The Buprestidae (Coleoptera) of Missouri

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Abstract

The distribution and seasonal occurrence of Missouri buprestids are discussed. Keys are presented for the eight subfamilies, 16 tribes, 23 genera, and 131 described species and subspecies known to occur in the state. Three additional species previously recorded from Missouri are excluded. Distribution within the state is cited by counties. Information on collecting techniques, seasonal abundance, and adult and larval host associations is presented and discussed.

Introduction

This paper represents the first comprehensive treatment of the buprestid fauna of Missouri. While this fauna has received a great deal of attention recently (Nelson and Westcott 1976; Nelson et al. 1981; Nelson 1987; Nelson and MacRae 1990), that work has focused primarily on documenting previously unknown host associations and occurrences in the state. Additional records of Missouri buprestids have been scattered amongst numerous taxonomic revisionary works. Other regional treatments of North American buprestids have been presented by Knull (1925) for Pennsylvania, Franklin and Lund (1956) for Georgia, Barr (1971) for the Pacific Northwest, Wellso et al. (1976) for Michigan, and Bright (1987) for Canada and Alaska. This paper presents keys and information on distribution, seasonal occurrence, abundance, adult and larval hosts, and collecting techniques.

The data presented are from specimens the author has examined except data which have been transcribed from specimens in the collection of Dr. Gayle H. Nelson [GHNC]. Supraspecific classification and nomenclature follows that of Nelson (1981) except where more recent revisions are available (Lerault 1983; Cobos 1986; Velten and Bellamy 1987; Kurosawa 1988; Nelson 1989). Subgenera and species are arranged alphabetically within each genus. Under each species discussion, information is presented on Missouri counties in which the species has been collected, dates of collection, and seasonal abundance. Information is also provided on host associations. Except as indicated, discussions of hosts are limited only to associations which have been determined from Missouri specimens. In cases where no host associations were determined, host information recorded for other states is presented. Undoubtedly, many of the host associations presented here represent new host records. However, no attempt is made to designate new host records as such. The phrase **larval host** indicates plants from which adults have emerged or been cut. The phrase **adult host** indicates plants on which adults have been collected. An adult host may or may not serve as a larval host (Nelson et al. 1981). Host plant nomenclature follows that of Steyermark (1963).

Data from over 7,000 specimens have been gleaned during the course of this study. They have been transcribed primarily from specimens in the author's collection [TCMC] and the collections of University of Missouri-Columbia [UMRM] and Dr. Gayle H. Nelson [GHNC]. Additional data have been transcribed from the collections of individuals and instituions listed in the acknowledgements. Abbreviations of collections [brackets] are as listed in Arnett and Samuelson (1986) or as given above.

General Information

Wellso et al. (1976) presented information on general buprestid collecting techniques. As they noted, collecting adults from caged, infested wood is an important method. In this study, over 100 separate "rearings" were conducted. In many cases, individual species of buprestids were "targeted" for collection by locating known or suspected host

plants, cutting the plants within a few months of adult activity and leaving them *in situ*, and then retrieving the cut plants after adults had the opportunity to oviposit on them. These presumably infested plants were caged and examined periodically for adult emergence. Another important collecting technique was examination of slash and logpiles from wood-cutting operations. This was especially productive for species of *Chrysobothris* and *Dicerca*,

Within Missouri, six natural divisions (Figure 1) have been identified based on geologic history, soils, topography, plant and animal distribution, and other natural features (Thom and Wilson 1980). Most of the collecting of buprestids in Missouri has taken place in the Ozark and Ozark Border regions of central, eastern, and southern Missouri. These regions are characterized primarily by dry to dry-mesic oak-hickory forests. Dominant woody plants are several species of oak (*Quercus* spp.) and hickory (*Carya* spp.), shortleaf pine (*Pinus echinata*), eastern redcedar (*Juniperus virginiana*), dogwood (*Cornus florida*), and redbud (*Cercis canadensis*). Much collecting has also been done in the Big Rivers region (Missouri and Mississippi Rivers). Wet bottomland forests dominated by pin oak (*Quercus palustris*), cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), black willow (*Salix nigra*), and river birch (*Betula nigra*) characterize this region (Nelson 1985). Although the Osage Plains (western Missouri) and the Mississippi Lowlands (extreme southeast Missouri) have been largely converted to agriculture, they do contain remnants of natural savannah and prairie habitats favorable to certain buprestids and have been well collected in recent years. The Glaciated Plains (northern Missouri) have been extensively converted to agriculture and contain very little original habitat. As a result, little collecting has occurred in this region.

This study has recorded 127 described species (plus four subspecies), 23 genera, 16 tribes, and eight subfamilies of Missouri buprestids. Three additional species which have been recorded from Missouri (*Agrilus lacustris* LeConte, *A. sayi* Saunders, and *Chrysobothris scitula* Gory) are excluded for reasons given in the species discussion. The Missouri fauna is generally allied to that of eastern North America. Eighty-seven (67.4%) of the native Missouri species and subspecies have distributions that broadly cover that region. Most of the remaining species and subspecies have distributions that are limited to more restricted parts of North America. The majority of these (20 species) are distributed within the southeastern or south-central United States. The rest (nine species and four subspecies) are restricted to the northern or northeastern United States. Seven Missouri species have transcontinental distributions, and there are two exotic species established in Missouri.

The species list included in this paper is presumed to be fairly comprehensive. There are, however, a number of species not included here that may occur in Missouri, particularly the southern portion of the state. These include: *Ptosima idolynae* Frost on *Crataegus* spp. or *Gleditsia triacanthos*; *Dicerca caudata* LeConte and *Eupristocerus cogitans* (Weber) on *Alnus serrulata*; *Dicerca spreta* (Gory) on *Nyssa sylvatica*; *Dicerca punctulata* (Schönheer), *Buprestis apricans* Herbst, *B. salisburyensis* (Herbst), *B. maculativentris* Say, *B. consularis* Gory, and *Chrysobothris pusilla* Laporte and Gory on *Pinus echinata*; *C. sloicola* Manley and Wellso on *Prunus americana*; *Agrilus impexus* Horn on *Gleditsia triacanthos* or *Robinia pseudoacacia*; *A. lacustris* LeConte on *Croton capitatus*; *Pachyschelus confusus* Wellso and Manley on *Lespedeza* spp.; and *Brachys tesselatus* Fabricius on *Quercus* spp. in extreme southeast Missouri. *Sapindus drummondii* may occur in extreme southwest Missouri, in which case *Agrilus limpiae* Knull, *A. ornatulus* Horn, and *A. scitulus* Horn might be found associated with it.

Key to Missouri Subfamilies of Buprestidae

1. Sternal cavity for reception of prosternal process formed entirely by mesosternum 2
1'. Sternal cavity for reception of prosternal process attaining or formed in part by metasternum 3

2(1). Lobulated antennomeres with sensory pores in part concentrated in fossae at least on 1 surface of apical segments ..... Polycestinae
2'. Lobulated antennomeres with sensory pores diffuse, without vestiges of fossae or depressions on dorsal or ventral surface . Acmaeoderinae

3(1'). Sternal cavity for reception of prosternal process formed laterally by mesosternum, apically by metasternum, mesosternum normally developed 4

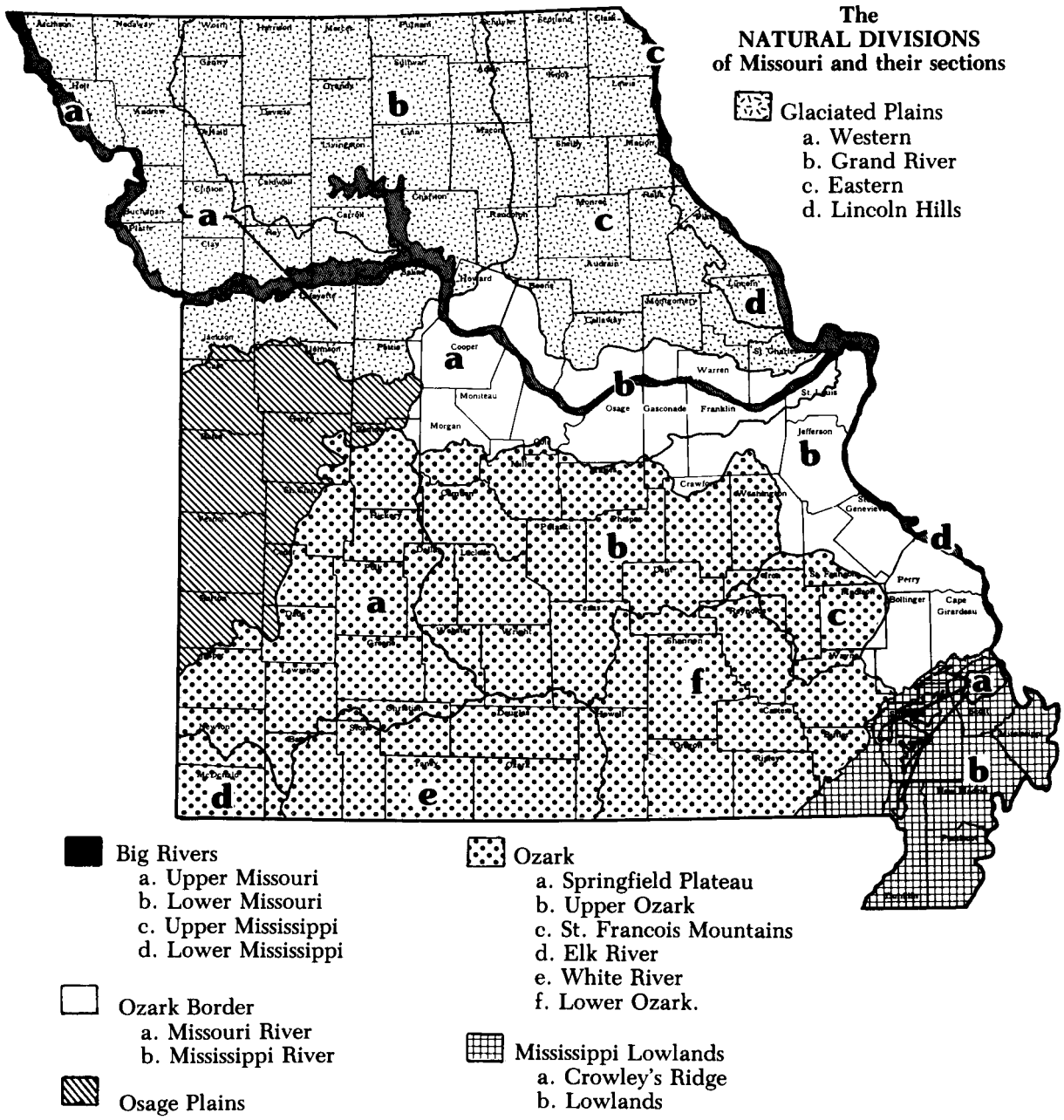

Figure 1. The natural divisions of Missouri and their sections.

3'. Sternal cavity for prosternal process formed almost entirely by metasternum, mesosternum reduced in size, very short 7

4(3). Antero-lateral projection of abdomen narrow, not covering exposed part of metepimeron 5

4'. Antero-lateral projection of abdomen broader, partially covering metepimeron 6

5(4). Antennal pores either diffuse on 2 surfaces of lobed antennomeres, or along outer border, especially on ventral surface, or sometimes condensed in a depression or multiple foveae

along this border and in this case there may be an apical depression; pronoto-elytral articulation overlapping in middle, usually not so on lateral outer half where they abut simply ..... Chalcophorinae

5'. Antennal pores mainly concentrated in single well defined foveae, either apical or ventral, on each lobed antennomere; pronoto-elytral articulation usually overlapping to lateral border ..... Buprestinae, part

6(4'). Eyes feebly convergent above on vertex; third antennomere at most slightly longer than fourth ..... Buprestinae, part

6'. Eyes strongly convergent above on vertex; third antennomere 1.5-4 times longer than the fourth ..... Chrysobothrinae

7(3'). Front of head not constricted by insertion of antennae; pronotum truncate at base ..... Mastogeninae

7'. Front of head constricted by insertion of antennae; pronotum lobed at base 8

8(7). Body narrowly elongate; mesocoxae not appreciably more separated than procoxae; anterior margin of metacoxae noticeably concave; tarsi elongate ..... Agrilinae

8'. Body triangular or oval; mesocoxae appreciably more separated than procoxae; anterior margin of metacoxae very little concave; tarsi very short ..... Trachyinae

Subfamily Polycestinae
Key to Missouri Tribes of Polycestinae

1. Posterior margin of pronotum without row of rasp-like grooves ..... Polycestini

1'. Posterior margin of pronotum with row of rasp-like grooves ..... Ptosimini

Tribe Polycestini
Genus *Polycesta*

Polycesta elata LeConte - 3 specimens taken in Gasconade and Stone Counties. Nelson et al. (1981) reported a specimen from Douglas County. Seasonal occurrence: 11 May-26 September. No Missouri host associations were determined. Camberlin (1933) lists several *Quercus* spp. as adult hosts.

