or 4-segmented club..... 8
- 6(5). Mesosternum with median longitudinal carina; both mandibles with a median tooth..... *Anogdus*
- Mesosternum without median longitudinal carina; at most left mandible with a small tooth..... 7
- 7(6). Underside of head without antennal grooves; anterior margin of clypeus not sinuous; mandible untoothed..... *Liocyrtusa*
- Underside of head with distinct antennal grooves (Fig. 12.19); anterior margin of clypeus clearly sinuous; left mandible with a small tooth in anterior third..... *Lianothus*
- 8(5). Tibia narrow; only the underside of the metatibia with spines, not on the outer surface; right mandible with a blunt tooth in anterior third..... *Cyrtusa*
- Tibia widened; shovel-like; outer surface of metatibia strongly spined; left mandible with a large tooth at basal third..... 9
- 9(8). Antennal club with 4 antennomeres (Fig. 12.19)..... *Zeadolopus*
- Antennal club with 3 antennomeres..... *Isoplastus*
- 10(4). Mesosternum with median longitudinal carina..... *Leiodes*
- Mesosternum without median carina..... *Ecarinosphaerula*
- 11(1). All tarsi with three tarsomeres; abdominal sternum 3 (first visible) with transverse carina (Fig. 13.19) (Tribe Scotocryptini)..... *Aglyptinus*
- All tarsi of at least four tarsomeres; abdominal sternum 3 (first visible) without transverse carina..... 12
- 12(11). Tarsal formula 5-4-4, segmentation not sexually dimorphic, elytra usually transversely striolate; male with enlarged (tenent) setae on protarsi only; tibiae without longitudinal carinae (Tribe Pseudoliadini)..... 13
- Tarsi sexually dimorphic, 5-5-4 in males, 5-4-4 or 4-4-4 in females; elytra not transversely striolate; male tenent setae usually on pro- and mesotarsi; tibiae with longitudinal carinae (Tribe Agathidiini)..... 14
- 13(12). Elytra and pronotum with abundant fine transverse striolae; elytra without longitudinal rows of punctures; color paler (testaceous); mesosternal carina variable (Fig. 14.19)..... *Colenis*



FIGURES 10.19-13.19. Fig. 10.19, *Cyrtusa* sp., mesosternum vertical between the coxae; Fig. 11.19, *Leiodes* sp., mesosternum oblique between the coxae; Fig. 12.19, *Zeadolophus* sp., with antennal grooves on underside of head, and 4 segmented antennal club; Fig. 13.19, *Aglyptinus laevis* (LeConte), abdominal sternum 3 (first visible) with transverse carina (all from Peck 1990).

