45. BUPRESTIDAE (Leach, 1815)

By C. L. Bellamy & G. H. Nelson

Common name: The metallic wood boring or jewel beetles

These hard bodied, generally shiny, iridescent-colored beetles are easily recognized by the hypognathous head, mostly serrate antennae, transverse metasternal suture and connate first two abdominal sterna.

Description: Shape cylindrical to flattened, elongate-ovoid, generally convex above, or cuneiform; size 3 to 100 mm. or more in length, usually less than 20 mm.; color various, often bright iridescent hues, or dark-colored with patterned or irregular pigmented maculae; vestiture absent or variously covered with setae and sometimes broad scale-like setae.

Head greatly deflexed, resting on the prosternum, retracted into the prothorax, but mostly as broad as the anterior portion of pronotum; surface punctate or rugose punctate. Antennae with eleven antennameres, usually serrate, some males flabellate or pectinate; inserted some distance from the eyes and mandibles, on the front within distinct frontoclypeal cavities. Anteclypeus sometimes visible, labrum small, distinct, often bilobed and setose distally; mandibles small, stout basally, curved, the apices acute; maxillary palpi with four palpomeres, filiform; mentum quadrate to triangular; ligula usually not prominent; labial palpi with three palpomeres, filiform. Eyes lateral, moderate to large, greatly elongate-oval to reniform, inner margins sometimes strongly converging.

Pronotum slightly broader than the head; shape irregularly quadrate, sometimes narrowed in front; lateral margins usually carinate, carinae sometimes incomplete from posterior angle; surface punctate to rugose; hypomeron broad; prosternum long and broad, produced posteriorly between the coxae and inserted in the mesosternal cavity or the cavity is comprised of the short mesosternal lobes laterally and the metatsternum distally; procoxal cavities open behind. Metasternum usually with the vestige of a transverse suture near the posterior coxal plates. Legs with the trochantins of the fore- and middle legs exposed; anterior coxae small, oval, separate; middle coxae small, flat, almost quadrate, separate; hind coxae large, transverse, with thick plates; trochanters small, triangular; femora subparallel to fusiform; tibiae slender, sometimes dentate or spinose, the apical spurs moderate; tarsal formula 5-5-5, tarsi slender, some of the tarsomeres bilobed, distal tarsomeres each with ventral pulvillus; claws simple, appendiculate or bifid. Scutellum triangular to cordifrom, moderate to small. Elytra entire except in *Hesperorhipis*, apically rounded and often with one or more apical spines, rarely expose the pygidium; striae punctate or carinate; intervals smooth or rugose; margins, especially apical portion serrate to serrulate; epipleural fold indistinctly separate or with fine carina separating it from disc, broad basally. Wing venation with 2A with three branches; wedge cell, when present, acute apically with only one vein coming from it. Folding pattern of the wing with area A and B normally reduced to slender crumples, area C about half the length of the wing, frequently fused more or less completely with area D which is either open to the costa or reduced to a slender crumple; area H always well marked and reaching the margin for the full width, very slender and nearly longitudinal in the more typical forms; commonly with one chevron-like apical fold, but may be two, or absent; anal lobe highly variable, but never free.

Abdomen with five visible sterna, the first and second connate; sutures shallow, sometimes partly obsolete laterally; surface smooth, punctate, or rugose. Male genitalia of a modified trilobed type; the median lobe a flat, dorsal plate, nearly parallel-sided, the apex acute to transverse, grooved deeply ventrally; parameres sometimes highly modified from swollen to having projecting lateral lobes and sensory setae distally, parameres surround most of the median lobe, fused to the pars basalis; pars basalis fused, forming a basal plate. Female genitalia with the valvifers reduced to a large and strong baculum; coxite dorsally with a baculum, the membranous part fan-shaped; stylus greatly reduced, proctiger large with two bacilli which extend around to the ventral surface where they meet and articulate with the basal parts of the valvifers.

Larvae with the segments flattened, or oval, deeply notched and tapering behind; thorax enlarged, body long, slender, subcylindrical (flat-headed wood borers), or enlarged, club-like head and thorax may or may not be enlarged (leaf miners); rarely with the mid-abdominal segments the widest, length 5 to 50 mm. or more; vestiture usually absent; color cream to near white, sometimes with yellow, orange, or brown pigment spots. Head small, depressed, more or less retracted into the prothorax. Antennae three-

segmented. Labrum arcuate, free; mandibles stout, toothed, spoon- shaped; maxillae with two-segmented palpi and a lobe-like mala; labium small, with ligula prominent, spatulate; labial palpi small, one-segmented, or absent. Ocelli absent. Thorax without legs; dorsally with a distinct V-shaped groove. Abdomen ten-segmented, usually with two fleshy lobes apically; some with tenth segment sometimes with a pair of sharp, sclerotized, toothed forks or forceps laterally. Spiracles cribriform, usually crescent-shaped, on the mesothorax and abdominal segments one to eight. The only key to larvae was that by Burke (1917) and is not repeated here. The eggs sometimes are enormous; in the collection of exotic beetles at the Academy of Natural Sciences in Philadelphia are a few eggs glued to a piece of cardboard. These eggs measure 3.5 by 5 mm and likely belong to Asian or African species of either *Sternocera* or *Julodis*. Otherwise, little has been reported yet on the eggs of this family.

Ecology: The larvae burrow through roots and logs, from within the bark to within the cambium layers, or are leaf and stem miners of herbaceous and woody plants, including grasses. Most of the wood boring species attack dying trees or dying/dead branches on healthy trees, only a few bore into green wood. Some produce galls on alder, roses, blue beech, ironwood, and hazelnut; a few live in pine cones or herbaceous plants. Some adults are active and very strong flyers (e.g. *Gyascutus* and *Chrysobothris*) and some make a loud buzzing noise as they fly, while others are slow and even approach being clumsy (e.g. *Chalcophora*, *Texania*, and Buprestis). The adults feed on foliage of their hosts or visit flowers to feed on energy-rich pollen or nectar except for some species of *Chrysobothris* and *Agrilus* which feed on fungus. With the often hirsute body and flower visiting habit, many species, particularly in the large genus *Acmaeodera*, serve as potential pollinators.