Tribe Ptosimini
Genus *Ptosima*
Key to Missouri Species of *Ptosima*

1. Disk of pronotum without distinct impressions; color blue or black, elytral markings bright yellow, as antereolateral spots and 1 spot on each elytron towards apex ..... *P. gibbicollis* (Say)

1'. Disk of pronotum with three distinct depressions; color black with aeneous or cupreous tints, disk of each elytron with 3 or 4 small stramineous spots ... *P. walshii* LeConte

Ptosima gibbicollis (Say) - 175 specimens taken in Barry, Boone, Cape Girardeau, Clay, Douglas, Franklin, Greene, Jackson, Jasper, Jefferson, Montgomery, Oregon, St. Francois, St. Louis, Ste. Genevieve, and Warren Counties. Seasonal occurrence: 15 April-9 July, most abundant mid-May through early-June. Adults were taken on the foliage of *Cercis canadensis*. Adults were also cut during winter or found emerging from dead branches of this plant.

Ptosima walshii LeConte - 3 specimens taken in Boone and Randolph Counties (Nelson 1978). Seasonal occurrence: 21 April-14 May. Nelson et al. (1981) reported *Quercus macrocarpa* as an adult host.

Subfamily Acmaeoderinae
Tribe Acmaeoderini
Genus *Acmaeodera*
Key to Missouri Species of *Acmaeodera*

1. Fifth abdominal sternite with thin subapical plate 2

1'. Fifth abdominal sternite without subapical plate 4

2(1). Elytra bluish with scattered small yellow spots ..... *A. ornata* (Fabricius)

2'. Elytra bronzed with transversely elongate yellow markings 3

3(2'). Pronotum with a lateral yellow spot; form stouter, length greater than 7 mm ..... *A. pulchella* (Herbst)

3'. Pronotum without lateral yellow spot; form narrower, length less than 7 mm ..... *A. texana* LeConte

4(1'). Dorsal surface less shining; elytral striae more narrowly separated, distinctly impressed; yellow spots confluent; frons convex, feebly impressed ..... *A. neglecta* Fall

4' Dorsal surface more shining; elytral striae more widely separated, feebly impressed; yellow spots distinctly separated; frons impressed ..... *A. tubulus* (Fabricius)

Acmaeodera neglecta Fall - 94 specimens taken in Benton, Carter, Dent, Douglas, Franklin, Jefferson, Maries, St. Clair, St. Francois, St. Louis, Shannon, and Taney Counties. Seasonal occurrence: 3 April-24 June, most abundant late-April through May. Nelson (1987) reported as adult hosts flowers of *Coreopsis lanceolata, Fragaria virginiana,* and *Lithospermum canescens.* Additional adult hosts include flowers of *Amelanchier arborea, Antennaria plantaginifolia, Chrysanthemum leucanthemum, Cornus florida, Dentaria laciniata, Hypoxis hirsuta, Oxalis violacea, Penstemon purpurea cobaea, Potentilla simplex, Ranunculus harveyi, Rosa carolina, R. setigera, Rudbeckia* sp., *Senecio* sp., *Stylosanthes biflora, Taraxacum officinale,* and *Viburnum rufidulum.* One specimen was labeled "host *Quercus alba.*"

Acmaeodera ornata (Fabricius) - 113 specimens taken in Barry, Callaway, Camden, Carter, Christian, Douglas, Franklin, Jefferson, St. Francois, St. Louis, Ste. Genevieve, Shannon, Stoddard, Taney, Texas, and Warren Counties. Seasonal occurrence: 3 April-5 July, most abundant late-April through early-June. Nelson (1987) reported as adult hosts flowers of *Geranium maculatum, Potentilla simplex, Rosa carolina,* and *Taraxacum officinale.* Additional adult hosts include dead *Quercus alba* and flowers of *Amelanchier arborea, Coreopsis lanceolata, Cornus florida, Echinacea pallida, Erigeron* sp., *Helianthus* sp., *Hypoxis hirsuta, Lithospermum canescens, Parthenium integrifolium, Potentilla recta, Prunus americana, Rosa multiflora, R. setigera, Rubus* sp., *Rudbeckia hirta, Senecio obovatus, S. platensis, Stylophorum diphyllum, Taenidia integgerima,* and *Viburnum rufidulum.*

Acmaeodera pulchella (Herbst) - 405 specimens taken in Adair, Atchison, Barry, Benton, Boone, Butler, Callaway, Camden, Cape Girardeau, Carter, Cass, Clark, Clay, Cole, Cooper, Crawford, Dallas, Dent, Franklin, Greene, Henry, Howard, Howell, Iron, Jackson, Jefferson, Lincoln, Maries, McDonald, Miller, Montgomery, Morgan, Newton, Nodaway, Oregon, Pettis, Phelps, Pike, Polk, Pulaski, Randolph, Ray, St. Charles, St. Clair, St. Francois, St. Louis, Ste. Genevieve, Scott, Shannon, Stoddard, Stone, Taney, Texas, Vernon, Wayne, and Wright Counties. Seasonal occurrence: 23 May-17 August, most abundant mid-June through July. Nelson (1987) reported as adult hosts flowers of *Carduus nutans, Erigeron* sp., *Ludwigia alternifolia, Rudbeckia missouriensis, R. triloba,* and *Ruellia strepens.* Additional adult hosts include dead *Acer saccharinum, Diospyros virginiana,* and *Quercus alba*; and flowers of *Ratibida pinnata, Apocynum cannabinum, Asclepias tuberosus, Coreopsis* sp., *Helianthus tuberosus, Tephrosia virginiana, Verbesina alternifolia,* and *Vernonia baldwini.* One specimen emerged from dead *Gleditsia triacanthos,* and Nelson (pers. comm.) has collected this species emerging from dead *Crataegus* sp.

Acmaeodera texana Horn - 83 specimens taken in Carter, Crawford, Franklin, Jefferson, Maries, St. Francois, St. Louis, and Stoddard Counties. Seasonal occurrence: 10 June-29 July. Nelson (1987) reported an adult host, flowers of *Ruellia strepens.* Additional adult hosts include flowers of *Cassia fasciculata, Hypericum perfoliatum, Linum sulcatum, Rosa carolina, Ruellia humilis, Stylosanthes biflora,* and *Tephrosia virginiana.*

Acmaeodera tubulus (Fabricius) - 487 specimens taken in Adair, Barry, Barton, Benton, Boone, Callaway, Camden, Cape Girardeau, Carter, Christian, Clay, Crawford, Dent, Douglas, Franklin, Gasconade, Henry, Howell, Iron, Jackson, Jefferson, Johnson, McDonald, Miller, Montgomery, Morgan, Newton, Oregon, Pettis, Phelps, Polk, Pulaski, Randolph, Reynolds, St. Charles, St. Clair, St. Francois, St. Louis, Ste. Genevieve, Shannon, Stoddard, Taney, Texas, Warren, Wayne, and Wright Counties. Seasonal occurrence: 3 April-29 July, most abundant late-April through June. Nelson (1987) reported as adult hosts flowers of *Hydrophyllum appendiculatum, Phlox pilosa, Potentilla simplex, Rosa carolina, R. setigera, Ruellia strepens, Taraxacum officinale,* and *Verbena canadensis.* Additional adult hosts include *Quercus velutina*; dead *Carya* sp., *Juglans nigra, Juniperus virginiana,* and *Taxodium distichum*; and flowers of *Amelanchier arborea, Anemonella thalictroides, Centaurium maculosum, Chrysanthemum leucanthemum, Cornus drummondi, C. florida, Crataegus* sp., *Daucus carota, Dentaria laciniata, Fragaria* sp., *Geranium maculatum, Hypericum perforatum, Hypoxis hirsuta, Iris* sp., *Krigia virginica, Linum sulcatum, Lithospermum canescens, Monarda russelliana, Opuntia compressa, Oxalis* sp., *Penstemon coboea purpurea, P. digitalis, Prunus americana, Rubus* sp., *Ranuncu-*

lus harveyi, Ruellia humilis, Sassafras alba, Schrankia uncincta, Scutellaria incana, Senecio obovatus, S. plattensis, Stylophorum diphyllum, Tradescantia sp., and *Viburnum rufidulum*. Larval hosts include dead branches of *Carya glabra, C. tomentosa, Celtis occidentalis, Cercis canadensis, Gleditsia triacanthos, Ostrya virginiana, Salix* sp., and *Ulmus rubra*.

Subfamily Mastogeninae
Tribe Mastogenini
Genus *Mastogenius*
Key to Missouri Species of *Mastogenius*

1. Elytra black; thorax rugose, pubescent, lateral margins strongly and abruptly arcuate; front strongly convex with broad, deep median channel ..... *M. crenulatus* Knull
1'. Elytra black with violaceous luster; thorax punctate, glabrous, lateral margins only slightly arcuate; front slightly, broadly convex with shallow median channel .... *M. subcyaneus* (LeConte)

Mastogenius crenulatus Knull - 1 specimen taken in Boone County. Seasonal occurrence: 12 May (Nelson and MacRae 1990). No Missouri host associations were determined. Hespenheide (1973) collected this species emerging from branches of *Cercis canadensis*, and Knull (1974) reported *Acer saccharum, Quercus* sp., and *Salix* sp. as adult hosts.

Mastogenius subcyaneus (LeConte) - 1 specimen taken in Camden County. Seasonal occurrence: 10 June (Nelson et al. 1981). No Missouri host associations were determined. Knull (1922) recorded dead branches of *Quercus* sp. as a larval host.

Subfamily Chalcophorinae
Key to Missouri Tribes of Chalcophorinae

1. First metatarsal segment about twice as long as second ..... Chalcophorini
1'. First metatarsal segment subequal to second . ..... Psilopterini

Tribe Chalcophorini
Key to Missouri Genera of Chalcophorini

1. Pronotum elevated medially .. *Chalcophora*
1'. Pronotum grooved medially ..... *Texania*

Genus *Chalcophora*

Chalcophora virginiensis (Drury) - 27 specimens taken in Boone, Carter, St. Louis, Stone, Vernon, and Wayne Counties. Seasonal occurrence: 12 May-12 November. The majority of these specimens were collected in Carter County on trunks of fallen *Pinus echinata*.

Genus *Texania*
Key to Missouri Species of *Texania*

1. Lateral serrations of elytra coarse near apices ..... *T. campestris* (Say)
1'. Lateral serrations of elytra fine near apices 2

2(1'). Pronotum with lateral margins subparallel near base, abruptly convergent in front of middle; median sulcus of pronotum broad .... *T. fulleri* (Horn)
2'. Pronotum with lateral margins convergent from base to apex; median sulcus of pronotum limited to a fine line on a smooth median line ..... *T. langeri* (Chevrolat)

Texania campestris (Say) - 19 specimens taken in Barry, Boone, Camden, Dunklin, Jefferson, Maries, Platte, Pulaski, St. Francois, St. Louis, Warren, and Wayne Counties. Seasonal occurrence: 24 April-26 July. 1 specimen was collected on the trunk of fire-killed *Quercus* sp.

Texania fulleri (Horn) - Nelson (pers. comm.) reports one male specimen in his collection labeled "Columbia" (Boone County). The only recorded host association for this species is a female ovipositing at the base of the trunk of a standing dead *Celtis laevigata* in Texas (Nelson and MacRae 1990).

Texania langeri (Chevrolat) - 2 specimens taken in Boone and Clay Counties. Seasonal occurrence: 7 June (Nelson et al. 1981). No host associations are known for this species.

Tribe Psilopterini
Genus *Psiloptera*
Subgenus *Lampetis*

Psiloptera drummondi Laporte & Gory - No specimens of this species have been examined from Missouri. Kerremans (1910) and Nelson (1986) reported this species from "Missouri," however, its occurrence should be verified. Specimens were examined from as near as Riley County, Kansas [KSUC]. No larval hosts are known, however,

adults have been associated with *Petalostemon multiflorum* in Kansas (Marlatt 1891) and *Euphorbia* sp. in Louisiana (Nelson 1986).