- Elytra not as above, with longitudinal rows of punctures; color darker, mesosternal carina with transverse depression or notch (Fig. 15.19)..... *Cainosternum*
- 14(12). Eighth antennomere distinctly smaller than seventh; antennal club with five antennomeres; head narrow behind the eyes; body form convex to hemispherical, contractile..... *Anisotoma*
- Eighth antennomere not (or slightly) smaller than seventh, antennal club abruptly formed, with three antennomeres; head often broad behind eyes (postocular tempora well developed); body form variable, sometimes oblong-elliptical and subdepressed, sometimes hemispherical and highly contractile..... 15
- 15(14). Elytra with nine complete, punctate striae; head narrower behind eyes; body form oblong-elliptical, subdepressed..... *Stethaliodes*
- Elytra with fewer than nine complete, punctate striae (or without striae); head often wide behind eyes; body form variable, often hemispherical and very contractile..... *Agathidium*
- 2(1). Elytra with glossy surface, setal bases arranged in transverse or oblique strigae (Fig. 1.19)..... 3
- Elytra with granular surface of irregularly arranged setal bases; strigae absent (Tribe Cholevini)..... 7
- 3(2). Hind margin of hind tibia with two inner long spines and an outer row or comb of short and equal spines only (Fig. 16.19) (Tribe Ptomaphagini), *Ptomaphagus*..... 4
- Hind margin of hind tibia with two long inner spines (and perhaps a comb of short, equal spines), but more importantly, also with about four longer outer spines (Fig. 17.19) (Tribe Anemadini)..... 6
- 4(3). Form oval or elongate oval; with long and erect hairs as well as short recumbent hairs; mesosternal carina high, low and effaced, or absent; compact and modified for life as guests in ant nests..... subgenus *Echinocoelus*
- Form elongate oval; with short recumbent hairs only, mesosternal carina present and usually well developed; may live with ants but not as highly modified myrmecophile..... 5
- 5(4). Size medium (2.6 mm) to smaller; flight wings absent, eyes reduced to poorly defined collection of about 20 pigmented facets; aedeagal tip more elaborately sculptured, broader and blunter, southeastern United States, usually in litter or soil..... subgenus *Appadelopsis*
- Size medium (2.6 mm) or larger, flight wings usually present and eyes usually normal (wings absent, and eyes smaller or reduced to unpigmented spot in most cavernicolous species); aedeagal tip simple, elongate and pointed; widespread, in many habitats..... subgenus *Adelops*
- 6(3). Basal mesotarsomeres of male (with expanded protarsi) weakly dilated and spongy pubescent beneath; mesosternal carina more elevated and extending nearly to anterior margin of mesosternum..... *Nemadus*
- Basal mesotarsomeres of male (with expanded protarsi) not expanded; mesosternal carina feebly elevated, sometimes confined to region between mesocoxae..... *Dissochaetus*
- 7(2). Antennomeres 1-10 serrate (bipectinate); with anterior projections, giving sawtoothed appearance..... *Catoptrichus*
- Antennae normal, not serrate (bipectinate)..... 8
- IV. KEY TO THE NEARCTIC GENERA OF PLATYPSYLLINAE (= LEPTININAE, = LEPTINIDAE)
1. Prosternum short and acute at apex, not extending between procoxae; length about 2 mm..... *Leptinus*
- Prosternum produced posteriorly, extending beyond procoxae and appearing to separate them, or forming a broad flat plate, ending in a median lobe fringed with long setae..... 2
- 2(1). Prosternum produced posteriorly; separating the procoxae..... *Leptinillus*
- Prosternum forming a broad, flat plate, ending in a median lobe fringed with long setae..... *Platypsillus*
- V. KEY TO THE NEARCTIC TRIBES AND GENERA OF CHOLEVINAE (= LEPTODIRIDAE, CATOPIIDAE, CHOLEVIDAE)
1. Posterior coxae contiguous, all tarsi with five tarsomeres..... 2
- Posterior coxae somewhat separated, tarsi all with five tarsomeres, except female protarsi with four tarsomeres (Tribe Leptodirini)..... *Platychoelus*



FIGURES 14.19-20.19. Fig. 14.19, *Colonis impunctata* LeConte, simple (undivided) mesosternal carina; Fig. 15.19, *Cainsternum imbricatum* Notman, divided (with notch) mesosternal carina; Fig. 16.19, *Promaphagus* sp., apical metatibial comb of equal spines; Fig. 17.19, *Disschaetus oblitus* (LeConte), apical metatibial spurs; Fig. 18.19, *Prionochoasta opaca* (Say), apical metatibial spurs; Fig. 19.19, *Sciodrepoides fumatus terminans* (LeConte), pronotum with rectangular posterior angles and undulating hind margin; Fig. 20.19, *Catops* sp., pronotum with rounded posterior angles and arcuate hind margin (all from Peck 1990).

- 8(7). Tibial spurs long serrate, longest metatibial spur as long as first metatarsal segment (Fig. 18.25); first mesotarsomere not dilated in males (with expanded protarsi) ..... *Prionochoasta*
- Tibial spurs not long and serrate; much shorter than first tarsal segment, first mesotarsomere dilated in males (with expanded protarsi) ..... 9
- 9(8). Pronotum usually with base sinuate on either side just within the more or less distinctly rectangular posterior angles (Fig. 19.19); internal sac of aedeagus with a Y-shaped piece ..... *Sciodrepoides*
- Pronotum usually with base arcuate, the hind angles obtuse or more or less evidently rounded (Fig. 20.19); internal sac of aedeagus without a "Y" shaped piece ..... *Catops*

