

Insects of Western North America

7. The Blister Beetles (Meloidae) of Colorado



Contributions of the
C.P. Gillette Museum of Arthropod Diversity
Colorado State University

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by

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Abstract

Colorado's unique blister beetle (Coleoptera: Meloidae) fauna was reviewed through examination of literature, museum, and personal collections and over three years of fieldwork throughout the state. This study includes identification, ecological, and distributional information for the 15 genera and 81 species confirmed to occur in Colorado representing nearly 26% of the known meloid fauna in the United States. Eight new state records, *Epicauta abadona* Skinner, *Epicauta atrata* (Fabricius), *Epicauta ochrea* (LeConte), *Gnathium nitidum* (Horn), *Lytta deserticola* Horn, *Lytta navajo* Werner, *Meloe angusticollis* Say, and *Rhyphonemognatha rufa* (LeConte) were recorded. Artificial keys, pictures of select species and taxonomically important characters, and distributional maps are provided to help facilitate identification.

Introduction

The family Meloidae, blister beetles, is found on every continent with the exception of Antarctica and New Zealand. It is estimated that, worldwide, this family contains 120 genera and approximately 2,500 species (Pinto and Bologna 1999). Currently, in North America, the family Meloidae includes about 316 species belonging to 22 genera arranged into three subfamilies.

Beetles in the family Meloidae may be recognized by their soft integument, narrow and anteriorly constricted pronotum, deflexed head that is constricted behind, 5-5-4 tarsal formula, and elongated coxae with open coxal cavities. Most meloid species are adapted to xeric conditions with the greatest species diversity, in the New World, occurring in arid and semi-arid regions.

Some specialized species are non-feeding as adults however; the majority of adults feed on a wide variety of plants, grasses and some trees, largely preferring the families Asteraceae, Fabaceae and Solanaceae. Plants are fed on in a variety of ways with some species feeding exclusively on pollen while others consume only the flowers, stems, leaves or any combination (Pinto and Bologna 2002).

The hypermetamorphic larval development of meloids has been well studied (Horsfall 1941, MacSwain 1956, Selander and Weddle 1969). The first instar larvae, or triungulin, are usually well sclerotized, have functional legs and actively search out preferred hosts. Additionally, larvae of the genus *Meloe* and the subfamilies Nemognathinae and Tetraonycinae are phoretic and attach themselves to adult solitary bees to be taken back to the nest where they feed on the larval bees and cell contents.

Instars two through five are grub-like and do not move much. The majority of this life stage is spent feeding. Instar six, a mostly diapausing form, does not feed and the legs are largely vestigial. Instar seven is similar in appearance to the feeding grubs and pupation soon follows (Horsfall 1941, MacSwain 1956, Pinto and Bologna 2002).

Larvae of *Epicauta* and *Linsleya* feed on the eggs of grasshoppers, primarily *Melanoplus* species, with a few species of *Epicauta* thought to be predators of other meloid eggs (Selander 1981, 1982a, c, 1986, Pinto 1991). Larvae of all other genera, occurring in the United States, are thought to feed on the cell provisions and larvae of bees largely preferring the families Apidae and Megachilidae, or have unknown hosts (Enns 1956, Selander 1960, Pinto and Selander 1970).

When threatened adult meloids will secrete clear droplets of a defensive compound, containing cantharidin mixed with hemolymph, through their leg joints. The larvae are also capable of exuding a milky cantharidin substance from their mouths. Cantharidin is a potent terpenoid toxin found primarily, but not exclusively, in meloids. Cantharidin is produced and synthesized in the male's third pair of seminal vesicles and the ovaries of females. However, it has been shown that in many species of blister beetle, female beetles cannot produce cantharidin although the substance is present in their bodies. During copulation, males transfer large packets of cantharidin along with semen to the female. This may be a form of nuptial gift by providing the mated female chemical protection and subsequently passing this protection on to the eggs (McCormick and Carrel 1987, Young 1984a, b).

Throughout history, blister beetles and cantharidin have had medical and economic significance with the use of cantharidin well-documented as an aphrodisiac

(Spanish Fly), the monetary value associated with blister beetle feeding damage on crops, loss of valuable livestock due to fatal toxicosis, cantharidin may be use as a pharmaceutical for removing warts and *Molluscum contagiosum*, and the potential use a possible biological control agent. Every year several cases of livestock death due to the ingestion of cantharidin are reported. In the United States the problem of cantharidin toxicosis affecting horses reached its peak in the late 1970s to early 1980s. After a million dollar pair of thoroughbred horses died in 1983, a large campaign was launched to investigate this problem (Lane 1983). As common practice during this time period, grass hay and alfalfa were simultaneously cut and crimped during harvest. It was subsequently found that blister beetles feeding on the plants were harvested with the crop and immediately imprisoned within the vegetation. The trapped beetles died in the bales and remained there until the vegetation was fed to the livestock. It is note worthy that occurrences of livestock death due to blister beetle impregnated feed increases in years immediately following population explosions of grasshoppers, since grasshoppers are the larval host for many of the blister beetles in the genus *Epicauta*. Dry weight concentrations of blister beetles may reach up to 145 g in 5.25 kg flakes of alfalfa hay. This is especially important when considering that studies focused on determining toxic levels of consumed blister beetles showed that as little as 4 g of dried ground blister beetle given to horses weighing 135-408 kg results in death (Pancier 1972, Capinera *et al.* 1985). After it was determined that the harvesting technique being used during this time period was probably responsible for the blister beetle contaminated hay, new harvesting methods were examined. Bauernfeind and Breeden (1984) suggested using sickle bar harvesting equipment on the principal that if the hay or alfalfa was cut and

allowed to dry in the field before being compacted into bales, the beetles would have a chance to escape before the baling process, thus reducing the amount of beetles compressed in the feed. After the new techniques were adopted, cases of accidental animal toxicosis decreased significantly. However, cases of fatal toxicosis in livestock animals due to cantharidin poisoning occasionally still arise. Zhu *et al.* (1997) have shown that even with new harvesting techniques, cantharidin levels in hay and alfalfa bales can reach 34 ppm in a 500 g sample of vegetation. In an experiment, they determined that living blister beetles on the plants during harvest may be crushed by the tires and equipment of the harvesting machines. Up to 6.51% of the total cantharidin content of the beetles may be transferred to the alfalfa from crushed beetles. Because cantharidin is a terpenoid it has high stability and can be a long-term risk to livestock. After nine months of dry, room temperature storage, dead blister beetles may only lose 34% of their dry body weight cantharidin concentration (Zhu *et al.* 1997).

Some blister beetle studies have suggested that cantharidin may be a potential biological control agent. Carrel and Eisner (1974) conducted studies to determine the practicality of cantharidin for biological control use. Bioassays were designed to test the effectiveness of cantharidin as a potential feeding deterrent against ants and predaceous beetles. In a feeding preference test, ants were given a choice of twenty capillary tubes presented at regular feeding stations. Ten of the tubes were filled with a glucose solution and a cantharidin mixture at varying concentrations. The other ten tubes were filled with glucose solution. When presented with this choice, the ants showed a distinct preference for the cantharidin-free glucose solution, even when the concentration of cantharidin was as low as $7.7 \times 10^{-6} M$. Additionally, ground beetles (Carabidae) were presented with

swabs of a lipid emulsion mixed with varying concentrations of cantharidin. The beetles were tested for oral sensitivity. A sensitivity response was recorded if the beetle exhibited a mouth cleansing response to the swabs. This response consisted of wiping the mandibles and mouth parts in sand. It was stated that even minimal concentrations of cantharidin was enough to deter feeding. As a result of the study, it was concluded that cantharidin was an effective feeding deterrent at concentrations as low as $1.0 \times 10^{-5} M$, and it is nonvolatile (Carrel and Eisner 1974). These qualities may show potential for use as an effective biological control agent.

Colorado is unique in having three distinct physiographic regions or provinces: the plains, the Rocky Mountain range, and the western plateaus (Chronic and Chronic 1972), giving rise to a variety of diverse habitats. The plains or prairie lands of Colorado are the western extension of the Great Plains and extend from the eastern limit of the Rocky Mountain range 242 km east to Kansas encompassing about 40% of the state (Chronic and Chronic 1972, Kondratieff *et al.* 2002). The plains are characterized by shortgrass prairie, a relatively flat appearance, and low elevations of 1,021 to 1,524 m. The dominant vegetation includes, buffalo grass, galleta, junegrass, little bluestem, needle-and-thread, western wheatgrass, ringgrass, sagebrush, and cottonwood trees in the riparian zones (Sims 1988). The Great Plains are considered a semi-arid climate, averaging less than 51 cm of precipitation annually. In Colorado, two major rivers traverse the Great Plains, the South Platte River in the northern portion of the state and the Arkansas River in the south; the area between the two rivers forms the Colorado Piedmont. The Front Range is the transitional zone between the Great Plains and the Rocky Mountains and is the longest continuous uplift in the state. It extends from Cañon

City north to the Wyoming border (Lovering 1929, Chronic and Chronic 1972). The Rocky Mountain range stretches from British Columbia to northern New Mexico cutting through Colorado from the northwest to the southeast with its highest point, Mount Elbert at 4,401 m, located in Colorado. Vegetation patterns vary greatly by elevation, soil composition, and precipitation with oak species and riparian vegetation found at lower elevations followed by ponderosa pine, lodgepole pine, and quaking aspen towards higher elevations (Peet 1978, 81, Buchholtz 1983). The western plateaus are comprised mainly of greasewood, sage, and saltbush in the northwest and pinion pine-juniper woodlands and greasewood shrublands in the southwest (West *et al.* 1975).

Colorado is noted as having a diverse insect fauna, and many insects reach their distributional limits within the state (Milliken 1921, Kippenhan 1994, Kondratieff *et al.* 2002, Durfee *et al.* 2005). The greatest diversity of meloid species in Colorado occurs throughout the Great Plains in the southeastern corner of the state where many of the southwestern and eastern North American species reach their northern and western most limits respectively. Species diversity drops dramatically as elevation increases throughout the Rocky Mountain range but increases again throughout the western plateaus as many southwestern species reach their northern and eastern distributional limits. This study has identified 81 species within 15 genera occurring in Colorado including eight new state records *Epicauta abadona* Skinner, *Epicauta atrata* (Fabricius), *Epicauta ochrea* (LeConte), *Gnathium nitidum* (Horn), *Lytta deserticola* Horn, *Lytta navajo* Werner, *Meloe angusticollis* Say with one *Rhyphonemognatha rufa* (LeConte) representing a new generic record. This represents 26% of the known meloid fauna in the United States (Appendix 1). An additional 15 species are suspected to occur in the state.

One species *Spastonyx nemognathoides* (Horn) labeled from Colorado is considered a doubtful record.

The purpose of this study is to provide professional entomologists and extension workers a list and diagnostic tool for the identification of Meloidae known to occur in Colorado and to provide additional distributional and ecological information specific to Colorado including new state records. Additionally, this work is intended to provide further evidence that Colorado has a relatively high insect diversity and is the distributional limit of many southwest and eastern meloid species. Some previous work has been done to compile a checklist for Colorado and Wyoming; however, these treatments were largely inadequate. The publication “A Catalogue of the Coleoptera of Colorado” by H. F. Wickham (1902) is out of date, using many obsolete names and lists only a small portion of the known Colorado meloid fauna. Other than Wickham (1902) and two other publications on the Cicindelidae (Kippenhan 1994) and Cerambycidae (Heffern 1998) there are no further lists available for the terrestrial Coleoptera in Colorado. Additionally, a treatment of the Meloidae of Wyoming (Bomar 1993) exists but only covers about half of Colorado’s diverse meloid fauna. Selander’s (1951), unpublished MS thesis on the Meloidae of Utah, provided descriptions of species and gives distributions of many meloid species that range into the western plateau of Colorado but does not cover Colorado’s eastern fauna.

Material and Methods

Adult meloids were collected using a variety of methods which included: targeting adult host plants, using host records taken from several literature sources and specimen labels, sweep netting through suitable vegetation using a 38 cm diameter net, black light trapping using of a bucket trap, and checking lights around hotels and gas stations. Specimens were immediately pinned or pointed following dispatch. Genitalia is removed from males when of taxonomic value and placed in microvials of glycerin. Specimens collected during this study were deposited in C.P. Gillette Museum of Arthropod Diversity (CSUC) and the author's personal reference collection. The following 1,171 records are from collections made throughout Colorado since 1893. Material from the following collections was examined during this study. The official four letter acronyms were taken from (Arnett *et al.* 1997) and are the same acronyms listed in the species treatment: Brigham Young University, Monte L. Bean Life Science Museum, Provo (BYUC); C.P. Gillette Museum of Arthropod Diversity, Fort Collins (CSUC); Denver Museum of Nature and Science, Denver (DNHC); University of Wyoming, Laramie (ESUW); Florida State Collection of Arthropods, Gainesville (FSCA); University of California, Davis (UCDC); University of Colorado Museum, Boulder (UCMC); the personal collections of Dr. Bob Gemmil, Denver (BGPC), Jeff Owens, Fort Collins (JOPC), and Matthew Garhart, Fort Collins (MGPC).

A key to the genera and species in each genus, if more than one species occurs or is suspected to occur in Colorado, is provided. The keys provided are artificial and are structured to facilitate quick and accurate identifications and separate species known and

suspected to occur in Colorado. Additionally, Figs. 1-78 are provided for confirmation of identification and should not be used in place of keys. Specimens chosen for these figures represent the average morphology of Colorado specimens and not necessarily the average for the species.

Discussion of characters used: Color is often a useful character for quick separation of several meloid taxa. Often when referring to black markings (maculation) and cuticular coloration, a tolerance is given to include dark brown. Many species of meloid have a pale orange colored frontal spot on the head. When head coloration is given this spot is often disregarded except in the genus *Lytta* where the presence or absence of this spot is indicated. Antennal, leg and palpi segments are given in Roman numerals and are counted proximally to distally. Following the anatomical terms in Pinto (1991) the anterior edge of the antennae refers to the surface facing forward when the antennae are viewed from above when they are held straight out to the side. Tarsal pads refer to the light colored densely pubescent pads on the ventral side of the tarsi. A glossary of the common terms used is included at the end of this work (Appendix 2).

Cysteodemus LeConte is included in the following key; however, it has not been recorded from Colorado. After reviewing the available distributional information it is suspected to occur in the state. Additionally, *Spastyonix* is included, however the lone Colorado record from Larimer County stored in the C.P. Gillette Museum of Arthropod Diversity (CSUC) is a doubtful locality.

Key to the genera of adult Colorado Meloidae

Key modified in part from Pinto and Bologna (1999)

- 1 Tarsal claws pectinate, with a single or double row of teeth along the ventral margin of the dorsal blade (Fig. 79)13
- 1' Tarsal claws simple (Fig. 80), or with a single large tooth formed by a reduced ventral blade fused with the dorsal blade (Fig. 81).....2
- 2 (1') Tarsal claws appearing toothed.....8
- 2' Tarsal claws simple, both blades smooth along their ventral margins and free from each other; ventral blade may be reduced but not fused in some specimens of *Hornia*.....3
- 3 (2') Inside of pro-femora at apical end excavated and lined with a patch of transverse silky pubescence (Fig. 82) *Epicauta* Dejean (p. 18)
- 3' Pro-femora without such modification4
- 4 (3') Elytra abbreviated, shorter than fully distended abdomen; either not meeting along sutural mid line by overlapping basally (Fig. 54) or squamiform (scale like) (Fig. 83); wings greatly reduced or absent5
- 4' Elytra usually covering tip of abdomen, or slightly reduced but always meeting along sutural mid line, at least basally; wings fully developed or only slightly reduced at least reaching apical portion of abdomen.....6
- 5(4) Elytra reduced to a length shorter than that of the pronotum, squamiform, only partially covering first abdominal sternite, not overlapping basally (Fig. 83);

- abdominal membranous area light in coloration, contrasting with darker sclerites; found in nests of solitary bees*Hornia* Riley (p. 93)
- 5' Elytra reduced but longer than pronotum, covering several abdominal sternites, overlapping basally; abdominal membranous area dark in coloration, similar in coloration to abdominal sclerites (Fig. 54)*Meloe* Linnaeus (p. 118)
- 6 (4') First antennal segment elongate, greatly increasing in width apically (Fig. 84); pronotum longer than wide, narrowing towards head; males, of most species, possessing enlarged pyriform maxillary palpi; color usually yellow with contrasting black vittate or fascia*Pyrota* Dejean (p. 151)
- 6' If first antennal segment elongated than not greatly increasing in width apically; males without greatly enlarged pyriform maxillary palpi; color not yellow with contrasting black vittae or fascia.....7
- 7 (6') Antennae with intermediate segments compressed, transverse; first antennal segment longer than third; hind tibial spurs similar, spiniform; usually dark metallic blue or green.....*Linsleya* MacSwain (p. 96)
- 7' Antennae not compressed, usually moniliform or subfiliform (Fig. 85); first antennal segment shorter than third; hind tibial spurs usually dissimilar (Fig. 86), with outer spur thickened and obliquely truncate; coloration variable
.....*Lytta* Fabricius (p. 100)
- 8 (2) Elytra reticulate or with deep punctations, fused along midline and greatly inflated (Figs. 1, 87); appearing spider like*Cysteodemus* LeConte (p. 17)
- 8' Elytra may be reticulate or punctate, but never inflated and fused along the midline9

9 (8')	Elytra reduced, leaving several abdominal sternites visible in a natural state; wingless.....	10
9'	Elytra normal length, covering abdominal sternites in natural state; with hind wings present	11
10 (9)	Elytra reticulate, reticulations may be seen without magnification; usually with red or orange/yellow coloration on the head, elytra, and posterior margins of the abdominal sternites (Fig. 88)	<i>Megetra</i> LeConte (p. 117)
10'	Elytra not reticulate, appearing slightly to moderately rugose; black, never with above coloration.....	♀ <i>Cordylospasta</i> Horn (p. 16)
11 (9')	Tarsal claws with unguis spine, a spine like process arising from the base of the ventral tooth and extending parallel to the outer surface of each claw; pronotum orange.....	<i>Spastonyx</i> Selander (p. 158)
11'	Tarsal claws without a unguis spine	12
12 (11')	Coloration dull black; males without cephalic sulcus.....	♂ <i>Cordylospasta</i> Horn (p. 16)
12'	Coloration never dull black, usually variously colored with red, orange/brown, or metallic green or blue; males of most species with cephalic sulcus.....	<i>Eupompha</i> LeConte (p. 87)
13 (1)	Galeae produced into a sucking tube of varying lengths (Figs. 89, 90).....	14
13'	Galeae not produced into a sucking tube, may be slightly elongated; usually a short, lobiform structure (Fig. 91).....	16

- 14 (13) Antennae clavate, segments becoming progressively larger distally; small beetles, between 4-11mm, but rarely greater than 6 mm, usually with a long well developed sucking tube; head usually elongated*Gnathium* Kirby (p. 89)
- 14' Antennae usually filiform or submoniliform, distal segments not larger than proximal segments; small to large beetles; sucking tube may be well developed or may only scarcely exceed the length of the mandibles15
- 15 (14') Galeae usually long, just reaching metacoxae to longer than body length; elytra rugose, or punctulate to varying degrees, but punctures never coarse; males usually with abdominal sterna 2 to 5 variously modified (Figs. 92, 93); hind tibial spurs usually dissimilar (Figs. 94, 95), if similar and spatulate then males with abdominal sterna 2 through 5 unmodified; aedeagus without a pair of large, sclerotized lobes.....*Nemognatha* Illiger (p. 133)
- 15' Galeae usually short, just surpassing mandibles, sometimes attaining or slightly surpassing metacoxae, but never longer than body; elytra with sparse to moderately dense, coarse punctuations; hind tibial spurs usually similar, and broadly spatulate, males usually with abdominal sterna 2 and 4 unmodified, 5 may have a small medial impression at apex; aedeagus with a large, sclerotized, pair of lobes.....(in part) *Zonitis* Fabricius (p. 160)
- 16 (13') Body black, with brick red elytra (Fig. 72); antennae short, submoniliform; ventral blade of tarsal claws thin and hair-like*Tricrania* LeConte (p. 159)
- 16' Body variously colored, combinations not as above; antennae longer, not submoniliform; ventral blade of tarsal claws thicker and laterally compressed, not hair-like17

- 17 (16') Head and mandibles elongate (Fig. 98), hind tibial spurs dissimilar, inner spur more slender than outer spur with an acute apex, outer spur broad, rounded at apex; head, pronotum and elytra rufous with reddish pubescence; elytra with shallowly, densely punctulate, almost appearing rugose
.....*Rhyphonemognatha* Enns (p. 157)
- 17' Head and mandibles not as elongate, hind tibial spurs usually similar, and broadly spatulate; without above color combination; pubescence clear to piecous, not red, elytra sculpturing variable(in part) *Zonitis* Fabricius (p. 160)

Genus *Cordylospasta* Horn

Cordylospasta is distinguished from all other genera of Colorado Meloidae by the following characters: dull black coloration; tarsal claws with dorsal blade fused to a shorter ventral blade, appearing toothed; antennae submoniliform, short, never reaching base of elytra with 8-11 segments; hind tibial spurs spiniform; no central cephalic sulcus; and strong sexual dimorphism. Males have complete elytra, covering all abdominal terga and are fully winged. Females exhibit abbreviated elytra that do not overlap basally.

Cordylospasta is restricted to arid habitats in the western United States and adult activity is dependant on the summer rains. Larvae are thought to feed on the nest contents of solitary bees, while adults feed on the flowers of many desert plants in the family Asteraceae (Pinto 1972a, b)

***Cordylospasta fulleri* Horn**

(Fig. 150)

Diagnosis: Only two North American species are represented in this genus, *Cordylospasta fulleri* and *C. opaca* Horn, the latter being largely restricted to southern California, with a few records from southern Nevada and northwestern Arizona. *Cordylospasta fulleri* is differentiated from *C. opaca* and all other Colorado meloids by the short, 8-10 segmented, slightly clavate antennae with varying degrees of fusion of apical segments (more so in males), and the above generic characters (Pinto 1972b).

Comments: Pinto (1972b) noted that *Cordylospasta* exhibits more sexual dimorphism than any other New World genus with the exception of some species of the South American genus *Picnoseus* Solier, then known to him as *Gynapteryx* Fairmaire and Germain. No Colorado specimens of *C. fulleri* were available for examination during this study.

Distribution: Widely distributed throughout the Great Basin from southeastern Oregon and southwestern Idaho, south to east central California, east to western Colorado (Pinto 1972a). Colorado distribution (Fig. 150) is restricted to extreme western Colorado; here it reaches its eastern-most range extension.

Colorado Records: Mesa Co.: Grand Junction, 2, (Pinto 1972a).

Genus *Cysteodemus* LeConte

(Figs. 1, 87, 151)

Cysteodemus has not been recorded from Colorado; however, due to records in northern New Mexico, and similar habitat in southeastern Colorado, it has been included as possibly occurring in the state. The greatly inflated, reticulate and connate elytra, toothed tarsal claws and apterous condition readily distinguish this genus. Only two species, *C. armatus* LeConte and *C. wislizeni* LeConte, are placed in this genus.

Cysteodemus armatus only occurs in southern California, southern Nevada, western Arizona and extreme northwestern Mexico. However, *C. wislizeni* LeConte is distributed throughout New Mexico, Texas, and north-central Mexico. Pinto (1984) recorded this species from Koehler, New Mexico, Colfax County, which is located only 28 km south of

Colorado's Las Animas County (Fig. 151). The extreme south central and southeastern Colorado counties Costilla, Las Animas, and Baca would be the most probable locations for its occurrence.

Genus *Epicauta* Dejean

This cosmopolitan genus is readily distinguished from other genera of meloids by the excavation on the inside of the fore femora lined with a patch of cinereous pubescence (Fig. 82). Further characters used to distinguish this genus include: most species are holelytrous and fully winged, elytra are never reticulate or inflated, simple tarsal claws (Fig. 80), filiform, to submoniliform antennae. Additionally, members of the subgenus *Macrobasis* usually have antennal segment I enlarged (Fig. 100) and some species may have a comb like structure on the hind tibia (Fig. 99) (Werner 1945, Pinto 1991).

This genus is widely distributed across the United States with the majority of the species occurring in the semi-arid southwest. Seasonal activity begins as early as March and can last until the first killing frost. Adults feed on a wide variety of plants consuming the flowers, leaves, stems, or all combinations with the most preferred food plants in the families Fabaceae and Asteraceae. Adult *Epicauta* can occur in great numbers on their host plants sometimes causing localized damage to crops. Larvae are parasitoids of grasshopper egg pods and a few species have been shown to be cannibalistic on the eggs of other *Epicauta* (Pinto 1991).

Key to the subgenera of adult Colorado *Epicauta*

Modified from (Pinto 1991)

- 1 With one or more of the following specialized traits: Antennal segment I longer than or equal to III, males of many species with segment I possessing an excavation or slight impression anteroapically (Fig. 100), females with posterior surface bowed; Segment II $\frac{2}{3}$ length of segment III or longer; Eye with deep, narrow emargination dividing eye into a short dorsal lobe and an elongate ventral lobe (Fig. 101); males with a hind tibial comb (Fig. 99), however, it may be greatly reduced.....*Epicauta (Macrobasis)* (p. 19)
- 1' Antennal segment I usually shorter than III, males without an impression or excavation apically, females usually with posterior surface straight; Segment II shorter than, or subequal to, $\frac{1}{2}$ segment III; Eye not emarginate, or more commonly, with a broad emargination dividing eye into more equal portions (Fig. 102); males lacking hind tibial comb *Epicauta (Epicauta)* (p. 43)

Epicauta (Macrobasis)

The subgenus *Macrobasis* in Colorado is represented by 12 species in six species groups. One species, *E. ochrea* (LeConte) represents a new state record for Colorado.

The following species *E. atrivittata* (LeConte) and *E. subglabra* (Fall) are included in the following key although they have not been recorded from the state. Both species have distributional patterns and habitat requirements conducive to occurring in

Colorado. Records supporting this distribution are discussed under the comments and distribution section under each species treatment.

Recognition of this subgenus is easiest with male specimens which usually have one or more of the following characters; the presence of a hind tibial comb (Fig. 99), elongated and usually enlarged first antennal segments which may or may not have an anteroapical impression or excavation (Fig. 100). However, females and some males may lack these pronounced characters, but will have at least the first antennal segment somewhat elongated and at least slightly bowed, and antennal segment II is usually elongated as well (Fig. 103).