Subfamily Buprestinae
Key to Missouri Tribes of Buprestinae

1. Antero-lateral projection of abdomen narrow, not covering exposed part of metepimeron 2
1'. Antero-lateral projection of abdomen broader, partially covering metepimeron 3

2(1). Antennal cavities large, usually deep and bordered above by well developed ridge; last segment of maxillary palpus enlarged, triangular or oval; epipleuron forming angulate junction with mesepimeron and metepisternum; above commonly marked by smooth raised reliefs ..... Dicercini
2'. Antennal cavities small, usually shallow; last segment of maxillary palpus cylindrical or slightly expanded apically; epipleuron not angulate at junction of mesepimeron and metepisternum; above smooth or costate, usually without distinct smooth raised reliefs ..... Buprestini

3(1'). Base of pronotum sinuate; punctation of disk not reticulated; mentum coriaceous in front ..... Melanophilini
3'. Base of pronotum subrectangular; punctation of disk reticulated, at least laterally; mentum entirely corneous 4

4(3'). Prothorax truncate at base; front not margined over antennal insertions; both sexes with antennae serrate ..... Anthaxiini
4'. Prothorax sinuate at base; front slightly margined over antennal insertions; male with antennae flabellate ..... Xenorhipini

Tribe Dicercini
Key to Missouri Genera of Dicercini

1. Body narrow, subcylindrical; first metatarsomere longer than second ..... *Spectralia*
1'. Body broad, flattened; first metatarsomere not longer than second 2

2(1'). Pronotum closely punctate or depressed on midline; elytral apices not distinctly prolonged, or if prolonged, not distinctly more reddish than the remainder of the elytra ..... *Dicerca*
2'. Pronotum with a median longitudinal ridge; elytral apices prolonged and more reddish than the remainder of the elytra ..... *Descarpentriesina*

Genus *Dicerca*
Key to Missouri Species of *Dicerca*

1. Tip of elytron entire, truncate, weakly bidentate, or produced at suture 2
1'. Tip of elytron strongly bidentate 4

2(1). Prosternal process slightly convex (male) or flattened (female); upper surface with raised areas inconspicuous ... *D. mutica* LeConte
2'. Prosternal process slightly to strongly concave, or if flattened; upper surface with raised areas conspicuous 3

3(2'). Median channel of pronotum faintly indicated; punctures of upper surface moderate laterally and less rugose ..... *D. divaricata* (Say)
3'. Median channel of pronotum well-developed; punctures of upper surface generally coarse laterally and more rugose ..... *D. tenebrica* (Kirby)

4(1'). Elytral tips distinctly prolonged ..... *D. pugionata* (Germar)
4'. Elytral tips not or but faintly prolonged .. 5

5(4'). Raised smooth areas of pronotum and elytra distinctly indicated 6
5'. Raised smooth areas feebly indicated 7

6(5). Transverse smooth callous between eyes strongly indicated; body moderately robust, color aeneous usually with a greenish tinge, punctate areas coarse and rugose ..... *D. asperata* (Laporte & Gory)
6'. Transverse smooth callous between eyes feebly indicated; body narrow, brassy cupreous, punctate areas moderate and quite uniform ..... *D. lepida* LeConte

7(5'). Hind coxal plate indistinctly notched without tooth; pronotal margins subparallel to beyond middle, then converging to apex ..... *D. lurida* (Fabricius)
7'. Hind coxal plate notched with tooth on outer side of notch; pronotal margins narrowed from base ..... *D. obscura* (Fabricius)

Dicerca asperata (Laporte & Gory) - No specimens of this species have been seen from Missouri, however, Nelson (1975) reported it from south-

central Missouri. No Missouri host associations were determined. Nelson (1975) records *Quercus* sp. as a larval host.

Dicerca divaricata (Say) - 6 specimens taken in Boone, Callaway, Morgan, and St. Charles Counties. Seasonal occurrence: 21 April-11 June. 1 specimen was collected on 12 February under loose bark. No Missouri host associations were determined. Numerous larval and adult hosts have been reported, including *Acer* spp., *Betula* spp., *Cercis canadensis*, *Fagus grandifolia*, *Fraxinus* spp., *Ostrya virginiana*, *Prunus* sp., *Quercus* spp., and *Ulmus americana* (Knull 1920, 1932, Nelson 1975).

Dicerca lepida LeConte - Nelson et al. (1981) reported 1 specimen taken in Boone County on 21 April. No Missouri host associations were determined, but known larval hosts are *Ostrya virginiana* (Knull 1920) and dead *Crataegus coccinea* (Knull 1922).

Dicerca lurida (Fabricius) - 127 specimens taken in Adair, Andrew, Barry, Boone, Caldwell, Carter, Clay, Cole, Crawford, Dent, Franklin, Iron, Jackson, Jefferson, Johnson, Lafayette, Miller, Oregon, Pike, Polk, St. Louis, Ste. Genevieve, Stone, Taney, Washington, and Wright Counties. Seasonal occurrence: 14 April-2 November. Adult hosts include fire-injured *Carya* sp.; and dead *C. ovata* and *Quercus falcata*. Larval hosts include dead *C. glabra* (Nelson and MacRae 1990) and *Carpinus caroliniana*.

Dicerca mutica LeConte - Nelson et al. (1981) reported 2 specimens of this rare species taken in Clay and St. Louis Counties. Seasonal occurrence: 19 May and 29 June. The Clay County specimen was collected on *Acer saccharum*.

Dicerca obscura (Fabricius) - 93 specimens taken in Andrew, Boone, Butler, Callaway, Cape Girardeau, Cole, Franklin, Gasconade, Henry, Iron, Jackson, Jasper, Jefferson, Mississippi, Montgomery, New Madrid, Newton, Ozark, Pike, Polk, St. Louis, Shannon, Stoddard, Taney, and Wayne Counties. Seasonal occurrence: 10 April-24 November, more abundant May-June and August-October. Many of the specimens were beaten from *Diospyros virginiana*, a known host. Adults have also been taken during winter under the bark of dead trees, including *Ulmus* sp. and *Pinus echinata*.

Dicerca pugionata (Germar) - 98 specimens taken in Jefferson, St. Francois, Shannon, and Wayne Counties. Nelson et al. (1981) reported a specimen from Reynolds County. Seasonal occurrence: 3 April-22 June and 11 September-9 October. All of the specimens were collected on branches of living *Physocarpus opulifolius intermedius*. This host species normally occurs on gravel bars and rocky banks and bluffs along streams and moist thickets (Steyermark 1963). However, it rarely occurs in dry, rocky, wooded ravines intersecting dolomitic glades. *D. pugionata* was associated almost exclusively with plants growing in the latter situation, and damage from this insect could be found at the base of these plants (larval host).

Dicerca tenebrica (Kirby) - 1 specimen taken in Mississippi County. Seasonal occurrence: 13 August (Nelson and MacRae 1990). No Missouri host associations were determined, but it is known to breed in *Populus* spp., including *P. deltoides* (Nelson 1975).

Genus *Descarpentriesina* Key to Missouri Species of *Descarpentriesina*

1. Lateral carinae of prosternal process terminating at anterior angles of procoxal cavities; male with projected outline of fifth abdominal sternite equal to or longer than equilateral; elytral apices not elongate, slightly metallic; female with fifth abdominal sternite longer than equilateral, apical emargination feeble ..... *D. ferrea* (Melsheimer)

1'. Prosternal carinae extending past anterior angles of procoxal cavities and diverging slightly from them; male with fifth abdominal sternite less than equilateral; female with fifth abdominal sternite equal to or less than equilateral, apical emargination usually deep 2

2(1'). Body width usually less than two-fifths body length as measured from anterior pronotal margin to elytral apices .... *D. cyanipes* (Say)

2'. Body width equal to or greater than two-fifths body length as defined above .... *D. thureura* (Say)

Descarpentriesina cyanipes (Say) - 2 specimens labeled "Mo" were examined [UMRM]. Say (1823) first described this species from "Missouri." Evans (1957) recorded Polk, St. Louis, and Washington Counties as localities. No Missouri host associations were determined. Knull (1920) associated it with galls of *Saperda concolor* LeConte on *Populus deltoides*.

Descarpentriesina ferrea (Melsheimer) - No specimens of this species were seen. LeConte (1860) recorded this species from "Missouri." Chamberlin (1922) records *Populus* sp. as an adult host.

Descarpentriesina thureura (Say) - 3 specimens taken in Boone and Pettis Counties. Seasonal occurrence: 20 June and 4 July. Two specimens were collected on *Salix* sp. (a known larval host), the other was collected on the trunk of living *Cercis canadensis.*

Genus *Spectralia*

Spectralia gracilipes (Melsheimer) - 18 specimens taken in Boone, Henry, Jackson, Jefferson, Johnson, Newton, Polk, Randolph, St. Louis, and Vernon Counties. Seasonal occurrence: 27 May-20 July. Adults have been taken on *Quercus alba* and *Q. stellata.*

Tribe Buprestini

Key to Missouri Genera of Buprestini

1. Elytra with large punctures, dispersed or arranged in rows, not striate; apices bidentate ..... *Buprestis*
1'. Elytra with 5 costae widely separated by closely punctate intervals; apices not bidentate ... . *Cypriacis*

Genus *Buprestis*

Key to Missouri Species of *Buprestis*

1. Prosternum broadly sulcated; both sexes with protibia simple (subgenus *Stereosa*) .... *B. decora* Fabricius
1'. Prosternum not or weakly and shortly sulcated; male with protibia internally emarginate, armed with apical or subapical reflexed tooth or spine 2

2. First abdominal sternite longitudinally sulcate medially (subgenus *Buprestis*) 3
2'. First abdominal sternite not longitudinally sulcate (subgenus *Knulliobuprestis*) 4

3(2). Elytra with yellow or orange markings more or less confluent, forming longitudinal vittae; male genitalia subparallel .... *B. lineata* (Fabricius)
3'. Elytra with irregular yellow spots, sometimes confluent but never forming longitudinal vittae; male genitalia broader at base, abruptly narrowed near middle .... *B. maculipennis* Gory

4(2'). Elytra with small yellow spots isolated to slightly confluent, scattered over surface; legs iridescent green ..... *B. confluenta* Say
4'. Elytra usually with 6 large yellow markings; legs red ..... *B. rufipes* Olivier

Subgenus *Buprestis*

Buprestis lineata Fabricius - 12 specimens taken in Boone, Butler, Carter, Dent, Jefferson, and Wayne Counties. Seasonal occurrence: 8 June-4 August. Adults emerged from dead *Pinus echinata* and *P. sylvestris.*

Buprestis maculipennis Gory - No specimens of this species were seen. Nicolay and Weise (1918) and Fisher (1925) reported this species from "Missouri." Helfer (1941) records this species associated with *Pinus* spp. and *Taxodium distichum.*

Subgenus *Knulliobuprestis*

Buprestis confluenta Say - 2 specimens taken in Jasper and Nodaway Counties. Seasonal occurrence: 11 June and 3 October (Nelson and MacRae 1990). No Missouri host associations were determined. Helfer (1941) recorded it associated with injured, dead, or dying *Populus deltoides.*

Buprestis rufipes (Olivier) - 53 specimens taken in Andrew, Benton, Boone, Butler, Callaway, Cass, Clay, Cole, Gasconade, Greene, Holt, Iron, Jackson, Jasper, Jefferson, Johnson, Lafayette, Pike, Platte, Randolph, Ray, St. Clair, St. Louis, and Texas Counties. Seasonal occurrence: 7 May-30 September, more common late-June through July. Several specimens were cut from dead *Acer saccharinum* (larval host).

Subgenus *Stereosa*

Buprestis decora (Fabricius) - 1 specimen taken in Dent County on 28 April (Nelson and MacRae 1990). No Missouri host associations were determined. Helfer (1941) associates it with rotting *Pinus* spp.

Genus *Cypriacis*

Cypriacis striata (Fabricius) - No Missouri specimens were seen. Nicolay and Weise (1918) recorded this species taken on 27 November in St.

Louis County. No Missouri host associations were determined. Helfer (1941) recorded it from dead *Pinus* spp.