A number of recent papers on distribution and biology have helped fill in many gaps of understanding about many Nearctic species. These include works by Barr (1971), Bellamy (1982), Nelson (1959, 1960, 1962, 1965, 1967, 1987), Nelson and MacRae (1990), Nelson and Westcott (1976), Nelson, et al. (1981), Walters (1975, 1976), Walters and Bellamy (1982, 1990), Westcott (1990, 1991) and Westcott, et al. (1979, 1989). State or regional synopses have been given by Barr (1971) for the Pacific Northwest, Bright (1987) for Alaska and Canada, Cazier (1951) for Northcentral Mexico, Knull (1925) for Pennsylvania, MacRae (1991) for Missouri, Vogt (1949) for the lower Rio Grande valley, Texas and Wellso, et al. (1976) for Michigan.

Status of the classification: The classification of the family is becoming better understood, although a complete modern phylogenetic perspective is lacking. Some of the genera are fairly well known, but the classification of genera and their placement in higher taxa is still being contested. In terms of our phylogenetic understanding of the buprestids, it seems to be now generally agreed that there are five major lineages: schizopodines, julodines, polycestines, buprestines and agrilines. Some prefer that these five groups should be assumed to be the subfamiles of Buprestidae, but there is compelling data to argue for familial status for one or two of these groups as well. This five lineage concept is rather stark in contrast to the last major subfamily scheme proposed by Cobos (1980) where he outlined 13 subfamilies and suggested a 14th. Few attempts to use real phylogenetic analysis techniques to the family, as a whole or groups of taxa within, have been conducted, but these are emerging slowly and will undoubtedly increase as we try to make sense of such a large group of beetles. There are approximately 15,000 species placed within about 450 genera. The last global accounting of the family came in the six buprestid parts of the Coleopterorum Catalogus by Obenberger (1926, 1930, 1934a, 1934b, 1936, 1937) with a summary of the higher categories provided by Bellamy (1985). The most recent higher system has been proposed by Ho y ski (1993) in which he suggested four subfamilies, 12 tribes and about 64 subtribes, but many of the proposals first brought forward there are untested, or intuitively unsupportable, so further refinement is necessary. This classification was the first attempt to organize the entire family since that by Kerremans in 1893. Here, to some extent, we use the subtribal system of Ho y ski, although some changes are proposed that differ from his original scheme. The most recent assessment of the classification was presented for the Nearctic region by Nelson (1982). A catalogue of the North American fauna by Nelson is nearly complete, while a complete world catalogue and bibliography by Bellamy is still in preparation.

The julodines are a large group composed of six genera and many species distributed from the southern Palaearctic and Oriental to the Cape region of South Africa. The largest two genera, *Julodis* and *Sternocera*, are found as far west as Pakistan and Southeast Asia, respectively. Interestingly, they are not present on Madagascar. The bodies of these insects a nearly cylindrical, tapering to the posterior end, from about 1 to 7 or 8 cm in length. This group is arguably supported at the family level too.

The remaining three main lineages comprise the majority of buprestid taxa and are virtually cosmopolitan. The polycestines and buprestines generally have very typical larvae, each with a strongly dorsoventrally flattened thoracic region, or ambulatory plate (Burke 1917), a feature that spawned the dubious moniker flat-headed wood-borers. The typical buprestid body is said to be bullet shaped, but rather they are mostly flattened dorsoventrally and tapering towards the rear end. They are very active flyers, especially during the warmth of the day and are quick to escape both predators and collectors. Many species are found feeding on the foliage of their larval host plants and many other species visit flowers to feed and to rendezvous with others looking to mate. The range of host plants is rather broad and includes many families of gymnosperms and dicot angiosperms. Many species seem to be generalist feeders as larvae, often known to inhabit several plant hosts, sometimes

developing in a variety of dead wood. Both groups are known from every biogeographical region and most every habitat.

The main differences between the polycestines and buprestines are found in both larvae and adults. The polycestine larvae, as far as is known, possess a single central line or groove on the dorsal first thoracic segment, while in the buprestines this line is either "Y" or "V" shaped. In the adults, the main dividing characteristic is found in the structure of the sternal cavity. The polycestines have the prosternal process received distally by lateral lobes of the mesosternum, while in the buprestines and agrilines the sternal cavity involves the anteromedial portion of the metasternum.

POLYCESTINE TRIBES. Seven tribes contain Neartic genera: Ptosimini, Polycestini, Polyctesini, Thrincopygini, Acmaeoderini, Tyndarini and Mastogeniini. In the past, Thrincopygini, Acmaeoderini and Mastogeniini were recognized as subfamilies. All but Acmaeoderini contain a single subtribe in the Nearctic region. The placement of Mastogeniini is still somewhat a matter of conjecture without any known larvae, but the most recent discussion by Bellamy (1996b) indicates a polycestine placement.

BUPRESTINE TRIBES. Three tribes are included in this lineage: Buprestini, Anthaxiini and Chrysobothrini. The Buprestini has Nearctic taxa placed in six subtribes with the Chalcophorina once accorded subfamily rank. The Anthaxiini is comprised of five subtribes with the Sphenopterina formerly a subfamily and the Melanophilina previously a tribe. The Chrysobothrini has two subtribes.