CLASSIFICATION OF THE NEARCTIC GENERA

Subfamily Coloninae Horn 1880

- Colon* Herbst 1797, 42 species in 5 subgenera in litter habitats in North America (see Peck and Stephan 1996).
  - Colon* Herbst 1797
  - subgenus *Colon* Herbst 1797
  - subgenus *Myloechus* Latreille 1807
  - subgenus *Mesagyrtes* Brown 1895
  - subgenus *Eurycolan* Ganglbauer 1899
  - subgenus *Platycolon* Portevin 1907
  - subgenus *Chelicolon* Szymczakowski 1964
  - subgenus *Desmidocolon* Szymczakowski 1964
  - subgenus *Tricolan* Peck and Stephan 1996
  - subgenus *Striatocolon* Peck and Stephan 1996

Subfamily Catopocerinae Hatch 1927

Tribe Catopocerini Hatch 1927

*Catopocerus* Motschoulsky 1870, 14 spp., widespread North American (also in Siberia), in forest soil and deep litter (Peck 1974); all species are eyeless and wingless scavengers or feed on subterranean fungi (Fogel and Peck 1975).

- Homaeosoma* Auscin 1880
- Pinodytes* Horn 1880
- Typholeoides* Hatch 1955

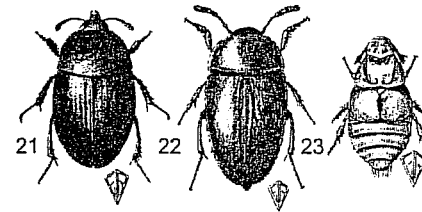
Tribe Glacicavicolini Westcott 1968

*Glacicavicola* Westcott 1968, 1 sp., *G. bathyscinides* Westcott 1968, the ice-cave beetle; a highly evolved eyeless cave inhabitant, a scavenger in both cold lava tube and limestone caves in Idaho and Wyoming (Peck 1981; Westcott 1968).

Subfamily Leiodinae Fleming 1821  
The round fungus beetles

Tribe Sogdini Lopatin 1961 (= Hydnobiini)

- Hydnobius* Schmidt 1847, 16 spp., mostly western, but several with a general northern distribution; subterranean fungi feeders (Hatch 1957).
- Triarthron* Märkel 1840, 2 spp., from Pennsylvania to Oregon (Hatch 1957).
- Triarthrum* Agassiz 1847



FIGURES 21.19 - 23.19. Dorsal habitus (not to same scale). Fig. 21.19, *Leiodes assimilis* (LeConte); Fig. 22.19, *Sciodrepoides terminans* (LeConte); Fig. 23.19, *Platyphyllus castoris* Ritsema.

Tribe Leiodini Fleming 1821

- Anogdus* LeConte 1866, 10 spp., in the eastern United States and British Columbia (Hatch 1957; Daffner 1988).
- Neocyrtusa* Brown 1937

*Cyrtusa* Erichson 1842, 2 spp., from Quebec and Michigan to British Columbia (Hatch 1957; Daffner 1988).

*Ecarinaspheerula* Hatch 1929, 1 sp., *E. carina* Hatch 1929, British Columbia and Nevada (Hatch 1957).

*Isoplastus* Horn 1880, 1 sp., *I. fossor* Horn 1880, from Quebec and Michigan to the District of Columbia, and Oklahoma.

*Leiodes* Latreille 1796, 72 spp., widely distributed, usually in forested habitats (Hatch 1957; see especially Baranowski 1993).

- Anisotoma* of Schmidt 1841: 143 (misidentification of *Anisotoma* Panzer)
- Liodes* Erichson 1845: 98 (unjustified emendation of *Leiodes* Latreille)
- Oosphaeerula* Ganglbauer 1896
- Oreosphaeerula* Ganglbauer 1899
- Pseudohydnobius* Ganglbauer 1899
- Pteromerula* Fleischer 1905
- Trichosphaeerula* Fleischer 1905
- Parahydnobius* Fleischer 1908
- Eremosphaeerula* Hlissnikovsky 1967

*Liocyrtusa* Daffner 1982, 3 spp., widely distributed (Daffner 1988).