Tribe Anthaxiini
Genus *Anthaxia*
Key to Missouri Species of *Anthaxia*

1. Body long and narrow; clypeus long and narrow (subgenus *Agrilaxia*) .. *A. flavimana* Gory
1'. Body broad and short; clypeus broad and short (subgenus *Haplanthaxia*) 2

2(1). Tarsal claws without tooth at base 3
2'. Tarsal claws with tooth at base 4

3(2). Lateral pronotal margins each for one-fourth width of thorax differing from the disc color; elytra dark purplish-black ..... *A. viridicornis* (Say)
3'. Lateral pronotal margins each more broadly pigmented anteriorly than posteriorly and differing in color from disc; elytra uniformly bronze ..... *A. viridifrons* Gory

4(2'). Male with prothorax uniformly green; female with prothorax uniformly purple-blue, frons not entirely dark purple ..... *A. quercicola* Wellso
4'. Prothorax bronze or more than one color .. 5

5(4'). Frons green (males) 6
5'. Frons not green (females) 8

6(5). Metathoracic and abdominal sternites bronze; elytra strongly tapered at apex ..... *A. fisheri* Obenberger
6'. Metathoracic sternite green, abdominal sternites not green 7

7(6'). Elytra uniformly bronze-green to green-blue .. *A. cyanella* Gory
7'. Apical one-third of elytra bronze and blue-green ..... *A. quercata* (Fabricius)

8(5'). Elytra and front of head entirely blue ..... *A. cyanella* Gory
8'. Elytra not blue 9

9(8'). Pronotal disc bronze; elytra strongly tapered at apex ..... *A. fisheri* Obenberger
9'. Pronotal disc bronze with 2 green areas on either side of the midline and along basal margin; elytra tapered gradually at apex .. *A. quercata* (Fabricius)

Subgenus *Agrilaxia*

Anthaxia flavimana Gory - 258 specimens taken in Barry, Boone, Callaway, Camden, Carter, Dent, Franklin, Gasconade, Henry, Holt, Jackson, Jefferson, Johnson, Lincoln, Miller, Montgomery, Newton, Phelps, Polk, Randolph, St. Charles, St. Clair, St. Francois, St. Louis, Ste. Genevieve, Shannon, Stoddard, Stone, Taney, Wayne, and Wright Counties. Seasonal occurrence: 6 May-30 July, abundant late-May through June. Nelson (1987) listed an adult host, flowers of *Rudbeckia hirta*. Additional adult hosts include *Celtis occidentalis, Cercis canadensis, Juglans nigra, Quercus lyrata, Q. marilandica, Q. stellata*, and *Q. velutina*; dead *Pinus echinata*; and flowers of *Apocynum cannabinum, Ceanothus americana, Cornus drummondii, Daucus carota, Erigeron* sp., *Hydrangea arborescens, Rhus glabra, Rosa multiflora, Rudbeckia hirta, Vaccinium arboreum, and Vitis* sp.

Subgenus *Haplanthaxia*

Anthaxia cyanella Gory - 22 specimens taken in Barry, Boone, Jackson, Jefferson, and St. Louis Counties. Seasonal occurrence: 13 May-26 June. Adult hosts include *Prunus americana, Rhus aromatica, Ulmus rubra* (Nelson and MacRae 1990), *Cercis canadensis, Crataegus* sp., and *Ostrya virginiana*. Adults have emerged from dead *Amelanchier arborea* (Nelson et al. 1981) and *Vitis* sp.

Anthaxia fisheri Obenberger - 106 specimens taken in Barry, Boone, Callaway, Franklin, Henry, Jackson, Jefferson, Oregon, Randolph, St. Francois, St. Louis, Stoddard, and Stone Counties. Seasonal occurrence: 6 May-29 June. Large series have been taken on *Prunus americana* and have emerged from dead branches of this plant. Other adult hosts include *Gleditsia triacanthos* and *Acer* sp.

Anthaxia quercata (Fabricius) - 86 specimens taken in Boone, Carter, Dent, Franklin, Holt, Jefferson, Oregon, Randolph, St. Clair, St. Louis, Ste. Genevieve, Shannon, Stoddard, Stone, and Taney Counties. Seasonal occurrence: 8 May-18 July. The observations of Hespenheide (1973) were confirmed for this species in Missouri. Adults were taken on the flowers of *Rosa* sp. and *Rubus* sp.; and were beaten from *Carya tomentosa, Corylus americana, Prunus americana, Quercus coccinea, Q. palustris, Q. rubra, Q. stellata, Q. velutina*, and *Sassafrass albidum*. The only rearing was a single specimen emerged from a dead branch of *Pinus echinata*.

Anthaxia quercicola Wellso - 6 specimens taken in Boone, Callaway, Randolph, St. Louis, and Stone Counties. Nelson et al. (1981) recorded it also from Benton County. Seasonal occurrence: 12 May-23 June. Adults have been taken on *Quercus palustris* (Nelson et al. 1981) and *Gleditsia triacanthos*.

Anthaxia viridicornis (Say) - 186 specimens taken in Bollinger, Boone, Franklin, Jackson, Lewis, Reynolds, St. Louis, Shannon, and Stoddard Counties. Seasonal occurrence: 25 April-7 July, most common in May. Adults were collected only on *Salix* spp., including *S. babylonica* and dead *S. caroliniana*. Large series of this species emerged from the latter.

Anthaxia viridifrons Gory - 327 specimens taken in Barry, Boone, Callaway, Cape Girardeau, Carter, Christian, Clay, Cole, Cooper, Dade, Franklin, Henry, Jackson, Jefferson, Johnson, Lawrence, Montgomery, Newton, Oregon, Phelps, Pike, Platte, Randolph, Ray, Reynolds, St. Charles, St. Clair, St. Francois, St. Louis, Ste. Genevieve, Scott, Shannon, Stoddard, Vernon, Warren, and Webster Counties. Seasonal occurrence: 15 April-27 July, abundant May through June. Adults were collected from a variety of plants, including *Acer saccharinum, Carya* sp., *Celtis occidentalis, Cercis canadensis, Crataegus* sp., *Fraxinus americana, Quercus alba, Q. rubra, Rubus* sp., *Salix* sp., *Ulmus alata, U. americana, and U. rubra*. It emerged, however, only from dead branches of *Carya* spp. and *Ulmus* spp., including *U. rubra* (Nelson and MacRae 1990), *C. glabra, C. illinoiensis, C. ovata, C. tomentosa*, and *U. americana*.

Tribe Xenorhipini
Genus *Xenorhipis*

Xenorhipis brendeli LeConte - 2 specimens taken in Randolph (Nelson et al. 1981) and Scott Counties. Seasonal occurrence: 20 and 30 July. The Scott County specimen emerged from a dead branch of *Carya illinoensis*.

Tribe Melanophilini
Key to Missouri Genera of Melanophilini

1. Body flattened; head and thorax without smooth facets; a distinct pit contiguous to the lateral margin of the mesocoxal cavity .. *Oxypteris*
1'. Body more convex; no pit contiguous to the mesocoxal cavity ..... *Melanophila*

Genus *Oxypteris*
Key to Missouri Species of *Oxypteris*

1. Elytra black without yellow spots .... *O. acuminata*
1'. Elytra black with 6 to 8 yellow spots .... *O. notata*

Oxypteris acuminata (DeGeer) - A single Missouri specimen of this species was examined. It was collected in St. Louis, 5 August 1938, in a USDA Japanese beetle trap. Sloop (1937) associates this species with *Pinus* spp.

Oxypteris notata notata (Laporte & Gory) - 3 specimens taken in Boone, Greene, and St. Louis Counties. Seasonal occurrence: 23 May-26 August. One specimen was taken in a USDA Japanese beetle trap, another was taken at lights. The only known host association for this species is a series of adults attracted to a burning stump of *Pinus* sp. in North Carolina (Manee 1913).

Genus *Melanophila*

Melanophila aeneola Melsheimer - A single specimen was taken at ultraviolet light in Ste. Genevieve County on 5 August. Sloop (1937) associates this species with *Pinus* spp.

Subfamily Chrysobothrinae
Tribe Chrysobothrini
Genus *Chrysobothris*
Key to Missouri Species of *Chrysobothris*

1. Lateral margin of fifth abdominal sternite not serrate, rarely interrupted 2
1'. Lateral margin of fifth abdominal sternite serrate 4

2(1). Elytra without longitudinal costae .... *C. chlorocephala* Gory
2'. Elytra with costae 3

3(2'). Body above violaceous, cupreous, or bluish ... . *C. azurea* LeConte
3'. Body above dark bronzy-brown .... *C. sexsignata* (Say)

4(1'). Disk of pronotum even, without a distinct median depression or elevated callosities 5
4'. Disk of pronotum uneven, longitudinally sulcate medially, and frequently with elevated callosities 6

5(4). Abdominal sternites with distinct, more or less elevated, smooth, lateral callosities .... *C. neotexana* Dozier

5'. Abdominal sternites without distinct, smooth, lateral callosities .... *C. purpureovittata* Horn

6(4'). Clypeus transversely truncate or slightly sinuate ..... *C. cribraria* Mannerheim

6'. Clypeus emarginate, or with a median incision in front 7

7(6'). Protibia of male with a single apical spine and dilated subapically on the inner margin; eighth abdominal tergite of female not carinate medially ..... *C. dentipes* (Germar)

7'. Protibia of male with several small spines along inner margin; eighth abdominal tergite of female medially carinate (*femorata* complex) 8

8(7'). Clypeus acutely notched at middle but not semicircularly rounded on each side; male genitalia with parameres equal in length, lateral spine on each side transverse .... *C. adelpha* Gemminger & Harold

8'. Clypeus semicircularly rounded on each side of medial notch; male genitalia with parameres unequal in length, lateral spine on each side oblique 9

9(8'). Antennae not narrowed to apex, the last segment quadrate and as wide as tenth segment; male genitalia with tip of aedeagus not wider than tip of paramere, recurved; eighth abdominal tergite of female with median carina strongly elevated and extending beyond apical notch ..... *C. rugosiceps* Melsheimer

9'. Antennae gradually narrowed to apex, the last segment not distinctly quadrate, narrower than tenth segment; male genitalia with tip of aedeagus wider than tip of paramere, flat; eighth abdominal tergite of female with median carina not extending beyond apical notch 10

10(9'). Elytra smooth, longitudinal costae distinct and entire, separating the posterior pair of fovae; male antennal segments yellow on outer margin; male genitalia with parameres evenly rounded on sides, longer paramere strongly constricted midway between lateral spine and apex; female with eighth abdominal tergite shallowly depressed on each side of median carina ..... *C. viridiceps* Melsheimer

10'. Elytra more or less rugose, longitudinal costae frquently interrupted, not bissecting posterior pair of fovae; male antennal segments bronzy-green and usually reddish-cupreous toward apex; male genitalia with parameres more or less distinctly arcuate on sides, both parameres constricted at lateral spines 11

11(10'). Body above cupreous; elytra narrowly rounded to apex, apical one-third of outer margin straight, distinctly reddish toward apex; male with front of head green, antennae distinctly reddish-cupreous toward apex; male genitalia with parameres weakly acuminate, ending abruptly; female with eighth abdominal tergite deeply depressed on each side of median carina ..... *C. femorata* (Olivier)

11'. Body above greenish-bronze; elytra broadly rounded to apex, apical one-third of outer margin arcuate; male with front of head bronze, antennae faintly reddish toward apex; male genitalia with parameres slender, acuminate, gradually tapering to apex; female with eighth abdominal tergite shallowly depressed on each side of median carina .... *C. misella* LeConte

Chrysobothris adelpha Gemminger & Harold - 159 specimens taken in Barton, Boone, Carter, Dent, Greene, Henry, Jackson, Jasper, Jefferson, Johnson, Mississippi, and St. Louis Counties. Seasonal occurrence: 13 May-13 September, most common June through July. Adults were collected on *Acer platanoides, Fraxinus pennsylvanica*, and *Quercus* sp., and commonly on logpiles or dead branches of *Carya illinoensis, C. ovata*, and *C. tomentosa*. Adults emerged only from dead branches of *Carya* spp., including *C. glabra, C. ovata*, and *C. tomentosa*.

Chrysobothris azurea LeConte - 27 specimens taken in Adair, Boone, Clinton, Franklin, Henry, Jackson, Jefferson, Montgomery, and St. Louis Counties. Seasonal occurrence: 7 May-26 June. Adult hosts include *Diospyros virginiana* and *Prunus* sp.; and dead *Acer saccharum, A. platanoides, Carya tomentosa, Fraxinus pennsylvanica, Koelreuteria paniculata,* and *Quercus palustris*. Larval hosts include dead *Amelanchier arborea* (Nelson et al. 1981), *Acer* sp., *Celastrus scandens*, and *Juglans nigra*.