The agriline line is comparable in size and taxonomic diversity to the buprestid line and perhaps exceeds it. These beetles are generally smaller, often very small, mostly subcylindrical or flattened and cuneiform or wedge-shaped. The larvae differ significantly in that they lack the proventriculus of the alimentary canal, indicating a very different way of handling food. The larvae also share a modification to the caudal segment, always in one way or another, bilobed, bifurcate and sometimes with this paired terminus sclerotized. The adults are most always collected from the foliage of their host plants and most seem to be very host specific. In fact, within this group, there are some very pronounced coevolutionary trends apparent with entire species-groups utilizing only one genus of host plant. The agrilines are also known from every biogeographical region and most every habitat, with leaf-mining taken precedence over wood-boring forms in the moist tropical areas as the larvae are much less exposed to the threat of fungal infection. *Agrilus* is one of the largest genera in the animal kingdom with nearly 2,500 described species. There are no known associations in *Agrilus* with gymnosperms. Other members of this group utilize monocotyledonous plants as larval hosts (i.e. Poaceae and Cyperaceae)

AGRILINE TRIBES. The Agrilinae is comprised of three tribes: Agrilini, Aphanisticini and Trachydini. The separation of Agrilina and Coraebina is a difficulty still not resolved. The coraebines are the most generically diverse group in the family, but with most of this diversity found in the Old World. The Aphanisticini is added to the Nearctic fauna with the recent discovery of an Asian species in Texas (Wellso and Jackman, 1996). The tribe Trachyidini contains mostly small, often cuneiform, leaf- or stem-mining beetles. It is now thought from preliminary studies of larvae that this grouping is highly artificial and that leaf-mining may have evolved independently several times in the family and may represent an repeated evolutionary outcome at the distal end of several otherwise widely separated lineages (S. Bílý, pers. comm.).

HIGHER TAXON ADDITIONS AND CHANGES. The basic structure of the higher classification has evolved from the general system of Lacordaire (1857), with more specific changes from LeConte and Horn (1883), Kerremans (1893), Nelson (1982) and Ho y ski (1993). The tribes or subtribes that have more recently been defined and which contain, partly, Nearctic genera are: Agaeocerina Nelson, 1982 (originally as tribe); Hippomelanina Ho y ski, 1993; Trachykelina Ho y ski, 1988; Rhaeboscelidina Cobos, 1976; Brachydina Cobos, 1979; Pachyschelina Cobos, 1979; and Leiopleurina Ho y ski, 1993. Higher level recombinations or synonymies are: Chalcophorinae Lacordaire as a synonym of Buprestinae by Toyama (1987) and Dicercini Kerremans as a synonym of Psilopterina Lacordaire by Ho y ski (1993). The placement of Polycestina Lacordaire under Buprestini was refuted by Bellamy (1996b).

GENERIC ADDITIONS, CHANGES AND PLACEMENTS. Recently described generic taxa for the Nearctic region include: *Acmaeoderopsis* Barr, 1974; *Anambodera* Barr, 1974; *Barrellus* Nelson and Bellamy, 1996; *Beerellus* Nelson, 1982; *Lepismadora* Velten, 1987; and *Squamodera* Nelson, 1996. Previously described genera recently added to the regional fauna are *Aphanisticus* Latreille, 1810; *Leiopleura* Deyrolle, 1864; *Micrasta* Kerremans, 1893; *Sphaerobothris* Semenov-Tian-Shanskij and Rikhter, 1934; *Sphenoptera* Dejean, 1833 and *Tyndaris* Thomson, 1857. Recent status changes or subgeneric elevations are: *Paratyndaris* Fisher, 1919 was reduced to a subgenus of *Tyndaris* by Cobos (1980); *Texania* Casey, 1909 was validated with the recognition of *Chalcophorella* Kerremans, 1903 as a strictly Palaearctic genus by Obenberger (1942); *Nanularia* Casey, 1909 and *Ampheremus* Fall, 1917 were recognized as valid genera by Bellamy (1987); *Gyascutus* LeConte, 1859, with *Stictocera* Casey, 1909 as a subgenus, and *Prasinalia* Casey, 1909 were elevated from subgenera of *Hippomelas* Laporte and Gory, 1837 by Nelson and Bellamy (1996); *Lampetis* Dejean, 1833, subgenus *Spinthoptera* Casey, 1909 contain the Nearctic species formerly placed in *Psiloptera* Solier, 1833 according to Kurosawa (1993); *Spectralia* Casey, 1909 was validated with the recognition of *Cinyra* Laporte and Gory, 1837 as a Neo-

tropical taxon; *Cypriacis* Casey, 1909 was recognized as distinct from *Buprestis* L., 1758 by Kurosawa (1988); *Phaenops* Dejean, 1833 and *Xenomelanophila* Sloop, 1837 were recognized as distinct from *Melanophila* Eschscholtz, 1829 by Cobos (1987); and *Agrilaxia* Kerremans, 1903 was again recognized at the genus level by Bright (1987). The placement of *Acmaeoderoides* Van Dyke, 1942 in Ptosimina by Ho y ski (1993) was refuted by Bellamy and Westcott, 1996. The placement of *Chrysophana* LeConte, 1859 in Bubastina Obenberger by Ho y ski (1993) was refuted by Bellamy (1996c).

Three recent rulings by the ICZN affected buprestid nomenclature. A very unstable situation was corrected (ICZN 1994) when type species were designated for *Buprestis* and *Chrysobothris*, Eschscholtz, 1829. The fixation of the name *Poecilonota* Eschscholtz, 1829 by type species designation (ICZN 1996a) reduced *Descarpentriesiola* Lerault, 1983 to junior synonymy. A controversy between specialists from Europe and North America was solved with the designation of type species for *Melanophila* and *Phaenops* (ICZN 1996b).

Distribution: An estimated 15, 000 species are known from all areas, making this family the eighth largest beetle family. There are 782 species and 36 subspecies currently listed for North America, north of Mexico. The state of understanding for Mexican taxa does not allow a clear accounting for species found in the southern extent of the Nearctic area.

Key to Nearctic Genera

1. Sternal cavity for reception of prosternal process formed entirely by the mesosternum (fig. 9:45) (subfamily Polycestinae) 2
- Sternal cavity for reception of prosternal process attaining or formed in part by metasternum (fig. 10:45) 12

Polycestinae

2(1). Metacoxal plates distinctly dilated medially; last visible abdominal sternum with deep groove around apical half (fig. 9:45) (Thrincopygini, Thrincopygina) ..... *Thrincopyge*
— Metacoxal plates not distinctly dilated medially (fig. 11:45); last visible abdominal sternum without deep groove around apical half 3

3(2). Lobulated antennameres with sensory pores diffuse, without vestiges of fossae or depressions on either surface (fig. 7:45) (Acmaeoderini) 4
— Lobulated antennameres with sensory pores in part concentrated in fossae on one or both surfaces, at least on apical segments (fig. 8:45)..... 8