*Lionothus* Brown 1937, 2 spp., widely distributed (Daffner 1988).

*Zeadolopus* Brown 1903, 3 spp., Quebec to Michigan to Oklahoma and Florida.

*Apheleplastus* Brown 1937

Tribe Pseudoliadini Portevin 1926

*Cainsternum* Notman 1931, 1 sp., *C. imbricatum* Notman 1921, New York (Wheeler 1986).

*Colenis* Erichson 1845, 4 spp., in forests, from eastern United States and Canada to British Columbia (Peck 1998b).

- Carcharodus* Hlissnikovsky 1965 (preoccupied)
- Carcharodes* Hlissnikovsky 1965 (preoccupied)
- Mathussonia* Hlissnikovsky 1965
- Colenoides* Peck 1998 (replacement name)

Tribe Scorocyrtini Reitter 1884

*Aglyptinus* Cockerell 1906, 1 sp., *A. laevis* (LeConte) 1853, in the east from Ontario to Louisiana; usually associated with soft fungi.

- Aglyptus* LeConte 1866 (preoccupied)
- Aglyptanotus* Champion 1913 (replacement name)

Tribe Agathidiini Westwood 1838

*Agathidium* Panzer 1797, 47 spp., widely distributed across the United States and Canada; usually in forested habitats and on slime molds (Hatch 1957; Russell 1979; Wheeler 1987, 1990). Taxonomy under study by Wheeler.

- Volvoxis* Kugelann 1794
- Agathidium* Illiger 1798
- subgenus *Agathidium* Panzer 1797
- subgenus *Cyphoclebe* Thomson 1859
- subgenus *Chaetoclebe*, Sainte-Claire-Neville 1879
- subgenus *Neoclebe* Gozis 1886
- subgenus *Euryclebe* Hlissnikovsky 1964
- subgenus *Rhabdoelytrum* Hlissnikovsky 1964
- subgenus *Microclebe* Angelini and De Marzo 1986
- subgenus *Macroclebe* Angelini 1993

*Anisotoma* Panzer 1797, 15 spp., generally distributed in forests over much of Canada and the United States; feeders on plasmodia and fruiting bodies of slime molds (Russell 1979; Wheeler 1979, 1987, 1990).

- Pentatoma* Schneider 1792
- Anisotoma* Illiger 1798
- Leiodes* of Schmidt 1841
- Eucyrtia* Portevin 1927

*Stetholinodes* Fall 1910, 1 sp., *S. laticollis* Fall 1910, Indiana (Wheeler 1981).

- Agathodes* Portevin 1926
- Agathidioides* Portevin 1944

Subfamily Cholevinae Kirby 1837

The small carrion beetles

Tribe Leptodictini Lacordaire 1854

*Platycholeus* Horn 1880, 3 spp., small-eyed winged *P. leptinoides* (Crotch) 1874, *P. opacellus* (Fall) 1909, and an undescribed species in the Pacific Northwest, the only North American representatives of this large and predominantly litter and cave dwelling tribe of Eurasia (see Newton 1998); in litter and under bark of logs and stumps, sometimes with ants and termites (Hatch 1977).

## Tribe Anemadini Hatch 1928

*Nemadus* Thomson 1867, 10 spp., widespread North America, scavengers in forest litter and sometimes in caves and animal burrows; some species seem restricted to ant nests (Hatch 1933; Jeannel 1936; Fall 1937).

subgenus *Nemadus* Thomson 1867

subgenus *Eonargus* lablakkoff-Khnzorian 1959

subgenus *Laferius* Petkovsky 1994

*Dissochaetus* Reitter 1884, 3 spp., eastern, central, and southwestern United States, scavengers in forest litter and on carrion (Hatch 1933; Jeannel 1936; Peck 1999).

## Tribe Cholevini Kirby 1837

*Catops* Paykull 1798, 10 spp. (and six undescribed), in forest litter and related habitats across North America south to Mexico only; carrion scavengers (Hatch 1933; Jeannel 1936; Peck, in prep.).