Key to the species of adult Colorado *Epicauta* (*Macrobasis*)

- 1 Cuticle of, at least, legs light in coloration; if elytra darker brown, than a central cinereous vittae, reaching from the humerus to near the apex, present on each elytra expressed by thicker vestiture, and antennal segment III distinctly longer than I2
- 1' Cuticle of elytra and legs piceous or dark brown, without a cinereous vittae expressed by thicker vestiture on elytra.....3
- 2 (1) Antennae moniliform, bead like; elytra without vittae; fore tibia of males with 1 apical spur*Epicauta ochrea* (LeConte) (p. 36)
- 2' Antennae subensiform; elytra with a pair of central vittae formed by denser vestiture; fore tibia of males without an apical spur
.....*Epicauta alastor* Skinner (p. 25)

3 (1')	Elytra and body black in cuticular coloration, covered entirely with black vestiture; usually with a fringe of cinereous pubescence on margins of pronotum, metathorax, abdominal sterna, and coxae; a fairly large, robust species	4
3'	Elytra and body color usually black, but vestiture never completely black, vestiture ranging from cinereous to rufous, without cinereous markings as above	5
4 (3)	Hind wings fully developed, length when extended surpassing apex of abdomen, folded at rest; middle and hind coxae widely separated (Fig. 104), usually by a distance equal to or greater than the combined length of abdominal sterna 2 and 3	<i>Epicauta segmenta</i> (Say) (p. 38)
4'	Hind wings not fully developed, length, at most, only attaining the fifth abdominal sterna; middle and hind coxae not as widely separated (Fig. 105), distance between the two less than the combined length of abdominal sterna 2 and 3.....	<i>Epicauta valida</i> (LeConte) (p. 41)
5 (3')	Basal segments of antennae testaceous; pronotum usually with two thin black vittae; abdominal sterna with black markings; males with antennal segment I greatly enlarged and excavated anteroapically (Fig. 4)	<i>Epicauta albida</i> (Say) (p. 26)
5'	Basal segments of antennae fuscous; pronotum not marked as above; males with or without antennal segment I enlarged and excavated anteroapically	6
6 (5')	Males.....	7
6'	Females	15

7 (6)	Antennal segment I impressed or distinctly excavated anteroapically (Fig. 100)	8
7'	Antennal segment I may be elongated or enlarged but not impressed or distinctly excavated anteroapically	9
8 (7)	Antennal segment I distinctly excavated anteroapically; segment II with distinct apical spine, body boldly contrasting with black and cinereous markings; elytra with two broad black vittae, connected apically; occiput, pronotum, metasternum, and abdominal terga with a pair of broad black markings, which are sometimes fused; legs except femora black	..... .....<i>Epicauta atrivittata</i> (LeConte) (p. 27)
8'	Antennal segment I only slightly impressed apically; body usually predominantly uniform cinereous with black markings only on extreme base of elytra and patterned on legs	.....<i>Epicauta longicollis</i> (LeConte) (p. 34)
9 (7')	Two spurs present at apex of fore tibia	10
9'	One spur present at apex of fore tibia	14
10 (9)	First antennal segment greatly elongated, usually reaching occiput, flattened, or sub-triangular in cross section; second segment elongate, distinctly longer than third segment	11
10'	First antennal segment only slightly elongated, usually only reaching half way between eye and occiput, never attaining occiput, not flattened but may have a very slight anteroapical impression	13
11 (10)	Second antennal segment with sides nearly parallel, much shorter than the combined length of segments III-V, usually less than 2.4 times longer than	

- segment III (Fig. 103); vestiture fairly dense, masking color of cuticular surface (Fig. 106) *Epicauta fabricii* (LeConte) (p. 28)
- 11' Second antennal segment slightly bowed (Fig. 107), subequal to or slightly shorter than the combined length of segments III-V, close to 2.9 times longer than segment III; vestiture more sparse, not greatly masking color of the cuticular surface 12
- 12 (11') Elytra hazy gray in appearance as a result of sparse light colored vestiture (Fig. 108) *Epicauta murina* (LeConte) (p. 35)
- 12' Elytra appearing same color as cuticle, vestiture very sparse and brown in color *Epicauta subglabra* (Fall) (p. 40)
- 13 (10') First antennal segment extending to hind margin of eye, slightly impressed anteroapically; a well developed hind tibial comb present (Fig. 99); smaller species, 8–12 mm *Epicauta uniforma* Werner (p. 40)
- 13' First antennal segment surpassing hind margin of eye by about $\frac{1}{4}$ its length, no impression anteroapically; hind tibial comb absent; larger species 12-20 mm *Epicauta immaculata* (Say) (p. 31)
- 14 (9') Fore tarsal segment I shorter than segment II, contorted; posterior surface of femora and trochanters flattened and glabrous; mandibles elongated extending well beyond labrum (Fig. 109) *Epicauta parkeri* Werner (p. 38)
- 14' Fore tarsal segment I longer than segment II, straight; posterior surface of femora and trochanters more evenly rounded, pubescent; mandibles not elongated, barely exceeding labrum *Epicauta ingrata* Fall (p. 33)

15 (6')	Body boldly contrasting with black and cinereous markings; elytra with two broad black vittae, connected apically; occiput, pronotum, metasternum, and abdominal terga with a pair of broad black markings, which are sometimes fused.....	<i>Epicauta atrivittata</i> (LeConte) (p. 27)
15'	Body not boldly contrasting with black and cinereous markings; elytra without two broad black vittae.....	16
16 (15')	Antennal segment II shorter than or sub-equal to III, length approximately 2/3 or less than the length of III.....	17
16'	Antennal segment II distinctly longer than III.....	21
17 (16)	Vestiture on elytra sparse, not concealing cuticle; each elytron with an indistinct pale line; mandibles elongated and straightened, well surpassing the labrum (Fig. 109)	<i>Epicauta parkeri</i> Werner (p. 38)
17'	Vestiture on elytra thicker, mostly concealing the cuticle, elytra without an indistinct pale line, mandibles normal, barely exceeding the labrum.....	18
18 (17')	Large species 14-25 mm; with humeral markings at base of elytra, vestiture on elytra of uniform length	19
18'	Smaller species 6-12 mm; if humeral markings present then elytra margined with denser pubescence	20
19 (18)	Vestiture cinereous to ferruginous in coloration; elytra lacking scutellar spots.....	<i>Epicauta immaculata</i> (Say) (p. 31)
19'	Cinereous to luteocinereous, but never ferruginous; elytra with scutellar spots, fore and middle tarsi with cinereous patches basally (Fig. 110)	<i>E. longicollis</i> (LeConte) (p. 34)

- 20 (19') Vestiture cinereous; elytra with black scutellar and humeral markings,
pubescence denser along margins and apices of abdominal terga.....
..... *Epicauta ingrata* Fall (p. 33)
- 20' Vestiture yellow ferruginous to luteocinereous; elytra without black scutellar
and humeral markings, pubescence of consistent density throughout.....
.....*Epicauta uniforma* Werner (p. 40)
- 21 (16') Vestiture fairly dense, masking color of cuticular surface (Fig. 106)
..... *Epicauta fabricii* (LeConte) (p. 28)
- 21' Vestiture more sparse, not greatly masking color of the cuticular surface12
- 22 (21') Elytra dull gray in appearance as a result of sparse light colored vestiture (Fig.
108) *Epicauta murina* (LeConte) (p. 35)
- 22' Elytra appearing same color as cuticle, vestiture very sparse and dark in color
..... *Epicauta subglabra* (Fall) (p. 40)

***Epicauta alastor* Skinner**

(Figs. 3, 153)

Diagnosis: This species may be readily recognized by its elongate body shape, subensiform antennae with segment III longer than I, light brown to ferruginous cuticle coloration. Elytra with a central cinereous vittae expressed by a line of thicker vestiture and with the margins and suture also having denser vestiture. Males without an apical spur present on the foretibia.

Comments: Throughout its range, considerable variability in cuticular coloration is observed. Additionally, although rare, some male specimens have been observed possessing a single fore tibial spur (Werner *et al.* 1966).

Distribution: Mexico: Sinaloa and Sonora. United States: throughout the Southwest from southern California east to western Texas and Colorado (Werner 1945, Pinto 1991). Colorado distribution: one isolated record from northcentral Larimer County (Fig. 153).

Colorado Records: Larimer Co.: Fort Collins, 14 September 19??, 1, (CSUC).

Epicauta albida (Say)

(Figs. 4, 154)

Diagnosis: Vestiture cinereous to luteocinereous, pronotum usually with two thin black vittae and abdominal sterna with black markings, basal segments of antennae and maxillary and labial palpi testaceous. Males with antennal segment I greatly enlarged and with a distinct anteroapical excavation. No hind tibial comb present.

Comments: Werner (1945) designated a neotype for *E. albida* from “La Junta, Bent Co., Colorado...” after the holotype was presumed lost. Selander and Mathieu (1964) also gave this locality; however, for clarification, La Junta is located in Otero County, Colorado. The neotype is deposited in the Museum of Comparative Zoology, Harvard University (MCZC).

Distribution: Mexico: Coahuila, Nuevo Leon, and Tamaulipas. United States: largely distributed throughout the Great Plains from Colorado, Nebraska and Kansas

south to the Coastal Plain of Texas, west to Arizona (Selander and Mathieu 1969, Pinto 1991). Colorado distribution: confined to the plains east of the Rocky Mountains (Fig. 154).

Colorado Records: **Cheyenne Co.:** Wild Horse, 1, (Selander and Mathieu 1964) **Denver Co.:** Denver, 1, (Selander and Mathieu 1964) **La Plata Co.:** Durango, 8, (Selander and Mathieu 1964) **Larimer Co.:** Fort Collins, July 30, 1935, 1, (CSUC); same location but, June 17, 1925, 1, (CSUC) **Lincoln Co.:** Hugo, 2, (Selander and Mathieu 1964) **Morgan Co.:** Fort Morgan, 1, (Selander and Mathieu 1964) **Otero Co.:** La Junta, 10, Rocky Ford, 10, (Selander and Mathieu 1964) **Phillips Co.:** Holyoke, 2, (Selander and Mathieu 1964) **Prowers Co.:** Lamar, July 10, 1983, Leatherman, D., 1, (CSUC); Road DD, Lamar, August 11, 2002, Miller, H., 1, (CSUC); same location but September 15, 2003 **Pueblo Co.:** Pueblo, 6, (Selander and Mathieu 1964) **Sedgwick Co.:** Julesburg, 2, (Selander and Mathieu 1964) **Weld Co.:** Masters, August 1, 1939, 1, (DMNS).

Epicauta atrivittata (LeConte)

(Figs. 10, 159)

Diagnosis: This distinctive species is recognized by its highly contrasting bold black and cinereous color pattern. Vestiture cinereous, each elytron with two broad, black vittae starting at the extreme base of elytra and extending nearly to apex where they are fused; occiput, pronotum, abdominal terga and sides of metasternum also with a pair of large black spots which are sometimes fused. In males, antennal segment I is greatly

enlarged with a distinct anteroapical excavation, about as long as the combined length of the remaining segments, and segment II with a distinct apical spine. Only one apical spine is present on the fore tibia.

Comments: No specimens have been collected in Colorado; however, Selander and Mathieu (1964) list a collection of three specimens from Lumberton, Rio Arriba County, New Mexico. This location is approximately 10 km south of Archuleta County, Colorado (Fig. 159). This species may occur in the southwestern Colorado counties of Archuleta, Conejos, La Plata, and Montezuma.

Distribution: Mexico: Chihuahua, Coahuila, Durango, and Tamaulipas. United States: throughout the Southwest from Arizona east to Texas (Selander and Mathieu 1969, Pinto 1991). Colorado distribution: none

Colorado Records: None.

Epicauta fabricii (LeConte)

(Figs. 15, 103, 106, 164)

Diagnosis: Body black, clothed in fairly dense cinereous to luteocinereous pubescence (Fig. 106) which mostly conceals the cuticular surface giving the beetle an overall dark cinereous appearance without magnification. Elytra with dark scutellar and humeral spots (Fig. 15). Antennal segment I without an anteroapical impression, flattened, slightly arcuate, and elongated, especially so in males where segment I attains the occiput. Segment II noticeably longer than III, more exaggerated in males, length

about as long as the combined length of segment III and IV and the sides nearly parallel (Fig. 103). Both sexes have two fore tibial spurs.

Comments: In Colorado, this widespread and common species, is recorded from May to July with collections in July representing 61% of all available records. *Epicauta fabricii* is known to feed primarily on leguminous plants and can occur in large populations on alfalfa and soybean, sometimes greatly reducing crop yields (Horsfall 1943, Werner 1945). Capinera *et al.* (1985) showed that this species has moderate levels of cantharidin, averaging 0.87 mg per beetle out of five males and five females tested. The larvae of this species are thought to develop on the eggs of the common grasshopper species *Melanoplus differentialis* (Thomas), the differential grasshopper, and *M. bivittatus* (Say), the two-striped grasshopper (Horsfall 1943, MacSwain 1956, Werner *et al.* 1966).

Separation of *E. fabricii* from the similar species *E. murina* and *E. subglabra* is easiest with males where the second antennal segment is wider with parallel sides in contrast to the longer, slightly bowed antennal segment II of *E. murina* and *E. subglabra*. Females, although more difficult, may be separated by vestiture density, and length of antennal segment II. *Epicauta fabricii* has moderately dense vestiture mostly covering the cuticular surface thus giving the beetle an overall cinereous appearance. Additionally, antennal segment II is noticeably shorter than I. *Epicauta murina* and *E. subglabra* have antennal segment II more sub-equal to, or slightly shorter than, segment I, the vestiture is less dense and does not obscure the cuticular surface thus giving *E. murina* an overall dark gray cast. *Epicauta subglabra* has even less dense and darker colored vestiture, producing an overall black appearance.

Distribution: Canada: Manitoba. United States: widely distributed from Maine south to Virginia, west to Arizona, Utah, Montana, and North Dakota (Pinto 1991).

Colorado distribution: statewide (Fig. 164).

Colorado Records: **Adams Co.:** Brighton, May 21, 1992, 16, (CSUC) **Boulder Co.:** Glacier Lake, June 27, 1936, H. Rodeck, 1, (UCMC); Saint Vrain Nuclear Power Site, July 31, 1972, J. W. Brewer, 1, (CSUC) **Delta Co.:** county label only, June 25, 2004, 1, (CSUC); Delta, June 26, 1938, U. Lanham, 1, (UCMC) **Douglas Co.:** Castlewood Canyon State Park, June 20, 1992, D. Leatherman, 2, (CSUC) **Jefferson Co.:** Chatfield State Park, June 2, 1977, D. Polhemus, 2, (CSUC); Wheat Ridge, July 13, 1988, J. Scott, 1, (CSUC) **Larimer Co.:** Bay Farm, Fort Collins, June 20, 1984, 5, (CSUC); Environmental Learning Center, Fort Collins, June 27, 1992, S. Fitzgerald, 4, (CSUC); Fort Collins, June 13, 1933, K. Maehler, 1, (CSUC); La Porte, June 9, 1938, M. Jamis, 1, (CSUC); Red Feather, June 10, 1933, K. Maehler, 1, (CSUC); Ted's Place, June 1, 1984, 14, (CSUC) **Logan Co.:** Sterling, July 31, 1912, 1, (CSUC) **Mesa Co.:** Grand Junction, July 10, 1931, L.G. Davis, 1, (CSUC); Palisade, June 27, 1990, J. Welch, 1, (CSUC); same locality but, May 26, 1981, J. Sirota, 1, (CSUC) **Montezuma Co.:** Cortez, July 5, 1932, L.G. Davis, 1, (CSUC); Yellow Jacket Canyon, July 7, 1956, H.G. and H.E. Rodeck, 1, (UCMC) Yucca House National Monument, July 5, 2001, Schmidt, J. and B. Kondratieff, 1, (CSUC); same locality but, May 24, 2001, Kondratieff, B. and H. Aldhafer, 1, (CSUC) **Morgan Co.:** Fort Morgan, June 1, 1979, D. Leatherman, 2, (CSUC) **Otero Co.:** Arkansas River Research Center, July 7, 1993, F. Schweissing, 3, (CSUC) **Prowers Co.:** Lamar, July 10, 1983, D. Leatherman, 1, (CSUC) **Rio Blanco Co.:** county label only, June 19, 1981, J. Sirota, 2, (CSUC) **Weld Co.:** Greeley, June 27,

1984, 7, (CSUC); Highway 34 and Road 57, June 16, 1992, 1, (CSUC); Roggen, June 17, 1936, 2, (CSUC) **Yuma Co.:** near 52 Road and R Road, July 13, 2000, J. Bishop, 1, (CSUC).

***Epicauta immaculata* (Say)**

(Figs. 18, 167)

Diagnosis: A somewhat large species 12-22 mm in length. Males and females with body black, vestiture ranging from cinereous, yellow cinereous to ferruginous, and uniform in length throughout. Antennal segment I slightly elongated, surpassing hind margin of eye by about $\frac{1}{8}$ to $\frac{1}{4}$ of its length. Males without an anteroapical impression on segment I; segment II shorter than III; antennae tapering slightly to apex. Tarsi usually completely black but may have a few scattered light hairs basally. Eyes slender and elongated. Pronotum as long as wide, impressed medially but not deeply so in basal half. The elytra of this species are without markings except for small black humeral spots at extreme base. Legs with two spurs present on fore tibia; hind tibial comb absent.

Comments: Throughout its geographical range *E. immaculata* shows considerable variation in vestiture coloration, and amount of humeral and scutellar markings. Selander and Mathieu (1969) showed that, throughout the northeastern portion of its range, populations tend to have an overall gray coloration as a result of white, nearly translucent vestiture covering the black cuticle of the body. Moving west, the vestiture becomes more yellow in coloration and less translucent until it reaches its western most range extension in New Mexico. Populations occurring in Mexico have

vestiture color ranging from dark gold-yellow to orange. Most individuals examined from Colorado range from yellowish to dark brown-yellow with no scutellar markings or a few scattered black hairs. Separation of *E. immaculata* females from *E. longicollis* may be difficult and is discussed on page 34.

Epicauta immaculata has been recorded from several species of garden and crop plants including: alfalfa, tomatoes, onion, sugar beet, and Irish potato. Gilbertson and Horsfall (1940) reported that the damage from these beetles on Irish potato fields in South Dakota from 1934-1938 was extensive and attacked plants made little recovery. This species is gregarious and may occur in large numbers on host plants. Capinera *et al.* (1985) noted that *E. immaculata* has relatively high levels of cantharidin, averaging 4.8 mg per beetle out of five males and five females tested.

Distribution: Mexico: Coahuila, Tamaulipas, and Veracruz. United States: from Ohio and West Virginia, south to Georgia, west to South Dakota and New Mexico (Selander and Mathieu 1969, Pinto 1991). Colorado distribution: throughout the Great Plains east of the Rocky Mountains (Fig. 167).

Colorado Records: **Baca Co.:** Picture Canyon, July 12, 1991, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 4, (CSUC); same location but, July 29, 1997, Francis, 1, (CSUC) **Bent Co.:** county label only, August 9, 1984, 3, (CSUC); Hasty, July 5, 1975, H.E. Evans, 1, (CSUC); Las Animas, August 8, 1984, 2, (CSUC); Road CC and Road 23.5, July 2, 1990, Kippenhan, M. and B. Kondratieff, 14, (CSUC) **Larimer Co.:** Fort Collins, September 23, 1934, 2, (CSUC); Livermore, July 15, 1984, J. Capinera, 3, (CSUC) **Las Animas Co.:** Cottonwood Canyon, July 1, 2004, D. Leatherman, 4, (CSUC); Purgatoire River, Lockwood Arroyo, July 2, 1989, Welch, J.

and B. Kondratieff, 5, (CSUC) **Otero Co.:** Route 109, mile marker 42, August 11, 1990, DeJong, G., Kondratieff, B., Rhoades, C., and D. Leatherman, 1, (CSUC); La Junta, July 3, 1992, D. Leatherman, 1, (CSUC); Rocky Ford, 3, (Selander and Mathieu 1969); Route 109, McMahon Arroyo, north of Higbee, July 3, 1993, Hook, A. and B. Kondratieff, 2, (CSUC); Vogel Canyon, August 16, 1995, Cranshaw, W., Leatherman, D., and B. Kondratieff, 1, (CSUC) **Prowers Co.:** Granada, 1, (Selander and Mathieu 1969); Lamar, July 10, 1983, D. Leatherman, 2, (CSUC) **Pueblo Co.:** Chico Creek Bluff wetlands, July 8, 1999, G. Doyle, 1, (CSUC) **Yuma Co.:** Wray, July 23, 1935, 1, (DMNS).

***Epicauta ingrata* Fall**

(Figs. 19, 168)

Diagnosis: Body cuticle black, clothed throughout with cinereous pubescence which is usually denser along the elytral margins and suture, and apices of abdominal terga. Elytra with dark scutellar and humeral spots. Antennae very long, filiform, antennal segment II shorter than III, segment III longer than I, especially so in males. Males with one fore tibial spur and antennal segment I not excavated anteroapically.

Comments: The Walsenburg specimens were taken from New Mexican Locust (*Robinia neomexicana* Gray) and an individual specimen from Lathrop State Park was collected on Willow (*Salix* sp.).

Distribution: United States: restricted to higher elevations of northern Arizona and New Mexico, and southcentral Colorado (Pinto 1991). Colorado distribution: along the eastern slope of the Rocky Mountains in the southern portion of the state (Fig. 168).

Colorado Records: Archuleta Co.: Frances, B. Rotger, 10, (UCMC); Road 193, Piedra River, July 1, 1996, Evans, H., Fitzgerald, S., Kondratieff, B., and D. Leatherman, 1, (CSUC) **El Paso Co.:** Colorado Springs, (Werner 1945) **Huerfano Co.:** Lathrop State Park, June 5, 1992, D. Leatherman, 1, (CSUC); Walsenburg, June 22, 1989, D. Leatherman, 5, (CSUC).

Epicauta longicollis (LeConte)

(Figs. 20, 100, 110, 170)

Diagnosis: A large species 12-25 mm in length (Werner 1945, Werner *et al.* 1966). Body black, clothed throughout with cinereous to luteocinereous vestiture. Pronotum strongly impressed medially in basal half and transversely at the extreme base, with a distinct basal collar (Fig. 110). Antennal segment I of males very elongated, longer than the combined length of II through V, bowed, and excavated anteroapically (Fig. 100). Legs with hind tibial comb absent and only one spur present on the fore tibia.

Comments: Females of *E. longicollis* may be easily confused with females of *E. immaculata*. The coloration of the vestiture, scutellar spots, shape of the pronotum, and the second antennal segment readily separate individuals of *E. immaculata* from Colorado and *E. longicollis*. *Epicauta longicollis* has cinereous to luteocinereous vestiture, a well-marked pair of scutellar spots, a noticeably longer than wide pronotum with deep median and transverse impressions basally, and antennal segment II is shorter than that of *E. immaculata*. Most Colorado populations of *E. immaculata* usually have yellowish to dark brown-yellow vestiture, no scutellar markings or a few scattered black

hairs and a subquadrate pronotum not as deeply impressed medially or transversely basally.

Distribution: Mexico: Chihuahua and Coahuila. United States: the Southwest from Texas west to Arizona, and southern Colorado. Colorado distribution: only recorded from the southeastern portion of the state (Fig. 170).

Colorado Records: Las Animas Co.: Purgatoire River, Lockwood Arroyo, July 2, 1989, Kondratieff, B. and J. Welch, 1, (CSUC) **Otero Co.:** La Junta, 3, (Selander and Mathieu 1969); Purgatoire Canyon, Rourke Ranch, June 18, 2002, Schmidt, J. and B. Kondratieff, 1, (CSUC).

***Epicauta murina* (LeConte)**

(Figs. 22, 107, 108, 172)

Diagnosis: Body black, clothed sparsely in cinereous to luteocinereous pubescence which does not conceal the cuticular surface giving the beetle an overall dark gray appearance (Fig. 108) without magnification. Elytra with black scutellar and humeral spots. Males with antennal segment I greatly elongated, attaining the occiput, without an anteroapical impression, flattened and slightly arcuate (Fig. 107); segment I longer than III in females; antennal segment II noticeably longer than III, just short of the combined length of segment III-V, arcuate and more exaggerated in male. Both sexes have two fore tibial spurs.

Comments: *Epicauta murina* is morphologically similar to, and may be easily confused with *E. fabricii* and *E. subglabra*. For separation of these species see comments

section under *E. fabricii*. This species has been recorded feeding on potatoes and alfalfa (Werner 1945, Capinera *et al.* 1985). Capinera *et al.* (1985) showed that this species has relatively low levels of cantharidin, averaging 0.61 mg per beetle out of five males and five females tested.

Distribution: Canada: New Brunswick. United States: northcentral states from Montana south to Colorado, east to Minnesota, Wisconsin, Michigan, and to the northeast from Maine to Massachusetts. Colorado distribution: in the higher elevations of the West Slope, along the Front Range, and southeastern Las Animas County (Fig. 172).

Colorado Records: **Archuleta Co.:** Route 160, Pagosa Springs, July 16, 1987, B. Kondratieff, 2, (CSUC) **Boulder Co.:** Gregory Canyon, May 20, 1992, 1, (UCMC) **Gunnison Co.:** Dark Canyon, Erikson Springs, June 7, 2004, M. Garhart, 4, (CSUC); Gunnison National Forest, Little Soap Park 10-12 miles north Highway 92, July 25, 1993, R. Gemmill, 1, (BGPC) **Jefferson Co.:** Tinytown, June 18, 1997, J. Scott, 1, (CSUC) **Larimer Co.:** Fort Collins, June 14, 1925, 2, (CSUC); Pingree Park, July 6, 1939, 2, (CSUC); Ted's Place, June 1, 1984, 8, (CSUC) **Las Animas Co.:** Stonewall, near Abbott Creek, July 14, 2001, G. Doyle, 2, (CSUC) **Routt Co.:** Steamboat Springs, June 28, 2001, D. Leatherman, 1, (CSUC).

***Epicauta ochrea* (LeConte)**

(Figs. 25, 175)

Diagnosis: This is a distinctive species, unique among the *Epicauta* in body coloration and antennal form. Body cuticle light in coloration, varying from luteous to

dark ferruginous, with the head and pronotum sometimes darker than the rest of the body. Vestiture luteocinereous to light ferruginous. Antennae submoniliform, beadlike, with antennal segment II shorter than III. Males with antennal segment I not excavated anteroapically; fore tarsal segment I contorted, shorter and broader than II; only one fore tibial spur present.

Comments: The majority of individuals with host plant information were recorded from the blossoms of yucca. Werner (1954) first noted the preferred host plant for this species after he discovered swarms of *E. ochrea* feeding on and mating on a yucca plant in bloom in southern Arizona. He concluded that the rarity of this species in collections was due to the nocturnal habits of this species and lack of knowledge of its host plant. *Epicauta ochrea* has not been previously recorded from Colorado and represents a new state record

Distribution: Mexico: Guanajuato and Sonora. United States: throughout the Southwest from California to Utah, and east to Texas and Oklahoma (Werner 1945, 1953, Pinto 1991). Colorado distribution: records are from southern portion of the state (Fig. 175).

Colorado Records: **Baca Co.:** Sand Canyon, July 12, 1991, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 2, (CSUC) **Kiowa Co.:** Eads, July 18, 1998, 1, (CSUC) **Las Animas Co.:** Spool Ranch, Gotera Canyon, May 29, 1994, Opler, P., Simonson, S., Kingery, K., and A. Ellingson, 1, (CSUC) **Mesa Co.:** Colorado National Monument, Headquarters, August 30, 1996, Buckner, E. and P. Opler, 1, (CSUC) **Montezuma Co.:** Mesa Verde National Park, July 10, 1941, A. Rose, 1, (CSUC).

***Epicauta parkeri* Werner**

(Figs. 109, 177)

Diagnosis: Cuticle of body black. Elytra sparsely covered with cinereous vestiture; vestiture not masking color of cuticle giving the beetle a gray hue however, it is denser along the margins and suture of the elytra; each elytra with an indistinct pale line. Antennal segment II shorter than III. Mandibles elongated and straightened, well surpassing the labrum by over $\frac{1}{4}$ their total length (Fig. 109). Legs, with femora and trochanters flattened and glabrous. Males with tarsal segment I contorted and shorter than segment II, forelegs with only one tibial spur.

Comments: Werner *et al.* (1966) reports that the individuals taken from the Manitou Springs location were beaten from pine and a specimen in southern Arizona was collected from *Gutierrezia* sp. (snakeweed).

Distribution: United States: Arizona, Colorado, and New Mexico (Werner 1966, Pinto 1991). Colorado distribution: only recorded from El Paso County (Fig. 177).

Colorado Records: El Paso Co.: Manitou Springs, (Werner *et al.* 1966); Pikes Peak, July 14, 1901, 1, (CSUC).

***Epicauta segmenta* (Say)**

(Figs. 29, 104, 181)

Diagnosis: A robust species with integument black, covered entirely with black vestiture except a fringe of cinereous pubescence on, pronotum, metathorax, abdominal

sterna, and coxae. Hind wings fully developed, length when extended surpassing apex of abdomen, folded at rest. Legs with middle and hind coxae widely separated (Fig. 104) usually by a distance equal to, or greater than, the combined length of abdominal sterna II and III; two fore tibial spurs present.

Comments: *Epicauta segmenta* is most commonly confused with *E. valida*. Morphologically they are very similar with the exception of wing length and middle and hind coxal placement. *Epicauta segmenta* has fully developed wings when extended, reach well beyond the last abdominal segment and the middle and hind coxae are widely separated (Fig. 104). In contrast, *E. valida* has abbreviated wings, which, at most, only reach to the 5th abdominal segment, but are usually shorter, and the coxae are more approximate.