4(3). Scutellum visible; elytra free; epipleuron more or less hypertrophied toward base (Acmaeoderoidina) ... . *Acmaeoderoides*
— Scutellum not visible; elytra fused; epipleuron not hypertrophied toward base (Acmaeoderina) 5

5(4). Ventral surface clothed by a dense tomentum largely obscuring the surface..... *Squamodera*
— Ventral surface variously clothed otherwise 6

6(5). Pronotum without or with only faint indication of margin; front angles of pronotum in side view are rounded; suture between abdominal sterna one and two readily visible ..... *Anambodera*
- Pronotum distinctly margined at least in part; front angles of pronotum in side view are angled; suture between abdominal sterna one and two obliterated or faint 7

7(6). Abdominal sterna three to five clothed differently than rest of body, consisting of dense long recurved hairlike setae..... *Acmaeoderopsis*
- Abdominal sterna three to five not distinctively clothed ..... *Acmaeodera*

8(3). Articulating base of pronotum with row of rasp-like grooves (fig. 12:45) (Polycestini, Ptosimina) .... *Ptosima*
- Articulating base of pronotum without row of rasp-like grooves 9

9(8). Elytral apices not rounded, provided with special armiture (fig. 14:45); epipleuron completely covering metepisternum (fig. 15:45) (Tyndarini, Tyndarina) ..... *Tyndaris*
- Elytral apices rounded or more or less serrate (fig. 13:45); epipleuron not completely covering metepisternum (fig. 16:45)..... 10

10(9). Tarsomeres 1-4 with plantulae below (fig. 5:45) / (Polyctesini) 11
- Only tarsomere 4 and sometimes 3 with plantulae below (fig. 6:45) (Polycestini) ..... *Polycesta*

11(10). Epipleural lobe rounded, covering all but antero-inferior angle of metepisternum (fig. 17:45) .... *Beerellus*
- Epipleural lobe truncate leaving most of metepisternum exposed (fig. 16:45) .... *Chrysophana*

12(1). Metacoxal plates dilated medially or not, but only slightly longer medially than laterally, with anterior margin usually sinuate (fig. 20:45) 13
- Metacoxal plates distinctly dilated medially, usually cut off laterally by prolongation of abdomen, with anterior margin rather straight, posterior margin oblique (fig. 18:45) (Buprestinae) 16

13(12). Thorax truncate at base (fig. 22:45) (Mastogeniini, Mastogeniina) 14
- Thorax lobed at base (fig. 20:45) (Agrilinae) 44

14(13). Prosternum with distinctly limited antennal cavities, and carinae on each side of middle .... *Trigonogya*

15(14). Eyes parallel..... *Micrasta*
- Eyes converging slightly above ..... *Mastogenius*

Buprestinae

16(12). Prosternum obtusely angulate behind coxae (fig. 10:45); front not contracted by insertion .. of antennae 17

- Prosternum acutely angulate behind coxae (fig. 23:45); front contracted by insertion of antennae (Chrysobothrini) 42

17(16). Antennae with sensory foveae absent (sensory pores dispersed) or placed on ventral surface of antennameres (Buprestini) 18
- Antennae with sensory foveae placed on distal surface of antennameres (Anthaxiini) 33

18(17). Elytral epipleuron with denticle wedging between mesepimeron and rounded lateroposterior . angle of metepisternum (fig. 18:45) 19
- Elytral epipleuron with lower margin more or less straight, without denticle (fig. 19:45) (Buprestina) 31

19(18). Body subcylindrical in cross-section; sensory pores diffuse on both surfaces; protrochanter ... usually with sharp tooth (fig. 30:45); antennamere 11 usually with terminal notch (fig. 31:45) (Hippomelanina) 20
- Body oval in cross section; sensory pores otherwise; protrochanter without sharp tooth; antennamere 11 without terminal notch 25

20(19). Antennameres 4-10 compact, triangular, not flattened (fig. 28:45); inner margin of eyes ..... parallel (fig. 24:45); elytral apices rounded to slightly emarginate (fig. 25:45) 24
- Antennameres 4-10 elongate, subserrate or, in part parallel-sided, strongly flattened (fig. 39:45); inner margin of eyes converging above (fig. 40:45); elytral spices moderately emarginate and bidentate (fig. 1:45) 21

21(20). Surface sculpture irregular, with conspicuous raised callosities; protibia arcuate (fig. 29:45); antennamere 11 of male with strong terminal notch (fig. 31:45) ..... *Gyascutus*
- Surface sculpture uniform, without conspicuous raised callosities; protibia weakly arcuate or straight (fig. 32:45); antennamere 11 of male usually without strong terminal notch (fig. 34:45) 22

22(21). Epipleuron with small marginal tooth near metacoxa (fig. 37:45); tarsomere 1 of male about 2X as long as 5; metacoxa of male with acute tooth along inner margin (fig. 35:45) ..... *Prasinalia*
- Epipleuron not toothed (fig. 38:45); tarsomere 1 subequal to 5 or shorter; metacoxa of male without acute tooth along inner margin (fig. 36:45) 23

23(22). Protrochanter without distinct tooth (fig. 33:45); antennameres 4-10 of males parallel- .. sided (fig. 39:45) ..... *Hippomelas*
- Protrochanter with distinct acute tooth (fig. 41:45); antennameres 4-10 of male triangular with roundly truncate margin (fig. 42:45) ..... *Barrellus*

24(20). Lateral margin of pronotum carinate in posterior half; epipleuron carinate basally; hind ... margin of abdominal sterna 2-4 notched near sides (fig. 26:45) ..... *Nanularia*
— Lateral margin of pronotum without carina; epipleuron without sublateral carina; hind margin of abdominal sterna 2-4 entire (fig. 27:45) ..... *Ampheremus*

25(19). Metacoxal plates slightly dilated medially, hind margin weakly oblique (fig. 43:45); . antennae usually not extending beyond anterior third of pronotum when laid alongside, outer .. antennameres transverse (fig. 46:45) (Agaeocerina) ..... *Agaeocera*
— Metacoxal plates strongly dilated medially, hind margin strongly oblique (fig. 18:45); antennae usually extending beyond anterior third of pronotum when laid alongside, outer antennameres usually elongate-triangular (fig. 47:45) 26