*Sciodrepa* Thomson 1862

*Lasiocatops* Reitter 1901

*Catoptrichus* Murray 1856, 1 sp., *C. frankenbaueri* (Mannerheim) 1852, in forest litter in the Pacific Northwest, habits unknown, probably carrion scavenger (Hatch 1933).

*Prionocheata* Horn 1880, 1 sp., *P. opaca* (Say) 1825, in forest litter and some caves in eastern North America; common on carrion (Peck 1977b).

*Sciodrepanoides* Hatch 1933, 2 spp., subspecies of two Holarctic species, *S. fumatus terminans* (LeConte) 1850, and *S. usatoni hornianus* (Blanchard) 1915, commonly found as carrion scavengers in many field, forest and soil-related habitats across the northern half of the continent (Hatch 1933; Jeannel 1936).

## Tribe Ptomaphagini Jeannel 1911

*Ptomaphagus* Illiger 1798, 52 spp., widespread in the United States and southern Canada, occupying a wide range of litter and soil habitats as scavengers, and extensions of these habitats such as ant nests and animal burrows; eighteen species are blind inhabitants of cave habitats in the southern United States (Peck 1973, 1984, 1998b); other such troglodites occur in Mexico and Central America.

*Adelops* Tellkampff 1884

subgenus *Ptomaphagus* Illiger 1798

subgenus *Adelops* Tellkampff 1884

subgenus *Echinocoleus* Horn 1885; Peck and Gnaspini 1997

subgenus *Merodiscus* Jeannel 1934

subgenus *Tupania* Szymczakowski 1961

subgenus *Alphadelopsis* Gnaspini 1996; Peck 1978 (for U.S. species, as *Adelopsis*)

## Subfamily Platypsyllinae Ritsema 1869

## The mammal nest beetles

*Leptinillus* Horn 1882, 2 spp.; *L. apodontiae* Ferris 1918, the mountain beaver beetle, with mountain beaver, from California to Washington; and *L. validus* (Horn) 1872, the beaver nest beetle, with beaver throughout its range (Wood 1965).

*Leptinus* Müller 1817, 3 spp., the mouse nest beetles, distributed over much of eastern North America and the Pacific Northwest; most frequently found in nests and fur of mice, shrews, and moles and occasionally in litter (Peck 1982). Their biology is not well-known, although it has been studied for *L. testaceus* Müller, the mouse nest beetle of Europe (Buckle 1976; Ising 1969).

*Platypsyllus* Ritsema 1869, 1 sp., the highly modified and flea-appearing *P. castoris* Ritsema 1869, the beaver parasite beetle, a true ectoparasite of beavers (*Castor*) in North America and Eurasia (see Wood 1965).

*Platypsyllus* Westwood 1869

*Platypsylla* LeConte 1872

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## 20. SCYDMAENIDAE Leach, 1815

by Sean T. O'Keefe

Family synonyms: Scydmaenides Leach 1815; Scydmaenidae LeConte 1852; Anisospheraidae; Tömösváry 1882

Common name: The ant-like stone beetles

The elongate elytra, five-segmented tarsi, six visible sternites, and clavate femora serve to distinguish these beetles from other minute staphylinoids (Fig. 1.20).

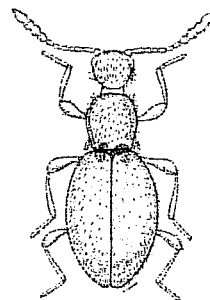


FIGURE 1.20. *Euconus* (*Drastopbus*) *laevicollis* (LeConte) (From O'Keefe 1998).

**Description:** Body elongate, slender to ovoid; slightly to very convex. 0.6-2.7 mm long; often distinctly constricted between head and pronotum and between pronotum and elytra, usually light to dark brown, sometimes black in color; often densely pubescent on head, pronotum, and elytra, pubescence usually long.