Chrysobothris chlorocephala Gory - 14 specimens taken in Barry, Boone, Carter, Dent, Henry, Jackson, Jefferson, Miller, Randolph, and Scott Counties. Seasonal occurrence: 14 June-29 July. Adults were collected on *Quercus alba* and emerged

from dead *Amelanchier arborea* and *Carya illinoensis*.

Chrysobothris cribraria Mannerheim - 17 specimens taken in Carter, Franklin, Ste. Genevieve, Stone, and Wayne Counties. Seasonal occurrence: 10 May-10 August. All of the specimens were collected on or emerged from dead *Pinus echinata* and *P. sylvestris*.

Chrysobothris dentipes (Germar) - 33 specimens taken in Carter, Ste. Genevieve, Shannon, and Stone Counties. Seasonal occurrence: 12 May-5 July. All of the specimens were collected on logpiles or dead branches of *Pinus echinata*.

Chrysobothris femorata (Olivier) - 141 specimens taken in Adair, Barton, Boone, Buchanan, Butler, Callaway, Crawford, Dent, Franklin, Holt, Howard, Howell, Jackson, Jasper, Jefferson, Lafayette, Lawrence, Montgomery, Newton, Pike, Platte, Polk, St. Charles, St. Francois, St. Louis, Ste. Genevieve, Shannon, Vernon, and Wayne Counties. Seasonal occurrence: 9 May-18 October, common late-May through early-July. The "flatheaded appletree borer" is especially common in nurseries and urban landscapes where it attacks young trees suffering from various stress factors. Adults were collected on the trunks of *Acer rubrum, A. saccharinum, Betula nigra, Cercis canadensis, Crataegus* sp., *Gleditsia triacanthos, Platanus occidentalis, Quercus rubra, Salix interior, Sorbus aucuparia, Tilia cordata, Ulmus americana*, and *U. rubra*. Adults emerged from trunks of dead or living *Acer platanoides, A. saccharinum, A. saccharum, Cornus florida, Crataegus crus-galli*, and *Malus* sp.

Chrysobothris misella LeConte - 248 specimens taken in Boone, Callaway, Cape Girardeau, Carter, Clay, Crawford, Dallas, Dent, Douglas, Franklin, Greene, Henry, Jackson, Jefferson, Maries, Pike, Platte, Randolph, Reynolds, St. Francois, St. Louis, Shannon, Stoddard, Stone, and Wayne Counties. Seasonal occurrence: 20 April-28 September, abundant late-May through early-July. Adults were collected on logpiles or dead branches of a variety of plants, especially *Quercus* spp. Adult hosts include *Diospyros virginiana, Fraxinus pennsylvanica, Juglans nigra, Quercus alba, Q. coccinea, Q. imbricaria, Q. marilandica, Q. palustris, Q. shumardi, Q. stellata, Q. velutina*, and *Ulmus americana*. A series of specimens emerged from dead *Quercus* sp.

Chrysobothris neotexana Dozier - 15 specimens taken in Dent, Jefferson, and Taney Counties. Seasonal occurrence: 5 June-8 August. All adults were collected on or emerged from dead trunks or branches of *Juniperus virginiana* (Nelson and MacRae 1990).

Chrysobothris purpureovittata Horn - 18 specimens taken in Benton, Cass, Franklin, Gasconade, Henry, Jackson, Jasper, Jefferson, and Stone Counties. Seasonal occurrence: 1 June-26 July. Adults were collected on *Celtis occidentalis, C. tenuifolia, Diospyros virginiana* (Nelson et al. 1981), *Crataegus phaenopyrum, Koelreuteria paniculata*, and *Prunus americana*. Larval hosts include dead branches of *Celtis tenuifolia* and *Koelreuteria paniculata*.

Chrysobothris rugosiceps Melsheimer - 69 specimens taken in Adair, Barton, Benton, Boone, Carter, Cole, Crawford, Dent, Franklin, Jackson, Jefferson, New Madrid, Ozark, St. Louis, Shannon, Stoddard, Stone, and Wayne Counties. Seasonal occurrence: 26 April-6 August. Adults were collected primarily on logpiles or dead branches of *Quercus* spp., including *Q. alba, Q. macrocarpa, Q. marilandica, Q. palustris, Q. stellata*, and *Q. velutina*. Adults were collected also on *Carya ovata* and dead *Pinus echinata*.

Chrysobothris sexsignata (Say) - 91 specimens taken in Boone, Callaway, Cass, Dent, Franklin, Howell, Jackson, Jefferson, Johnson, Lawrence, Lincoln, Montgomery, Polk, Randolph, Reynolds, St. Louis, Ste. Genevieve, Shannon, Stoddard, and Wright Counties. Seasonal occurrence: 5 May-18 August, more common late-May through June. Adults have been collected on *Carya ovata* and *Juglans nigra*; and on dead branches of *Acer saccharinum, Betula nigra, Diospyros virginiana, Fraxinus pennsylvanica, Quercus palustris*, and *Sorbus aucuparia*. Larval hosts include dead *Amelanchier arborea, Carya ovata* (Nelson and MacRae 1990), *Celtis laevigata, Fraxinus pennsylvanica, Gleditsia triacanthos*, and *Ulmus rubra*.

Chrysobothris viridiceps Melsheimer - 70 specimens taken in Adair, Benton, Boone, Dent, Franklin, Jackson, Jefferson, Montgomery, Pike, St. Francois, St. Louis, Shannon, Stone, and Wayne Counties. Seasonal occurrence: 30 April-23 September, more common during late-June through early-July. This species was usually found on logpiles or dead limbs of *Quercus* spp., including *Q. alba, Q. bicolor, Q. macrocarpa, Q. marilandica*, and *Q. stellata*. Single specimens were collected on *Acer saccharinum, Carya ovata*, and *Ulmus americana*; and emerged from dead *Quercus* sp.

Excluded Species

Chrysobothris scitula Gory - No specimens of this species were examined from Missouri. Arnett (1983) recorded it from "Mo," however, no supporting literature records could be found. Since this species has often been confused with other species, it is considered here to be unknown from Missouri.

Genus *Actenodes*

Key to Missouri Species of *Actenodes*

1. Elytra even ..... *A. davidi* Nelson
1'. Elytra uneven 2

2. Fourth antennal segment strongly triangular, nearly twice as wide as third, following segments transverse ..... *A. acornis* (Say)
2'. Fourth antennal segment slightly triangular, slightly wider than third, following segments not transverse ..... *A. simi* Fisher

Actenodes acornis (Say) - 36 specimens taken in Boone, Buchanan, Franklin, Henry, Jefferson, Johnson, Newton, Perry, Polk, St. Louis, Ste. Genevieve, and Wayne Counties. Seasonal occurrence: 19 May-31 July. Adults were collected on *Diospyros virginiana* (Nelson et al. 1981) and *Quercus prinoides*; and on dead *Acer saccharum* and *Cercis canadensis*. Larval hosts include dead *Acer saccharum*, *Carya glabra* (Nelson and MacRae 1990), and *Fagus americana*.

Actenodes davidi Nelson - Nelson (1979) described this uncommon species from a small series including 3 specimens taken in Jackson County. An additional specimen was examined from Boone County. The type material was associated with *Gleditsia triacanthos*.

Actenodes simi Fisher - No specimens of this species were examined, however, Fisher (1942) recorded it from "Missouri." No hosts are known for this uncommon species.

Subfamily Agrilinae

Key to Missouri Tribes of Agrilinae

1. Pronotum without submarginal carina; tarsi short, first metatarsomere not longer than following 2 tarsomeres combined; scutellum without transverse carina ..... Coroebini
1'. Pronotum with submarginal carina; tarsi elongate, first metatarsomere as long as following 3 tarsomeres combined; scutellum usually with transverse carina ..... Agrilini

Tribe Coroebini

Genus *Paragrilus*

Paragrilus tenuis (LeConte) - 67 specimens taken in Franklin, St. Louis, and Stoddard Counties. Seasonal occurrence: 23 May-4 July. All of the specimens were collected on *Hibiscus lasiocarpus* (Nelson 1987).

Tribe Agrilini

Genus *Agrilus*

Key to Missouri Species of *Agrilus*

1. Elytral apices prolonged, terminating in a large spine ..... *A. ferrisi* Dury
1'. Elytral apices not prolonged 2

2(1'). Antennae serrate beginning with the fourth antennomere 3
2'. Antennae serrate beginning with the fifth antennomere 43

3(2). Tarsal claws bifid with the inner tips nearly touching 4
3'. Tarsal claws bifid with the inner tips widely separated 23

4(3). Pygidium with a projecting carina 5
4'. Pygidium without a projecting carina 6

5(4). Body above uniformly black ..... *A. champlaini* Frost
5'. Head and pronotum cupreous, elytra black ..... *A. ruficollis* (Fabricius)

6(4'). Front of head concave or deeply depressed . 7
6'. Front of head not concave or deeply depressed 8

7(6). Front of head concave, the concavity extending to the lateral margins and epistoma; length 12 mm ..... *A. fuscipennis* Gory
7'. Front of head with a narrow depression on the vertex and occiput, the depression not extending to the lateral margins; length 5-6 mm ..... *A. rubroniger* Hespenheide

8(6'). Abdominal segments with pubescent spots laterally ..... *A. difficilis* Gory
8'. Abdominal segments without pubescent spots laterally 9

9(8'). Male metatibia without a distinct apical spine on the inner margin 10
9'. Male metatibia armed with a distinct apical spine on the inner margin 15

10(9). Metatarsi as long or longer than metatibia; length of first tarsomere equal to combined length of next 4 tarsomeres ..... *A. masculinus* Horn
10'. Metatarsi shorter than metatibia; length of first tarsomere equal to combined length of next 3 tarsomeres 11

11(10'). Elytra with vague pubescent vittae ..... *A. paramasculinus* Champlain & Knull
11'. Elytra without pubescent vittae 12

12(11'). Coloration of body surface not sexually dimorphic 13
12'. Coloration of body surface sexually dimorphic 14

13(12). Surface above bicolored, pronotum greenish, aeneous, brownish, or cupreous, elytra black ..... *A. arcuatus* (Say)
13'. Surface above unicolored, aeneous with a more or less cupreous tinge ..... *A. arcuatus corylicola* Fisher

14(12'). Female reddish-cupreous, more or less violaceous; male with pronotum aeneous and elytra violaceous ..... *A. arcuatus fulgens* LeConte
14'. Female uniformly brownish-cupreous; male with pronotum reddish-cupreous, the sides greenish or bluish, and the elytra black with a violaceous tinge ..... *A. arcuatus torquatus* LeConte

15(9'). Male with antennomeres with long white setae beneath ..... *A. crinicornis* Horn
15'. Male with antennomeres without long white setae beneath 16

16(15'). Male with fifth abdominal sternite fimbriate at apex ..... *A. defectus* LeConte
16'. Male with fifth abdominal sternite not fimbriate at apex 17

17(16'). Male prosternum conspicuously pubescent 18
17'. Male prosternum not conspicuously pubescent 21

18(17). Prosternum deeply emarginate ..... *A. cliftoni* Knull
18'. Prosternum truncate or slightly emarginate 19

19(18'). Pronotum with prehumeral carinae indistinct; male genitalia with parameres parallel ..... *A. geminatus* (Say)
19'. Pronotum with prehumeral carinae very distinct; male genitalia with parameres expanded 20

20(19'). Male with front of head sparsely clothed with white hairs behind epistoma; male genitalia with parameres transparent apically ..... *A. ohioensis* Knull
20'. Male with front of head densely clothed with long, white hairs behind epistoma, nearly concealing surface; male genitalia with parameres not transparent apically ..... *A. otiosus* Say

21(17'). Male with second abdominal sternite transversely concave ... *A. transimpressus* Fall
21'. Male with second abdominal sternite not transversely concave 22

22(21'). Prosternal lobe emarginate in front ..... *A. diospyroides* Knull
22'. Prosternal lobe not emarginate in front ..... *A. frosti* Knull

23(3'). Pygidium with a projecting carina 24
23'. Pygidium without a projecting carina ... 36

24(23). Pronotum with a densely pubescent median longitudinal groove 25
24'. Pronotum without a densely pubescent median longitudinal groove 27