26(25). Terminal segment of maxillary palpi slender (fig. 45:45) 27
— Terminal segment of maxillary palpi broadened (fig. 44:45) (Psilopterina) 29

27(26). Elytral apex sharply bidentate; last visible abdominal sternum with thin rectangular lobe .. filling apical emargination between sharp lateral teeth (Phrixiina) ..... *Spectralia*
— Elytral apex rounded and/or unidentate; last visible abdominal sternum not as above (Chalcophorina) 28

28(27). Pronotum unisulcate; apical third of elytral margins strongly serrate ..... *Texania*
— Pronotum bisulcate, midline more or less costuliform; apical third of elytral margins entire or finely serrate ..... *Chalcophora*

29(26). Metatarsomere 1 longer than 2; outer antennameres regularly triangular (fig. 47:45) 30
— Metatarsomere 1 subequal in length to 2; outer antennameres somewhat to distinctly truncate along external margin (fig. 48:45) ..... *Lampetis*

30(29). Scutellum rounded; pronotum variably longitudinally sulcate in midline ..... *Dicerca*
— Scutellum broader than long; pronotum with median longitudinal ridge or smooth line ..... *Poecilonota*

31(18). Prosternal process not or only slightly widened behind front coxae 32
— Prosternal process strongly widened behind front coxae (fig. 50:45) ..... *Juniperella*

32(31). Elytra not striate but regularly costate; prosternum impressed and punctate along middle ... *Cypriacis*
— Elytra striate; prosternum convex or flattened along middle ..... *Buprestis*

33(17). Scutellum invisible; antennal grooves closed; epistoma with broad lateral lobes (Trachykelina) ..... *Trachykele*
— Scutellum visible; antennal grooves open anteriorly; epistoma without distinct lateral lobes 34

34(33). Scutellum transverse anteriorly, acuminate posteriorly; protibia with one apical spur (Sphenopterina) ..... *Sphenoptera*
— Scutellum small, not as above; protibia with two spurs 35

35(34). Mentum coriaceous in front; prothorax sinuate at posterior margin; punctation of pronotum simple (Melanophilina) 36
— Mentum entirely corneous; prothorax commonly truncate; punctation of pronotum variable 38

36(35). With mesothoracic pits next to lateral margin of middle coxal cavities (fig. 51:45); .. flattened; glabrous ..... *Melanophila*
— Without mesothoracic pits 37

37(36). Flattened; glabrous; apices of elytra acute; head and pronotum with smooth facets ... *Xenomelanophila*
— More convex; elytra with fine, short hair-like setae; apices of elytra not acute; head and pronotum without smooth facets ..... *Phaenops*

38(35). Pronotum truncate at base; antennae serrate in both sexes (Anthaxiina) 39
— Pronotum usually sinuate at base; antennae of male pectinate (Xenorhipidina) 40

39(38). Body elongate, slender, *Agrilus*-like; pronotum with medioposterior depression; vestiture . completely lacking; pygidium with margin serrate . *Agrilaxia*
— Body short, more robust, not *Agrilus*-like; pronotum without medioposterior depression; .... often with vestiture on head, elytra; pygidial margin entire . ..... *Anthaxia*

40(38). Pronotum broadly evenly rounded at sides without lateral margins ..... *Trichinorhipis*
— Pronotum quadrate with lateral margins 41

41(40). Posterior coxal plates scarcely narrowed laterally (fig. 52:45) ..... *Xenorhipis*
— Posterior coxal plates triangular, hind margin strongly oblique (fig. 53:45) ..... *Hesperorhipis*

42(16). Tarsomere 3 prolonged on each side into a long, divergent spine that extends beyond .. tarsomere 4 (fig. 54:45) (Actenodina) ..... *Actenodes*
— Tarsomere 3 truncate at apex, not extending beyond tarsomere 4 (fig. 55:45) (Chrysobothrina) 43

43(42). Eyes close together on vertex, space between them equal or less than width of eye; elytrawith distinct foveae and more or less prominent carinae along main veins; tooth on front femur right or acute angled ..... *Chrysobothris*
— Eyes widely separated on vertex, space between them almost twice or more than width of eye; elytra with distinct carinae and inconspicuous foveae; tooth on front femur short, obtuse ..... *Sphaerobothris*

Agrilinae

44(13). Tarsi elongate, at least half as long as tibia; legs neither flattened nor tightly folding (Agrilini) 45
— If tarsi longer than 2/5 of tibiae, legs flat, tightly folding against body 48

45(43). Pronotum with entire marginal carina and one submarginal carina (fig. 56:45) (Agrilina) ..... *Agrilus*
— Pronotum without submarginal carina, sometimes without any lateral carina (fig. 57:45) 46

46(45). Frons with deep longitudinal groove; pronotum without lateral carinae; body covered by squamose setae; ovipositor with ventral pair of opposing setal brushes (Coraebina) ..... *Lepismodera*
— Frons without deep longitudinal groove; pronotum with lateral carinae; body sparsely setose; ovipositor without ventral brushes 47

47(46). Antennae free in repose; anterior prosternal margin feebly bilobed (Coraebina) ..... *Eupristocerus*
— Antennae in repose received in sulci in hypomera ventral to pronotal marginal carinae; anterior prosternal margin arcuately produced medially (Rhaeboscelidina) ..... *Paragrilus*

48(44). Propleura without sulci for antennae; if femora without sulci for tibiae, then either supraantennal pits absent, or propleural suture double (Aphanisticini, Aphanisticina) ..... *Aphanisticus*
— Propleura with deep sulci for antennae; or femora without sulci for tibiae; supraantennal pits present, and propleural suture simple (Trachydini) 49

49(48). Tibiae not markedly flattened 50
— Tibiae strongly flattened; scutellum large, triangular (Pachyschelina) ..... *Pachyschelus*

50(49). Propleura without antennal sulci (Trachydina) .... *Trachys*
— Propleura with deep sulci for antennae (fig. 58:45) 51

51(50). Prosternal process rounded or truncated apically (Leiopleurina) ..... *Leiopleura*
— Prosternal process pointed at apex (fig. 58:45) (Brachydina) 52