Selander and Mathieu (1969) note that these two closely related species share a very similar distributional pattern throughout the Great Plains. R.B. Selander, J.M. Mathieu, and others have suggested that there has been a recent decline of these two species possibly due to the decline of potato production and acreage in the Midwest following the end of World War II (Selander and Mathieu 1969).

Distribution: Mexico: Sonora east to Coahuila south to Durango and Sinaloa. United States: throughout the Great Plains and southwest from South Dakota and Wyoming south to Texas west to California (Selander and Mathieu 1969, Pinto 1991). Colorado distribution: only recorded from the southeastern portion of the state (Fig. 181).

Colorado Records: Baca Co.: Picture Canyon, July 29, 1997, Francis, 2, (DMNS); Sand Canyon, July 12, 1991, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 2, (CSUC) **Otero Co.:** Corrizo Creek Picnic Area, July

15, 1992, H.E. Evans, 1, (CSUC); Vogel Canyon, June 23, 1994, W. Cranshaw, 1, (CSUC).

***Epicauta subglabra* (Fall)**

Diagnosis: *Epicauta subglabra* is morphologically similar to *E. murina* with the exception of vestiture density and color (Werner 1945). Body black, clothed sparsely in dark pubescence that does not conceal the cuticular surface thus giving the beetle an overall black appearance without magnification (Pinto 1991).

Comments: There is little morphological difference between *E. subglabra* and *E. murina* except a slight difference in vestiture color and density. Pinto (1991) states that *E. subglabra* and *E. murina* may prove to be the same species pending a revision. To separate *E. subglabra* from the morphologically similar *E. murina* and *E. fabricii* see comments under *E. fabricii*.

Distribution: Canada: Alberta, Manitoba, and Saskatchewan. United States: Arizona, Idaho, Michigan, New Mexico, North Dakota, and South Dakota (Pinto 1991). Colorado distribution: no specimens have been recorded from Colorado, however the known range of this species indicates that it should occur in the state.

Colorado Records: None.

***Epicauta uniforma* Werner**

(Figs. 32, 82, 99, 101, 184)

Diagnosis: Body black, evenly covered with yellow ferruginous to light brown cinereous vestiture. Eye narrowly, deeply emarginated (Fig. 101). Two spurs present on the fore tibia of both sexes. Males, with well-developed hind tibial combs (Fig. 99) and antennal segment I relatively slender and slightly impressed anteroapically.

Comments: The specimens listed below from Las Animas County were collected from alfalfa.

Distribution: Mexico: Sonora and Chihuahua to Zacatecas. United States: throughout the Southwest from Arizona east to Texas and Colorado (Werner 1945, 1958, Pinto 1991). Colorado distribution: southeastern counties (Fig. 184).

Colorado Records: **Bent Co.:** Las Animas, August 8, 1984, 4, (CSUC) **Las Animas Co.:** Hoehne, (Werner 1945) **Otero Co.:** La Junta, (Werner 1945) **Prowers Co.:** Lamar, (Werner 1958).

Epicauta valida (LeConte)

(Figs. 105, 185)

Diagnosis: A robust species; body black, covered completely with black vestiture except, pronotum, metathorax, abdominal sterna, and coxae usually fringed with cinereous pubescence. Hind wings weakly developed, length when extended only attaining fifth abdominal sternite, usually shorter and fully extended at rest. Legs with middle and hind coxae relatively approximate, distance between the two less than the combined length of abdominal sterna II and III. Forelegs with two fore tibial spurs.

Comments: Due to morphological similarity, *E. valida* may be confused with *E. segmenta*. For separation of these two species see comments for *E. segmenta*.

Distribution: United States: Utah and along the Great Plains states from South Dakota and Colorado south and east to Louisiana (Selander and Mathieu 1969, Pinto 1991). Colorado distribution: throughout the southeastern portion of the state (Fig. 185).

Colorado Records: **Bent Co.:** 1 mile north Caddoa Creek, June 17, 2002, Schmidt, J. and B. Kondratieff, 4, (CSUC); 2.5 miles south of Caddoa, Sand-dunes along Caddoa creek, August 11, 1990, Kippenhan, M., Leatherman, D., Kondratieff, B., and P. Opler, 1, (CSUC); east of Road CC and Road 23.5, July 2, 1990, Kippenhan, M. and B. Kondratieff, 9, (CSUC); Road 26 at Road DD, Pasture, July 15, 1992, Cranshaw, W., Leatherman, D., and B. Kondratieff, 1, (CSUC) **El Paso Co.:** Fountain, June 20, 1936, 4, (CSUC) **Las Animas Co.:** Tyrone Rangeland, June 10, 1992, R.E. Pfadt, 2, (ESUW); Northgate Pond, July 14, 1991, Kippenhan, M., Leatherman, D., Kondratieff, B., and P. Opler, 2, (CSUC) **Otero Co.:** Route 109, mile marker 37, August 11, 1990, Leatherman, D. and B. Kondratieff, 1, (CSUC); Vogel Canyon, June 23, 1994, W. Cranshaw, 2, (CSUC) **Prowers Co.:** Two Buttes Reservoir, June 7, 1966, J. Brookhart, 1, (UCMC) **Pueblo Co.:** Pueblo Chemical Depot, July 8, 1999, G. Doyle, 1, (CSUC).

Epicauta (Epicauta)

The nominate subgenus, in Colorado, is represented by 23 species with three additional species suspected to have distributions within the state. This subgenus is recognized by the lack of specialized characters on the antennal segments, eyes, and lack of hind tibial comb that are present in the *Epicauta (Macrobasis)* subgenus.

Key to the species of adult Colorado *Epicauta* (*Epicauta*)

Modified in part from Pinto (1980; 1991)

- 1 Vestiture cinereous with, at least elytra, appearing spotted as a result of denude areas exposing black underlying cuticle (Figs. 5, 6).....2
- 1' Vestiture cinereous or not, but without spotted appearance10
- 2 (1) Maculae (spots) obsolescent, vestiture along pronotal midline perpendicular to midline (Fig. 112); males with two fore tibial spurs.....
.....*Epicauta oregona* Horn (p. 74)
- 2' Maculae distinct (Fig. 6), vestiture along midline projected posteriorly; males with one or two fore tibial spurs3
- 3 (2') Maculae large (Fig. 33) and may be confluent (Fig. 5), largest maculae wider than length of antennal segment II; males always with one fore tibial spur.....4
- 3' Maculae small, never confluent, width of largest maculae shorter than length of antennal segment II, males may have more than one fore tibial spur5
- 4 (3) Base of elytra with black markings ranging from humeral spots to a complete collar, pronotum and abdomen with no, or greatly reduced, maculae. Males with segment II of labial palpi not greatly enlarged
..... *Epicauta ventralis* Werner (p. 86)
- 4' Base of elytra without black markings, pronotum and abdomen with large, some times confluent, maculae, segment II of male labial palpi greatly enlarged.....
..... *Epicauta andersoni* Werner (p. 49)

- 5 (3') Erect setae on antennae short (Fig. 113), less than half the width of its respective segment. Males with two elongated fore tibial spurs6
- 5' Erect setae on antennae long (Fig. 114), length usually more than, or equal to, half the width of its respective segment. Males with one fore tibial spur7
- 6 (5) Maculae present on head, pronotum and abdominal sternites; dorsum of abdominal tergum IV with large glabrous areas laterally; segment I of tarsi without tarsal pad. Males without enlarged maxillary palpi.....
.....*Epicauta bispinosa* Werner (p. 57)
- 6' Maculae usually absent on head, pronotum, and abdominal sternites; dorsum of abdominal tergum IV pubescent, without glabrous areas laterally; segment I of tarsi with tarsal pad present. Males with enlarged maxillary palpi.....
.....*Epicauta punctipennis* Werner (p. 81)
- 7 (5') Dorsum of mesotibia with black pubescent line, usually entire, from base to apex (Fig. 115).....8
- 7' Dorsum of mesotibia cinereous throughout or with a few scattered dark hairs basally9
- 8 (7) Tarsal pad absent from first segment of meso and hind tarsi; male maxillary palpi enlarged and orbicular (Fig. 116)..... *Epicauta apache* Pinto (p. 51)
- 8' Tarsal pad present on both meso and hind tarsal segment I; male maxillary palpi variable, may be widened but not orbicular.....
.....*Epicauta maculata* (Say) (p. 69)
- 9 (7') Pygidium with a central black spot basally (Fig. 117); cinereous setae present on all surfaces of antennal segment I and II*Epicauta jeffersi* Pinto (p. 67)

9'	Pygidium without basal central black spot; dark setae present on anterior surface of antennal segments I and II.....	<i>Epicauta normalis</i> Werner (p. 71)
10 (1')	Elytra with four raised costae; setae scale like (Fig. 118)	<i>Epicauta costata</i> (LeConte) (p. 62)
10'	Elytra without raised costae; setae hair like.....	11
11 (10')	Elytra with black longitudinal vittate contrasting with light yellow to deep orange vestiture	12
11'	Elytra without longitudinal vittae, vestiture may or may not be light yellow to deep orange	13
12 (11)	Antennae, tibia, tarsi and venter black, femora black apically; antennae compressed (Fig. 119), more so in males ...	<i>Epicauta occidentalis</i> Werner (p. 73)
12'	Antennae, legs and venter light yellow, antennae not compressed.....	<i>Epicauta abadona</i> Skinner (p. 49)
13 (11')	Hind wings absent; elytra abbreviated (Fig. 26).....	<i>Epicauta parvula</i> (Haldeman) (p. 76)
13'	Hind wings present; elytra of full length	14
14 (13')	Eye broadly emarginate, usually narrow and appearing bisinuate	15
14'	Eye entire or only slightly emarginate, usually appearing round to ovate and often bulged (Figs. 102, 120).....	19
15 (14)	Abdominal sterna with well-defined, sub ovate patches of black setae; males with fringes of elongate setae on middle and hind trochanters and femora.....	<i>Epicauta aspera</i> Werner (p. 53)

- 15' Abdominal sterna without well-defined, sub ovate patches of black setae; males without elongate setae on middle and hind trochanters or femora16
- 16 (15') Hind tibial spurs obliquely truncate, usually more so on outer spur (Fig. 121) .17
- 16' Hind tibial spurs spiniform or only slightly widened apically (Figs. 122,123)..18
- 17 (16) Labial palpi with last segment elongated, longer than eye width, more so in males; vestiture ranging from cinereous (most common vestiture coloration in Colorado) to all black; length of antennal segment III 1½ times width of eye.....
.....*Epicauta funebris* Horn (p. 66)
- 17' Labial palpi not elongated, shorter than eye width; vestiture always black; length of antennal segment III barely exceeding eye width
.....*Epicauta pensylvanica* (DeGeer) (p. 77)
- 18 (16') Vestiture color, in Colorado, most commonly cinereous; antennal segment I short, bulbous, more so in males; male antennal segments IV-XI with long, curved exerted setae on anteroventral surface (Fig. 125); body of moderate length 9-19 mm *Epicauta cinerea* (Forster) (p. 59)
- 18' Vestiture always black; antennal segment I not bulbous, segments IV-XI without anteroventral curved exerted setae; large species 13-24 mm
.....*Epicauta corvina* (LeConte) (p. 61)
- 19 (14') Vestiture yellow orange to deep orange, boldly contrasted with large black markings on elytra, pronotum, head, and abdomen
.....*Epicauta stuarti* LeConte (p. 84)
- 19' Vestiture may be yellow orange in color but never with black and orange contrasting vestiture20

- 20 (19') Hind tibial spurs similar, usually spiniform or slightly flattened and sticklike (Fig. 123); if outer spur narrowly obliquely truncate than similar in width to inner spur (Fig. 122)21
- 20' Hind tibial spurs dissimilar, outer spur obliquely truncate, if only narrowly so, usually twice as wide as inner spur; inner spur usually spiniform (Fig. 126)24
- 21 (20) Pronotum with a pair of small, centrally located, glabrous calluses (Fig. 127).....
.....*Epicauta callosa* LeConte (p. 58)
- 21' Pronotum without calluses22
- 22 (21') Outer hind tibial spur extremely narrowly obliquely truncate, not wider than inner spur (Fig. 122); fore tibia slightly bowed with suberect elongate setae posteriad.....*Epicauta atropos* Pinto (p. 55)
- 22' Outer and inner hind tibial spur spiniform, may be slightly flattened and sticklike, fore tibia not bowed with shorter setae posteriad.....23
- 23 (22') Antennal segment III greater than one half eye width; midline of pronotum obvious; vestiture usually short, less dense not obscuring cuticle; eye somewhat bulged; hind tibial spurs acute, narrowing apically (Fig. 123)
.....*Epicauta pruinosa* LeConte (p. 79)
- 23' Antennal segment III usually one half eye width; midline of pronotum more obscure; body covered with fairly dense vestiture concealing cuticle; eye distinctly bulged and widened (Fig. 120); hind tibial spurs more sticklike, somewhat flattened not narrowing apically *Epicauta sericans* LeConte (p. 82)
- 24 (20') Occiput and vertex of head usually with cuticle orange to varying degrees (Fig. 128), may be all black; antennal segment III greater than or equal to eye width ...

-*Epicauta atrata* (Fabricius) (p. 54)
- 24' Occiput and vertex of head black; length of antennal segment III 1/5-3/5 shorter than total eye width.....25
- 25 (24') Antennae relatively short, apical segments about as long as broad, segment III usually 1/2 eye width; vestiture cinereous to luteocinereous, never orange to light rufous; if occurring in Colorado, restricted to extreme southeastern portion of the state*Epicauta fortis* Werner (p. 66)
- 25' Antennae more elongate, apical segments longer than broad, segment III usually 7/10 eye width; vestiture cinereous to light rufous; widespread and common throughout Colorado*Epicauta ferruginea* (Say) (p. 63)

***Epicauta abadona* Skinner**

(Figs. 2, 152)

Diagnosis: Cuticle light yellow to pale tan covered primarily with yellow vestiture. Body marked with three long, black longitudinal vittae on elytra and usually with a pair of black vittae on pronotum. Inner two vittae on elytra marked in both cuticular coloration and black vestiture however, outer most vittae expressed by cuticular coloration only and somewhat obscured by yellow overlying vestiture. Antennae orange. Legs with hind tibial spurs broadened and spatulate. Male fore and middle tibial spurs thickened and curved ventrally, fore tibia usually with only one spur.

Comments: *Epicauta abadona* Skinner and *E. occidentalis* Werner are the only two species of *Epicauta* in Colorado having three longitudinal black vittae expressed in

both coloration of the cuticle and overlying vestiture. However, these two species are easily separated by the cuticular coloration, expression of the outer most vittae, and antennal coloration and structure. *Epicauta abadona* has a light yellow to pale tan cuticle including that of the antennae, the outermost vittae on the elytra is expressed by cuticular coloration but not in vestiture coloration, and the antennae are unmodified. In contrast, *E. occidentalis* has a darker dorsal cuticle, with the venter and antennae black, the outermost vittae on the elytra is expressed in both cuticular coloration and overlying vestiture, and the antennal segments III to XI are compressed, especially so in males.

This species was previously known only from Mexico and Arizona. The historical collection of this species from Delta, located in southwestern Colorado, greatly expands its known range northward and represents a new state record.

Distribution: Mexico: Sonora and Sinaloa. United States: southern Arizona north to southwestern Colorado. Colorado distribution: one known record from Delta County (Fig. 152).

Colorado Records: Delta Co.: Delta, July 20, 1898, 1, (CSUC).

***Epicauta andersoni* Werner**

(Figs. 5, 155)

Diagnosis: A maculate species, maculation formed by round denuded spots. Body black, covered with cinereous to luteocinereous vestiture except round denuded spots; dark setae present on pygidium, legs and palpi, and a few scattered dark setae on base of elytra. Macula wider in diameter than the length of antennal segment II, usually

greatly so, distinct to largely confluent on elytra, and usually predominate the head, pronotum, and abdominal sterna. Males with two fore tibial spurs, segment III of labial palpi enlarged and sub-orbicular in shape. Segment IV of maxillary palpi elongated.

Comments: In Colorado, potentially eight species of *Epicauta* have the distinctive maculate vestiture pattern. Five of these species *E. andersoni* Werner, *E. apache* Pinto, *E. jeffersi* Pinto, *E. maculata* (Say), and *E. normalis* Werner belong to the *Epicauta maculata* species group. This group as defined by Pinto (1980) includes species expressing a maculate vestiture pattern produced by contrasting cinereous vestiture with numerous denude areas which vary in density and size and the males possess only one slightly curved fore tibial spine. Three additional species, *E. bispinosa* Werner, *E. oregona* Horn, and *E. punctipennis* Werner, have a maculate vestiture pattern but are not included in the *E. maculata* species group due to the males of these species having two straight fore tibial spurs. Additionally, males of *E. oregona* have enlarged maxillary palpi with elongated setae on the ventral surface and ensiform antennae.

Epicauta andersoni may be confused with *E. ventralis* but is easily separated by the enlarged and modified palpi of the males as well as the lack of black markings on the base of the elytra and the well maculated pronotum, head and abdominal sterna of *E. andersoni*. *Epicauta ventralis* has largely unmodified palpi, black markings at the base of the elytra ranging from only a small humeral spot to a complete transverse band across base. The pronotum, head, and abdominal sterna of *E. ventralis* have at most, only obsolescent maculae. Pinto (1991) reports this species in association with alfalfa.

Distribution: Mexico: Chihuahua. United States: southern Utah south to Arizona east to western Kansas and Texas (Pinto 1980, 1991). Colorado distribution: primarily east of the Rocky Mountains (Fig. 155).

Colorado Records: **Baca Co.:** Comanche National Grasslands, west of Campo, July 16, 1999, L. Nadeau, 2, (CSUC); Springfield, June 7, 1990, J. George, 1, (CSUC) **Cheyenne Co.:** Cheyenne Wells, (Pinto 1980) **El Paso Co.:** Colorado Springs (Pinto 1980) **Larimer Co.:** Livermore, July 15, 1984, J. Capinera, 5, (CSUC) **Otero Co.:** Higbee Canyon, Route 109, June 17, 2002, Schmidt, J. and B. Kondratieff, 1, (CSUC); Rocky Ford, May 29, 1930, 1, (CSUC); Vogel Canyon, July 1, 1994, B. Kondratieff, 1, (CSUC) **Pueblo Co.:** Pueblo (Pinto 1980) **Rio Grande Co.:** Center, August 12, 1992, W. Cranshaw, 1, (CSUC); Monte Vista, July 24, 1984, 1, (CSUC).

***Epicauta apache* Pinto**

(Figs. 6, 114, 115, 116, 156)

Diagnosis: A maculate species, maculation formed by round denuded spots. Pronotum with small, nearly obsolescent maculae. Maculae on elytra small, usually with length shorter than length of antennal segment II. Body black, covered with cinereous to luteocinereous vestiture. Mesotibia with a linear patch of black setae usually spanning the entire dorsal surface (Fig. 115). Both the middle and hind legs lacking tarsal pads on tarsal segment I. Males with greatly enlarged maxillary palpi (Fig. 116).

Comments: Both *E. apache* Pinto and *E. maculata* (Say) have small maculae and a black dorsal stripe on the mesotibia however, the shape of the male maxillary palpi

and the form of the tarsal pads can separate them. *Epicauta apache* males have the last segment of maxillary palpi greatly enlarged, orbicular in shape and both sexes lack a pale tarsal pad on segment I of the meso and hind tarsi. *Epicauta maculata* has pale tarsal pads present on segment I of the meso and hind tarsi and males have widened maxillary palpi but not as greatly so or appearing orbicular. The following records represent the first records of this species in Colorado (Pinto 1991).

Distribution: Mexico: Sonora and Chihuahua. United States: throughout the Southwest from Arizona east to Texas north to Colorado, Kansas, and Nebraska (Pinto 1980, 1991). Colorado distribution: east of the Rocky Mountains throughout the Great Plains (Fig. 156).

Colorado Records: **Bent Co.:** Hasty, June 6, 1974, Evans, H. and W. Rubink, 2, (CSUC); John Martin Reservoir, May 29, 2002, Anderson, S. and J. Schmidt, 1, (CSUC); John Martin Reservoir, Caddoa Creek at junction of CC road, July 18, 2001, Schmidt, J. and B. Kondratieff, 1, (CSUC) **Fremont Co.:** county label only, August 2, 1991, R. Irvine, 1, (CSUC) **Larimer Co.:** Livermore, July 15, 1984, J. Capinera, 3, (CSUC) **Otero Co.:** Route 109, Purgatoire River, August 11, 1990, DeJong, G., Kondratieff, B., Leatherman, D., and C. Rhoades, 1, (CSUC); Rourke Ranch, Purgatoire Canyon, June 18, 2002, Schmidt, J. and B. Kondratieff, 2, (CSUC) **Weld Co.:** Pawnee Buttes trailhead, June 15, 2004, M. Garhart, 1, (CSUC).

***Epicauta aspera* Werner**

(Figs. 7, 157)

Diagnosis: Body vestiture primarily cinereous to luteocinereous and, as reported by Pinto (1991), rarely yellow green. Usually with black markings as follows: large ovate patches on the ventral and usually lateral side of abdominal sterna, humeral and scutellar spots which may be fused, and apices of tibia and tarsi. Males with a characteristic fringe of elongate setae on the ventral margins of the femora, middle and hind tibia and trochanters.

Comments: In Colorado, only males of *E. stuarti*, share the unique, elongate setation of the legs; however, these two species are easily separated by the bold black and orange coloration of *E. stuarti*. Some specimens of *E. aspera* occurring in Colorado have been observed with nearly absent ovate black spots on the venter of the abdominal sternites.

Distribution: United States: throughout the higher elevations of Arizona east to western Texas, north to Colorado and Kansas (Pinto 1991). Colorado distribution: east of the Rocky Mountains, widely distributed throughout the eastern portion of the state (Fig. 157).

Colorado Records: **Adams Co.:** Watkins, 12 miles east, (Pinto 1991) **Boulder Co.:** county label only, September 8, 1913, N. Henderson, 1, (CSUC); Boulder, (Pinto 1991) **Chaffee Co.:** Salida, (Pinto 1991) **Custer Co.:** Oak Creek Campground, (Pinto 1991) **Douglas Co.:** county label only, September 24, 1988, B. Kondratieff, 1, (CSUC) **Fremont Co.:** Beaver Creek State Wildlife Area, riparian area, September 6, 2003, A.

Strong, 1, (CSUC); Canon City, (Pinto 1991) **Jefferson Co.:** Green Mountain, August 30, 1992, J. Scott, 1, (CSUC); Morrison, Fleck, 1, (CSUC) **Larimer Co.:** Buckhorn Canyon, September 13, 1986, R. Zimmerman, 1, (CSUC); Environmental Learning Center, Fort Collins, September 10, 2003, 1, (CSUC); Fort Collins, November 1, 1934, 1, (CSUC); Fort Collins, September 10, 2003, A. Strong, 2, (CSUC); same locality but, September 14, 1930, 1, (CSUC); September 28, 1970, J. Greggs, 1, (CSUC); September 5, 1931, 1, (CSUC); Glacier View, Mead, September 1, 1991, H.E. Evans, 1, (CSUC); Lory State Park, September 12, 1991, J. Bowser, 1, (CSUC); Masonville, September 3, 1934, 1, (CSUC); same locality but, September 5, 1931, 3, (CSUC); Fleck, 1, (CSUC) **Las Animas Co.:** 2.5 miles west of Trinchera, August 29, 1990, D. Leatherman, 1, (CSUC); Spring Creek Dam, August 30, 1987, B. Kondratieff, 1 (CSUC); Trinidad, 5 miles south, (Pinto 1991) **Lincoln Co.:** Limon, (Pinto 1991) **Prowers Co.:** Lamar. (Pinto 1991) **Pueblo Co.:** county label only, (Pinto 1991) **Saguache Co.:** Northwest La Garita, June 9, 1987, J. Scott, 1, (CSUC) **Teller Co.:** Florissant, (Pinto 1991).

***Epicauta atrata* (Fabricius)**

(Figs. 8, 128, 158)

Diagnosis: Cuticle black, except head often with vertex and occiput orange (Fig. 128). The extent of the orange marking on the head is variable from nearly completely orange to almost all black. Body covered with black to cinereous vestiture. Eyes broad and only shallowly emarginate. Legs with hind tibial spurs dissimilar; outer spur obliquely truncate and much wider than inner spur.

Comments: In Colorado no specimens were examined lacking the orange head coloration. Pinto (1991) provides an analysis of the frequency at which this coloration varies by designated region. Using this information it is speculated that the all black head color form is very rare in Colorado, if present at all.

Adults of this species have been recorded from a wide variety of host plants largely preferring the families Asteraceae, Convolvulaceae, and Malvaceae, with many collections reported from cotton (Pinto 1991). Unlike most other *Epicauta*, the larvae of *E. atrata* have been shown to feed on the eggs of other meloids (Selander 1981, 1982c). The following reported collection represents a new state record for Colorado.

Distribution: Canada: southern Manitoba. Mexico: Nuevo Leon, San Luis Potosi, and Tamaulipas. United States: primarily eastern in distribution from Maine south to Georgia and northwestern Florida, west to Texas and Montana (Pinto 1991). Colorado distribution: one collection from northeastern Weld County (Fig. 158).

Colorado Records: Weld Co.: Empire Reservoir, Highway 76, 0.5 miles south of Highway 34, July 17, 2003, Schmidt, J. and S. Anderson, 6, (CSUC).

***Epicauta atropos* Pinto**

(Figs. 9, 122, 160)

Diagnosis: Body black with cinereous to luteocinereous vestiture. Eyes very shallowly emarginate, wide, and somewhat bulged. Legs with hind tibial spurs dissimilar; outer spur very narrowly obliquely truncate but not wider than inner spur (Fig. 122).

Comments: This species may be confused with *E. ferruginea* (Say) and *E. sericans* LeConte, however, the structure of the hind tibial spurs provide separation. The hind tibial spurs of *E. atropos* are similar in width and the apices of the outer spurs are not widened even though they are obliquely truncate. *Epicauta ferruginea* has the outer hind tibial spur obliquely truncate, wider than the inner spur, and greatly expanding towards the apex. *Epicauta sericans* hind tibial spurs which are nearly equal in width, the outer spur is not obliquely truncate, and both spurs are slightly widened and sticklike. Seasonality may also help separate individuals of *E. atropos* from *E. ferruginea*. *Epicauta atropos* is an early season species with most records available between mid-May to early July and *E. ferruginea* is commonly recorded from mid-July to mid-September. The most common host plant recorded by Pinto (1991) is *Opuntia* sp.

Distribution: Canada: southern Alberta. United States: Montana east to South Dakota, south to northern Arizona and Oklahoma (Pinto 1991). Colorado distribution: along the Front Range east to Otero County (Fig. 160).

Colorado Records: **Boulder Co.:** Boulder, 5 miles south, June 28, 1900, 1, (CSUC); Hygiene, 4 miles north, (Pinto 1991) **Denver Co.:** Denver, (Pinto 1991) **Douglas Co.:** Daniel's Park, (Pinto 1991) **Jefferson Co.:** Golden, Mount Lookout, (Pinto 1991) **Larimer Co.:** Fort Collins, June 28, 1900, 1, (CSUC); Red Feather, June 10, 1933, K. Maehler, 2, (CSUC) **Otero Co.:** McMahon Arroyo, Route 109, June 18, 1996, Cranshaw, W. and B. Kondratieff, 1, (CSUC) **Weld Co.:** Purcell, 6 miles north, (Pinto 1991).

Epicauta bispinosa Werner

Diagnosis: Body black, a maculate species covered by cinereous vestiture except round denuded spots. Maculae small, diameter less than the length of antennal segment II, and well-defined on elytra. Head, pronotum, and venter with maculae present but smaller than those on elytra. Abdominal tergum IV with large areas of denuded pubescence dorsal-laterally. Antennae heavy, with exerted setae short, less than half the width of the corresponding segment. Maxillary palpi with cinereous pubescence on all surfaces, and males with two fore tibial spurs and unmodified palpi.