Head short and broad to ovoid; deflexed; distinctly constricted between vertex and occiput, except in *Cephennini*; occiput formed into a "neck"; neck present but not abruptly constricted in *Chevolatia* and

*Lophioderus*; clypeofrontal region moderate in length and slightly narrowed anteriorly. Eyes anterior, median, or posterior; moderate in size, or absent, as in *Cephennium anaphthalmicum*. Antennae inserted anterior to eyes, antennal insertions adjacent to widely separated; antennae composed of scape, pedicel and 9 flagellomeres; antennal club composed of distal 3 to 5 antennomeres, from indistinct to distinct in form. Vertex rounded, impressed (*Brachycephis*, *Parascydms*), excavated (*Taphroscydms*), foveate (*Veraphis*), to highly sculptured (*Chevolatia*). Mandibles usually planar, subtriangular with large basal area, narrowed to acute incisor, subapical teeth absent, although present in *Papusus*; prostheca present in most genera, quite varied in form; retinaculum present in many genera. Maxillary palpus composed of 4 palpomeres; palpomere III large, clavate; palpomere IV variable, although distinctly smaller than III (Figs. 26.2-8); apices of laciniae and galea densely covered with long setae. Labial palpus composed of 3 palpomeres; palpomeres II and III varied in form; mentum large.

Thorax with pronotum varied in shape, from rounded to quadrate in dorsal view, flat to distinctly convex, distinctly wider than head; most species with fovea or transverse furrow along posterior margin. Scutellum small, visible, although hidden in some genera, as in *Euconus*, *Papusus*, *Leptroscydms*, and *Microscydms*. Elytra ovoid, convex as in *Cyrtoscydmini* and

*Scydmaenini*, to rectangular, flat as in *Chevolatiini* and *Eucheini*; humeri varied in form with 0-2 basal foveae in broad basal impression; elytral apices entire in most genera, but also truncate (*Chevolatiini*, *Eucheini*), and in some forms fused (e.g., *Papusus*). Hind wings, if present, well-developed. Legs relatively short to moderate in length; procoxae projecting beyond prosternum, procoxal cavities open; mesocoxal cavities closed; trochanters relatively large and sublinear or rounded triangular; femora strongly clavate in distal half; protibiae and mesotibiae of most genera with dense patches of setae at distal end. Prosternum varied from subquadrate to very narrow before conical, contiguous procoxae, pubescence varied. Mesosternum raised (except flat in *Eutheia*), densely setose in many genera, bearing mid-ventral carina separating otherwise contiguous mesocoxae. Metasternum long, broad, occasionally carinate or medially excavate; metacoxae round to transverse, conical, widely separate to contiguous.

Abdomen with six visible sternites; intersegmental margins relatively straight, except in *Scydmaenini*, where they are strongly apically arcuate. Pygidium exposed, horizontal in *Chevolatiini*, *Eucheini*, *Leptroscydms*, and *Taphroscydms*; exposed, vertical in *Scydmaenini*; covered by elytra in *Cephennini* and most *Cyrtoscydmini*. Male genitalia with median lobe bulbous, large (especially in *Cyrtoscydmini*), to elongate (*Scydmaenini*), to reduced, lightly sclerotized, distinctly curved (e.g., *Papusus*); parameres long, slender, articulated on dorsal surface of aedeagus, absent from some groups (e.g., *Lophioderus*). Ovipositor composed of paired, fused or unfused dorsolateral paraprocs. triangular dorsal proctiger, paired elongate ventral valvifers, paired elongate gonocoxae; gonostyli absent; spermtheca present, variable in shape from elongate, slender to spherical, accessory gland sometimes present.

Most scydmaenid larvae have been placed to genus by association with adults (Wheeler and Pakaluk 1983, Brown and Crowson 1980); although Schmid (1988a) had some success in rearing. Of the nearly 80 genera of Scydmaenidae, larvae have been associated only for *Cephennium*, *Coutesia*, *Eutheia*, *Euconus*, *Leptomastax*, *Mastigus*, *Neuraphes*, *Scydmaenus*, *Scydmorephes*, *Stenichnus*, and *Veraphis* (Brown and Crowson 1980, De Marzo 1984, Newton 1991, Schmid 1988a, Vit and DeMarzo 1989, Wheeler and Pakaluk 1983).