52(51). Body broad, ovate, less than 2.0X longer than wide; elytra with sublateral carina extending from humerus to near apex; prosternal process sulcate (fig. 58:45) ..... *Brachys*
— Body narrow, elongate, at least 2.4X longer than wide; elytra without sublateral carina; prosternal process not sulcate ..... *Taphrocerus*

Classification of the Nearctic Genera

Buprestidae

Polycestinae

Polycestini

Ptosimina

Ptosima Serville in Dejean, 1833, 4 spp., Eastern and midwestern United States to Texas (key to spp. Nelson, 1978; notes Cobos, 1980)

Polycestina

Polycesta Solier, 1833, 12 spp., Pennsylvania, Alabama, Arkansas, Florida, Missouri, Oklahoma, Texas, Arizona, and California (key to spp., Barr, 1949; notes Cobos, 1981).
Subgenus *Arizonica* Cobos, 1981
Subgenus *Nelsonella* Cobos, 1981
Subgenus *Tularensia* Nelson, 1997

Polyctesina

Chrysophana LeConte, 1859, 2 spp., Arizona, California, Colorado, Idaho, Oregon, Washington and British Columbia (key to spp., Barr in Hatch, 1971).

Beerellus Nelson, 1982, 1 sp. *B. taxodii* Nelson, 1982, from *Taxodium*, Georgia.

Thrincopygini

Thrincopygina

Thrincopyge LeConte, 1858, 2 spp. in *Dasylirion* and *Nolina* (Agavaceae) Texas, New Mexico, Arizona (key to spp., Nelson, 1980).

Acmaeoderini

Acmaeoderina

Acmaeodera Eschscholtz, 1829, 144 spp., widely distributed, mostly in southwestern United States, many species visit flowers (key to spp., Fall, 1899).

Squamodera Nelson, 1996, 4 spp., Arizona, California, and Nevada (key to spp. Nelson, 1996).

Acmaeoderopsis Barr, 1974, 12 ssp., Arizona, California, New Mexico, and Texas.

Anambodera Barr, 1974, 6 spp., Arizona, California, Idaho, Nevada, Oregon, and Washington.

Acmaeoderoidini

Acmaeoderoidina

Acmaeoderoides Van Dyke, 1942, 11 spp., Arizona, California, and Texas (key to spp. Nelson, 1968).

Tyndarini

Tyndarina

Tyndaris Thomson, 1857, 14 spp., Arizona, California, Florida, New Mexico, Oklahoma, and Texas (key to spp., as *Ancylotela*, Barr, 1972).
Ancylotela Auctorum
Subgenus *Paratyndaris* Fisher, 1919
Subgenus *Barberia* Cobos, 1980 (unavailable)
Subgenus *Knulliella* Cobos, 1980
Subgenus *Tucsonia* Cobos, 1980 (unavailable)

Mastogeniini

Mastogeniina

Mastogenius Solier, 1850, 5 spp., Connecticut, New Jersey, Indiana, Florida, Texas, and Arizona (key to spp., Nelson 1985; notes, Bellamy, 1991).
Haplostethus LeConte, 1859

Trigonogya Schaeffer, 1918, 1 sp., *T. reticulaticollis* (Schaeffer, 1904), Texas.

Micrasta Kerremans 1893, 1 sp. *M. oakleyi* Fisher, 1935, described from Puerto Rico, has been collected in Florida (Nelson, et al., 1996).

Buprestinae

Buprestini

Chalcophorina

Chalcophora Solier, 1833, 5 spp., generally distributed except in coniferous forests throughout North America.

Texania Casey, 1909, 3 spp., New York, Pennsylvania, Indiana, Southeastern United States, Louisiana, and Texas (key to spp., as *Chalcophorella*, Casey, 1909; review Obenberger, 1942; notes Nelson, 1982).
Chalcophorella Auctorum

Agaeocerina

Agaeocera Waterhouse, 1882, 2 spp., Arizona, California, New Mexico, and Texas.
Anataxis Casey, 1909

Hippomelanina

Hippomelas Laporte and Gory, 1837, 4 spp., Arizona, New Mexico and Texas. (key to spp. Nelson and Bellamy, 1996).

Prasinalia Casey, 1909, 2 spp., Arizona and California (key to spp. Nelson and Bellamy, 1996).

Gyascutus LeConte, 1859, 12 spp., Arizona, California, Idaho, Nevada, New Mexico, Oregon, Texas, and Utah.
Subgenus *Stictocera* Casey, 1909

Barrellus Nelson and Bellamy, 1996, 1 sp. *B. femoratus* (Knull, 1941), California.

Nanularia Casey, 1909, 7 spp., Arizona, California, Idaho, Nevada, Texas, and Utah (key to spp. Bellamy, 1987)

Ampheremus Fall, 1917, 1 sp., *A. cylindricollis* Fall (1917). Arizona, California, Nevada, and New Mexico.

Psilopterina

Lampetis Dejean, 1833, 3 spp., Arizona, Colorado, Kansas, Louisiana, New Mexico, Oklahoma, and Texas (key to spp., Nelson, 1986; notes, Kurosawa, 1993).
Psiloptera Auctorum
Subgenus *Spinthoptera* Casey, 1909

Dicerca Eschscholtz, 1829, 24 spp., occurs widely from Alaska, most Canadian Provinces and U.S. states (key to spp., Nelson, 1975).
Stenuris Kirby, 1837

Poecilonota Eschscholtz, 1929, 9 spp., widely distributed (key to spp., Evans, 1957).
Analampis Dejean, 1836
Polydora Gistel, 1848
Descarpentriesiola Lerault, 1983

Phrixiina

Spectralia Casey, 1909, 6 spp., Arizona, California, Northeastern United States to North Carolina, and Texas (key to spp., Chamberlin, 1920).
Cinyra Auctorum

Buprestina

Buprestis Linnaeus, 1758, 18 spp., generally distributed; bore into such trees as beech, cottonwood, maple, and oak, as well as various conifers (key to spp., Helfer, 1941).
Ancylocheira Eschscholtz, 1829
Anoplis Kirby, 1837
Gymnota Gistel, 1834
Subgenus *Stereosa* Casey, 1909
Subgenus *Knulliobuprestis* Kurosawa, 1988

Cypriacis Casey, 1909, 8 spp., generally distributed, hosts as in *Buprestis* (key to spp., Helfer, 1941).
Subgenus *Nelsonocheira* Kurosawa, 1988

Juniperella Knull, 1947, 1 sp., *J. mirabilis* Knull, 1947, California.