25(24). Thoracic pleurae and coxae not densely pubescent; sides of prosternal process bent downward and forming a tooth near apex ..... *A. vittaticollis* (Randall)
25'. Thoracic pleurae and coxae densely pubescent; sides of prosternal process not bent down near apex 26

26(25'). Head moderately depressed in front and rather densely pubescent over entire surface; male with a deep, smooth, elongate depression on second abdominal sternite .. *A. audax* Horn
26'. Head deeply depressed in front and densely pubescent only over lower half; male with only an obsolete depression on second abdominal sternite ..... *A. benjamini* Fisher

27(24'). Pronotum without, or with only feebly indicated, prehumeral carinae 28
27'. Pronotum with distinct prehumeral carinae 34

28(27). Elytra with pubescent spots or pubescent vittae 29
28'. Elytra without pubescent spots or pubescent vittae 30

29(28). Elytra black with a distinct whitish or yellowish vitta on each elytron ..... *A. bilineatus* (Weber)
29'. Elytra blue or bluish-black with an indistinct pubescent vitta in the basal depression of each elytron ... *A. bilineatus carpini* Knull

30(28'). Elytra with distinct, uniformly distributed, short, white pubescence ..... *A. olivaceoniger* Fisher
30'. Elytra without distinct pubescence, rarely with a few white hairs apically along the sutural margins 31

31(30'). Vertical surface of second abdominal segment glabrous, all other segments pubescent . 32
31' Vertical surface of all abdominal segments with white or gold pubescence 33

32(31). Elytra blue or blue-black; elytral apices broadly rounded, rarely acute ..... *A. acutipennis* Mannerheim
32'. Elytra olivaceous-bronze to black; elytral apices more acutely rounded; pronotum deeply depressed medioanteriorly ..... *A. nigricans* Gory

33(31'). Elytral apices more acutely rounded; vertical surface of abdominal segments with pubescence gold ..... *A. nigricans* Gory
33'. Elytral apices more broadly rounded; vertical surface of abdominal segments with pubescence white .. *A. quadriimpressus* Ziegler

34(27'). Vertical surface of abdominal segments uniformly, but not conspicuously, pubescent ..... *A. anxius* Gory
34'. Vertical surface of abdominal segments (except sometimes the second) conspicuously pubescent 35

35(34'). Frons densely pubescent, the pubescence nearly obscuring the surface; elytral apices broadly rounded ..... *A. granulatus* (Say)
35'. Frons not densely pubescent, the surface distinctly visible; elytral apices acute or narrowly rounded ..... *A. quadriguttatus* Gory

36(23'). Pronotum with a broad, deep, median depression extending from base to apex ..... *A. concinnus* Horn
36'. Pronotum without a broad, deep, median depression extending from base to apex, at most with a narrow, or moderately deep, braod depression at middle 37

37(36'). Elytra with pubescent spots or lines 38
37'. Elytra without pubescent spots or lines .. 39

38(37). Prosternal lobe not deeply emarginate in front ..... *A. fallax* Say
38'. Prosternal lobe deeply emarginate in front ... . *A. obsoletoguttatus* Gory

39(37'). Antennomeres 7-11 distinctly wider than long 40
39'. Antennomeres 7-11 not distinctly wider than long 41

40(39). Prosternal lobe broadly rounded in front .... *A. aurichalceus* Redtenbacher
40'. Prosternal lobe emarginate in front .... *A. politus* (Say)

41(39'). Body above dark blue to greenish-blue; prosternal lobe deeply emarginate in front .... *A. cyanescens* Ratzeburg
41'. Body above not blueish; prosternal lobe shallowly emarginate in front 42

42(41'). Elytra blackish-bronze to olivaceous; setae on lower fourth of front dense, obscuring surface ..... *A. cephalicus* LeConte
42'. Elytra cupreus, becoming reddish-cupreous apically; setae on lower fourth of front not obscuring surface ..... *A. crataegi* Frost

43(2'). Elytra with pubescent spots, vittae, or irregular designs 44
43'. Elytra sometimes uniformely pubescent but never distinctly patterned (female *A. oblongus* Fisher with an indistinct spot along sutural margin about halfway from basal margin) 48

44(43). Pronotum without prehumeral carinae .... *A. subcinctus* Gory
44'. Pronotum with prehumeral carinae 45

45(44'). Elytra with pubescent spots 46
45'. Elytra with irregular pubescent designs .. 47

46(45). Elytral spots indistinct, medial spots elongate; male genitalia with parameres strongly expanded near apex .... *A. egeniformis* Champlain & Knull
46'. Elytral spots distinct, medial spots rounded; male genitalia with parameres subparallel . ..... *A. pseudofallax* Frost

47(45'). Prosternal lobe broadly rounded in front .... *A. abductus* Horn
47'. Prosternal lobe deeply emarginate in front ... . *A. lecontei* Saunders

48(43'). Metacoxae with the posterior margin distinctly sinuate or arcuately emarginate, with the outer posterior angle more or less acute and somewhat prolonged ... *A. imbellis* Crotch
48'. Metacoxae with the posterior margin feebly sinuate or truncate, with the outer posterior angle rectangular and not prolonged ... 49

49(48'). Pronotum without prehumeral carinae .. 50
49'. Pronotum with prehumeral carinae 51

50(49). Prosternal lobe broadly rounded in front; eyes broadly rounded beneath .... *A. oblongus* Fisher
50'. Prosternal lobe distinctly emarginate in front; eyes acutely rounded beneath .... *A. putillus* Say

51(49'). Body above bicolored ... *A. parvus* Saunders
51'. Body above unicolored 52

52(51'). Prosternal lobe deeply emarginate in front; elytra uniformly sparsely clothed with distinct white hairs .... *A. olentangyi* Champlain & Knull
52'. Prosternal lobe truncate or slightly emarginate in front; elytra not uniformly clothed with distinct hairs, although an indistinct pubescent vitta may be present on each elytron 53

53(52'). Each elytron with a very indistinct often interrupted sutural vitta; male genitalia with aedeagus blunt apically .... *A. paracelti* Knull
53'. Elytra with distinct pubescence only in humeral depression 54

54(53'). Male genitalia with sides of parameres very strongly, arcuately expanded .... *A. egenus* Gory
54'. Male genitalia with sides of parameres subparallel 55

55(54'). Males with dorsal surface viridescent and ventrally with a median line of pubescence extending from prosternum to second abdominal sternite ..... *A. celti* Knull
55'. Males with dorsal surface uniformly dark bronze, not viridescent, and without a ventral median line of pubescence .... *A. cladrastis* Knull

Agrilus abductus Horn - 5 specimens taken in Boone, Callaway, Henry, and McDonald Counties. Nelson and Westcott (1976) also recorded this species from Jackson County. Seasonal occurrence: 18 May-19 June. Nelson and Westcott (1976) reported *Gleditsia triacanthos* and *Quercus* sp. as adult hosts.

Agrilus acutipennis Mannerheim - 30 specimens taken in Boone, Cape Girardeau, Christian, Henry, Jackson, Jefferson, McDonald, Montgomery, Pike, St. Clair, St. Francois, St. Louis, Ste. Genevieve, and Stone Counties. Seasonal occurrence: 3 May-20 June. Adults were collected from *Amelanchier arborea* (Nelson and MacRae 1990), *Carya cordiformis, Diospyros virginiana, Juglans nigra, Quercus alba, Q. marilandica, Q. stellata*, and *Q. velutina*.

Agrilus anxius Gory - 53 specimens taken in Cass, Greene, Jackson, Montgomery, and St. Louis Counties. Seasonal occurrence: 30 April-17 July. The "bronze birch borer" is a boreal species that has expanded its range into Missouri (Anonymous 1976) following the extensive planting of *Betula pendula* (European white birch). It is now an economic pest of this birch in the northern half of the state. Adults emerged or were collected from this plant and from *B. papyrifera* (paper birch), and were collected on *B. platyphylla japonica* 'Whitespire', all in nursery situations.

Agrilus arcuatus arcuatus (Say) - 31 specimens taken in Barry, Boone, Carter, Henry, Jackson, St. Louis, and Shannon Counties. Seasonal occurrence: 31 May-23 July. Adults were collected on *Quercus* sp. (Nelson and Westcott 1976), *Carya* sp., and *Juglans nigra*. A few specimens were taken at ultraviolet lights.

Agrilus arcuatus corylicola Fisher - No specimens of this subspecies were examined from Missouri. Horn (1891) recorded it from "Missouri." Fisher (1928) records *Corylus americana* as an adult host.

Agrilus arcuatus fulgens LeConte - No Missouri specimens were seen. Fisher (1928) recorded this subspecies from "Missouri." *Corylus americana* was recorded by Fisher (1928) as the larval host.

Agrilus arcuatus torquatus LeConte - 8 specimens taken in Barry, Henry, and Randolph Counties. Seasonal occurrence: 8-28 June. Nelson and Westcott (1976) collected this subspecies on *Carya ovata*. Nelson (pers. comm.) has also collected it on *Ostrya virginiana*.

Agrilus audax Horn - 1 specimen taken in Jefferson County. Seasonal occurrence: 22 May. Knull (1934) reported this rare species from Jackson County breeding in living upper branches of slippery elm (*Ulmus rubra*).

Agrilus aurichalceus aurichalceus Redtenbacher - No Missouri specimens of this species were seen. Nelson et al. (1981) reported specimens taken in St. Clair and Stoddard Counties on 12-22 June. Weiss (1914) reported the first U.S. occurrence of the "rose stem girdler," a European species, on *Rosa rugosa* in New Jersey.

Agrilus benjamini Fisher - 3 specimens taken in Boone and Warren Counties. Nelson and Westcott (1976) recorded it also from Jackson County. Seasonal occurrence: 20 May-30 June. One specimen was beaten from *Quercus alba*.

Agrilus bilineatus bilineatus (Weber) - 151 specimens taken in Adair, Boone, Carter, Cole, Crawford, Dent, Franklin, Jackson, Jefferson, Osage, Randolph, St. Francois, St. Louis, Ste. Genevieve, and Shannon Counties. Seasonal occurrence: 10 April-29 July, abundant late-May through June. The "twolined chestnut borer" causes considerable economic damage to oaks in Missouri, particularly during droughts. Adults were collected on *Quercus macrocarpa, Q. palustris, Q. stellata*, and *Q. velutina*.

Agrilus bilineatus carpini Knull - 3 specimens taken in Boone and St. Louis Counties. Seasonal occurrence: 2 June and 14 July. Knull (1922) described this subspecies from material reared from *Carpinus caroliniana*.

Agrilus celti Knull - 120 specimens taken in Barry, Boone, Clay, Dade, Franklin, Henry, Holt, Jackson, Lafayette, Montgomery, Oregon, St. Louis, Ste. Genevieve, Taney, and Wayne Counties. Seasonal occurrence: 6 May-11 July. Many adults were beaten from *Celtis laevigata* and *C. tenuifolia* and emerged or were beaten from *C. occidentalis*. A few adults were beaten from *Cercis canadensis, Corylus americana*, and *Gleditsia triacanthos*.

Agrilus cephalicus LeConte - 36 specimens taken in Carter, Christian, Douglas, Franklin, Jackson, Jefferson, St. Louis, Ste. Genevieve, Shannon, and Taney Counties. Nelson and Westcott (1976) reported it also from Cooper County. Seasonal occurrence: 12 May-5 July. Most of the specimens were beaten from *Cornus florida*, one was collected from *Juglans nigra*, and a few were taken at ultraviolet lights.

Agrilus champlaini Frost - 2 specimens taken in Montgomery and Ste. Genevieve Counties. Seasonal occurrence: 3 May. The specimens emerged or were cut from galls on live twigs of *Ostrya virginiana* (Nelson and MacRae 1990). An ichneumonid parasitoid, *Xylophrurus* prob. *nubilipennis* (Cresson), also emerged from several galls.

Agrilus cladrastis Knull - 2 specimens taken in Barry County. Seasonal occurrence: 17 June. Nelson et al. (1981) collected this species on foliage of *Cladrastis lutea*.

Agrilus cliftoni Knull - 40 specimens taken in Boone, Franklin, Jackson, Oregon, and St. Louis Counties. Seasonal occurrence: 23 May-1 July. Specimens were taken on *Juglans nigra* (Nelson and Westcott 1976). Single specimens were also taken on *Cercis canadensis, Platanus occidentalis*, and at ultraviolet light.