Comments: *Epicauta bispinosa*, *E. punctipennis* and *E. oregona* are all maculate species that are not included in the *E. maculata* species group. Males of these three species are separated from members of the *E. maculata* group by possessing two straight fore tibial spurs. Additionally, both sexes of *E. bispinosa* and *E. punctipennis* may be distinguished from the *E. maculata* group by the short exerted setae on the antennae (the length of the exerted setae less than half the width of the corresponding antennal segment). Both sexes of *Epicauta oregona* differs from all others by the nearly obsolescent maculae formed by denude spots lacking significant contrast against the sparse vestiture, which does not fully conceal the cuticle color.

Epicauta bispinosa is most likely to be confused with *E. punctipennis*. Separation is based vestiture patterning and the maxillary palpi of male specimens. *Epicauta punctipennis* usually lacks maculae on the head and pronotum, tergum IV lacks denude areas and males of this species have enlarged maxillary palpi where, in contrast, *E. bispinosa* usually has maculae present on the head and pronotum, tergum IV with large

areas of denude pubescence dorsal laterally and the maxillary palpi of males are not enlarged (Pinto 1975). *Epicauta bispinosa* has been recorded from tomato (Pinto 1991).

Distribution: Mexico: Durango. United States: southern Arizona east to western Texas, north to western Kansas and eastern Colorado (Pinto 1975, 1991). Colorado distribution: only two records are known from along the Front Range.

Colorado Records: Boulder Co.: Boulder, 2 miles north, 1, (Pinto 1975)
Denver Co.: Denver, 1, (Pinto 1975).

Epicauta callosa LeConte

(Figs. 11, 127, 161)

Diagnosis: Vestiture ranging from yellow to reddish brown, body cuticle black. Pronotum with two glabrous calluses, rarely absent, divided by the midline (Fig. 127). Eyes shallowly emarginate, broadened, and bulged. Hind tibial spurs are both similar in width and stick-like.

Comments: This species has been collected from a wide variety of plants including two economically important plants, cotton and alfalfa (Pinto 1991). This species appears to reach its peak abundance in mid-summer from June to August. Pinto (1991) discusses the morphological variation of this species in detail. It is noted that, although rare, individuals of *E. callosa* may have greatly reduced or even absent pronotal calluses.

Distribution: Mexico: Chihuahua, Coahuila, Nuevo Leon and Tamaulipas.
United States: primarily following the Great Plains from Montana south to Louisiana,

west to Arizona (Pinto 1991). Colorado distribution: east of the Rocky Mountains throughout the Great Plains (Fig. 161).

Colorado Records: **Adams Co.:** Eastlake, (Pinto 1991) **Boulder Co.:** Longmont, July 1, 1970, A. Mindell, 4, (CSUC) **Cheyenne Co.:** South of Cheyenne Wells, (Pinto 1991) **Douglas Co.:** Parker, Cherry Creek 0-2 miles south of Lincoln Drive, July 10, 1993, (CSUC) **Jefferson Co.:** Golden, June 23, 1984, D. Liewehr, 1, (CSUC); Lakewood, June 27, 1997, R. Gemmill, 2, (BGPC) **Las Animas Co.:** near Hoehne, (Pinto 1991) **Yuma Co.:** Yuma, (Pinto 1991).

Epicauta cinerea (Forster)

(Figs. 12, 125, 162)

Diagnosis: Body black, vestiture coloration most often cinereous to luteocinereous in Colorado. However, throughout its range vestiture color ranges from black to cinereous and three basic color forms may be encountered; see comments section below. Antennae abruptly tapered towards apex, segment I short and bulbous, more so in males. Eyes broadly emarginate and narrow. Hind tibial spurs slightly broadened apically but not obliquely truncate. Males with exerted setae on the anteroventral surface of antennal segments IV-XI conspicuously elongated and curved (Fig. 125). Palpi of both sexes are largely unmodified.

Comments: Throughout its range, this species exhibits three generalized color forms; cinereous, margined, and black. The cinereous color form varies from cinereous to luteocinereous body vestiture with black setae present on legs, last abdominal segment,

and occasionally scattered black setae at base of elytra. Margined forms are predominately black, the elytra margined with cinereous vestiture and the pronotum and head are cinereous with varying degrees of black markings to almost completely black. Black forms range from completely black to predominately black with cinereous setae on venter (Pinto 1991).

Separation from the superficially similar *E. funebris* is accomplished by examination of the antennal structure of the males, maxillary palpi, and the hind tibial spurs. Males of *E. cinerea* have a distinct row of elongate curved setae on the anteroventral surface of antennal segments IV-XI (Fig. 125); both sexes have relatively unmodified maxillary palpi and slightly broadened hind tibial spurs. In contrast, *E. funebris* males lack distinct curved setae on the anteroventral side of the antennae; both sexes have elongated maxillary palpi (Fig. 124) and widened, obliquely truncate hind tibial spurs.

Horsefall (1943) reports *E. cinerea* to feed on a wide variety of crop plants including potato, tomato, beet, bean, cabbage, sunflower, clover, and pumpkin. Wild hosts include pigweed, groundcherry, and honeylocust (Horsefall 1943).

Distribution: Canada: southeastern provinces of Manitoba, Ontario and Saskatchewan. United States: mostly eastern in distribution from Montana east to Maine, south to Texas and Florida (Pinto 1991). Colorado distribution: along the Front Range and suspected to occur throughout the Great Plains (Fig. 162).

Colorado Records: **Boulder Co.:** Boulder, July 28, 1997, S. Schaffner, 19, (UCMC) **Denver Co.:** Denver, (Pinto 1991) **Fremont Co.:** Phantom Canyon, July 30, 1992, S. Fitzgerald, 1, (CSUC) **Jefferson Co.:** Pine Junction, 18 miles south; Deer Creek

Canyon, southwest of Denver, (Pinto 1991) **Larimer Co.:** Fort Collins, July 11, 1901, 2, (CSUC); same locality but, July 27, 2000, D. Leatherman, 7, (CSUC); Phantom Canyon, July 30, 1992, S. Fitzgerald, 1, (CSUC); Poudre Canyon, 5 miles west of Highway 287 on Highway 14, July 27, 2000, H. Aldhafer, 3, (CSUC) **Logan Co.:** Sterling, July 10, 1970, D. Munger, 1, (CSUC).

Epicauta corvina (LeConte)

(Figs. 13, 163)

Diagnosis: A large species (13-24 mm). Body black covered entirely with black vestiture. Labial palpi of both sexes similar, males slightly broader and less setose than that of females (Pinto 1991). Eyes narrow and broadly emarginate, and legs with hind tibial spurs, broad and sticklike.

Comments: This species has been recorded feeding on alfalfa (Pinto 1991).

Distribution: Mexico: Chihuahua, Coahuila, Durango, and Sinaloa. United States: Wyoming east to Iowa south to Arizona and Texas (Pinto 1991). Colorado distribution: primarily along the Front Range and throughout the southern portion of the state (Fig. 163).

Colorado Records: **Boulder Co.:** Boulder, (Pinto 1991) **El Paso Co.:** Fountain, (Pinto 1991) **Fremont Co.:** Near Florence, (Pinto 1991) **Huerfano Co.:** Cucharas, (Pinto 1991) **Jefferson Co.:** Deer Creek Canyon; Morrison, (Pinto 1991) **Larimer Co.:** Fort Collins, July 15, 1934, K. Maehler, 1, (CSUC); same locality but, July 30, 1902, 1, (CSUC); June 28, 1900, 1, (CSUC); June 29, 1897, 2, (CSUC);

September 3, 1901, 1, (CSUC); Livermore, July 8, 1900, J. Lang, 1, (CSUC); **La Plata Co.:** Durango, 43 miles southeast, (Pinto 1991) **Las Animas Co.:** Route 109, mile marker 23, July 16, 1992, W. Cranshaw, 1, (CSUC); south of Tobe, August 4, 1933, Rodeck, H. G. and M. T. James, 23, (UCMC); Trinidad, (Pinto 1991) **Pueblo Co.:** Pueblo, (Pinto 1991) **Sedgwick Co.:** Ovid, July 20, 1912, J. Henderson, 1, (UCMC) **Weld Co.:** Greeley Narrows, (Pinto 1991).

Epicauta costata (LeConte)

(Figs. 14, 118)

Diagnosis: A very unique species with a black to brown cuticle clothed with flattened, scale like cinereous vestiture (Fig. 118). Four elevated longitudinal costae are present on each elytron.

Comments: One specimen of *E. costata* in the (CSUC) collection is labeled “Colorado 2194”. This accession number is listed twice in the original Gillette accessions catalogue. One listing indicates a specimen that is slide mounted and appears to refer to an aphid species. The other listing gives the date “July” and misleadingly appears to indicate Fort Collins as the locality. It is likely that Wickham (1902) was referring to this specimen in his catalogue of the Coleoptera of Colorado. However, it is doubtful that this specimen was collected in Colorado as the accession catalogue indicates that this specimen was sent through the mail to the collection but, unfortunately, no sender information, locality data or date of collection was provided.

It is still speculated that this species occurs in Colorado given collections from Texas County, Oklahoma reported by Arnold (1976) and the town of Farmington, located in extreme northern New Mexico, Pinto (1991). Farmington, New Mexico is located approximately 44 km to La Plata County, Colorado.

Distribution: Mexico: Chihuahua, Coahuila, Durango and Sonora. United States: throughout the Southwest from southeastern California east to southwestern Texas, and Oklahoma (Pinto 1991). Colorado distribution: most likely to occur in the southern counties bordering New Mexico and Oklahoma, specifically Montezuma, La Plata, and Baca counties.

Colorado Records: None confirmed.

Epicauta ferruginea (Say)

(Figs. 16, 126, 165)

Diagnosis: Cuticle black, covered in cinereous to ferruginous vestiture. Eyes somewhat bulged and broadly, shallowly emarginate. Legs with hind tibial spurs dissimilar; outer spur wider than inner spur at apex and obliquely truncate (Fig. 126).

Comments: *Epicauta ferruginea* and *E. fortis* may be easily confused. Mandible shape, antennal length and shape, and tarsal length separate these two species (Pinto 1991). The mandibles of *E. ferruginea* gradually curve towards the apex and appear straighter than those of *E. fortis* which curve more abruptly towards the apex. The antennae and tarsi of *E. ferruginea* are more elongate than those of *E. fortis*, with antennal segment III about 70% the eye width and apical segments equal or only very

slightly wider than middle segments and fore tarsal segment IV is longer than wide. In *E. fortis* antennal segment III is shorter usually about 50% the of the eye width with the apical segments wider than middle segments, antennae appearing subclavate, and fore tarsal segment IV about as wide as long (Pinto 1991). Additionally, in Colorado, *E. ferruginea* is widely distributed throughout the state where as *E. fortis* (which is not confirmed in Colorado) would only be found in the far southeastern Colorado.

Distribution: Canada: Alberta, Manitoba and Saskatchewan. Mexico: Chihuahua. United States: from Montana east to North Dakota, throughout the Great Plains south to Texas and west to Arizona. Colorado distribution: statewide (Fig. 165).

Colorado Records: **Archuleta Co.:** Pagosa Springs, (Pinto 1991) **Baca Co.:** Comanche National Grasslands, short grass, September 18, 1999, L. Nadeau, 1, (CSUC) **Bent Co.:** Hasty, (Pinto 1991) **Boulder Co.:** Allenspark; Boulder, (Pinto 1991); Longmont, July 1, 1970, A. Mindell, 6, (CSUC) **Costilla Co.:** county label only, August 28, 1932, 1, (CSUC) **Custer Co.:** Rosita, (Pinto 1991) **Delta Co.:** Hotchkiss, 2 miles east, (Pinto 1991); Paonia, 2 miles southwest, (Pinto 1991) **Denver Co.:** Denver, August 10, 1916, east Jackson, 1, (CSUC) **Douglas Co.:** 2 miles northwest of Larkspur, September 2, 1997, D. Leatherman, 1, (CSUC); Perry Park, July 30, 1977, J.T. Polhemus, 1, (CSUC) **El Paso Co.:** Air Force Academy, September 7, 1992, R. Gemmill, 1, (BGPC); Colorado Springs, Garden of the Gods, (Pinto 1991) **Elbert Co.:** Elizabeth, August 3, 1993, D. Leatherman, 1, (CSUC) **Fremont Co.:** Beaver Creek State Wildlife Area, riparian area, September 6, 2003, A. Strong, 1, (CSUC) **Garfield Co.:** Glenwood Springs, September 15, 1932, 1, (CSUC); Rifle, 3 miles north by northwest; Silt, 5 miles southeast, (Pinto 1991) **Gunnison Co.:** Somerset, 11.3 miles east, (Pinto 1991)

Huerfano Co.: La Veta, (Pinto 1991); junction of highway 160/I-25, Walsenburg, August 13, 1999, D. Leatherman, 1, (CSUC) **La Plata Co.:** 15 miles east of Durango on US 160, August 24, 1988, R. Gemmill, 1, (BGPC); Durango, (Pinto 1991) **Jefferson Co.:** Green Mountain, August 30, 1992, J. Scott, 3, (CSUC) **Larimer Co.:** Estes Park, 21 miles east; Livermore; Pingree Park, (Pinto 1991); Fort Collins, August 25, 1984, 6, (CSUC) **Las Animas Co.:** Morley, (Pinto 1991) **Lincoln Co.:** mile marker 52, County Route 71, August 12, 1992, W. Cranshaw, 3, (CSUC); northwest of junction L Road and 23 Road, August 23, 1996, Kondratieff, B., and D. Leatherman, 1, (CSUC); Limon, (Pinto 1991) **Mesa Co.:** Collbran, (Pinto 1991) **Moffat Co.:** Craig, 4 miles northeast, (Pinto 1991); Dinosaur National Monument, Pool Creek, August 23, 1990, Painter, W., Harris, M., and B. Kondratieff, 6, (CSUC); Mount Hamilton, 10 miles south, (Pinto 1991) **Montezuma Co.:** Yucca House National Monument, September 4, 2001, Schmidt, J. and B. Kondratieff, 1, (CSUC) **Prowers Co.:** Lamar, (Pinto 1991) **Pueblo Co.:** Beulah, 6 miles south; Nepesta; Rye, (Pinto 1991); Vineland, September 8, 1984, 1, (CSUC) **Routt Co.:** Hayden, (Pinto 1991); Milner, on US Route 40, July 29, 1987, R. Gemmill, 1, (BGPC) **Teller Co.:** Woodland Park, August 6, 1980, D. Thompson, 1, (CSUC) **Weld Co.:** James Nursery, near Brighton, September 21, 1996, J. Bishop, 1, (CSUC); Pawnee National grasslands, Central Plains Experiment Range, near Nunn, August 17, 1998, A. Hoffman, 2, (CSUC); same location but, August 21, 2003, J. Schmidt, 10, (CSUC); August 22, 1976, J. Scott, 1, (CSUC); August 29, 1991, D. Guertin, 2, (CSUC); August 6, 2003, J. Schmidt, 1, (CSUC).

***Epicauta fortis* Werner**

Diagnosis: Vestiture cinereous to light yellow, never ferruginous. Eyes widened, somewhat bulged, and broadly, shallowly emarginate. Antennae subclavate. Legs with tarsi short; hind tibial spurs dissimilar, with outer spur wider than inner spur at apex and obliquely truncate (Pinto 1991).

Comments: For separation from the similar *E. ferruginea* see comments section under that species. No specimens have been examined from Colorado however collections from extreme northern New Mexico, the panhandle of Oklahoma and western Kansas suggest that this species may have distribution in southeastern Colorado.

Distribution: Mexico: Baja California, Chihuahua, Sonora and Tamaulipas. United States: throughout the Southwest from California east to Texas, north to Kansas (Pinto 1991). Colorado distribution: if occurring in the state probably restricted to the far southeastern counties.

Colorado Records: None.

***Epicauta funebris* Horn**

(Figs. 17, 80, 124, 166)

Diagnosis: Cuticle of body black. Vestiture varying from entirely cinereous to black and exhibits the same three-vestiture color patterns as described for *E. cinerea*, cinereous, margined, and black; see comments under *E. cinerea* for descriptions of color patterns. Only the entirely cinereous color form has been observed in Colorado.

Antennae elongate, segment I not bulbous and gradually tapered towards apex. Eyes narrow and broadly emarginate. Both hind tibial spurs broadened apically and obliquely truncate. Maxillary palpi modified, elongated, more so in males (Fig. 124); length of last segment greater than eye width.

Comments: Due to its three distinct color forms, this species has several synonymies associated with it including the often-encountered *E. pestifera* Werner and *E. solani* Werner. Also known as the “margined blister beetle” this species has been recorded from several economically important crop plants including: alfalfa, soybean, sugar beet, tomato, and Irish potato on which it may occur in abundance.

For separation of *E. funebris* from the superficially similar *E. cinerea* see comments under *E. cinerea* (p. 59).

Distribution: United States: throughout the east from New Hampshire south to central Florida, west to Texas and South Dakota (Pinto 1991). Colorado distribution: the only record of this species in Colorado is from the southeastern Prowers County (Fig. 166).

Colorado Records: Prowers Co.: Lamar, July 15, 1997, D. Leatherman, 1, (CSUC).

***Epicauta jeffersi* Pinto**

(Figs. 117, 169)

Diagnosis: A maculate species, maculation formed by round denuded spots. Maculae small, length less than that of antennal segment II, varying from sparse to dense

on elytra. Maculae on head and pronotum usually absent but may be obsolescent, those on abdominal sterna small and sparse. Vestiture cinereous to luteocinereous except, black pubescence present in a small ovate patch at base of pygidium and may be present on other abdominal tergites; scattered black pubescence often at base of elytra. Exerted setae on antennae long, equal to or greater than half the width of the corresponding segment. Males with one fore tibial spur and only slightly widened maxillary palpi.

Comments: Specimens have been recorded from *Chenopodium* sp. and *Atriplex* sp. (Pinto 1980, 1991).

Distribution: United States: eastern Colorado, south to southwestern Texas west to southern Arizona (Pinto 1980, 1991). Colorado distribution: throughout the southeastern Great Plains (Fig. 169).

Colorado Records: Bent Co.: Hasty, July 18, 1974, H.E. Evans, 1, (CSUC); Hasty, June 6, 1974, H.E. Evans, 2, (CSUC); junction of Road GG and Road 23.5 sand dunes by reservoir, July 12, 1991, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 14, (CSUC) **Las Animas Co.:** county label only, July 19, 1931, L.H. Sweetman, 1, (CSUC) **Otero Co.:** Corrizo Creek, Picnic Area, July 15, 1992, Knuettel, H., Evans, H., Leatherman, D., Weissmann, M., Cranshaw, D., and B. Kondratieff, 2, (CSUC); Rourke Ranch, Purgatoire Canyon, June 18, 2002, Schmidt, J. and B. Kondratieff, 2, (CSUC) **Pueblo Co.:** Pueblo Chemical Depot, June 22, 2001, J. Schmidt, 5, (CSUC).

***Epicauta maculata* (Say)**

(Figs. 21, 171)

Diagnosis: A maculate species, maculation formed by round denuded spots. Maculae on head, pronotum, and abdominal sterna usually moderately dense and distinct. Elytra with small, distinct maculae, their length less than that of antennal segment II, and vary from sparse to moderately dense. Body primarily covered with cinereous to luteocinereous vestiture except, black pubescence present over the entire dorsum of the middle tibia, in an ovate patch at base of pygidium, and may be present at base of other abdominal tergites. Scattered black pubescence may be rarely present at base of elytra. Exserted setae on antennae long, equal to or greater than, half of the width of the corresponding segment. Males with one fore tibial spur and modified maxillary palpi ranging from slightly to greatly widened and orbicular depending on geographical location. Colorado populations tend to have very wide, suborbicular maxillary palpi.

Comments: This species is considered to be the “most widespread” species in the *E. maculata* species group (Pinto 1980). It has been recorded feeding on the crop plants sugar beet, alfalfa, and potato (Pinto 1991). Capinera *et al.* (1985) showed that this species has moderate levels of cantharidin, averaging 0.72 mg per beetle out of five males and five females tested.

Distribution: Canada: Manitoba and Ontario. Guatemala. Mexico: except Baja California. United States: from Montana south to Arizona, east to Illinois and Texas (Pinto 1980, 1991). Colorado distribution: throughout the state primarily east of the Rocky Mountains (Fig. 171).

Colorado Records: **Baca Co.:** Comanche National Grasslands, short grass, August 15, 1999, L. Nadeau, 1, (CSUC) **Boulder Co.:** Boulder, (Pinto 1980); Moraine Science Lodge, Boulder, July 17, 1936, G. Alexander, 1, (UCMC) **Cheyenne Co.:** Cheyenne Wells, (Pinto 1980); north of Cheyenne Wells, July 27, 1933, Rodeck, H.G. and M.T. James, 1, (UCMC) **Clear Creek Co.:** Echo Lake, Mount Evans, (Pinto 1980) **Douglas Co.:** Daniel's Park, (Pinto 1980) **El Paso Co.:** Colorado Springs, (Pinto 1980) **Kit Carson Co.:** Flagler, (Pinto 1980) **La Plata Co.:** Hesperus, August 2, 2003, J. Owens, 1, (CSUC) **Larimer Co.:** Fort Collins, August 10, 1937, G.A. Hinkle, 2, (CSUC) **Lincoln Co.:** Hugo, 28 miles east, (Pinto 1980) **Logan Co.:** near Johnson Draw, July 18, 1997, S. Fitzgerald, 7, (CSUC); Sterling Reservoir, State Wildlife Area, June 24, 1991, Harris, M., Kippenhan, M., and B. Kondratieff, 1, (CSUC) **Morgan Co.:** Snyder, 8 miles northwest, June 18, 1989, P.A. Opler, 1, (CSUC) **Prowers Co.:** Granada, (Pinto 1980); Lamar, July 15, 1997, 1, (CSUC); Two Buttes Reservoir, August 2, 1933, Rodeck, H.G. and M.T. James, 1, (UCMC) **Pueblo Co.:** Boone, August 9, 1984, 5, (CSUC) **Rio Blanco Co.:** White Rocks, (Pinto 1980) **Sedgwick Co.:** Julesburg, August 4, 1899, 1, (CSUC) **Washington Co.:** Akron, July 15, 1982, J. Sirota, 2, (CSUC); same locality but, July 2, 1993, 10, (CSUC) **Yuma Co.:** Idalia, 13.5 miles east; Wray, (Pinto 1980)

***Epicauta normalis* Werner**

(Figs. 23, 173)

Diagnosis: Maculate, maculation formed by round denuded spots. Maculae small, length less than that of antennal segment II, varying from sparse to dense on elytra. Head and pronotum usually with small obsolescent maculae; those on abdominal sterna small and sparse. Primarily covered with cinereous to luteocinereous vestiture except black pubescence rarely at base of elytra; black pubescence absent from base of pygidium. Exserted setae on antennae long, equal to or greater than, half the width of the corresponding segment. Males with one fore tibial spur, fore tibia compressed at apex, and only slightly widened maxillary palpi.

Comments: This species has been recorded feeding on sugar beet and alfalfa (Pinto 1991).

Distribution: Canada: Alberta and Saskatchewan. United States: throughout the western United States from Idaho and Oregon south to central California east to Texas and North Dakota (Pinto 1980, 1991). Colorado distribution: widely distributed throughout Colorado (Fig. 173).

Colorado Records: **Adams Co.:** Mesa, (Pinto 1980) **Baca Co.:** Comanche National Grasslands, short grass, August 15, 1999, L. Nadeau, 3, (CSUC); Springfield, July 21, 1990, R. George, 1, (CSUC) **Bent Co.:** junction of Road GG and Road 23.5, sand dunes by reservoir, July 12, 1991, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 1, (CSUC) **Boulder Co.:** Boulder, 4.5 miles south, (Pinto 1980) **Chaffee Co.:** Buena Vista, (Pinto 1980) **Costilla Co.:** county label only, July 9,

1932, 1, (CSUC) **Delta Co.:** Delta; Paonia, (Pinto 1980) **Douglas Co.:** Chatfield State Park, June 30, 1977, D.A. and J.T Polhemus, 29, (CSUC) **Eagle Co.:** Bond, (Pinto 1980) **El Paso Co.:** Colorado Springs; Garden of the Gods; Manitou Springs, (Pinto 1980) **Garfield Co.:** Glenwood Springs; Rifle, 3 miles north northwest, (Pinto 1980) **Huerfano Co.:** La Veta, (Werner 1945); near Tioga, (Pinto 1980); salty drainage, Walsenburg, July 10, 2002, S. Anderson, 1, (CSUC); same location but, August 7, 1999, Cranshaw, W., Leatherman, D., and B. Kondratieff, 1, (CSUC); August 23, 1979, J. Welch, 1, (CSUC) **La Plata Co.:** Bondad, 1 mile south, (Pinto 1980) **Larimer Co.:** Fort Collins, July 21, 1949, J. Stuntz, 4, (CSUC); same locality but, June 20, 2002, 1, (CSUC); Livermore, July 9, 1941, C.R. Jones, 17, (CSUC); Owl Canyon, July 27, 1982, J. Sirota, 3, (CSUC) **Mesa Co.:** Fruita, (Pinto 1980); Grand Junction, June 21, 1931, L. G. Davis, 1, (CSUC) **Moffat Co.:** Craig, July 11, 1986, B. Kondratieff, 1, (CSUC); Dinosaur National Monument, June 15, 1986, C. MacVean, (CSUC); Echo Park, July 19, 1986, B. Kondratieff, 1, (CSUC); Maybell, 10 miles east, (Pinto 1980) **Morgan Co.:** Fort Morgan, (Pinto 1980); Hillrose, July 16, 1982, W.D. Fronk, 1, (CSUC) **Prowers Co.:** Lamar, August 10, 2002, D. Leatherman, 1, (CSUC) **Pueblo Co.:** Pueblo Chemical Depot, June 22, 2001, J. Schmidt, 2, (CSUC) **Rio Blanco Co.:** Meeker, 8 miles north northwest, (Pinto 1980) **Washington Co.:** Akron, July 2, 1983, 12, (CSUC) **Weld Co.:** 8 miles northeast of Pawnee National Grasslands, June 28, 1985, J. Prezbyszewski, 5, (CSUC); Briggsdale, July 25, 2002, H. Miller, 1, (CSUC); Greeley, July 1, 1984, 4, (CSUC); southeast of Greeley, June 24, 1997, S. Fitzgerald, 1, (CSUC) Windsor, June 26, 1905, 4, (CSUC).

***Epicauta occidentalis* Werner**

(Figs. 24, 119, 174)

Diagnosis: Cuticle light to dark orange-brown, venter black, legs with varying degrees of mixed light and dark coloration. Elytra with three evenly spaced black vittae formed by both darkened cuticular coloration and dark overlying vestiture contrasting with lighter cuticular coloration covered with orange-brown pubescence. Additionally, pronotum and head with two elongated black marks on either side of midline. Antennae with segments III to XI compressed, more so in males (Fig. 119). Eyes more narrowly emarginate than most other Colorado meloids in the nominate subgenus. Males with dorsum of fore tibia glabrous.

Comments: Historically, this species has been referred to as *E. lemniscata* F., based on sexually dimorphic characters. This name has been placed in synonymy with *E. vittata* (F.) (Adams and Selander 1979). *Epicauta occidentalis* has been recorded feeding on many crops including sugar beet, soy, cotton, alfalfa, tomato, and potato. Due to its gregarious behavior with swarms often in the thousands of individuals, and its preference for many crop plants, it was noted as by Horsefall (1943) as “the most generally destructive blister beetle in Arkansas”. *Epicauta occidentalis* has been shown to be one of the most toxic species with the highest levels of cantharidin in Colorado (Capinera *et al.* 1985). It is commonly associated with alfalfa and was suspected to be the species responsible for the lethal poisoning of livestock, mainly horses, before new harvesting techniques reduced the occurrence of this problem (Capinera *et al.* 1985, Zhu *et al.* 1997).

Distribution: United States: throughout the Southwest from Arizona east to Texas north to Colorado, Kansas and Nebraska (Pinto 1991). Colorado distribution: throughout the southeastern Great Plains (Fig. 174).