Anthaxiini

Trachykelina

Trachykele Marseul, 1865, 6 spp., Arizona, Virginia, North Carolina, Georgia, Texas, New Mexico, California, Oregon, Washington, and British Columbia (notes, Fall, 1906; key to ssp., Burke, 1920).

Melanophilina

Melanophila Eschscholtz, 1829, 5 spp., generally distributed (key to spp., Sloop, 1937; Cobos, 1987).
Apatura Laporte and Gory, 1838 (part)
Oxypteris Kirby, 1837

Phaenops Dejean, 1833, 15 spp., generally distributed (key to spp., Sloop, 1937).

Xenomelanophila Sloop, 1937, 1 sp., *X. miranda* (LeConte, 1854), Arizona, Colorado, New Mexico, Oregon, Texas, and Utah (notes, Cobos, 1987).

Xenorhipidina

Xenorhipis LeConte, 1866, 3 spp., Connecticut, New York, Ohio, Pennsylvania, Illinois, and Texas (key to spp., Horn, 1882; Obenberger, 1939).
Lamesis Westwood, 1883

Hesperorhipis Fall, 1930, 4 spp., Arizona and California.

Trichinorhipis Barr, 1948, 1 sp., *T. knulli* Barr, 1948, California.

Anthaxiina

Anthaxia Eschscholtz, 1829, 36 spp., generally distributed (key to spp., Horn, 1882; Obenberger, 1942; Cobos, 1958).
Subgenus *Haplanthaxia* Reitter, 1911 (key to spp., Cobos, 1958)
Subgenus *Melanthaxia* Rikhter, 1945 (key to spp., Cobos, 1958)

Agrilaxia Kerremans, 1903, 2 spp., widely distributed. (key to spp., Cobos, 1971).

Sphenopterina

Sphenoptera Dejean 1833, 1 sp., *S. jugoslavica* Obenberger, 1926, introduced from Eastern Europe to control diffuse knapweed, *Centaurea diffusa*, in the Pacific Northwest (notes Nelson, 1982; Rees, et al., 1996).
Subgenus *Chilostetha* Jakovlev, 1889

Chrysobothrini

Chrysobothrina

Chrysobothris Eschscholtz, 1829, 134 spp., generally distributed (key to spp., Fisher, 1942).
Amblis Gistel, 1834
Odonotomus Kirby, 1837

Enocys Gistel, 1856
Knowltonia Fisher, 1935
Ceratobothris Pochon, 1972

Sphaerobothris Semenov-Tian-Shanskij and Rikhter, 1934, 2 spp. Arizona, California, Texas (key to spp., Bellamy and Volkovitsh, 1997).

Actenodes Lacordaire, 1857, 9 spp., widely distributed (key to spp., Nelson, 1979).

Agrilinae

Agrilini

Coraebina

Eupristocerus Deyrolle, 1864, 1 sp., *E. cogitans* (Weber, 1801), Eastern United States.
Coraebus LeConte, 1859, not Laporte and Gory, 1839.

Lepismadora Velten, 1987, 1 sp. *L. algodones* Velten (1987), California (Velten and Bellamy, 1987).

Agrilina

Agrilus Curtis, 1825, 171 spp., generally distributed; a few species occur on raspberries and blackberries; most species are wood borers (key to spp., Fisher, 1928; notes, Bellamy 1996a). At least four imigrant species from the eastern or western Palaearctic region are established in the Nearctic fauna and one species, *A. hyperici* (Creutzer, 1789), was introduced to control St. John's Wort, *Hypericum perforatum* in the Pacific Northwest (notes, Rees, et al., 1996).
Subgenus *Engyaulus* Waterhouse, 1889, (key to spp. Nelson and Westcott, 1991).

Rhaeboscelidina

Paragrilus Saunders, 1871, 2 spp., Eastern United States, Florida, and Texas.
Rhaeboscelis LeConte, 1863, not Chevrolat, 1837
Clinocera Deyrolle, 1864, not Meigen, 1803

Aphanisticini

Aphanisticina

Aphanisticus Latreille, 1829, 1 ssp., *A. cochinchinae seminulum* Obenberger, 1929, has recently been recorded from Southern Texas (Wellso and Jackman, 1995) and Florida (Peck and Thomas, 1998).

Trachydini

Trachydina

Trachys Fabricius, 1801, 1 sp. *T. troglodytiformis*, Obenberger, 1918 [= *T. pygmaea* (F., 1787)], naturalized on hollyhock (*Althaea rosea*) in New Jersey (Linsley, 1949; Weiss 1954, Hespenheide 1968).

Pachyschelina

Pachyschelus Solier, 1833, 5 spp., Eastern and Southern United States, Arizona, New Mexico, and Texas; leaf miners in *Croton* spp. and herbaceous spp. of Fabaceae (key to spp., Nicolay and Weiss, 1920).
Metonius Say, 1836

Leiopleurina

Leiopleura Deyrolle, 1864, 1 sp., *L. otero* (Fisher, 1935), described from Cuba, has been collected in the Florida Keys (notes Nelson, et al. 1981).
Leiopleurella Fisher, 1922
Enbrachys Fisher, 1935

Brachydina

Brachys Dejean, 1833, 12 spp., Eastern United States, Arizona, Colorado, New Mexico and Texas; species are leaf miners in various hardwoods, especially *Quercus* spp. (key to spp., Nicolay, 1923).

Taphrocerus Solier, 1833, 13 spp., Eastern United States to Texas, Arizona, California, and Washington; the larvae mine in *Scirpus* spp. and other Cyperaceae (key to spp., Obenberger, 1934).