Agrilus concinnus Horn - 3 specimens taken in Stoddard and Texas Counties (Nelson 1987). Seasonal occurrence 27 June-2 July. No host associations were determined for this rare species, however, the two Stoddard County specimens were taken in copula on roadside vegetation adjacent to a natural slough in the Mississippi River embayment. Blatchley (1919) collected this species by sweeping "low huckleberry."

Agrilus crataegi Frost - 14 specimens taken in Dade, Jackson, and St. Louis Counties. Seasonal occurrence: 9 May-28 June. Nelson and Westcott (1976) collected this species on and emerging from *Crataegus* sp. Additional adults were collected from *C. crus-galli* and *Juglans nigra*.

Agrilus crinicornis Horn - 34 specimens taken in Boone, Jackson, and Jefferson Counties. Seasonal occurrence: 2 May-5 July. Nelson and Westcott (1976) reported this species on *Carya* sp. and *Juglans nigra*. Adults were also collected from *C. glabra*.

Agrilus cyanescens Ratzeburg - 48 specimens taken in Franklin, Jefferson, Montgomery, St. Charles, and St. Louis Counties. Seasonal occurrence: 24 April-3 June. This European species was first recorded in the U.S. in Massachusetts and Wisconsin (as *A. coeruleus* Rossi) (Frost 1922). Subsequent literature recorded it breeding in *Lonicera tatarica*, and a few adults were collected on this plant species. As speculated by Westcott (1990), it has apparently adapted in Missouri to the related, native plant species *Symphoricarpos orbiculatus*, and most of the specimens were found

feeding on the new foliage of this plant during early spring.

Agrilus defectus LeConte - 89 specimens taken in Boone, Cedar, Clay, Crawford, Franklin, Jackson, Jefferson, Phelps, Pike, Reynolds, and St. Francois Counties. Fisher recorded it from St. Louis County. Seasonal occurrence: 16 April-16 June. Adults were beaten from *Carya tomentosa* (Nelson and MacRae 1990), *Aesculus glabra, Carya ovata, Celtis occidentalis, Cercis canadensis, Crataegus* sp., *Gymnocladus dioicus, Quercus alba, Q. marilandica, Q. stellata,* and *Q. velutina.*

Agrilus difficilis Gory - 79 specimens taken in Adair, Barry, Boone, Cass, Christian, Franklin, Greene, Henry, Jackson, Jefferson, Moniteau, Oregon, Pike, Randolph, St. Charles, St. Louis, and Stoddard Counties. Seasonal occurrence: 19 May-29 August, most common during June and July. Nearly all of the specimens emerged from or were collected on the trunks and main branches of *Gleditsia triacanthos.* This species prefers stressed, living trees and commonly attacks newly transplanted trees growing in nurseries and urban landscapes. Akers et al. (1986) reported the pest status of this species on honeylocust in Ohio.

Agrilus diospyroides Knull - 10 specimens taken in Boone, Christian, and Dade Counties. Seasonal occurrence: 9 May-4 June. All of the specimens were beaten from *Diospyros virginiana.*

Agrilus egeniformis Champlain & Knull - 73 specimens taken in Barry, Boone, Callaway, Christian, Franklin, Henry, Jackson, Jefferson, Lincoln, and Stoddard Counties. Seasonal occurrence: 23 April-15 July. Most of the specimens were beaten from *Gleditsia triacanthos* or emerged from dead limbs of this plant. Several adults were also collected on *Celtis occidentalis.*

Agrilus egenus Gory - 88 specimens taken in Audrain, Boone, Callaway, Jackson, Lewis, Lincoln, Oregon, Phelps, Pike, St. Louis, and Shannon Counties. Seasonal occurrence: 8 May-7 August. Specimens were beaten from *Robinia pseudoacacia* and emerged from dead limbs of this plant.

Agrilus fallax Say - 202 specimens taken in Adair, Barry, Boone, Callaway, Cape Girardeau, Cedar, Clinton, Franklin, Henry, Holt, Jackson, Jefferson, Johnson, Linn, McDonald, Montgomery, Oregon, Pike, St. Charles, St. Louis, Ste. Genevieve, and Webster Counties. Seasonal occurrence: 6 May-26 September, abundant late-May through June. Adults were most commonly collected from *Gleditsia triacanthos,* especially those growing in nurseries and urban landscapes. Adults were also collected on dead *Celtis laevigata* and emerged in large series from dead branches of *C. tenuifolia* (Nelson and MacRae 1990) and *C. occidentalis.* Single adults were collected on *Diospyros virginiana,* and *Tilia* sp.

Agrilus ferrisi Dury - 3 specimens taken in Henry and Jackson Counties (Nelson and Westcott 1976). Seasonal occurrence: 19 June-15 July. Adults were collected on *Celtis occidentalis.*

Agrilus frosti Knull - 2 specimens taken in St. Clair and Webster Counties (Nelson and Westcott 1976). Seasonal occurrence: 8 May, 26 June. The St. Clair County specimen was beaten from *Quercus stellata.*

Agrilus fuscipennis Gory - 27 specimens taken in Boone, Franklin, Henry, and St. Charles Counties. Seasonal occurrence: 7 June-6 July. The adult host is *Diospyros virginiana* (Nelson and Westcott 1976).

Agrilus geminatus (Say) - 25 specimens taken in Callaway, Carter, Clay, Crawford, Dent, Franklin, Jackson, Jefferson, Morgan, St. Francois, St. Louis, Ste. Genevieve, and Taney Counties. Seasonal occurrence: 30 April-22 June. Adults were collected most commonly from oaks, including *Quercus alba, Q. coccinea,* and *Q. velutina.* Adults were also collected from *Carya tomentosa, Gymnocladus dioicus,* and *Juglans nigra.*

Agrilus granulatus granulatus (Say) - 3 specimens taken in Adair, Boone, and Vernon Counties. Seasonal occurrence: 16-26 June. One specimen emerged from *Populus deltoides.*

Agrilus imbellis Crotch - 7 specimens taken in Pettis, Ste. Genevieve, and Stoddard Counties. Seasonal occurrence: 1-13 June. One specimen was collected on the flower of *Rudbeckia* sp., the remainder were collected by sweeping in prairie habitats.

Agrilus lecontei lecontei Saunders - 94 specimens taken in Barry, Boone, Dade, Franklin, Jackson, Jefferson, Pettis, Phelps, Pike, Polk, St. Louis, Ste. Genevieve, Taney, and Vernon Counties. Seasonal occurrence: 1 May-17 July. This species is restricted to *Celtis* spp. and emerged from *C. occidentalis.* Adults were beaten from *C. laevigata, C. occidentalis,* and *C. tenuifolia.*

Agrilus masculinus Horn - 67 specimens taken in Barry, Boone, Gasconade, Jackson, Jefferson, Phelps, Reynolds, St. Francois, St. Louis, and Wayne Counties. Seasonal occurrence: 21 April-17 June. Many adults of this species were beaten or

emerged from dead limbs of *Aesculus glabra* (Nelson et al. 1981) and *Acer saccharum*. Adults were also collected from *Acer negundo, Carya tomentosa, Gymnocladus dioicus, Rhus aromatica*, and *Quercus velutina*.

Agrilus nigricans Gory - 2 specimens taken in Chariton and Randolph Counties. Seasonal occurrence: 26 May and 8 June. No Missouri host associations were determined. Fisher (1928) recorded *Quercus rubra* as an adult host.

Agrilus oblongus Fisher - 1 specimen taken in Jackson County (Nelson, pers. comm.). Manley (1977) also reported this species from Phelps County. Seasonal occurrence: 16 May and 21 June. Nelson collected the Jackson County specimen on *Celtis occidentalis*.

Agrilus obsoletoguttatus Gory - 59 specimens taken in Boone, Callaway, Cape Girardeau, Crawford, Dent, Franklin, Gasconade, Jefferson, Newton, Phelps, St. Francois, and St. Louis Counties. Seasonal occurrence: 13 May-2 July. Adults have been collected on a variety of plants, including dead *Acer saccharum*; and *Celtis occidentalis, Diospyros virginiana, Juglans nigra, Quercus alba, Q. imbricaria, Q. marilandica, Q. palustris, Q. velutina, Ulmus americana*, and *U. rubra*. Adults emerged from dead *Fagus americana* and *Salix* sp.

Agrilus ohioensis Knull - 16 specimens taken in Ste. Genevieve County. Seasonal occurrence: 30 April-7 June. All of the specimens emerged from dead branches of *Carpinus caroliniana* (Nelson and MacRae 1990).

Agrilus olentangyi Champlain & Knull - 70 specimens taken in Carter, Dade, Franklin, Jackson, Jefferson, Montgomery, Pettis, St. Louis, Taney, and Vernon Counties. Seasonal occurrence: 8 May-2 July. This species is associated with *Celtis* spp., nearly all of the adults were collected from *C. occidentalis* (Nelson and Westcott 1976) and *C. tenuifolia* (Nelson and MacRae 1990).

Agrilus olivaceoniger Fisher - 3 specimens taken in Randolph County (Nelson et al. 1981). Seasonal occurrence: 18 May-17 June. No Missouri host associations were determined. Fisher (1928) recorded it from *Betula lenta* and *Populus* sp.

Agrilus otiosus Say - 73 specimens taken in Boone, Callaway, Cole, Jackson, Jasper, Jefferson, Montgomery, Reynolds, St. Louis, and Wright Counties. Seasonal occurrence: 27 April-3 July. Specimens emerged from dead limbs of *Carya laciniosa* (Nelson and MacRae 1990), *C. illinoensis, C. ovata*, and *C. tomentosa*. Nelson (pers. comm.) has collected a number of adults at ultraviolet light.

Agrilus paracelti Knull - 284 specimens taken in Barry, Boone, Carter, Clay, Dade, Franklin, Henry, Holt, Jackson, Jefferson, Lewis, Montgomery, Oregon, Polk, St. Francois, St. Louis, Ste. Genevieve, Stoddard, and Taney Counties. Seasonal occurrence: 30 April-11 July, most abundant mid- to late-May. Adults were collected abundantly on *Celtis occidentalis* (Nelson and Westcott 1976) and *C. laevigata* (Nelson and MacRae 1990). Large series emerged from these plants. Other adult hosts include *Carya* sp., *Celtis tenuifolia, Gymnocladus dioicus, Quercus marilandica*, and *Ulmus rubra*.

Agrilus paramasculinus Champlain & Knull - 26 specimens taken in Clay and Jackson Counties. Seasonal occurrence: 10-27 May. Nelson and Westcott (1976) reported adults of this species on *Gymnocladus dioicus*.

Agrilus parvus Saunders - 137 specimens taken in Barry, Barton, Boone, Crawford, Dent, Holt, Jefferson, Phelps, Pike, St. Charles, St. Francois, St. Louis, and Stoddard Counties. Seasonal occurrence: 14 May-21 July. This species is restricted to *Amorpha* spp., and most of the specimens were collected or found feeding on the foliage of *A. fruticosa* (Nelson and MacRae 1990). Two specimens were taken by sweeping in dolomite glades where *A. canescens* was abundant.

Agrilus politus politus (Say) - 27 specimens taken in Boone, Clay, Holt, Jackson, Lewis, St. Louis, and Shannon Counties. Seasonal occurrence: 18 May-23 July. Adults were beaten from *Salix* sp.

Agrilus pseudofallax Frost - 65 specimens taken in Barry, Boone, Christian, Franklin, Jackson, Jefferson, Lincoln, Montgomery, Pike, St. Louis, and Taney Counties. Seasonal occurrence: 23 April-4 July. This species is associated exclusively with *Gleditsia triacanthos*, adults emerged from or were collected on dead limbs of this plant. It commonly attacks stressed landscape plantings.

Agrilus putillus putillus Say - 4 specimens taken in Iron, Monroe, and Stoddard Counties. Nelson et al. (1981) reported it also from Boone County. Seasonal occurrence: 14-26 June. No Missouri host associations were determined, but Fisher (1928) records *Acer saccharum* as an adult host.

Agrilus quadriguttatus quadriguttatus Gory - 9 specimens taken in Boone, Crawford, Linn, and St. Louis Counties. Seasonal occurrence: 14 June-

15 July. Adults were collected from *Salix* sp. (Nelson and Westcott 1976), and *S. interior*.

Agrilus quadriimpressus Ziegler - 11 specimens taken in Boone, Jefferson, Montgomery, and Randolph Counties. Seasonal occurrence: 9-24 May. Adults were beaten from *Carya tomentosa*, *Quercus velutina* (Nelson and MacRae 1990), and *Q. stellata*.