Colorado Records: **Bent Co.:** Hasty, Route 50, July 18, 2001, Schmidt, J. and B. Kondratieff, 5, (CSUC) **Larimer Co.:** Fort Collins, September 23, 1934, 1, (CSUC); Joes Place, July 17, 1931, 2, (CSUC) **Mesa Co.:** Palisade, June 21, 2004, M. Camper, 1, (CSUC) **Otero Co.:** Arkansas River Research Center, August 11, 1993, F. Schweissing, 7, CSUC); Rocky Ford, June 17, 1925, 1, (CSUC); same locality but, June 26, 1940, J. Swink, 3, (CSUC); June 2, 1994, 1, (CSUC) **Prowers Co.:** Holly, June 19, 1900, 1, (CSUC); Lamar, August 2, 1996, D. Leatherman, 3, (CSUC) **Pueblo Co.:** Pueblo Chemical Depot, July 19, 1999, R.J. Rondeau, 2, (CSUC) **Yuma Co.:** Joes, July 17, 1931, 2, (CSUC).

***Epicauta oregona* Horn**

(Figs. 112, 176)

Diagnosis: A maculate species, maculation formed by round denuded spots. Maculae small on elytra, often indistinct due to vestiture thickness; length less than that of antennal segment II, obsolescent at most on head, pronotum, and venter. Body covered with relatively sparse, usually cinereous, vestiture, not dense enough to obscure cuticle surface. Pronotum with pubescence along midline projected laterally (Fig. 112). Males with two fore tibial spurs, enlarged maxillary palpi with elongated setae on the

ventral surface, and ensiform antennae. Segments IV-X of male antennae compressed; females with antennae subfiliform.

Comments: Pinto (1991) lists records of *E. oregona* feeding on both alfalfa and potato. For further separation of this species from *E. bispinosa*, *E. punctipennis* and the *Epicauta maculata* species group see comments under *E. bispinosa*.

Distribution: Canada: from British Columbia east to Manitoba. United States: throughout the western states from Washington south to Nevada east New Mexico and South Dakota (Pinto 1980, 1991). Colorado distribution: scattered records occur throughout the state (Fig. 176).

Colorado Records: **Cheyenne Co.:** Cheyenne Wells, (Pinto 1991) **Douglas Co.:** Castlewood Canyon Road 2 miles south Franktown, May 22, 1993, R. Gemmill, 1, (BGPC); Daniel's Park, (Pinto 1991) **Gunnison Co.:** Little Willow Creek, (Pinto 1991) **Jefferson Co.:** Morrison, (Pinto 1991) **Park Co.:** Lake George; Jefferson, (Pinto 1991); US Route 24, 5 miles east of junction, west US Route 285, August 8, 1995, R. Gemmill, 1, (BGPC); Wilkerson Pass, (Pinto 1991) **Pitkin Co.:** Redstone, 7 miles north, (Pinto 1991) **Teller Co.:** Florissant, June 20, ????, S.A. Rohwer, 1, (UCMC) **Montezuma Co.:** county label only, accession number 5379, 1, (CSUC) **Weld Co.:** 8 km north of Nunn, June 1, 1973, DLW, 1, (CSUC).

***Epicauta parvula* (Haldeman)**

(Figs. 26, 178)

Diagnosis: This species superficially resembles the genus *Meloe*. A unique *Epicauta* recognized by its lack of wings and abbreviated elytra. Body cuticle black covered with short black vestiture. Hind tibial spurs similar in shape, spiniform.

Comments: This is an early spring species and is usually one of the first species of Meloidae to appear in the season. It is often encountered walking through open patches of ground between grasses. When disturbed this species readily feigns death.

Distribution: United States: restricted to the Great Plains from northern Colorado and southeastern Nebraska south to northeastern New Mexico and western Kansas (Pinto 1991). Colorado distribution: widely distributed east of the Rocky Mountains throughout the Great Plains (Fig. 178).

Colorado Records: **Baca Co.:** Southern Colorado Research Center, May 11, 1960, J. George, 3, (CSUC) **Crowley Co.:** 6 miles south of Ordway, May 11, 2007, W. Cranshaw, 9, (CSUC) **Denver Co.:** Denver, (Pinto 1991) **Kit Carson Co.:** Flagler, (Pinto 1991) **Las Animas Co.:** Trinidad, May 7, 1992, D. Leatherman, 3, (CSUC) **Pueblo Co.:** Fort Reynolds, (Pinto 1991); Pueblo Chemical Depot, May 12, 2001, Schmidt, J. and S. Anderson, 3, (CSUC); Pueblo, 5 miles west of Boggs Creek, (Pinto 1991) **Weld Co.:** Pawnee National Grasslands, Central Plains Experimental Range, near Nunn, May 14, 1987, B. Kondratieff, 4, (CSUC); same locality but, June 7, 1976, R. Lavigne, 3, (ESUW); May 24, 1992, D. Guertin, 7, (CSUC); May 25, 1976, R. Lavigne, 2, (ESUW); May 31, 1990, T. Crist, 3, (CSUC); May 5, 1976, R. Lavigne, 1, (ESUW).

***Epicauta pensylvanica* (DeGeer)**

(Figs. 27, 121, 179)

Diagnosis: Body black covered with black vestiture. Eyes deeply and broadly emarginate. Both hind tibial spurs widened apically, obliquely truncate, more so in outer spur (Fig. 121). There is little to no sexual dimorphism exhibited by this species.

Comments: This species is one of the most commonly encountered species of *Epicauta* in North America including Colorado. Adults are often common in mid to late summer and fall on rabbitbrush (*Chrysothamnus* sp.) and golden rod (*Solidago* sp.). Pinto (1991) also provided records for this species from the crop plants alfalfa and sugar beet. This species is known to form fairly dense aggregations on their host plant. Interestingly, Horsfall (1941) provided evidence that *E. pensylvanica* only feeds on the pollen of the host flowers and the larvae are voracious predators of grasshopper egg pods, requiring an average of 21-27 host eggs for a single larva to complete development. Additionally, Capinera *et al.* (1985) showed that this species has very low levels of cantharidin, averaging 0.22 mg per beetle out of five males and five females tested. These life history attributes potentially make this species a beneficial insect in a sense of biological control.

Distribution: Canada: from southern Alberta east to southern New Brunswick. Mexico: Chihuahua, Coahuila, Durango, Nuevo Leon, and San Luis Potosi. United States: Idaho south to Arizona east to Maine and Florida (Pinto 1991). Colorado distribution: statewide (Fig. 179).

Colorado Records: Adams Co.: Brighton, September 10, 1905, 2, (CSUC)

Archuleta Co.: Echo Canyon Reservoir, Echo Canyon Lake State Wildlife Area, August 26, 1992, Painter, W., Leatherman, D., and B. Kondratieff, 2, (CSUC); Pagosa Springs, August 22, 1983, R. Gemmill, 3, (BGPC) **Bent Co.:** CC Road, August 24, 1998, Leatherman, D. and B. Kondratieff, 3, (CSUC) **Boulder Co.:** Niwot, August 24, 1999, J. and R. Walters, , 1, (CSUC) **Clear Creek Co.:** 5 miles north of Ice Lake, July 28, 1994, 1, (CSUC) **Costilla Co.:** county label only, July 18, 1932, 1, (CSUC) **Delta Co.:** Rogers Mesa Reservoir Center, September 8, 1993, R. Zimmerman, 4, (CSUC) **Denver Co.:** Denver, August 15, 1966, K. Penley, 1, (CSUC) **Douglas Co.:** Larkspur, Perry Park Avenue, July 30, 2000, R. Gemmill, 1, (BGPC) **El Paso Co.:** Air Force Academy, September 7, 1992, R. Gemmill, 1, (BGPC) **Jefferson Co.:** Golden, September 24, 1970, Thaden, 1, (CSUC); Lakewood, August 20, 1977, R. Gemmill, 6, (BGPC) **Kiowa Co.:** Neenoshe Reservoir, .August 17, 1995 Leatherman, D. and B. Kondratieff, 2, (CSUC) **La Plata Co.:** 15 miles east of Durango on US 160, August 24, 1988, R. Gemmill, 2, (BGPC) **Larimer Co.:** Colorado State University, Bay Farm, September 15, 1987, J. Welch, 1, (CSUC); Fort Collins, August 2, 1990, M. Harris, 1, (CSUC); Fort Collins, July 16, 1981, S. Green, 2, (CSUC); same locality but, July 30, 1984, 2, (CSUC); Horsetooth Recreation Area, Fort Collins, August 31, 2003, K.B. Hardwick, 1, (CSUC); Legacy Park, Fort Collins, September 24, 2003, S. Costello, 1, (CSUC); Livermore, July 15, 1984, J. Capinera, 2, (CSUC) **Lincoln Co.:** mile marker 52, State Route 71, August 12, 1992, D. Liewehr, 6, (CSUC); northwest of junction L Road and 23 Road, August 23, 1996, Leatherman, D. and B. Kondratieff, 2, (CSUC) **Logan Co.:** near Sterling, August 22, 1997, S. Fitzgerald, 1, (CSUC) **Mesa Co.:** Colorado National Monument, July 29,

1988, B. Kondratieff, 2, (CSUC) **Montezuma Co.:** Yucca House National Monument, September 4, 2001, Buckner, E. and P. Opler, 1, (CSUC) **Pueblo Co.:** county label only, August 8, 1984, 2, (CSUC) **Rio Blanco Co.:** Douglas Creek, August 4, 1986, B. Kondratieff, 1, (CSUC) **Saguache Co.:** county label only, August 4, 1938, James, M. and U. Lanham, 1, (CSUC); Center, July 26, 1984, J. Capinera, 1, (CSUC); 3 miles north Hooper, on Highway 17, August 21, 1983, R. Gemmill, 5, (BGPC) **Weld Co.:** Hudson, June 9, 1968, D. Munger, 3, (CSUC) **Yuma Co.:** Wray, September 1, 1995, W. Cranshaw, 3, (CSUC).

***Epicauta pruinosa* LeConte**

(Figs. 28, 102, 123, 180)

Diagnosis: Body black covered with cinereous to dark brown pubescence. Pubescence of varying length. In examined Colorado specimens, the pubescence is not usually thick enough to obscure the cuticle surface, giving the beetle an overall gray appearance. Eyes nearly round, bulged, very slightly and broadly emarginate (Fig. 102). Hind tibial spurs both similar in shape, sticklike, with apices not flattened (Fig. 123).

Comments: In Colorado, individuals of this species were observed feeding on dandelions (*Taraxacum* spp.) in Grand Junction. Additionally, Pinto (1991) recorded this species from *Opuntia* sp. and *Iris* sp.

Distribution: Canada: British Columbia south and east to southern Manitoba. United States: throughout the West from North Dakota south and west to New Mexico, west to Washington and California (Pinto 1991). Colorado distribution: widely

distributed from the eastern slope of the Rocky Mountains west to the Utah border (Fig. 180).

Colorado Records: **Boulder Co.:** Rock Creek; Boulder, (Pinto 1991) **Costilla Co.:** Ute Creek, (Pinto 1991) **Dolores Co.:** Rico, (Pinto 1991) **El Paso Co.:** Manitou Springs; Pikes Peak, (Pinto 1991) **Garfield Co.:** Arapaho National Forest, Willow Creek Reservoir, June 30, 1996, R. Gemmill, 3, (BGPC); Grand Lake on flowers, July 5, 1992, R. Gemmill, 6, (BGPC); Roan Plateau east of Long Ridge, June 23, 1996, D.A. Miles, 1, (CSUC) **Grand Co.:** Hot Sulphur Springs, 4 miles northeast, (Pinto 1991); Kremmling, July 6, 1995, J. Dawson, 8, (CSUC) **Gunnison Co.:** Lola; Dark Canyon; Gunnison, 10 miles south; Little Willow Creek, (Pinto 1991); Gunnison National Forest, Little Soap Park 10-12 miles north Highway 92, July 25, 1993, R. Gemmill, 1, (BGPC); Marshall Pass, August 27, 1999, 1, (CSUC) **Hinsdale Co.:** Lost Trail Creek, August 17, 1997, Simonson, S. and E. Ellingson, 1, (CSUC) **Huerfano Co.:** La Veta; Sierra Blanca, (Pinto 1991) **Jefferson Co.:** Shaffer's Crossing, (Pinto 1991) **La Plata Co.:** Durango, near Missionary Ridge, (Pinto 1991) **Lake Co.:** Leadville, (Pinto 1991) **Larimer Co.:** Fort Collins, September 16, 1978, 1, (CSUC); Rocky Mountain National Park, Beaver Brook, Wind River, (Pinto 1991) **Mesa Co.:** Hay Press Campground, June 24, 1990, J. Welch, 8, (CSUC); Grand Junction, July 2, 2002, M. Garhart, (MGPC); Skyway, (Pinto 1991); Skyway, Grand Mesa, July 20, 1963, C.J. McCoy, 1, (UCMC) **Mineral Co.:** Creede, July 4, 1977, J.T. Polhemus, 14, (CSUC) **Moffat Co.:** 72 Road, Antone Gap, July 12, 1999, Leatherman, D. and B. Kondratieff, 2, (CSUC) **Montrose Co.:** Highway 50, Cerro Summit, June 22, 2004, M. Garhart, 18, (CSUC) **Park Co.:** Alma; Grant; Jefferson, (Pinto 1991) **Routt Co.:** Steamboat Springs, (Pinto 1991) **Saguache Co.:** Highway 114,

Cochetopa Canyon, June 6, 2003, J. Schmidt, 1, (CSUC); South Park, (Pinto 1991) **Teller Co.:** Florissant Fossil Beds, June 10, 1982, F.M. Brown, 1, (UCMC).

***Epicauta punctipennis* Werner**

(Fig. 113)

Diagnosis: A maculate species, maculation formed by round denuded spots. Maculae small, less than the length of antennal segment II, varying from sparse to dense on elytra. Maculae usually absent on head, pronotum, and venter. Body black to bi-colored variations of black and red-brown covered with cinereous to luteocinereous vestiture. Exserted setae on antennae short, less than half the length of the corresponding segment. Males have two fore tibial spurs. Palpi slightly enlarged, with cinereous pubescence restricted to the dorsal surface.

Comments: *Epicauta punctipennis* may be confused with *E. bispinosa*, *E. oregona* and the *E. maculata* species group. For separation of these similar species see comments under *E. bispinosa*. This species is suspected to occur in Colorado as inferred by two records from extreme northwestern Kansas, two specimens from Sharon Springs and one from Saint Francis (Pinto 1975). Both localities are less than 32 km from the Colorado border. This species has been recorded feeding on alfalfa.

Distribution: United States: from Kansas south to southern Texas, and Missouri (Pinto 1980, 1991). Colorado distribution: if in Colorado, it most likely occurs in the eastern portion of the state bordering Kansas.

Colorado Records: None.

***Epicauta sericans* LeConte**

(Figs. 30, 120, 182)

Diagnosis: Body black, covered with cinereous to golden brown vestiture. Pubescence of varying length, usually thick enough to obscure cuticle surface. Eyes nearly round, extremely bulged, and very slightly broadly emarginated (Fig. 120). Hind tibial spurs both similar in shape, sticklike, and usually somewhat flattened.

Comments: This species has been recorded from the crop plants alfalfa and cotton and the flowers of *Opuntia* sp. (Milliken 1921, Pinto 1991). Capinera *et al.* (1985) showed that this species has moderate levels of cantharidin, averaging 1.27 mg per beetle out of five males and five females tested.

Distribution: Canada: southern Alberta and Saskatchewan. Mexico: Chihuahua east to Nuevo Leon, south to Veracruz. United States: Montana south to Arizona east to southern Indiana and northwest Georgia (Pinto 1991). Colorado distribution: widely distributed throughout the state, most commonly along the eastern slope of the Rocky Mountains east to Kansas (Fig. 182).

Colorado Records: **Archuleta Co.:** 1 mile north of Piedra on Forest Road 622, May 31, 2002, V. Scott, 1, (UCMC) **Baca Co.:** Sand Canyon, July 13, 1991, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 10, (CSUC); Springfield, August 1, 1933, Rodeck, H.G. and M.T. James, 1, (CSUC) **Bent Co.:** east of Road CC and Road 23.5, July 2, 1990, Evans, H., Kippenhan, M., and B. Kondratieff, 1, (CSUC); Hasty, 6 mile west, (Pinto 1991); off County Road 37, Route 50 near county

line, at rest stop, June 30, 1991, DeJong, G. and B. Kondratieff, 3, (CSUC) **Crowley Co.:** Fowler, (Pinto 1991) **Delta Co.:** Paonia, (Pinto 1991) **El Paso Co.:** Boone Road and Meyers Road, July 1, 1992, D. Leatherman, 1, (CSUC); Colorado Springs; Manitou Springs; Shirley; Wigwam, (Pinto 1991) **Garfield Co.:** North of Grand Valley, (Pinto 1991) **Jefferson Co.:** Golden, June 22, 1984 D. Liewehr, 6, (CSUC); Lakewood, June 27 1977, R. Gemmill, 21, (BGPC); Morrison, (Pinto 1991) **Larimer Co.:** Fort Collins, July 4, 1900, 1, (CSUC); same locality but, June 22, 1986, Livermore, B. Kondratieff, 3, (CSUC); west of Dixon Reservoir, July 21, 1991, D. Leatherman, 1, (CSUC) **Las Animas Co.:** August 8, 1984, 2, (CSUC); Purgatoire River, Lockwood Arroyo, July 2, 1989, Welch, J. and B. Kondratieff, 1, (CSUC) **Otero Co.:** La Junta, (Pinto 1991); McMahon Arroyo, Route 109, August 18, 1996, Cranshaw, W. and B. Kondratieff, 1, (CSUC); Rocky Ford, August 7, 1999, 1, (CSUC); Rourke Ranch, Purgatoire Canyon, June 18, 2002, Schmidt, J. and B. Kondratieff, 2, (CSUC) **Prowers Co.:** near Granada, (Pinto 1991) **Pueblo Co.:** Cedarwood Exit, I-25, July 16, 1990, Kippenhan, M. and B. Kondratieff, 1, (CSUC); same locality but, July 4, 2003, J. Owens, 1, (CSUC) **Washington Co.:** Akron, June 18, 2002, H. Miller, 1, (CSUC); Last Chance, June 23, 1994, W. Cranshaw, 1, (CSUC); south of Last Chance, August 17, 1995, Leatherman, D. and B. Kondratieff, 1, (CSUC) **Weld Co.:** Pawnee National Grasslands, Central Plains Experiment Range near Nunn, August 31, 1989, J. Welch, 1, (CSUC).

Epicauta stuarti LeConte

(Figs. 31, 183)

Diagnosis: Body black, covered with brown orange to, less commonly, light yellow vestiture. Distinctive black markings as follows: two marks on pronotum, two, usually distinct quadrate marks on each elytra; vertex of head black, last abdominal segment, most of the legs and thorax black. Abdominal sterna orange with large black maculae expressed by black setae. Males with tibia, middle and hind legs and trochanters fringed ventrally with elongate setae.

Comments: One specimen from Kirk, Yuma County, Colorado was collected on August 12, 1986 expresses a color variation not previously known for this species. The entire body except for the tarsi, antennae, palpi and part of the elytra, is covered in orange to yellow pubescence. The elytra are predominately dark brown pubescent with a margin of yellow orange. Further collections near this locality may provide evidence that this individual is either an aberrant specimen or a distinct ecophenotype.

Distribution: United States: southeastern Wyoming and southwestern Nebraska south to New Mexico and western Texas (Pinto 1991). Colorado distribution: widely distributed from the eastern slope of the Rocky Mountains east to the Kansas border (Fig. 183).

Colorado Records: **Adams Co.:** Watkins, 12 miles east, (Pinto 1991) **Baca Co.:** 1 mile north of County Road 18 on J Road, September 2, 1001, Hicks, A., Yuill, L., and V. Scott, 1, (UCMC); Bear Creek; Las Animas; Las Animas, 7 miles north, (Pinto 1991) **Denver Co.:** Denver; Montclair, (Pinto 1991) **El Paso Co.:** Colorado Springs,

(Pinto 1991) **Elbert Co.:** River Bend, 5 miles northwest, (Pinto 1991) **La Plata Co.:** Durango, (Pinto 1991) **Larimer Co.:** Fort Collins, (Pinto 1991); Park Creek 20 miles north Fort Collin, August 20, 1974, H. E. Evans, 5, (CSUC); Wellington, 10 miles north, (Pinto 1991) **Las Animas Co.:** Kim, 32.1 miles southwest, (Pinto 1991) **Lincoln Co.:** Genoa; Limon junction, (Pinto 1991); northwest of junction L Road and 23 Road, August 23, 1996, Leatherman, D. and B. Kondratieff, 2, (CSUC) **Logan Co.:** Sterling, July 6, 1968, D. Manger, 1, (CSUC) **Otero Co.:** La Junta; Rocky Ford, (Pinto 1991) **Prowers Co.:** Lamar, September 4, 1998, D. Leatherman, 1, (CSUC) **Pueblo Co.:** 8 miles east southeast of Fenrose, September 3, 2001, Hicks, A., Yuill, L., and V. Scott, 2, (UCMC); Pueblo, September 25, 1901, 1, (CSUC) **Weld Co.:** Pawnee National Grasslands, Central Plains Experiment Range off Road 114, 0.5 miles from US 85, August 21, 2003, Anderson, S. and J. Schmidt, 36, (CSUC); County Road 100, northeast of Keota, August 17, 1991, D. Leatherman, 11, (CSUC); same locality but, August 31, 1989, J. Welch, 3, (CSUC); Roggen, July 14, 1978, W. Rubink, 1, (CSUC) **Yuma Co.:** Kirk, August 12, 1986, B. Kondratieff, 1, (CSUC).

Epicauta ventralis Werner

(Figs. 33, 186)

Diagnosis: A maculate species with large elytral macula, maculation formed by round denuded spots. Macula usually distinct but may vary to largely confluent on the elytra; length of maculae averaging wider than the length of antennal segment II, usually greatly so. The head and pronotum have obsolescent to absent maculae, and abdominal sterna with only sparse maculation. Vestiture color cinereous with dark setae present in varying degrees on pygidium, abdominal sterna, and legs. Black markings at base of elytra ranging from only a small humeral spot to a complete transverse band across base, but always present. Males with two fore tibial spurs and only slightly widened palpi.

Comments: Due to similar coloration and size of maculation, *Epicauta ventralis* may be confused with *E. andersoni*. For separation of these two species see comments under *E. andersoni*. The type locality for *E. ventralis* is Walsenburg, Huerfano Co., Colorado. It has been recorded feeding on sugar beet and alfalfa (Pinto 1991).

Distribution: Canada: Alberta. United States: throughout the west from Montana south to Arizona, west to Washington and California (Pinto 1980, 1991). Colorado distribution: widely distributed from the Front Range west to the Utah border (Fig. 186).

Colorado Records: **El Paso Co.:** Colorado Springs, (Pinto 1980) **Fremont Co.:** county label only, (Pinto 1980) **Huerfano Co.:** Walsenburg, (Pinto 1980) **Larimer Co.:** county label only, August 1, 1941, 1, (UCMC) **Mesa Co.:** Grand Junction, July 19, 1993, R. Nelson, 1, (CSUC); Stove Canyon, July 3, 1963, C.J. McCoy, 3, (UCMC) **Park**

Co.: 1.5 miles south of Mexican Ridge and 2.5 miles east of Rainecker Ridge, July 15, 2001, M.B. Wunder, 1, (CSUC) **Pueblo Co.:** Colorado City; Pueblo, (Pinto 1980).

Genus *Eupompha* LeConte

The genus *Eupompha* is easily recognized by the tooth like appearance of the ventral blade of the tarsal claws (Fig. 81) which is formed by a reduced ventral blade fused with a full dorsal blade and lacking inflated, reticulate or greatly reduced elytra. Additionally, the hind wings are present and of full length and the elytra cover, or nearly so, the last abdominal segment.

Eupompha is distributed throughout the semi-arid southwest and northern Mexico reaching its greatest species diversity in the Sonoran Desert. Adults of most species feed on a wide variety of plants, only consuming the flowers. Some species may be restricted to only a few or a single species of plant. The larval hosts are largely unknown but are thought to be the larvae and nest provisions of solitary bees (Pinto 1979).

Only *E. viridis* (Horn) is known to occur in Colorado, however collections from southeastern Utah suggest that *E. edmundsi* (Selander) may also occur in the southwestern portion of Colorado, along the desert plateau region and potentially as far north as Grand Junction, Colorado.

Key to the species of adult Colorado *Eupompha*

- 1 Elytra yellow brown with three raised costae which may be largely obsolescent..
.....*Eupompha edmundsi* (Selander) (p. 88)
- 1' Elytra metallic green to blue green, roughly rugose, raised costae absent
..... *Eupompha viridis* (Horn) (p. 89)

***Eupompha edmundsi* (Selander)**

(Figs. 34, 187)

Diagnosis: Elytra subcostate, with three relatively distinct to obsolescent raised costae. Body slightly shining blue black with apex of femora, tibia, tarsi, and elytra yellow brown, covered with dense brown yellow vestiture.

Comments: This species has not been previously recorded from Colorado however it is expected to occur in the state. On June 23-24, 1990, two specimens were collected from “Emery, Grand County, Utah, a locality only 14.5 km west of the Colorado state line on Road D5” (Fig. 187). In Arizona, a large series of this species was recorded feeding on the sunflower *Helianthus anomalous* Blake (Werner *et al.* 1966).

Distribution: United States: from northern Arizona north to southern Utah (Pinto 1979). Colorado distribution: if occurring in Colorado it would most likely be distributed in the southwestern portion of the state near the Utah border.

Colorado Records: None.

***Eupompha viridis* (Horn)**

(Fig. 35, 81, 188)

Diagnosis: Body and elytra metallic green to blue green, tibia and tarsi dark brown. Elytra appearing roughly rugose, lacking costae and moderately to densely covered with cinereous to brown pubescence.

Comments: Adults of this species have been recorded feeding on sunflowers (*Helianthus* sp.), flax (*Linum* sp.) and many species of Asteraceae (Werner *et al.* 1966, Pinto 1979).

Distribution: Mexico: Chihuahua. United States: southeastern Arizona north to Colorado, east to western Texas (Pinto 1979). Colorado distribution: only one record from Weld County (Fig. 188).

Colorado Records: Weld Co.: Erie, July 15, 1935, H.B. James, 1, (CSUC).

Genus *Gnathium* Kirby

This genus may be separated from other genera of Colorado Meloidae by its clavate antennae, small size 4-11 mm rarely exceeding 6 mm, elongate galeae which is produced into a long sucking tube, elytra and wings not reduced, elongated head, and pectinate tarsal claws.

This genus is distributed throughout the southwestern United States, along the Great Plains and south into Mexico. Adults are usually found feeding on the pollen of *Helianthus* sp., including the annual sunflower (*H. annuus*), and flowers in the family

Asteraceae. Larval hosts are largely unknown, however Pinto and Bologna (1999) report triungulins of *Gnathium* being found on species of andrenid bees (Andrenidae).

Key to the species of adult Colorado *Gnathium*

- 1 Pronotum with dense, deep punctures, not shining (Fig. 129); both hind tibial spurs broadened and concave..... *Gnathium minimum* (Say) (p. 90)
- 1' Pronotum with shallow, sparse punctures, appearing shiny (Fig. 130); hind tibial spurs dissimilar, outer spur broadened, concave, inner spur parallel sided and straight..... *Gnathium nitidum* (Horn) (p. 92)

Gnathium minimum (Say)

(Figs. 36, 129, 189)

Diagnosis: The largest species of *Gnathium* in Colorado ranging from 4.0 to 6.5 mm (Werner *et al.* 1966). Color variable from light orange-brown to dark brown however, head may be darker. Elytra usually with margin darkened. Head and pronotum densely covered with deep punctures, which give the cuticle surface a dull appearance (Fig. 129). Galeae greatly elongated, about three times the length of the pronotum. Elytra shallowly, densely punctured and appearing rugose. Both hind tibial spurs broadened apically and concave; outer spur about twice as wide as inner.

Comments: This species seems to prefer to feed on the pollen of sunflowers (*Helianthus* sp.) including the annual sunflower (*H. annuus*) (MacSwain 1952, Werner *et al.* 1966).