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Captions

Figure 1:44, *Schizopus laetus* LeConte (from Nelson and Bellamy, 1991, with permission of Taylor & Francis Ltd.) 14.0 mm long

Figure 1:45, *Acmaeoderoides knulli* Nelson (from Nelson, 1968) 4.5 mm long

Figure 2:45, *Gyascutus* (*Stictocera*) *caelatus* (LeConte) (from Nelson and Bellamy, 1996, with permission of Taylor & Francis Ltd.) 25 mm long

Figure 3:45, *Agrilus* (*Engyaulus*) *pulchellus* Bland (from Nelson and Westcott, 1991) 10 mm long

Figures 4:45 - 11:45. Fig. 4:45, *Schizopus laetus* LeConte, metatarsus of male, ventral view; Fig. 5:45, *Beerellus taxodii* Nelson, metatarsus of female, ventral view; Fig. 6:45, *Polycesta angulosa* Duval, metatarsus of female, ventral view; Fig. 7:45, *Acmaeodera gibbula* LeConte, antenna; Fig. 8:45, *Ptosima gibbicollis* (Say), antenna, dorsal (left), ventral (right); Fig. 9:45, *Thrincopyge ambiens* (LeConte), thorax and abdomen, ventral view; Fig. 10:45. *Chalcophora georgiana* (LeConte), thoracic sternal areas; Fig. 11:45, *Polycesta angulosa* Duval, metasternal area, female. (All from Nelson, 1981)

Figures 12:45 - 23:45. Fig. 12:45, *Ptosima gibbicollis* (Say), head and pronotum, dorsal view; Fig. 13:45, *Polycesta elata* LeConte, elytral apices; Fig. 14:45, *Tyndaris olneyae* Skinner, elytral apices; Fig. 15:45, *T. olneyae*, lateral view; Fig. 16:45, *Chrysophana placida* (LeConte), lateral view; Fig. 17:45, *Beerellus taxodii* Nelson, lateral view; Fig. 18:45, *Dicerca hesperoborealis* Hatch and Beer, mesometasternal area, Epm2=mesepimeron, Eps3=metepisternum, Epp=epipleuron; Fig. 19:45, *Buprestis maculativentris* Say, mesometasternal area, Epm2=mesepimeron, Eps3=metepisternum; Fig. 20:45, *Agrilus cavifrons* Waterhouse, ventral view; Fig. 21:45, *A. cavifrons*, dorsal view; Fig. 22:45, *Mastogenius robustus* Schaeffer, dorsal view; Fig. 23:45, *Chrysobothris octocola* LeConte, thoracic sternal areas. (Figures 12:45 - 22:45 from Nelson, 1981)

Figures 24:45 - 36:45. Fig. 24:45, *Nanularia*, head, anterior view; Fig. 25:45, *Nanularia*, left, *Ampheremus*, right, elytral apices; Fig. 26:45, *Nanularia*, lateral view; Fig. 27:45, *Ampheremus*, lateral view; Fig. 28:45, *Ampheremus*, left, *Nanularia*, right, antennae; Figs. 29:45 - 31:45, *Gyascutus* (s.str.) *planicosta* (LeConte), 29:45, protibia; 30:45, protrochanter; 31:45, antennamere 11; Figs. 32:45 - 34:45, *Hippomelas sphenicus* (LeConte), 32:45, protibia; 33:45, protrochanter; 34:45, antennamere 11; Fig. 35:45, *Prasinalia cuneata* (Horn), metacoxa of male; Fig. 36:45, *Gyascutus* (*Stictocera*) *caelatus* (LeConte), metacoxa of male. (From Nelson and Bellamy, 1996, with permission of Taylor & Francis Ltd.)

Figures 37:45 - 42:45. Fig. 37:45, *Prasinalia cuneata* (Horn), left epipleuron; Fig. 38:45, *Hippomelas sphenicus* (LeConte), left epipleuron; Fig. 39:45, *H. aeneocupreus* Kerremans, antenna of male; Fig. 40:45, *H. saginatus* (Mannerheim), head, anterior view; Figs. 41:45 - 42:45, *Barrellus femoratus* (Knull), 41:45, front leg of male; 42:45, antenna of male. (From Nelson and Bellamy, 1996, with permission of Taylor & Francis Ltd.)

Figures 43:45 - 58:45. Fig. 43:45, *Agaeocera g. gentilis* (Horn), metasternal area of male; Fig. 44:45, *Dicerca querci* Knull, maxillary palpus; Fig. 45:45, *Buprestis* (s. str.) *maculativentris* Say, maxillary palpus; Fig. 46:45, *Agaeocera g. gentilis*, antenna of male; Fig. 47:45, *Poecilonota thureura* (Say), antenna of female; Fig. 48:45, *Lampetis* (*Spinthoptera*) *webbii* (LeConte), antenna of female; Fig. 49:45, *Buprestis* (s. str.) *rufipes* (Oliver), prosternal area of male; Fig. 50:45, *Juniperella mirabilis* Knull, prosternal area of female; Fig. 51:45, *Melanophila acuminata* (DeGeer), meso-metasternal area; Fig. 52:45, *Xenorhipis brendeli* LeConte, metacoxa of female; Fig. 53:45, *Hesperorhipis mirabilis* Knull, metacoxa of female; Fig. 54:45, *Actenodes calcarata* (Chevrolat), protarsus; Fig. 55:45, *Chrysobothris octocola* LeConte, protarsus; Fig. 56:45, *Agrilus cavifrons* Waterhouse, lateral view; Fig. 57:45, *Eupristocerus cogitans* (Weber), lateral view; Fig. 58:45, *Brachys floccosus* Mannerheim, ventral view. (Figures 43:45 - 48:45; 51:45; 56:45 - 58:45 from Nelson, 1981)\

*Acknowledgements
The authors of the chapters on Schizopodidae and Buprestidae would like to thank Svatopluk Bílý, Jerry Davidson, Henry Hespenheide, Ted MacRae and Rick Westcott for comments and contributions which improved the text.

Julodinae Lacordaire, 1857
Polycestinae Lacordaire, 1857
Buprestinae Leach, 1815
Agrilinae Laporte, 1835

* Acknowledgements