Agrilus rubroniger Hespenheide - 1 specimen taken in Taney County. Manley (1977) reported another specimen (as *A. cupricollis* Gory) from Phelps County. Seasonal occurrence: 11 May. No Missouri host associations were determined, but the Taney County specimen was swept from vegetation in a limestone glade habitat. Blatchley (1919) records "huckleberry" as an adult host.

Agrilus ruficollis (Fabricius) - 170 specimens taken in Adair, Barry, Barton, Boone, Callaway, Cape Girardeau, Carter, Christian, Cooper, Franklin, Greene, Howard, Jasper, Jefferson, Lincoln, Newton, Phelps, Pike, St. Charles, St. Francois, St. Louis, Ste. Genevieve, Shannon, Stoddard, Warren, and Wright Counties. Seasonal occurrence: 25 April-10 October, most abundant late-May through June. The "rednecked cane borer" is associated exclusively with *Rubus* spp. and was commonly found on cultivated blackberry and raspberry, in addition to native species.

Agrilus subcinctus Gory - 22 specimens taken in Boone, Clay, Franklin, Jackson, Jefferson, Lincoln, Phelps, St. Louis, and Taney Counties. Fisher (1928) reports it also from St. Charles County. Seasonal occurrence: 3 May-11 June. Adults were collected primarily from *Fraxinus americana*. Adults emerged from and were collected on dead branches of *F. pennsylvanica* in nursery situations. A few adults were collected on *Carya* sp. and *Gymnocladus dioicus*.

Agrilus transimpressus Fall - 55 specimens taken in Boone, Clay, Franklin, Jackson, Oregon, Pettis, Pike, Reynolds, St. Louis, and Taney Counties. Seasonal occurrence: 28 April-28 June, most common in late-May. Most of the specimens were beaten or emerged from dead limbs of *Juglans nigra*.

Agrilus vittaticollis (Randall) - 4 specimens taken in Montgomery, Ste. Genevieve, and Wayne Counties. Seasonal occurrence: 21 May-6 June. Specimens were beaten from foliage of *Amelanchier arborea* (Nelson and MacRae 1990), a known larval host, and *Quercus velutina*.

Excluded Species

Agrilus lacustris LeConte - Horn (1891) recorded this species from "Lapointe, Missouri," however, the accuracy of this record is doubtful. The type locality of this species is La Pointe, Wisconsin, Lake Superior, and I am unaware of the existence of a Missouri locality by that name. This species has also been recorded from Illinois and Ontario, but it is most commonly collected in the southwestern United States. Until its occurrence in Missouri is verified, *A. lacustris* LeConte is considered here as not known to occur in Missouri.

Agrilus sayi Saunders - Say (1823) first described this species (as *Buprestis lateralis*), giving "Missouri" as the type locality. This record has been repeated by Horn (1891) and Blatchley (1910) (as *A. lateralis*), and Arnett (1983). Say's type was subsequently lost and Fisher (1928) designated a neotype. Carlson and Knight (1969) argued that Say's description was synonymous with *A. ruficollis* (Fabricius) and that Fisher's neotype represented a previously undescribed species. Their argument seems plausible since *A. ruficollis* (Fabricius) is a common species in Missouri, yet *A. sayi* Saunders (*sensu* Fisher) has been collected only in the northeastern U. S. Therefore, *A. sayi* Saunders is considered here as not occurring in Missouri.

Subfamily Trachyinae

Key to Missouri Tribes of Trachyinae

1. Scutellum large, one-third width of body .... Pachyschelini
1'. Scutellum small, one-sixth or less width of body .... Brachyini

Tribe Pachyschelini

Genus *Pachyschelus*

Key to Missouri Species of *Pachyschelus*

1. Elytra with white pubescent markings; larger species .... *P. purpureus* (Say)
1'. Elytra without white pubescent markings; smaller species 2

2(1'). Dorsal surface black .... *P. laevigatus* Say
2'. Dorsal surface violaceous .... *P. schwarzi* Kerremans

Pachyschelus laevigatus (Say) - 430 specimens taken in Barry, Boone, Butler, Callaway, Carter, Christian, Crawford, Franklin, Greene, Henry,

Iron, Jackson, Jefferson, Lincoln, Newton, Pettis, Phelps, St. Charles, St. Francois, St. Louis, Saline, Shannon, Stoddard, Stone, Warren, and Wayne Counties. Seasonal occurrence: 8 May-25 August, abundant during June and July. This species mines the leaves of and was collected abundantly on *Desmodium* spp. J. M. Sullivan (pers. comm.) observed this species on *D. canescens, D. cuspidatum, D. glutinosum, D. paniculatum paniculatum*, and *D. paniculatum dillenii*. Observations were also made on *Lespedeza* spp., including *L. hirta*. It is conceivable that the latter records refer to *P. confusus* Wellso & Manley, a species known currently only from Michigan and Minnesota. However, a single male was reared from *Lespedeza* sp., and its genitalia are identical to those of *P. laevigatus* (Say).

Pachyschelus purpureus purpureus (Say) - 133 specimens taken in Boone, Callaway, Franklin, Iron, Jefferson, Randolph, St. Francois, St. Louis, Ste. Genevieve, Shannon, and Texas Counties. Seasonal occurrence: 9 April-13 September, most common late-April through mid-June. This species was found mining leaves of *Geranium maculatum*. J. M. Sullivan (pers. comm.) also observed this species feeding on new foliage of *Carya* sp., *Fraxinus americana*, and *Juglans nigra* during early spring.

Pachyschelus schwarzi Kerremans - 36 specimens taken in Boone, Jefferson, and Stoddard Counties. Seasonal occurrence: 12 May-23 July. This southeastern U. S. species was found mining the leaves of *Apios americana* (Nelson and MacRae 1990). The Boone County specimen was recorded from *Croton capitatus*.

Tribe Brachyini

Key to Missouri Genera of Brachyini

1. Body ovate; prosternum with a deep pit between procoxae ..... *Brachys*
1'. Body elongate; prosternum without a pit between procoxae ..... *Taphrocerus*

Genus *Brachys*

Key to Missouri Species of *Brachys*

1. Fifth abdominal sternite apically with long hairs along the emargination; length usually greater than 5.5 mm .. *B. ovatus* (Weber)
1'. Fifth abdominal sternite apically without long hairs along the emargination; length usually less than 5.5 mm 2

2(1'). Elytra with a purple, blue, or green luster, especially in the humeral region; apical elytral setae predominately gold; length 3-5.75 mm ..... *B. aerosa* Melsheimer
2'. Elytra dark brassy; apical elytral setae light gold to silver; length, 3-3.75 mm ..... *B. aeruginosus* Gory

Brachys aerosus Melsheimer - 150 specimens taken in Boone, Butler, Callaway, Camden, Carter, Dent, Douglas, Franklin, Henry, Jackson, Jasper, Jefferson, Montgomery, Newton, Oregon, Pettis, Phelps, Pulaski, St. Charles, St. Clair, St. Francois, St. Louis, Ste. Genevieve, Shelby, Stoddard, Vernon, and Warren Counties. Seasonal occurrence: 23 April-16 July, abundant during May. This leaf mining species was taken commonly on *Quercus* spp. and *Ulmus* spp. Adult hosts include *Q. imbricaria, Q. macrocarpa, Q. rubra, Q. stellata, Q. velutina, U. alata, U. americana*, and *U. rubra*.

Brachys aeruginosus Gory - 24 specimens taken in Boone, Callaway, Carter, Henry, Jackson, Phelps, Pike, and St. Francois Counties. Nelson and Westcott (1976) also list Cooper County. Seasonal occurrence: 20 April-16 June. Adults were beaten from *Carya* sp., *Quercus alba* (Nelson and Westcott 1976), *Q. marilandica* (Nelson and MacRae 1990), *Q. stellata*, and *Q. velutina*.

Brachys ovatus (Weber) - 178 specimens taken in Adair, Barry, Benton, Boone, Butler, Callaway, Carter, Clay, Crawford, Dent, Franklin, Gasconade, Henry, Howell, Jackson, Jefferson, Johnson, Maries, Miller, Newton, Oregon, Ozark, Phelps, Pike, Reynolds, St. Charles, St. Clair, St. Francois, St. Louis, Ste. Genevieve, Shannon, Stoddard, Stone, Taney, and Warren Counties. Seasonal occurrence: 25 April-11 October, abundant mid-May through early June. This common leaf mining species was beaten from foliage of several *Quercus* spp., including *Q. alba, Q. falcata, Q. imbricaria, Q. marilandica, Q. rubra, Q. shumardi, Q. stellata*, and *Q. velutina*.

Genus *Taphrocerus*

Key to Missouri Species of *Taphrocerus*

1. Elytra glabrous 2

1'. Elytra with spots or lines of pubescence, pubescence rarely wanting and replaced by punctate fovae 4

2(1). Thorax widest at and depressed at base; length 3.5-4 mm ... *T. schaefferi* Nicolay & Weise

2'. Thorax not depressed at base, uniformly rounded, sides parallel or widest at center 3

3(2'). Body subparallel, coppery, moderately shining; thorax widest at middle; head alutaceous, feebly impressed, narrower than widest portion of thorax; elytra finely punctate; length 3.5 mm ..... *T. agriloides* Crotch

3'. Sides of thorax parallel; head as wide as thorax; length 2.5 mm .... *T. laevicollis* LeConte

4(1'). Apical half of elytra with 6 isolated dots of white pubescence; black without aeneous luster; length 3.5-4.5 mm .... *T. cylindricollis* Kerremans

4'. Elytra with 2 more or less distinct white fascia; black with or without aeneous luster 5

5(4'). Elytra with 2 distinct white fascia on apical half; body black with aeneous luster, shining, more robust; length 3-5 mm .... *T. gracilis* (Say)

5'. Elytra with 2 indistinct white fascia on apical two-thirds; body black without aeneous luster, alutaceous, more or less subparallel; length 2.5-3.5 mm 6

6(5'). Body more subparallel; male genitalia with parameres slender, not expanded .... *T. howardi* Obenberger

6'. Body less subparallel; male genitalia with parameres slightly expanded .... *T. nicolayi* Obenberger

Taphrocerus agriloides Crotch - 46 specimens taken in Barton, Boone, Chariton, Jasper, Jefferson, Platte, and St. Louis Counties. Seasonal occurrence: 9 May-16 October. Most of the specimens were taken by sweeping sedges growing at pond's edge. A large series was swept from *Eleocharis* sp.

Taphrocerus cylindricollis Kerremans - 1 specimen taken in Vernon County on 8 May (Nelson and MacRae 1990). This specimen was swept in a moist, native prairie habitat.

Taphrocerus gracilis (Say) - 8 specimens taken in Clay, Platte, and Stoddard Counties. Seasonal occurrence: 23 May-22 August. The Stoddard County specimens were swept from sedges in wet roadside drainage ditches.

Taphrocerus howardi Obenberger - 114 specimens taken in Boone, Franklin, Holt, Jefferson, Mississippi, St. Louis, and Stoddard Counties. Seasonal occurrence: 30 April-12 October. Large series were taken by malaise trap (Nelson and Westcott 1976) in prairie habitat and by sweeping dolomite glades. Specimens were also swept from sedges in pond margins and wet roadside drainage ditches.

Taphrocerus laevicollis LeConte - 2 specimens taken in Jefferson and Vernon Counties. Seasonal occurrence: 3 May and 6 July. The specimens were swept from native prairie and dolomite glade habitats.

Taphrocerus nicolayi Obenberger - 74 specimens taken in Adair, Barton, Boone, Callaway, Dade, Franklin, Holt, Jasper, Mississippi, Platte, Polk, Randolph, St. Clair, St. Francois, St. Louis, Stoddard, and Vernon Counties. Seasonal occurrence: 24 April-2 October. This species has been swept from sedges in a variety of native prairie and glade habitats, natural woodland openings, pond margins, along small creeks, and in wet roadside drainage ditches.

Taphrocerus schaefferi Nicolay & Weise - 30 specimens taken in Adair, Boone, Franklin, Henry, Holt, Jefferson, Macon, Platte, Randolph, St. Clair, St. Louis, and Stoddard Counties. Seasonal occurrence: 1 May-29 September. This species has been taken by malaise trap (Nelson and Westcott 1976) in native prairie habitat and swept from sedges in a variety of native prairie and glade habitats, natural woodland openings, pond margins, and wet roadside drainage ditches. One adult was observed feeding on the leaf of *Cyperus escuelentus*.

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