Distribution: Canada: Alberta (MacSwain 1952). Mexico: Chihuahua and Sonora (Vaurie 1950). United States: from southeastern Arizona east to western Texas, north to Colorado (MacSwain 1952). Colorado distribution: widely distributed throughout the state (Fig. 189).

Colorado Records: **Alamosa Co.:** Great Sand Dunes National Monument, August 8, 2003, Harp, C. and P.A. Opler, 8, (CSUC); Maedano Ranch, Elk Wetlands, August 13, 1998, Nosaka, T.M. and P.M. Pineda, 1, (CSUC) **Archuleta Co.:** Route 500, 3 miles east of Route 151, July 24, 1993, Kippenhan, M., Fitzgerald, S., and D. Leatherman, 1, (CSUC) **Bent Co.:** Road 26, along Caddoa Creek, July 7, 2004, Schmidt, J.P. and J. Owens, 1, (CSUC); John Martin Reservoir, August 22, 1995, W Cranshaw, 3, (CSUC); junction Road GG and Road 23.5 sand dunes by reservoir, July 12, 1991, Cranshaw, W., Kippenhan, M., Leatherman D., and B. Kondratieff, 4, (CSUC); Road CC, southwest of Caddoa, August 17, 1995, W. Cranshaw, 1, (CSUC) **Kiowa Co.:** Neenoshe Reservoir Road E, July 18, 2001, Schmidt, J. and B. Kondratieff, 3, (CSUC); **Larimer Co.:** Fort Collins, July 16, 2003, 1, (CSUC) **Lincoln Co.:** mile marker 52, State Route 71, August 12, 1992, W. Cranshaw, 1, (CSUC) **Otero Co.:** Carrizo Creek picnic area 3.5 miles west Road 8 on Road M, July 13, 1991, W. Cranshaw, 1, (CSUC) **Prowers Co.:** near Granada, July 31, 1933, Rodeck, H.G. and M.T. James, 1, (CSUC); Lamar, August 27, 2003, D. Leatherman, 1, (CSUC) **Pueblo Co.:** Pueblo Chemical Depot, June 22, 2001, J. Schmidt, 2, (CSUC) **Saguache Co.:** Indian Springs Natural Area, near Great

Sand Dunes National Monument, August 10, 1999, Nevins, T.G. and Pineda, P.M., 4, (CSUC) **Sedgwick Co.:** Julesburg, August 4, 1999, 1, (CSUC) **Weld Co.:** Pawnee National Grasslands, Central Plains Experiment Range, near Nunn, July 20, 2003, J. Schmidt, 12, (CSUC); Roggen, June 16, 1936, R. Swain, 2, (CSUC); State Lands near Road 61 and Road 62, July 9, 2000, J. Bishop, 1, (CSUC) **Yuma Co.:** county label only, July 17, 1986, B. Kondratieff, 1, (CSUC).

***Gnathium nitidum* (Horn)**

(Fig. 37, 130, 190)

Diagnosis: A small species, generally less than 5 mm. Head, pronotum, and elytra shallowly, sparsely punctate; surface appearing shiny (Fig. 130). Color usually pale testaceous, head and pronotum may be slightly darker. Galeae moderately short, about two times the length of pronotum. Hind tibial spurs dissimilar, outer spur broadened, concave; inner spur parallel sided, straight.

Comments: MacSwain (1952) recorded this species from flowers of *Chrysothamnus* sp. This record represents a new state record for Colorado.

Distribution: Mexico: Baja California, Durango, and Coahuila (Vaurie 1950, MacSwain 1952). United States: Oregon south to California, east to Colorado and Texas (MacSwain 1952). Colorado distribution: this species has only been recorded from Saguache County but it is likely to occur throughout southern and western Colorado (Fig. 190).

Colorado Records: Saguache Co.: Indian Springs Natural Area near the Great Sand Dunes National Monument, August 10, 1999, Nevins, T.G. and P.M. Pineda, 6, (CSUC).

Genus *Hornia* Riley

This is a rare and unique genus recognized by the squamiform (scale-like) elytra which are reduced to a length shorter than that of the pronotum, only partially covering the first abdominal sternite, not overlapping basally, with wings absent, and simple tarsal claws, however, the ventral blade of the tarsal claws may be reduced. The abdomen is semi-membranous and sack like with areas of light colored membranous area contrasting with darker sclerites (Linsley 1942, Pinto and Bologna 1999).

This genus is distributed throughout the United States reaching its highest diversity in the west. The adults are subterranean (Linsley 1942) and only found in nests of solitary bees in the family Apidae almost exclusively on the genus *Anthophora*. Linsley and MacSwain (1942) give a detailed life history account of *H. minutipennis occidentalis* Linsley. Adults overwinter in the cells of their bee host. In spring, holes are cut in the bee cell and adult males emerge while the females remain in the cells of their host. It is thought that neither sex leaves the burrow as an adult unless only one sex is represented in the cell series. Males enter the cell of the female and copulate. Eggs are oviposited in the host cell where the female is located. The first instar larvae emerge from the cell and either exit the burrow where they wait to attach to alighting bees or, if at the end of a cell row, will attach to bees leaving the nest. If unsecured, larvae may

attach a silk thread to the ground surface as a dragline (Linsley and MacSwain 1942). Other species of *Hornia* have similar life histories varying by length of development. Due to the reclusive life historie of this species, it is very rare in collections and usually only collected by individuals working with the bee hosts.

Key to the species of adult Colorado *Hornia*

Key modified in part from Linsley (1942)

- 1 Ventral blade of tarsal claw absent or shorter than half the length of the dorsal blade, head, thorax and legs rufous.....*Hornia minutipennis* Riley (p. 94)
- 1' Ventral blade of tarsal claw long, attaining or surpassing $\frac{3}{4}$ the length of the dorsal blade; head, thorax, and legs black
.....*Hornia mexicana neomexicana* Cockerell (p. 95)

Hornia minutipennis Riley

(Figs. 38, 191)

Diagnosis: Head, thorax, and legs rufous. Males with abdominal sclerites II-VI heavily sclerotized and pigmented; females with abdominal segments II-VI unsclerotized and unpigmented. Ventral blade of tarsal claw short, equal to or less than, half the length of the dorsal claw

Comments: Linsley (1942) reports two host species of apid bees, *Anthophora occidentalis* Cresson and *A. stanfordiana* Cockerell.

Distribution: Canada: (MacSwain 1958). United States: throughout the United States with populations in California representing the subspecies *H. m. occidentalis* (Linsley 1942, MacSwain 1958). Colorado distribution: this species has only been recorded along the Front Range, but given its contiguous United States distribution, it may be found throughout the state wherever its bee host occurs (Fig. 191).

Colorado Records: **Denver Co.:** Denver, August 1, 1901, 1, (CSUC) **El Paso Co.:** Colorado Springs, (Mickel 1928 in Linsley 1942) **Larimer Co.:** Fort Collins, April 13, 1953, A. Daniels, 1, (CSUC); Hewlett Gulch, June 11, 1979, H.E. Evans, 2, (CSUC).

***Hornia mexicana neomexicana* Cockerell**

(Fig. 192)

Diagnosis: Head, thorax and legs black. Abdominal segments subcorneous, dark brown in coloration (Linsley 1942). Ventral blade of tarsal claw long, attaining or surpassing three fourths the length of the dorsal claw.

Comments: No representatives of the species were examined from Colorado during this study; previous literature records are noted. In a study by MacSwain (1958), *H. m. neomexicana* was found to be the most abundant insect parasite associated with the bee *Anthophora occidentalis* in the majority of their samples. Additionally, *H. m. neomexicana* specimens were even present in a bee nest located in the adobe wall of a house.

Distribution: Mexico: after the synonymy of *H. neomexicana* with *H. mexicana* by MacSwain (1958), it is assumed that this subspecies is distributed in northern Mexico.

United States: from Colorado and Kansas south to southern New Mexico (Linsley 1942, MacSwain 1958). Colorado distribution: only recorded along the Front Range; however, collection data from Kansas suggests that it may occur in the eastern Great Plains of Colorado (Fig. 192).

Colorado Records: Boulder Co.: Boulder, (Hicks 1926 in Linsley 1942)

Denver Co.: Denver, (Schwarz 1904 in Linsley 1942) **Douglas Co.:** Parker, (Cockerell 1905 in Linsley 1942) **El Paso Co.:** Colorado Springs, (Mickel 1928 in Linsley 1942).

Genus *Linsleya* MacSwain

This genus is distributed throughout western North America and northern Mexico. It is distinguished from the superficially similar genus *Lytta* and other North American genera by the similar and acute hind tibial spurs and the following antennal characteristics; the first antennal segment is longer than the third and the intermediate antennal segments are compressed and usually transverse, this is even more apparent in males.

Larval hosts are largely unknown however, Selander (1964b, 1982a) provides evidence that *L. sphaericollis*, and *L. convexa* may feed on the eggs of grasshoppers. Adults of most species are known to feed on a wide variety of plants from the families Caprifoliaceae, Asteraceae, Fabaceae, Oleaceae, and Solanaceae largely preferring the foliage (Selander 1955).

The shape of the last abdominal sternite may aid in sex determination. Males have a deep medial emargination, whereas the last abdominal sternite of the female is entire.

Key to the species of adult Colorado *Linsleya*

- 1 Males with a large spine basoventerally on fore femora (Fig. 131) and lack fore tibial spurs; females without tarsal pad present on segment I of middle tarsi; found at lower elevations of eastern plains....*Linsleya convexa* (LeConte) (p. 97)
- 1' Males without large spine on fore femora basoventerally; females with tarsal pad present on segment I of middle tarsi; found at high elevations.....
.....*Linsleya sphaericollis* (Say) (p. 98)

***Linsleya convexa* (LeConte)**

(Figs. 131, 193)

Diagnosis: Body color generally black with dark metallic blue cast, elytra dark metallic blue or green-blue. Females without tarsal pad present on segment I of middle tarsi. Males, with a large spine present basoventerally on the fore femora and unlike other *Linsleya*, generally lack fore tibial spurs.

Comments: Rarely, males may possess a reduced, but noticeable, fore tibial spur. However, the large basoventral spine on the fore femora will still easily distinguish male

specimens which exhibit this condition from any other species in this genus. None of the specimens collected in Colorado had a fore tibial spur.

Fall (1901) listed this species as occurring in Colorado. Selander (1955) understandably questioned this locality record as, at the time, this species was only known from northern Mexico, southwestern Texas, and extreme southern New Mexico. The following Colorado records confirm Fall (1901) and represent a considerable northern range extension.

Distribution: Mexico: Chihuahua. United States: southwestern New Mexico west to western Texas, north to southeastern Colorado. Colorado distribution: only one locality recorded from the southeastern Otero County however, this species was collected multiple times from this locality during subsequent visits and in June 2007 was present in large numbers (Fig. 193).

Colorado Records: Otero Co.: Vogel Canyon, Comanche National Grasslands, May 30, 2004, J. Owens, 2, (CSUC); same locality but June 3, 2007, W. Cranshaw, 9, and June 7, 2007, J. Owens, 47, (CSUC).

***Linsleya sphaericollis* (Say)**

(Figs. 50, 194)

Diagnosis: Color usually aeneous, green or blue with populations in northern California nearly black. Tarsal pads present on tarsal segment I of all legs and pads usually centrally divided. Males, with two fore tibial spurs and lack a basoventral spine on the fore femora.

Comments: This species has been recorded from numerous host plants including lilac, snowberry, and potato (Selander 1955)

Distribution: Canada: British Columbia east to Manitoba. United States: from Washington south to southern California, east to North Dakota, south to western Kansas and northern New Mexico. Colorado distribution: widespread throughout the higher elevations of Colorado from the eastern slope of the Rocky Mountains and Front Range west (Fig. 194).

Colorado Records: **Alamosa Co.:** Mosca Pass Trail, July 31, 1992, M.J. Weissman, 1, (CSUC) **Arapaho Co.:** Littleton, June 14, 1925, 1, (CSUC) **Boulder Co.:** Boulder, 7, (Selander 1955); Eldorado Springs, 4, (Selander 1955); Gold Hill, 1, (Selander 1955); Nederland, 1, (Selander 1955) **Costilla Co.:** Forbes Park, east of Fort Garland, July 16, 1997, D. Leatherman, 10, (CSUC) **Custer Co.:** Westcliffe, 17 km southeast, July 7, 1999, H.E. and M.A. Evans, 5, (CSUC) **Denver Co.:** Denver, 4, (Selander 1955) **Dolores Co.:** Rico, 14, (Selander 1955), **Douglas Co.:** Castle Rock, July 1, 1985, J. Capinera, 6, (CSUC) **El Paso Co.:** Manitou Springs, 4; Cheyenne Mountain, 7; Colorado Springs, 3, (Selander 1955) **Gunnison Co.:** Gunnison National Forest, Little Soap Park 10-12 miles north Highway 92, July 15, 1993, R. Gemmill, 1, (BGPC) **Huerfano Co.:** La Veta, 4, (Selander 1955) **Jefferson Co.:** Chatfield State Park, June 15, 1977, D.A. and J.T. Polhemus, 2, (CSUC) **La Plata Co.:** Hesperus, June 23, 1976, D. Leatherman, 3, (CSUC) **Lake Co.:** Leadville, September 15, 2002, J. Owens, 15, (CSUC) **Larimer Co.:** Estes Park, 1, (Selander 1955); same locality but, July 21, 1933, E.B. Andrews, 3, (DMNS); Fort Collins, July 1, 1998, 1, (CSUC); Livermore, July 15, 1984, J. Capinera, 41, (CSUC); Moraine Park, Rocky Mountain

National Park, July 9, 2000, B. Kondratieff, 1, (CSUC); Rist Canyon, June 17, 2004, 2, (CSUC); Rocky Mountain National Park, July 25, 2002, B. Kondratieff, 2, (CSUC)
Lincoln Co.: Westlake, July 7, 2001, (CSUC) **Mesa Co.:** Big Wash, May 4, 1992, Knuttel, H., Kondratieff, B., and W. Cranshaw, 1, (CSUC) **Ouray Co.:** Ouray, 3, (Selander 1955) **Park Co.:** Alma, 2, (Selander 1955) **Pueblo Co.:** Pueblo, July 25, 1923, 1, (CSUC) **Teller Co.:** Woodland Park, July 10, 2002, D. Leatherman, 4, (CSUC).

Genus *Lytta* Fabricius

Lytta is a widespread genus with the majority of the North American species occurring in the western United States and northern Mexico. This genus is distinguished from all other North American genera of Meloidae by the following morphological characters: the elytra are long and notched basally, hind wings present, antennae usually moniliform or submoniliform only reaching the base of the elytra, antennal segment I shorter than or equal to III, intermediate antennal segments not compressed, simple tarsal claws neither toothed or pectinate, and the hind tibial spurs are usually dissimilar, outer spur thickened and obliquely truncate (Dillon 1952, Selander 1960, Pinto and Bologna 1999).

Adults are usually active from mid to late summer however; some species may be active in early spring or late fall. On average most species persist for three and one-half months. Most species of adult *Lytta* can be found in large aggregations and feed on a wide variety of plant hosts, with most Colorado species preferring the families Fabaceae and Asteraceae.

Larvae feed on the cell provisions and larvae of bees almost exclusively in the family Apidae with one isolated record for *Colletes* sp. (Colletidae) (Selander 1960).

Lytta cyanipennis (LeConte) and *L. vulnerata* (LeConte) are included in the following key as possibly occurring in the state. Distributional records relevant to this assumption are included in the discussion for each species.

Key to the species of adult Colorado *Lytta*

- 1 Elytra black or metallic green, blue or purple.....3
- 1' Elytra yellow to orange brown.....2
- 2 (1') Head, pronotum and entire body black except for pale orange frontal spot; elytra without maculation..... *Lytta fulvipennis* LeConte (p. 107)
- 2' Head black with frontal spot yellow orange; pronotum yellow-orange with two black maculae; elytra usually with two black maculae towards apex
..... *Lytta biguttata* LeConte (p. 103)
- 3 (1) Elytra black, or with dark metallic luster; males without special modification to fore tarsal segment I.....4
- 3' Elytra bright metallic green, blue or purple; male fore tarsal segment I with deep notch basally and contorted9
- 4 (3) Elytra strongly reticulate (Fig. 132), sculpturing visible without magnification, if appearing finely reticulate than head and pronotum largely orange5
- 4' Elytra not as above, head and pronotum same color as elytra7
- 5 (4) Head and pronotum black *Lytta reticulata* Say (p. 112)

5'	Head and pronotum yellow to red-orange	6
6(5')	Pronotum with sides strongly angulate (Fig. 133); femora black	
	.....<i>Lytta vulnerata</i> (LeConte) (p. 116)	
6'	Pronotum with sides rounded (Fig. 134); femora orange tipped with black apically and sometimes basally.....	<i>Lytta deserticola</i> Horn (p. 106)
7 (4')	Small, usually shorter than 10 mm; front of head lacking a frontal orange spot	<i>Lytta puberula</i> LeConte (p. 111)
7'	Large, usually greater than 16 mm; head with a frontal orange spot.....	8
8 (7')	Males with only one fore tarsal spur and a well-developed ventral spine present on hind trochanters (Fig. 135); females with hind trochanters angulate.....	
	.....<i>Lytta nigrocyanea</i> Van Dyke (p. 108)	
8'	Males with two fore tarsal spurs, hind trochanters without a well developed spine ventrally on hind trochanters; females with hind trochanters rounded	
	.....<i>Lytta navajo</i> Werner (p. 107)	
9 (3')	Elytra blue, green or purple	10
9'	Elytra usually entirely violet to more uncommonly, brassy green with violet color restricted to margins	<i>Lytta nuttalli</i> Say (p. 109)
10 (9)	Males with antennal segments V-VIII somewhat flattened ventrally, flattened surface with tufts of long setae (Fig. 85), no spine present on hind trochanters; females with hind trochanters rounded. Setae on venter bicolored; occurs throughout Colorado	<i>Lytta viridana</i> LeConte (p. 113)

10' Males without above modifications to antennae; hind trochanters with a ventral spine present; females with hind trochanters angulate and setae on venter completely dark, if occurring in Colorado likely in extreme northwest
.....*Lytta cyanipennis* (LeConte) (p. 104)

***Lytta biguttata* LeConte**

(Figs. 39, 195)

Diagnosis: Head varying from black to yellow-brown, pronotum yellow-brown usually with a central pair of macula, and elytra yellow-brown to yellow usually with paired elongate black maculae towards apical one third.

Comments: Selander (1956, 1960) discuss the variable color pattern of the head, undersurface, and elytral maculation for this species. As a result of Selander's work, three distinct phenotypes are recognized for this species: the typical, the pale, and the southern Mexico race. The vast majority of the Colorado specimens examined by Selander (1956) and all of the material in this study represented the "typical race" in that the head except a pale frontal spot, underside, and tibia are all black.

This species is known to feed on a wide variety of plants in the family Asteraceae (Selander 1960), with most Colorado records from sunflowers (*Helianthus* spp.).

Distribution: Mexico: Chihuahua, Coahuila, Durango, San Luis Potosi, Guanajuato, and Mexico (Selander 1956; 1960). United States: Montana south to Arizona east to South Dakota and western Texas. Colorado distribution: primarily throughout the Great Plains and southern portion of the state (Fig. 195).

Colorado Records: **Arapaho Co.:** Cherry Creek Reservoir, prairie dog town, June 10, 1990, R. Gemmill, 1, (BGPC) **Baca Co.:** Comanche National Grassland, west of Campo, June 12, 1999, L. Nadeau, 1, (CSUC) **Conejos Co.:** Antonito, (Wickham 1902 in Selander 1960) **Denver Co.:** Denver, June-July, 4, (Selander 1960) **El Paso Co.:** Colorado Springs, June, 5, (Selander 1960) **Fremont Co.:** Canon City, (Wickham 1902 in Selander 1960) **Larimer Co.:** Fort Collins, June 27, 1913, 1, (CSUC) **Las Animas Co.:** near Hoehne, August, 1, (Selander 1960); Trinidad, May 29, 1951, 1, (CSUC) **Logan Co.:** near Johnson Draw, July 18, 1997, S. Fitzgerald, 1, (CSUC); Sterling, July, 1, (Selander 1960) **Montezuma Co.:** Cortez, August 10, 1903, 1, (CSUC); McPhee Reservoir, August 25, 1992, Painter, B., Kondratieff, B., and D. Leatherman, 1, (CSUC) **Otero Co.:** Rocky Ford, September, 1, (Selander 1960); Vogel Canyon, June 3, 2007, W. Cranshaw, 9, (CSUC) **Washington Co.:** Akron, July 2, 1983, 1, (CSUC) **Weld Co.:** Pawnee National Grasslands, Central Plains Experiment Range, near Nunn, July 2, 1971, 1, (CSUC); same locality but, July 2, 1977, R. Lavigne, 2, (ESUW); June 10, 1977, R. Lavigne, 1, (ESUW).

Lytta cyanipennis (LeConte)

(Fig. 40)

Diagnosis: Metallic green, blue or purple in coloration. Pubescence present on ventral surface of thorax completely dark. Pronotum hexagonal in shape. Males with a ventral spine present on hind trochanters, fore tarsal segment I deeply notched basally

and contorted, and lack the antennal modifications present in the similar *L. viridana*.
Females with hind trochanters angulate.

Comments: Records from Selander (1960) and Selander and Downey (1963) suggest that *L. cyanipennis* may occur in the extreme northwestern portion of the state. One specific locality, as mentioned in Selander and Downey (1963) is “32 km north of Vernal, 8200 feet” located in Uintah County, Utah. This locality is approximately 42 km west of Colorado’s northwestern Moffat County.

Lytta cyanipennis is closely related and morphologically similar to *L. viridana*. Separation of the males is easily accomplished by comparison of the antennae and hind trochanters. *Lytta cyanipennis* has largely unmodified antennae and a ventral spine present on the hind trochanters where as; *L. viridana* has tufts of long setae present on the ventral surface of antennal segments V-VIII and no spine present on the hind trochanters. Separation of females is more difficult with the only consistent character for separation other than geography being the color of the setae on the venter. Females of *L. cyanipennis* have completely piceous ventral setae where as females of *L. viridana* have bicolored setae piceous base and colorless apically.

Adults have been recorded from Fabaceae seeming to prefer species of *Lupinus* sp. (Selander 1960, Selander and Downey 1963).

Distribution: Canada: British Columbia. United States: from Washington south to central California east to Montana, Wyoming and Utah. Colorado distribution: if occurring in the state it is most likely to occur in the extreme northwestern counties near the Utah or Wyoming border.

Colorado Records: None.

***Lytta deserticola* Horn**

(Figs. 41, 134, 196)

Diagnosis: Head orange with frontal area between eyes and labrum and a narrow band on the ventral side of the head, black. Pronotum with sides rounded, orange, two maculae present maculations may be fused, and margined with a thin black border (Fig. 134). Elytra black in coloration and finely reticulate; reticulation, although fine, visible without magnification. Femora orange, with base and apex narrowly black.

Comments: *Lytta deserticola* is a rare species with little biological information known (Werner *et al.* 1966). The following records of *L. deserticola* represent a new state record for the species (Selander 1960, Werner *et al.* 1966).

Distribution: Mexico: Sonora. United States: Utah south to Arizona east to southwestern Colorado and New Mexico. Colorado distribution: from Mesa County south to Montezuma County (Fig. 196).

Colorado Records: Mesa Co.: Colorado National Monument, August 1, 1981, R. Skiles, 1, (CSUC); same locality but, August 16, 1981, R. Skiles, 1, (UCMC)
Montezuma Co.: Mesa Verde National Park, August 15, 1954, 1, (CSUC).

***Lytta fulvipennis* LeConte**

(Figs. 42, 197)

Diagnosis: Head except orange frontal spot, pronotum, and entire body black. Elytra entirely yellow-brown to orange-brown in coloration, lacking any maculae. Outer hind tibial spur about three times wider than inner spur.

Comments: This species has only been listed one other time as occurring in Colorado in Horn (1873).

Distribution: United States: Nebraska south to southern Texas west through southern Arizona. Colorado distribution: northeastern Yuma County (Fig. 197).

Colorado Records: Yuma Co.: springs at Head Horse Creek, June 27, 1962, Anderson and Robinson, 9, (UCMC).

***Lytta navajo* Werner**

(Figs. 43, 198)

Diagnosis: Body entirely black except pale orange spot on front of head, some individuals may have a bluish luster. Antennal segments clavate, becoming thicker distally. Males with hind trochanters somewhat rounded, only slightly angulate, and with a sharp ventral margin (Selander 1960). Females with hind trochanters evenly rounded or only slightly angulate.

Comments: The only known host plant for this species is *Astragalus* sp. This species has only been collected once in Colorado. The beetles were present in a large

aggregation on one relatively small, localized patch of *Astragalus* sp. growing on the side of the road. The beetles have never been collected again in Colorado (to the best of the author's knowledge) despite efforts to locate them again in the same locality and season. This species represents a new state record for Colorado (Werner 1950, Selander 1960)

Distribution: United States: Northern Arizona, southeastern Utah and southwestern Colorado. Colorado distribution: only one locality is known from the southwestern county of Montezuma (Fig. 198).

Colorado Records: Montezuma Co.: 14.6 miles west of San Juan River on Route 160, May 2, 1992, Kondratieff, B.C., Cranshaw, W., and H. Knuttel, 65, (CSUC).

***Lytta nigrocyanea* Van Dyke**

(Figs. 44, 135, 199)

Diagnosis: Entirely black, except pale orange spot on front of head, with a dull dark blue luster. Males with hind trochanters armed with a ventral spine (Fig. 135) and antennae with segments IV-VIII sub-triangular in shape, thickening towards apex (Selander 1960). Females with hind trochanters distinctly angulate.

Comments: The type locality of *L. nigrocyanea* is Palisade, Mesa County, Colorado.

Distribution: United States: in western Colorado and along the Utah and Wyoming borders. Colorado distribution: from midwestern Mesa County north to Moffat County (Fig. 199).

Colorado Records: Mesa Co.: Loma, May 4, 1978, U. Lanham, 1, (UCMC); Palisade, May 7, 1901, 3, (CSUC) **Moffat Co.:** Dinosaur National Monument, Plughat Butte, June 14, 2003, P.A. Opler, 3, (CSUC).

Lytta nuttalli Say

(Figs. 45, 86, 200)

Diagnosis: Head and pronotum brassy green to blue-green and rarely brassy violet (Selander 1960). Body color varies from green to green-blue; elytra almost always violet or, less commonly brassy green with at least margins violet. Pronotum hexagonal in shape. Males with fore tarsal segment I deeply notched basally and contorted; hind trochanters with a spine present on the ventral margin.

Comments: The most common host plants recorded for *L. nuttalli* are in the family Fabaceae (Selander 1960). This species has also been reported from crop plants including beans, beets, oats, and barley (Chittenden 1903, Gibson 1912).

Distribution: Canada: from Alberta east to Manitoba. United States: Idaho south to Arizona, east to Minnesota and New Mexico. Additionally, a disjunct population exists along the Sierra Nevada mountain range in eastern California (Selander 1960, Selander and Downey 1963). Colorado distribution: widespread throughout the state (Fig. 200).

Colorado Records: Alamosa Co.: Alamosa, July 1, 1986, W. Cranshaw, 2, (CSUC); Great Sand Dunes National Monument, August 1, 1979, K. O'Neill, 1, (CSUC); same locality but, August 8, 2003, Buckner, E. and P. Opler, 1, (CSUC); July 21, 1989,

B. Kondratieff, 1, (CSUC) **Bent Co.:** Bent's Fort, (LeConte 1853) **Boulder Co.:**
 Boulder Canyon, June 10, 1996, D. Leatherman, 1, (CSUC) **Chaffee Co.:** Salida, June
 29, 1998, T. Adair, 1, (CSUC) **Clear Creek Co.:** Georgetown, 2, (Selander 1960)
Conejos Co.: Antonito, July, 13, (Selander 1960) **Costilla Co.:** Cottonwood Creek
 north of Fort Garland, July 27, 2001, D. Leatherman, 1, (CSUC); Forbes Park, east of
 Fort Garland, July 16, 1997, D. Leatherman, 1, (CSUC); **Denver Co.:** Denver, (Selander
 1960) **Douglas Co.:** Larkspur, July 4, 1993, D. Leatherman, 1, (CSUC); Spruce
 Mountain, July 22, 1994, 1, (CSUC) **El Paso Co.:** Air Force Academy, July 1, 1994, A.
 Ellingson, 1, (CSUC); Colorado Springs, July, 1, (Selander 1960); Eastonville, August, 2,
 (Selander 1960); Palmer Lake, June, 2, (Selander 1960) **Fremont Co.:** San Isabel
 National Forest, August, 3, (Selander 1960) **Gilpin Co.:** county label only, July, 2,
 (Selander 1960) **Gunnison Co.:** Gunnison National Forest, Soap Creek campground, 7
 miles north Highway 92, July 2, 1993, R. Gemmill, 1, (BGPC) **Jackson Co.:** East Sand
 Hills Natural Area, July 24, 1995, Simonson, S. and P. Pineda, 2, (CSUC); North Park,
 June, 4, (Selander 1960); North Sand Dunes State Recreation Management Area, July 19,
 1993, D. Leatherman, 1, (CSUC); **Jefferson Co.:** Crawford Hill, June 18, 1980, J. Scott,
 5,(CSUC); Tinytown, June 14, 1992, J. Scott, 2, (CSUC) **Lake Co.:** near Leadville,
 August, 6, (Selander 1960) **Larimer Co.:** Arthur's Rock, July 1, 1976, D. Leatherman,
 1, (CSUC); Fort Collins, June, 15, (Selander 1960); Glacier View, Mead, June 10, 1988,
 H.E. Evans, 2, (CSUC); Lory State Park, June 30, 1979, H.E. Evans, 1, (CSUC); near
 Longs Peak, (LeConte 1847 in Selander 1960); Pingree Park, June, 3; Wellington, July,
 1, (Selander 1960) **Mineral Co.:** Creede, August, 4, (Selander 1960) **Park Co.:** South
 Park, (Selander 1960) **Saguache Co.:** Center, 2 miles east, July 16, 1993, S. Hoffman, 1,

(CSUC); Center, August 9, 1984, J. Capinera, 1, (CSUC); Poncha Loop Road, July 26, 1978, B.B. Hostetler, 7, (CSUC); Raspberry Creek, July 25, 1997, P.M. Pineda, 5, (CSUC) **Teller Co.:** Woodland Park, July 14, 1980, D. Thompson, 5, (CSUC) **Weld Co.:** Pawnee National Grasslands, Central Plains Experiment Range, near Nunn, May 31, 1990, T. Crist, 1, (CSUC).

***Lytta puberula* LeConte**

(Figs. 46, 137, 201)

Diagnosis: A small species for the genus, 7-11 mm. in length (Selander 1960). Body black in coloration; head lacking a pale frontal spot. Entire body clothed throughout with moderately long, semi-erect, cinereous pubescence (Fig. 137) resulting in an overall dark gray coloration when viewed without magnification.

Comments: This species has been reported on primrose and *Campanula* sp. and may be attracted to lights at night (Werner *et al.* 1966).

Distribution: United States: throughout New Mexico north to southwestern Colorado and northern Arizona. Colorado distribution: only known from La Plata and Montezuma counties (Fig. 201).

Colorado Records: La Plata Co.: Durango, July, 5, (Selander 1960)

Montezuma Co.: Mesa Verde, July, 1, (Selander 1960); Morefield Canyon, mile 2, Mesa Verde National Monument, August 6, 1999, Wells, S., Cranshaw, W., Kondratieff, B., and W. Painter, 3, (CSUC); Soda Canyon, Mesa Verde National Monument, August

6, 1999, Wells, S., Cranshaw, W., Kondratieff, B., and W. Painter, 3, (CSUC); Yellow Jacket, July 28, 1961, S.M. Sutton, 1, (UCMC).

***Lytta reticulata* Say**

(Figs. 47, 132, 202)

Diagnosis: Elytra with raised, roughly reticulate lines; reticulation visible without magnification (Fig. 132). Entire body and elytra black. Head densely and finely punctate, lacking a pale frontal spot. Fore tibia with two spurs.

Comments: Milliken (1921), Dillon (1952), and Selander (1960), report morning-glory (*Ipomoea* sp.) as a common host plant for this species.

Distribution: United States: from southeastern Wyoming and western Nebraska south to southeastern New Mexico and western Texas (Selander 1960). Colorado distribution: fairly common and wide-ranging throughout the Great Plains (Fig. 202).

Colorado Records: **Baca Co.:** Road 45 north of the Oklahoma border, July 15, 1992, Evans, H.E., Kondratieff, B., Leatherman, D., Weissmann, M., and W. Cranshaw, 7, (CSUC) **Bent Co.:** Caddoa, 2.5 miles south, July 3, 1990, Kippenhan, M., Evans, H., and B. Kondratieff, 1, (CSUC); Caddoa Creek, CC Road, John Martin Reservoir, July 18, 2001, Schmidt, J. and B. Kondratieff, 1, (CSUC); Hasty, July 4, 1975, H.E. Evans, 1, (CSUC); south shore of John Martin Reservoir, July 2, 2001, Schmidt, J. and S. Anderson, 2, (CSUC) **El Paso Co.:** Fountain High School, Colorado Springs, August, 1, (Selander 1960) **Logan Co.:** Sterling, September, 1, (Selander 1960) **Morgan Co.:** Fort Morgan, 15 miles west, July 8, 1932, K. Maehler, 1, (CSUC); Fort Morgan, July, 2,

(Selander 1960) **Otero Co.:** La Junta, August, 1, (Selander 1960) **Prowers Co.:** Lamar, 3 miles north, May 21, 1986, P.A. Opler, 2, (CSUC); Arkansas River at Route 50, Lamar. southeast shore, July 15, 1992, 1, (CSUC); Carlton, June 26, 1974, H.E. and M.A. Evans, 4, (CSUC); Walker Ranch, June 6, 2000, D. Leatherman, 1, (CSUC) **Pueblo Co.:** Pueblo Chemical Depot, August 13, 2001, Schmidt, J. and S. Anderson, 4, (CSUC) **Sedgwick Co.:** Julesburg, July 23, 1936, 1, (CSUC) **Washington Co.:** Akron, July, 14, (Selander 1960) **Weld Co.:** Hardin, August, 1, (Selander 1960); Hudson, July 10, 1934, 3, (CSUC); Roggen, July 7, 1937, Moas, C.H. and M.T. James, 2, (CSUC) **Yuma Co.:** near Wray, June 30, 1986, D. Thompson, 1, (CSUC).

Lytta viridana LeConte

(Figs. 48, 85, 136, 203)

Diagnosis: Body metallic green, blue or purple. Pubescence on ventral surface of thorax bicolored; dark basally and colorless apically. Males without a ventral spine present on hind trochanters. Legs with fore tarsal segment I with deep notch basally and contorted (Fig. 136). Antennal segments V-VIII of males somewhat flattened ventrally; flattened surface with tufts of long setae (Fig. 85). Females with hind trochanters evenly rounded. Both sexes with pronotum hexagonal in shape.

Comments: *Lytta viridana* may be confused with *L. cyanipennis*; separation of these two species is discussed under *L. cyanipennis*. Adults feed on species of Fabaceae (Selander 1960) and some isolated records exist from *Iris missouriensis* Nuttall (Iridaceae) (Selander and Downey 1963).

Distribution: Canada: from British Columbia east to Manitoba. United States: Wyoming, Utah, and Arizona east to South Dakota and New Mexico (Selander 1960, Selander and Downey 1963). Colorado distribution: distributed widely throughout the state (Fig. 203).

Colorado Records: **Boulder Co.:** Indian Parks Wilderness Area, June 17, 1994, B. Kondratieff, 2, (CSUC); near Nederland, June, 8, (Selander 1960); Ward, July 10, 1937, M.T. James, 2, (CSUC) **Clear Creek Co.:** Dumont, June, 1(Selander 1960); Georgetown, June, 6, (Selander 1960) **Costilla Co.:** Russell, June, 1, (Selander 1960) **Custer Co.:** Westcliffe, (Wickham 1902 in Selander 1960) **Delta Co.:** Hotchkiss, 3, (CSUC) **Dolores Co.:** Rico, (Wickham 1902 in Selander 1960) **El Paso Co.:** Black Forest, June 7, 1998, R. Gemmill, 1, (BGMC); Cascade, June 25, 1910, D.E. Lantz, 1, (CSUC); Green Mountain Falls, August, 1, (Selander 1960) **Garfield Co.:** hill above Tichner Draw, Roan Plateau, June 22, 1996, K.M. Potter, 1, (CSUC); Palmer Lake, June, 7, (Selander 1960); Summra, 1973, T. Torner, 1, (CSUC) **Gilpin Co.:** Central City, June 7, 1994, C. Slater, 2, (CSUC); Lump Gulch, July 4, 1957, H.G. Rodeck, 2, (UCMC) **Grand Co.:** Grand Lake, August, 4, (Selander 1960); Grand Lake, on flowers, July 5, 1992, R. Gemmill, 1, (BGPC) **Gunnison Co.:** 4 miles north of Highway 50 on Road 42B, June 6, 2003, J. Schmidt, 1, (CSUC); Gunnison, June, 2, (Selander 1960); Kebler Pass, Lost Lake, July 1, 1990, J. Welch, 2, (CSUC); Ohio, July, 2, (Selander 1960); Ragged Mountain, June, 1, (Selander 1960); Sheep Lake, June, 1, (Selander 1960) **Huerfano Co.:** La Veta Pass, 1, (Selander 1960) **Jackson Co.:** North Park, June, (Selander 1960) **Jefferson Co.:** county label only, July 1, 1911, D.E. Lantz, 1, (CSUC); same locality but, July 7, 1992, C. Pague, 1, (CSUC) **Kit Carson Co.:** Little Beaver,

(Wickham 1902 in Selander 1960) **Lake Co.:** Leadville, 18 miles north, June, 3, (Selander 1960) **Larimer Co.:** Ben Delatour Scout Ranch, June 23, 1990, B. Kondratieff, 10, (CSUC); Estes Park, July, 1, (Selander 1960); Fort Collins, (Wickham 1902 in Selander 1960); Glacier View, Mead, June 10, 1987, H.E. and M.A. Evans, 2, (CSUC); Glendevey, July 9, 1932, C.R. Jones, 1, (CSUC); Livermore, July 15, 1984, J. Capinera, 8, (CSUC); Rocky Mountain National Park, Fall River Entrance, June, 4, (Selander 1960); Sportsman's Lodge, July 11, 1970, D. Munger, 2, (CSUC); Trails End, June 27, 1932, C.A. Blurman, 1, (CSUC) **Mesa Co.:** 25 Mesa, June 7, 2000, M. Garhart, 3, (MGPC); Grand Mesa National Forest, south of Glade Park, June 24, 1990, J. Welch, 11, (CSUC) **Mineral Co.:** Creede, August, 34, (Selander 1960); 10 miles southwest of Creede, July, 1, (Selander 1960) **Montrose Co.:** southwest of Montrose, (Wickham 1902 in Selander 1960) **Ouray Co.:** Ouray, (Wickham 1902 in Selander 1960) **Park Co.:** 1.6 miles west of Agate Creek, 4.5 miles southeast of Highway 24, July 10, 2001, M.B. Wunder, 1, (CSUC); Fairplay, June 29, 1938, V.F. Lotrich, 6, (DMNS); High Creek Fen Preserve 9 miles south of Fairplay, July 2, 1995, R. Durfee, 1, (CSUC); Jefferson, July, 5, (Selander 1960); Pike National Forest, 11 Mile Canyon, June 4, 1992, 1, (CSUC) **Routt Co.:** Steamboat Springs, Yampa River, sweeping grasses, July 3, 2000, R. Gemmill, 1, (BGPC) **Saguache Co.:** South Cavnero Creek, La Garita, June 12, 1988, J. Welch, 1, (CSUC) **Teller Co.:** Florissant, August 4, 1987, B. Kondratieff, 1, (CSUC); Woodland Park, June 28, 1992, B.A. Drummond, 5, (DMNS) **Weld Co.:** 24 miles northeast Pawnee National Grasslands, May 24, 1988, T. Ebert, 3, (CSUC); 5 miles east Nunn, May 19, 1987, B. Kondratieff, 1, (CSUC); 8 km north of Nunn, May 26, 1976, 3, (CSUC); County Road 49, south of County Road 124, May 20, 1994, D. Leatherman, 1, (CSUC); Pawnee

National Grasslands, Central Plains Experiment Range, near Nunn, June 1, 1988, 1,
(CSUC).

***Lytta vulnerata* (LeConte)**

(Figs. 49, 133, 204)

Diagnosis: Head and pronotum orange, remainder of body including elytra black. Elytra coarsely reticulate. Pronotum with sides strongly angulate (Fig. 133).

Comments: This species has not been recorded in Colorado; however, records from eastern Utah suggest that it may occur along the western borders of the state. One such record collected on June 1, from Watson, Uintah County, Utah is only 13 km from the Colorado, Moffat County border (Selander 1960). Additionally, Knowlton and Taylor (1952) cite a record for this species from Manila, Daggett County, Utah, a locality approximately 56 km to the Colorado, Moffat County border (Fig. 204).

Distribution: Canada: southern British Columbia. Mexico: Baja California Norte. United States: throughout the western states from Washington south to southern California, east to Idaho. Colorado distribution: If occurring in the state, distribution would likely be restricted to the extreme western portion of the state.

Colorado Records: None.

Genus *Megetra* LeConte

Megetra is a small genus with only three North American species recognized and distributed throughout the southwestern United States and north-central Mexico (Selander 1965). Adults are easily recognized given that they are relatively large and brightly colored with red or orange-yellow markings. Additionally, the combination of abbreviated and reticulate elytra, lack of hind wings, and toothed tarsal claws aid in separation from all other North American genera.

Adults are active in late summer. They prefer sandy areas with sparse vegetative cover and feed on the leaves of many desert plants in the family Solanaceae and Amaranthaceae. Little information is presently available for the feeding habits of the larvae (Selander 1965).

Megetra vittata (LeConte)

(Figs. 58, 88, 205)

Diagnosis: Body and elytra black, marked with red to orange-yellow on vertex of head, elytra, and inter-segmental membranes of abdomen. Elytra finely reticulate and with orange-yellow marked reticulations in a well defined line on outer margin of the elytra (Fig. 88) (Selander 1965, Werner et al 1966). Wings absent and tarsal claws toothed.

Comments: *Megetra vittata* is the only species in this genus recorded from Colorado. It seems to prefer elevations between 1,524 and 2,134 m in the northern part of its range (Selander 1965).

Distribution: United States: throughout the northern half of Arizona east to southern Colorado and western Texas. Colorado distribution: extreme southwest La Plata County (Fig. 205).

Colorado Records: La Plata Co.: Ignacio, 1, (Selander 1965).

Genus *Meloe* Linnaeus

The genus *Meloe* is distinguished from other North American genera by the abbreviated imbricate elytra, lack of hind wings, sparse pubescence, and the uniquely modified antennae of the males of most species. Most *Meloe* are all black in body coloration but may have a dark metallic green, blue or violet luster

Adults are most common in early April through mid-June. Most species of Colorado *Meloe* overwinter as adults, except *M. laevis*, which overwinter as coarctate larvae. Adults eat a wide variety of herbaceous and woody plants, and grasses with some species non-feeding in the adult stage. Larvae feed on the nest provisions and larvae of bees. They locate bee nests by waiting on flower tops and attach themselves to visiting bees and ride them back to the nest (Pinto and Selander 1970). This genus is widely distributed throughout the United States. Due to the variability in the morphological characters used to separate species in this genus, the identification of several species may be difficult. Consulting the descriptions and diagnoses in Pinto and Selander (1970) is suggested to confirm identification.

Key to the species of adult Colorado *Meloe*

Modified from Pinto and Selander (1970)

1	Scutellum with posterior margin straight or slightly emarginate; males with antennal segments V-VII unmodified.....	2
1'	Scutellum with posterior margin produced; males with antennal segments V-VII modified and arranged semi-circularly	3
2 (1')	Head and pronotum shallowly, finely, and sparsely punctured (Fig. 138); males without modifications to antennal segments V-VII... <i>Meloe laevis</i> Leach (p. 129)	
2'	Head and pronotum densely coarsely punctate; male antennal segments V-VII somewhat compressed and widened	<i>Meloe afer</i> Bland (p. 122)
3 (1)	Scutellum with a conical projection extending well beyond posterior margin of pronotum (Fig. 139).....	<i>Meloe angusticollis</i> Say (p. 123)
3'	Scutellum not conically produced, may be angulate in <i>Meloe impressus</i>	4
4 (3)	Pronotum with sides protuberant at greatest width.....	
	.....<i>Meloe bitoricollis</i> Pinto and Selander (p. 124)	
4'	Pronotum with sides evenly rounded at greatest width	5
5 (4)	Antennae long and slender, males with segment V flared apically (Fig. 140); females with last abdominal segment notched.....	<i>Meloe impressus</i> Kirby (p. 127)
5'	Antennae more robust, males without segment V flared apically; females with last abdominal segment notched or not.....	6
6(5')	Males.....	7
6'	Females	12

7 (4')	Antennal segment V with a well-defined platform.....	8
7'	Antennal segment V without a well-defined platform.....	10
8 (7')	Antennal segment V robust, VI ¼ wider than long somewhat short, VIII short, as wide as long (Fig. 141).....	<i>Meloe dianella</i> Pinto and Selander (p. 125)
8'	Antennal segments V-VIII more elongate	9
9	Hind legs with tarsal pad absent on segments III and IV	
	.....	<i>Meloe carbonaceus</i> LeConte (p. 124)
9'	Hind legs with tarsal pad present on all segments	
	.....	<i>Meloe vandykei</i> Pinto and Selander (p. 132)
10 (7')	Larger species, length from head to apex of elytra 8-18mm. Punctures on head and pronotum small and moderately dense (Fig. 142).....	
	.....	<i>Meloe niger</i> Kirby (p. 130)
10'	Smaller species, length from head to apex of elytra 5-11mm. Punctures on head and pronotum large and dense (Figs. 143, 144).....	11
11 (10')	Pronotum strongly converging posteriorly	
	.....	<i>Meloe exiguus</i> Pinto and Selander (p. 126)
11'	Pronotum only feebly convergent posteriorly.....	
	.....	<i>Meloe occultus</i> Pinto and Selander (p. 131)
12 (6')	Head and pronotum with small to medium sized, moderately dense punctation; eyes small, not as wide as the length of antennal segment III	13
12'	Head and pronotum with large dense punctation; eyes may be smaller or larger than the length of antennal segment III.....	14

- 13 (12) Sixth abdominal sternite usually entire to feebly emarginate; segment IV of maxillary palpi equal to, or shorter than, segment II
..... *Meloe niger* Kirby (p. 130)
- 13' Sixth abdominal sternite feebly emarginate; segment IV of maxillary palpi longer than segment II*Meloe dianella* Pinto and Selander (p. 125)
- 14 (12') Small ranging from 5-11 mm from head to apex of elytra; punctures on head and pronotum confluent in part (Figs. 143, 144)15
- 14' Large ranging from 9-18 mm from head to apex of elytra; punctures on head and pronotum discrete16
- 15 (14) Pronotum with sides strongly converging posteriorly
..... *Meloe exiguus* Pinto and Selander (p. 126)
- 15' Pronotum with sides only feebly converging posteriorly
..... *Meloe occultus* Pinto and Selander (p. 131)
- 16 (14') Tarsal pads present on segment I of middle and II-IV of hind tarsi
..... *Meloe vandykei* Pinto and Selander (p. 132)
- 16' Tarsal pads absent on segment I of middle and all of hind tarsi
.....*Meloe carbonaceus* LeConte (p. 124)

***Meloe afer* Bland**

(Fig. 206)

Diagnosis: Pronotum narrow, posterior margin of scutellum not produced but straight or slightly sinuate. Males with antennal segments V-VII not modified into a semi-circular arrangement, but widened and laterally compressed. Punctures on head and pronotum coarse and moderately dense to dense; punctures and may be confluent in part (Pinto and Selander 1970).

Comments: *Meloe afer* and *M. laevis* are the only two species of *Meloe* in Colorado where the males do not have antennal segments V-VII in a semi-circular arrangement. These two species are easily separated by the punctation on the head and pronotum and shape of antennal segments V-VII. In *M. afer* the punctures on the head and pronotum are coarse and at least moderately dense and antennal segments V-VII are widened and laterally compressed where as, the punctures on the head and pronotum are fine and sparse and antennal segments V-VII are largely unmodified in *M. laevis*. Additionally, given the information presented in Pinto and Selander (1970) and specimen labels in the (CSUC), *M. afer* is an early spring species with all records occurring between March and May where as *M. laevis* is found throughout the year with the majority of records from mid to late June through late August.

Distribution: United States: Washington east to Montana south to Nevada and New Mexico (Pinto and Selander 1970). Colorado distribution: only recorded from the Front Range (Fig. 206).

Colorado Records: Boulder Co.: Boulder, 1, (Pinto and Selander 1970);
Marshall, 1, (Pinto and Selander 1970) **Larimer Co.:** Fort Collins, 2, (Pinto and
Selander 1970).

Meloe angusticollis Say

(Figs. 51, 139, 207)

Diagnosis: Punctures on head and pronotum coarse and moderately dense.
Scutellum produced with a conical projection extending beyond the posterior margin
(Fig. 139). Males with antennal segments V-VII modified and arranged semi-circularly.

Comments: This species represents a new state record for Colorado. Previously
it had been recorded from Laramie, Wyoming in Albany County by Pinto and Selander
(1970).

Distribution: Canada: from northern British Columbia east to southern Quebec.
United States: throughout much of the northern half of the United States from
Washington east to Maine, south to central California and northern Georgia. Colorado
distribution: collected along the Front Range and in extreme northwestern Colorado (Fig.
207).

Colorado Records: Larimer Co.: Viestenz-Smith Mountain Park, 11 miles
west of Loveland, May 22, 1996, Buckner, E. and P. Opler, 1, (CSUC) **Moffat Co.:**
Dinosaur National Monument, May 12, 1987, C. MacVean, 1, (CSUC).

***Meloe bitoricollis* Pinto and Selander**

(Fig. 208)

Diagnosis: Punctures on head and pronotum small and moderately dense to dense. Pronotum with sides, at point of greatest width, protuberant. Male antennal segments V-VII modified and in a semi-circular arrangement, segment V lacking a distinct platform (Pinto and Selander 1970).

Comments: To date, no records have been recorded from Colorado. However, collections of this species were examined from the University of Wyoming collection (ESUW) from 5 km east of Laramie, Albany County, Wyoming; a location approximately 40 km north of the Colorado border (Fig. 208) strongly suggesting that this species may be distributed in the state.

Distribution: United States: from southwestern Idaho south to north-central Utah east to Montana and southern Wyoming (Pinto and Selander 1970, Bomar 1993).
Colorado Distribution: if occurring in the state, most likely in the north-central Larimer and Weld counties.

Colorado Records: None.

***Meloe carbonaceus* LeConte**

(Fig. 209)

Diagnosis: Punctures on head and pronotum medium sized, coarse, dense, and may be partially confluent. The eyes are uniquely subpyriform. Males, with antennal

segments V-VII modified and in a semi-circular arrangement; segment V with a poorly defined platform. Segments III and IV of hind legs lacking tarsal pads. Females, with tarsal pads absent from segment I of middle and II-IV of hind tarsi (Pinto and Selander 1970).

Comments: A very rare species (personal communication, Pinto 2001) with most records of activity in early spring from March to May (Pinto and Selander 1970). Further separation of this species from the similar *M. vandykei* is discussed under the comments section for that species.

Distribution: Canada: southeastern Alberta. United States: from Washington south and east to Utah, Nebraska and Kansas (Pinto and Selander 1970). Colorado distribution: only two records exist for Colorado, one record from the Front Range and the other from southeastern Las Animas County (Fig. 209).

Colorado Records: **Denver Co.:** Denver, 3, (Pinto and Selander 1970) **Las Animas Co.:** Ogden, 1, (Pinto and Selander 1970) locality not found.

***Meloe dianella* Pinto and Selander**

(Figs. 52, 141)

Diagnosis: Head and pronotum with shallow, coarse, and moderately dense punctures. Males, with antennal segments V-VII in a semi-circular arrangement; segment V enlarged with a well-defined platform, VI wider than long, somewhat short and slender, and segment VIII appearing short, as wide as long (Fig. 141). Females, with sixth abdominal sternite weakly emarginate (Pinto and Selander 1970).

Comments: No records have been observed from Colorado. However, this species has recorded by Pinto and Selander (1970) from an unknown location between Laramie, Albany County, Wyoming and Cheyenne, Laramie County, Wyoming, this location should be between 40 and 16 km (depending on its position between these two cities) north of the Colorado border. Additionally, Pinto and Selander (1970) recorded this species from Logan County, Utah. These records suggest this species may have distribution within the state.

Distribution: Canada: British Columbia east to southern Nova Scotia. United States: widespread from Idaho east to Maine, south to Texas and Arkansas. Colorado distribution: suspected to occur in the northern half of the state.

Colorado Records: None.

***Meloe exiguus* Pinto and Selander**

(Figs. 53, 142, 210)

Diagnosis: A small species, less than 11 mm from head to apex of elytra. Punctures on head and pronotum coarse and moderately dense; may be partially confluent (Fig. 142). Sides of pronotum strongly converge posteriorly. Palpifer long, curved, and tapered towards base. Males, with antennal segment V lacking a well-defined platform (Pinto and Selander 1970).

Comments: *Meloe exiguus* is most likely to be confused with *M. occultus*. These two species vary primarily by the shape of the palpifer, pronotum, and body size. *Meloe exiguus* has a long curved palpifer that is tapered basally, the pronotum is strongly

convergent posteriorly, and out of 20 specimens measured averaged about 6.9 mm from the head to the tip of the elytra (Pinto and Selander 1970). In contrast, *M. occultus* has a short, straight palpifer that is not tapered basally, the pronotum is feebly convergent, and averages slightly larger; 9.9 mm long from head to tip of elytra out of 20 individuals measured (Pinto and Selander 1970).

Distribution: United States: from Washington east to South Dakota south to central Colorado. Colorado distribution: in the northern half of the state (Fig. 210).

Colorado Records: **Arapahoe Co.:** Cherry Creek Reservoir, March 23, 1993, R. Gemmill, 1, (BGPC) **Denver Co.:** Denver, 2, (Pinto and Selander 1970) **El Paso Co.:** Black Forest, Lakeview Drive, April 9, 2000, R. Gemmill, 1, (BGPC) **Larimer Co.:** Fort Collins, April 20, 1903, 1, (CSUC) **Moffat Co.:** 7 miles southwest, Elk Springs, 1, (Pinto and Selander 1970) **Weld Co.:** 0.5 miles north of Grover, April 14, 1990, B. Kondratieff, 3, (CSUC); Pawnee National Grasslands, Central Plains Experiment Range, near Nunn, April 17, 1971, 1, (CSUC).

Meloe impressus Kirby

(Figs. 54, 140, 211)

Diagnosis: Punctures on head and pronotum fine and sparse to moderately dense. Males, with antennal segments V-VII modified and in a semi-circular arrangement; segment V with a well-defined plat form and flared apically (Fig. 140). Females, with long, slender antennae and a distinct notch on the last abdominal segment (Pinto and Selander 1970).

Comments: This is one of the most common *Meloe* species occurring in Colorado. Pinto and Selander (1970) provide records of this species feeding on the crop plants rutabaga and potato.

Distribution: Canada: just below the Arctic Circle recorded from nearly every province except in the extreme east. United States: throughout most of the United States in Alaska and from Washington east to New Hampshire, south to Arizona and South Carolina (Pinto and Selander 1970). Colorado distribution: throughout the state, seeming to prefer higher elevations (Fig. 211).

Colorado Records: **Chaffee Co.:** Saguache Range, 1, (Pinto and Selander 1970); Salida, 2, (Pinto and Selander 1970) **Fremont Co.:** Florence, 1, (Van Dyke 1928 in Pinto and Selander 1970) **La Plata Co.:** Durango, Animas River, 2, (Pinto and Selander 1970); La Plata Canyon, 1, (Pinto and Selander 1970) **Larimer Co.:** Cameron Pass, September 4, 1935, 1, (CSUC); Estes Park, Big Thompson Canyon, 1, (Pinto and Selander 1970); Glendevy, October 7, 1973, H.E. and M.A. Evans, 1, (CSUC); Lower Cherokee Park, September 19, 1992, L. Bjostad, 2, (CSUC); Masonville, 1, (Pinto and Selander 1970); Pingree Park, August 18, 1932, 1, (CSUC); Redfeather Lakes, 1, (Pinto and Selander 1970) **Mesa Co.:** Mount Lincoln, 1, (Pinto and Selander 1970) **Mineral Co.:** Creede, 1, (Pinto and Selander 1970) **Park Co.:** South Park, (Van Dyke 1928 in Pinto and Selander 1970) **Pitkin Co.:** Aspen, 2, (Pinto and Selander 1970) **Saguache Co.:** Harry Creek, Marshall Pass, 1, (Pinto and Selander 1970) **San Miguel Co.:** San Miguel Mountains, Wilson Peak, 1, (Pinto and Selander 1970) **Summit Co.:** Breckenridge, 1, (Van Dyke 1928 in Pinto and Selander 1970) **Teller Co.:** Florissant, 2, (Pinto and Selander 1970).

***Meloe laevis* Leach**

(Figs. 55, 138, 212)

Diagnosis: Punctures on head and pronotum fine and sparse (Fig. 138).

Pronotum about as long as wide; posterior margin of scutellum straight or slightly sinuate, not produced. Males, with antennal segments V-VII not modified into a semi-circular arrangement. Antennae clavate, becoming progressively larger distally (Pinto and Selander 1970).

Comments: Pinto and Selander (1970) report adults of *M. laevis* labeled as feeding on potatoes. It is noted as one of the few species of *Meloe* that overwinter as a coarctate larvae.

Distribution: South of the United States: This species is known from Mexico south to Venezuela. United States: from Wyoming and Nebraska south to Arizona and Texas (Pinto and Selander 1970). Colorado distribution: along the Rocky Mountain range and east into parts of the Great Plains (Fig. 212).

Colorado Records: Adams Co.: Brighton, 1, (Pinto and Selander 1970)

Alamosa Co.: San Luis Valley, July 10, 1984, 3, (CSUC) **Boulder Co.:** Boulder, 2,

(Pinto and Selander 1970) **Cheyenne Co.:** Arapahoe, July 18, 1999, T. Adair, 2,

(CSUC); Cheyenne Wells, July 20, 2002, T. Burton, 1, (CSUC) **Conejos Co.:** Lobato, 1,

(Pinto and Selander 1970) **El Paso Co.:** Amo, 5, (Pinto and Selander 1970); Colorado

Springs, 28, (Pinto and Selander 1970); Meyers Road, August 23, 1990, D. Leatherman,

1, (CSUC) **Larimer Co.:** 7 miles west of Carr, April 1, 1951, T. Thatcher, 2, (CSUC);

Boyd Lake, 3 miles east of Loveland, July 28, 1997, E. Buckner, 1, (CSUC); Fort

Collins, 1, (Pinto and Selander 1970); Livermore, July 15, 1984, 1, J. Capinera, 1, (CSUC) **Pueblo Co.:** Fort Reynolds, 1, (Pinto and Selander 1970) **Rio Grande Co.:** county label only, July 17, 1932, 2, (CSUC) **Saguache Co.:** Center, August 1, 1984, 7, (CSUC) **Sedgwick Co.:** Julesburg, August 27, 1990, W. Cranshaw, 1, (CSUC) **Weld Co.:** Briggsdale, September 17, 2002, J. Stubiss, 1, (CSUC); Keenesburg, August 1, 1931, 3, (CSUC); Nunn, August 12, 1987, B. Kondratieff, 1, (CSUC).

***Meloe niger* Kirby**

(Figs. 56, 142, 213)

Diagnosis: Punctures on head and pronotum small, varying from moderately to densely punctate (Fig. 142). Males, with antennal segments V-VII modified and arranged semi-circularly; segment V with a poorly defined platform. Females, with robust antennae, small eyes, greatest width less than length of antennal segment III, and sixth abdominal sternite entire (Pinto and Selander 1970).

Comments: Pinto and Selander (1970) report specimens of this species labeled as feeding on asparagus and onions.

Distribution: Canada: southeastern British Columbia north to the southern portion of District of Mackenzie, south to Quebec. United States: widespread throughout the eastern states and again in the northwest, from Washington south to central California and southern Arizona, east to Wisconsin and Texas. Another population exists from Main south to New Jersey west to Pennsylvania (Pinto and Selander 1970, Mayer and

Johansen 1978). Colorado distribution: nearly statewide but there is a lack of records from the southeastern counties (Fig. 213).

Colorado Records: **Custer Co.:** county record only, 1, (Pinto and Selander 1970) **Denver Co.:** Cherry Creek State Park, April 8, 1977, D.A. and J.T. Polhemus, 1, (CSUC); Denver, 1, (Pinto and Selander 1970) **Jefferson Co.:** 3 mi off Waterton Road, Platte Canyon, April 6, 2008, Maiya Kondratieff, 1 (CSUC) **La Plata Co.:** Durango, 1, (Pinto and Selander 1970) **Larimer Co.:** Grey Rock, March 29, 1992, W. Cranshaw, 1, (CSUC) **Moffat Co.:** Dinosaur National Monument, May 10, 1987, C. MacVean, 2, (CSUC); Harpers Corn Road, Dinosaur National Monument, June 8, 1978, G. Wolfe, 2, (CSUC) **Park Co.:** Pike National Forest, Carpenter Peak, April 11, 1993; R. Gemmill, 1, (BGPC) **Saguache Co.:** Highway 114, Cochetopa Canyon, June 6, 2003, J. Schmidt, 2, (CSUC).

***Meloe occultus* Pinto and Selander**

(Figs. 57, 144, 214)

Diagnosis: A small species; less than 11 mm from head to apex of elytra.

Punctures on head and pronotum coarse, dense, and may be partially confluent (Fig. 144). Sides of pronotum feebly converge posteriorly. Palpifer short and straight. Males with antennal segment V lacking a well-defined platform and in a semi-circular arrangement.

Comments: *Meloe occultus* may be confused with *M. exiguus*. For separation of these two species see comments under *M. exiguus*.

Distribution: Canada: southern British Columbia. United States: throughout the western states from Washington south to southern California east to Montana and southern Colorado. Colorado distribution: only two records from Colorado are known; both were collected along the Front Range (Fig. 214).

Colorado Records: **Larimer Co.:** Fort Collins, April 1, 1900, 1, (CSUC) **Las Animas Co.:** Ogden, 1, (Pinto and Selander 1970) locality not found.

***Meloe vandykei* Pinto and Selander**

(Fig. 215)

Diagnosis: Punctures on head and pronotum large, coarse, and dense. Eyes large, their greatest width usually wider than length of antennal segment III. Males, with antennal segments V-VII in a semi-circular arrangement, antennal segment V with a distinct platform, and hind tarsal pads present on all segments. Females, with robust antennae and tarsal pads present on segment I of middle and II-IV of hind tarsi (Pinto and Selander 1970).

Comments: This species may be confused with *M. carbonaceus*. However, *M. vandykei* may be separated from *M. carbonaceus* by the presence of tarsal pads on all segments of the hind tarsi in the males and tarsal segments II-IV in females. Male *Meloe carbonaceus* lack tarsal pads on segments III-IV of the hind tarsi and females lack pads on segment I of middle and all hind tarsi (Pinto and Selander 1970).

Distribution: Canada: southern British Columbia. United States: throughout the West from Washington south to southern California, east to Montana and Colorado.

Colorado distribution: along the Front Range west to the Utah border (Fig. 215).

Colorado Records: **Boulder Co.:** Boulder, 1, (Pinto and Selander 1970) **Jefferson Co.:** Red Rocks Park, 3, (Pinto and Selander 1970) **La Plata Co.:** Durango, 3, (Pinto and Selander 1970) **Moffat Co.:** Maybell, Douglas Mountain, 1, (Pinto and Selander 1970).

Genus *Nemognatha* Illiger

Nemognatha is a geographically widespread genus separated from other North American genera by their pectinate tarsal claws, robust bodies, long, highly modified galeae, and emarginate eyes. Additionally, the elytra are rugose or punctulate to varying degrees but, the punctures are never coarse. Males usually have abdominal sterna 2 to 5 variously modified with ovate patches of dense pubescence, densely punctate trapezoidal areas on sternites IV and V, or a medial excavation lined with pubescence. The aedeagus lacks a pair of large, sclerotized lobes; (Dillon 1952, Werner *et al.* 1966, Pinto and Bologna 1999). Species in this group are often difficult to separate and the generic limits are poorly understood.

Adults have been found to feed on the pollen from plants in the genera *Geraea*, *Helianthus*, *Encelia*, *Croton*, and *Atriplex*. Larvae feed on the nest provisions and larvae of bees (Werner *et al.* 1966).

Key to the species of adult Colorado *Nemognatha*

Modified in part from Enns (1956) and Werner *et al.* (1966)

- 1 Hind tibial spurs similar in shape and size (Fig. 145); abdominal sternites, IV and V sometimes III-IV, of males unmodified, with a medial excavation lined with long pubescence (Fig. 93), or with ovate patches of dense pubescence (Fig. 92)2
- 1' Hind tibial spurs dissimilar, outer spur usually wider than inner and may be flared apically (Figs. 94, 95); males with a densely punctate trapezoidal area on abdominal sternites IV-V8
- 2 (1) Hind tibial spurs somewhat flattened, concave; males with a deep medial excavation lined with long pubescence on abdominal sternites IV and V (Fig. 93) *Nemognatha piazzata bicolor* LeConte (p. 146)
- 2' Hind tibial spurs spatulate or slender and acute; males without a densely punctate trapezoidal area on abdominal sternites IV-V3
- 3 (2') Hind tibial spurs spatulate; males with unmodified abdominal sterna4
- 3' Hind tibial spurs slender; males with ovate tufts of pubescence on abdominal sternites (Fig. 92)5
- 4 (3) Head black; galeae short, slightly longer than maxillary palpi.....
.....*Nemognatha selanderi* Enns (p. 148)
- 4' Head reddish brown; galeae longer, greater than three times the length of the maxillary palpi*Nemognatha sparsa* LeConte (p. 149)
- 5 (3') Entire venter, scutellum, and margins of elytra black

-*Nemognatha scutellaris* LeConte (p. 148)
- 5' Venter at least partly pale, scutellum may be black or not, elytra not margined with black but may be vittate or with an apical black spot6
- 6 (5') Mandibles short, head appearing rounded (Fig. 146); hind tibial very slender, spurs spiniform with apices acute, elytra may be entirely black to reddish brown
.....*Nemognatha nigripennis* LeConte (p. 145)
- 6' Mandibles longer, head appearing triangular; hind tibial spurs flattened, wide, apices rounded or flat; elytra reddish brown with median vittae or an apical black spot7
- 7 (6') Antennal segment II half the length of III, III usually shorter than IV; if occurring in Colorado than in the northeastern plains
.....*Nemognatha nebrascensis* Enns (p. 144)
- 7' Antennal segment II much less than half the length of III, usually 1/3 length of III, segment III longer than IV; widespread throughout Colorado
.....*Nemognatha cribraria* LeConte (p. 136)
- 8 (1') Outer hind tibial spur much wider (2 to 3 times larger) than inner spur, flared at apex (Fig. 95).....*Nemognatha lurida* LeConte (p. 138)
- 8' Outer hind tibial spur only slightly wider than inner spur, may be feebly flared at apex (Fig. 94).....*Nemognatha lutea* LeConte (p. 141)

Nemognatha cribraria LeConte

(Fig. 59, 216)

Diagnosis: Head varying from orange-brown to less commonly all black; pronotum orange-brown. Body predominately black to brown ventrally except two or more segments of the abdomen orange-brown. Elytra ranging from orange-brown to yellow-brown with two crescent shaped black apical spots. Antennal segment II much less than half the length of III, usually 1/3 length of III; segment III longer than IV. Galeae short, usually just attaining hind coxae. Hind tibial similar in shape and length. Spurs slender, triangular, and slightly rounded at apex; inner spur slightly flattened; outer spur more cylindrical (Enns 1956). Males, with abdominal segments IV and V having shallow, densely punctate, ovate depressions lined with tufts of elongate setae; sometimes with a small tuft of setae present on segment III.

Comments: This species has two recognized subspecies *N. c. cribraria* and *N. c. fuscula* Enns; however, only *N. c. cribraria* is known from Colorado. These two subspecies are geographically distinct in the United States as discussed below. In addition, they differ morphologically in head coloration and maculation and punctuation on the elytra. *Nemognatha c. cribraria* tends to have the head orange-brown and the elytra with sparse, shallow, punctures basally becoming denser apically marked with two apical spots of varying length. *Nemognatha c. fuscula* has an all black head and densely punctured basally, broadly vittate elytra (Enns 1956).

Distribution: United States: *Nemognatha c. cribraria* is distributed in the western United States from Oregon south to central California, east to Kansas,

Oklahoma, and southern New Mexico. *N. c. fuscula* occurs in the northeastern states from Minnesota east to Rhode Island south and east to North Carolina (Enns 1956).

Colorado distribution: *N. c. cribraria* records in Kansas indicates that this species may be statewide in distribution; however, all available records are from central Colorado west to the Utah border with one isolated record in the southeastern corner of the state (Fig. 216).

Colorado Records: **Alamosa Co.:** Medano Ranch, Elk Wetlands, August 12, 1998, Nosaka, T.M. and P.M. Pineda, 1, (CSUC); Zapata Ranch, August 12, 1998, Nosaka, T.M. and P.M. Pineda, 2, (CSUC) **Conejos Co.:** Antonito, August 5, 1899, 1, (CSUC) **Costilla Co.:** Fort Garland; Ute Creek, (Enns 1956) **Denver Co.:** Denver, (Enns 1956) **Grand Co.:** Sage Flats, (Enns 1956) **La Plata Co.:** Durango, August 3, 1900, 1, (CSUC) **Mesa Co.:** Highland View Overlook, Colorado National Monument, August 10, 1989, M.J. Weissman, 1, (CSUC) **Moffat Co.:** Chew Ranch, Dinosaur National Monument, August 23, 1990, Darrow, K and M.J. Weissman, 3, (CSUC); Deer Lodge Park, Dinosaur National Monument, August 24, 1990, M.J. Weissman, 2, (CSUC); Echo Park, Dinosaur National Monument, August 18, 1993, Fitzgerald, S., Kondratieff, B., and R. Durfee, 2, (CSUC); Pool Creek, Dinosaur National Monument, August 23, 1990, Harris, M., Kippenhan, M., and B. Kondratieff, 6, (CSUC) **Montezuma Co.:** Dolores, August 2, 1900, 1, (CSUC); Soda Canyon, Mesa Verde National Monument, August 6, 1999, Wells, S., Kondratieff, B., Painter, W., and W. Cranshaw, 4, (CSUC) **Otero Co.:** Vogel Canyon, June 3, 2007, W. Cranshaw, 2, (CSUC) **Saguache Co.:** Great Sand Dunes National Monument, (Enns 1956); Indian Springs Natural Area, near Great Sand Dunes National Monument, August 10, 1999, Nosaka, T.M. and P.M.

Pineda, 5, (CSUC); Mineral Hot Springs, August 3, 1933, James, M. and U. Lanham, 1, (CSUC).

***Nemognatha lurida* LeConte**

(Figs. 60, 95, 217)

Diagnosis: Color variable. Elytra ranging from all black, vittate, with an apical spot, or entirely pale reddish-brown to yellow-brown. The most common color form in Colorado is with entire body pale reddish-brown except tarsi, sensory appendages, and sometimes scutellum black. Punctures on elytral distinct and dense. Galeae long, reaching just beyond hind coxae (Werner *et al.* 1966). Outer hind tibial spur greatly widened and flared apically, concave, scoop like, and usually about three times wider than inner spur (Fig. 95). Males with a densely punctate, trapezoidal, pubescent area on abdominal sterna IV and V (Enns 1956).

Comments: The two currently recognized subspecies, *N. l. apicalis* LeConte and *N. l. lurida* are both recorded from Colorado and broadly overlap across much of the western slope of the state. Separation can be accomplished by examination of the punctation, shape of the pronotum, and coloration of the pubescence. *Nemognatha l. lurida* is recognized by a densely punctate pronotum with the anterior angles somewhat abrupt with the pubescence pale to black. In contrast, *N. l. apicalis* has a less densely punctate pronotum with the anterior angles more evenly rounded and the pubescence is never pale in coloration (Enns 1956).

Intergrades are the most commonly encountered form of this species from along the eastern edge of the Rocky Mountains west to Utah, with most individuals appearing closest to *N. l. apicalis*. Throughout most of the eastern plains the specimens examined could be placed as *N. l. lurida*. Pending a revision, *N. l. apicalis* may not be a valid recognized form. Herein, records for both forms are listed under *N. l. lurida*.

The body coloration of this species is variable. Extremely dark forms are characterized as having entirely black body coloration except the head and pronotum red-brown. This melanistic form was uncommon in Colorado with the only representatives examined occurring in southwestern Archuleta County. This species is most commonly found feeding on *Helianthus* sp. (sunflower). See also comments under *N. lutea* for further separation of these two similar species.

Distribution: Mexico: Sonora east to Coahuila, south to Durango and Zacatecas (Vaurie 1950). United States: widespread throughout the central and western United States from Washington east to eastern Missouri, south to southern California and Louisiana. *Nemognatha l. apicalis* is distributed from the Rocky Mountains and northern Arizona west to the Pacific Coast. *Nemognatha l. lutea* ranges from Montana south to Arizona east to Wisconsin and Texas (Enns 1956, Werner *et al.* 1966). Colorado distribution: statewide (Fig. 217).

Nemognatha lurida lurida

Colorado Records: **Archuleta Co.:** Navajo Reservoir, County Road 500, August 26, 1992, Painter, W., Leatherman, D., and B. Kondratieff, 1, (CSUC); Route 500, 3 miles east of Route 151, July 24, 1993, Kippenhan, M., Kondratieff, B., Leatherman, D., and S. Fitzgerald, 3, (CSUC) **Baca Co.:** Picture Canyon, August 25,

2001, Schmidt, J. and S. Anderson, 4, (CSUC) **Bent Co.:** John Martin Reservoir, sand dunes, July 14, 1992, 1, (CSUC); Road 26 at Road DD, pasture, July 15, 1992, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 1, (CSUC); Road CC, southwest of Caddoa, August 17, 1995, Cranshaw, W., Leatherman, D., and B. Kondratieff, 5, (CSUC) **Boulder Co.:** Boulder, (Enns 1956) **Delta Co.:** Delta, July 20, 1898, 2, (CSUC); Lamborn Mesa, August 9, 1998, B. Kirk, 1, (CSUC) **Jefferson Co.:** Golden, (Enns 1956) **La Plata Co.:** Durango, (Enns 1956) **Larimer Co.:** Fort Collins, July 23, 1934, 1, (CSUC) **Las Animas Co.:** Bent Canyon, Purgatoire River, July 2, 1989, Cranshaw, W., Leatherman, D. and B. Kondratieff, 1, (CSUC) **Lincoln Co.:** Horse Creek, Service Road 71, July 17, 2001, Kondratieff, B. and J. Schmidt, 1, (CSUC) **Mesa Co.:** Grand Junction, (Enns 1956); Highway 141, Unaweep Canyon, June 23, 2004, M. Garhart, 1, (CSUC); Orchard Mesa, August 28, 1993, B. Kondratieff, 1, (CSUC) **Otero Co.:** Cheraw, June 11, 1993, D. Leatherman, 1, (CSUC); Route 109, mile marker 42, August 11, 1990, Rhoades, C., Kondratieff, B., DeJong, G., and D. Leatherman, 1, (CSUC); Corrizo Creek Picnic Area, July 15, 1992, H. E. Evans, 2, (CSUC) **Prowers Co.:** sand dunes south of fairgrounds Highway 287/385, Lamar, July 21, 1991, Cranshaw, W., Kippenhan, M., Kondratieff, B., Leatherman, D., and P. Opler, 1, (CSUC) **Sedgwick Co.:** county label only, August 21, 1937, 1, (CSUC) **Weld Co.:** Deerfield, July 25, 1983, D. Liewehr, 1, (CSUC); near Nunn, July 23, 1988, B. Kondratieff, 1, (CSUC); Pawnee National Grassland, July 13, 1988, J. Welch, 1, (CSUC); same locality but, July 23, 1984, J. Capinera, 1, (CSUC) **Yuma Co.:** Kirk, July 20, 1987, B. Kondratieff, 1, (CSUC); Wigwam, August 6, 1933, James, M. and U. Lanham, 1, (CSUC).

Nemognatha lutea LeConte

(Figs. 61, 94, 218)

Diagnosis: Dorsum of beetle, except scutellum and sensory appendages, light yellow-brown in coloration. Elytra rugose punctate, sometimes marked with a dark apical spot. Ventral side varying in color from completely dark brown or black to; last two abdominal sterna to entire abdomen, predominately yellow-brown (Enns 1956, Werner *et al.* 1966). Galeae attaining apex of abdomen. Outer hind tibial spur only slightly wider than inner spur, concave, scoop like, and may be flared apically or not (Fig. 94). Males with a trapezoidal, densely punctate, and pubescent area on abdominal sterna IV and V (Enns 1956).

Comments: This species most closely resembles the pale form of *N. lurida* (Enns 1956, Werner *et al.* 1966). It may be separated from *N. lurida* by its more slender outer hind tibial spur, longer galeae, and shorter, dark to light colored, less erect and dense setae. *Nemognatha lurida* with outer hind tibial spur usually two to three times wider than the inner spur, galeae not attaining apex of abdomen, and setae dark, somewhat dense, and erect.

Two of three subspecies recognized for *N. lutea* occur in Colorado, *N. l. lutea* and *N. l. dichora* LeConte. The shape of the hind tibial spurs can separate these two subspecies. The outer hind tibial spur is flared apically and the inner spur is somewhat flattened with the apex more rounded in *N. l. lutea* where as, the outer spur is not flared apically and the inner spur is more slender with the apices acute in *N. l. dichroa*.

Additionally, the mouthparts and clypeus are usually reddish brown in *N. l. lutea* versus black in *N. l. dichroa* (Enns 1956).

Enns (1956) examined Colorado material and indicated that the area of overlap between these two subspecies generally occurs near Pueblo and El Paso County extending north through Larimer and Jackson counties. Additionally, he noted that *N. l. dichroa* seems to prefer higher elevations.

Distribution: Canada: southwestern provinces of British Columbia and Alberta. Mexico: Sonora and Chihuahua (Vaurie 1950). United States: Washington south to southern California, east to North Dakota and southern Texas. *Nemognatha l. lutea* is distributed from Alberta south to western Arizona east to North Dakota and Texas. *Nemognatha l. dichroa* LeConte is distributed throughout the northwestern portion of the species range from British Columbia south to central California west to Colorado overlapping with *N. l. lutea* in Montana and eastern Idaho, western Wyoming, northern Utah, and north-central Colorado. The third subspecies *N. l. dubia* LeConte is distributed from southern Washington to southern California overlapping with *N. l. dichroa* throughout most of its range except southern California (Enns 1956). Colorado distribution: this species is distributed statewide (Fig. 218).

***Nemognatha lutea lutea* LeConte**

Colorado Records: **Alamosa Co.:** Great Sand Dunes National Monument, July 7, 1976, D. Gwynne, 2, (CSUC) **Baca Co.:** Picture Canyon, May 30, 2002, J. Schmidt, 14, (CSUC) **Costilla Co.:** county label only, July 19, 1932, 4, (CSUC) **El Paso Co.:** I-25 and Baorist Road, June 29, 1990, M. Kippenhan, 1, (CSUC) **Garfield Co.:** Glenwood Canyon, June 15, 2000, D. Leatherman, 1, (CSUC) **Gunnison Co.:** Elk Creek, 8,000

feet, August 5, 1997, E. Ellingson, 1, (CSUC) **Huerfano Co.:** 3 miles west of Walsenburg, July 25, 1974, H.E. Evans, 1, (CSUC) **Jackson Co.:** East Sand Hills, July 25, 1995, P. Pineda, 1, (CSUC) **Kiowa Co.:** 8.5 miles north of Eads, July 1, 1990, B. Kondratieff, 1, (CSUC) **La Plata Co.:** Twin Crossing, Highway 550, June 6, 2003, Schmidt, J. and B. Kondratieff, 10, (CSUC) **Larimer Co.:** Glacier View, Mead, 7, 000 feet, June 22, 1985, H.E. and M.A. Evans, 1; Fort Collins, July 7, 1900, 1; Rocky Mountain National Park, Horseshoe Peak, June 1, 1986, 1, (CSUC) **Lincoln Co.:** mile marker 86, Highway 71, south of Limon, July 3, 2004, J. Owens, 1; Road 41, 2 miles south of Road 29, June 18, 1997, D. Leatherman, 1, (CSUC) **Mesa Co.:** Highway 141, Unaweep Canyon, June 23, 2004, M. Garhart, 1; 2 miles northeast Gateway, June 24, 1977, H.E. Evans, 1, (CSUC) **Mineral Co.:** Creede, July 4, 1977, J.T. Polhemus, 1, (CSUC) **Moffat Co.:** Craig, July 11, 1986, B. Kondratieff, 1, (CSUC) **Montezuma Co.:** Mesa Verde National Park, Weatherill Mesa Road, June 28, 1999, Kondratieff, B. and D. Leatherman, 1, (CSUC) **Montrose Co.:** Cerro Summit, south of summit on Road P77, July 2, 1991, D. Leatherman, 2; Highway 50, 1 mile west of Cimarron, June 22, 2004, M. Garhart, 2, (CSUC) **Prowers Co.:** Highway 287 at Gobblers Knob, mile marker 55-56, July 10, 1992, D. Leatherman, 2, (CSUC) **Pueblo Co.:** southwest of Lake Pueblo State Park, June 15, 2001, C. Harp, 1, (CSUC) **Saguache Co.:** Cochetopa Creek, July 4, 1990, J.L. Welch, 1, (CSUC) **Weld Co.:** Sand Dunes, north of Roggen, May 17, 1992, B. Kondratieff, 1; Windsor, July 3, 1984, D.J. Liewehr, 1; 8 miles north of Nunn, June 9, 1976, 2, (CSUC) **Yuma Co.:** Arikaree River Sand Hills, June 5, 1999, P. Pineda, 1, (CSUC).

Nemognatha lutea dichora LeConte

Pueblo Co.: Pueblo, (Enns 1956).

***Nemognatha nebrascensis* Enns**

Diagnosis: Coloration similar to *N. cribraria* except elytra varying from completely yellow-brown, to having a discal vittae, to solid black (Enns 1956). Antennal segment II longer than *N. cribraria*, II half the length of III, III usually shorter than IV. Hind tibial spurs equal, somewhat widened, concave, triangular, and slightly rounded at apex (Enns 1956). Males with abdominal segments IV and V with shallow, densely punctate, ovate depressions lined with tufts of elongate setae.

Comments: This species has not been collected in Colorado. However, given the paratype locality of Imperial, Chase County, Nebraska, located approximately 35.5 km east of the Phillips County, Colorado, it seems likely that this species occurs in the state.

Distribution: United States: only known from Nebraska and Kansas. Colorado distribution: if occurring in the state the most probable distribution is in the extreme northeastern portion of the state near the Kansas or Nebraska border.

Colorado Records: None

Nemognatha nigripennis LeConte

(Figs. 62, 92, 145, 219)

Diagnosis: Head, pronotum, and abdomen orange-brown. Elytra varying from orange-brown to completely black. Mandibles short, giving head a rounded appearance (Fig. 145). Hind tibial spurs very slender; spurs spiniform with apices acute. (Enns 1956). Males with abdominal segments IV and V with shallow, densely punctate, ovate depressions lined with tufts of elongate setae (Fig. 92).

Comments: A very common species known to feed on a wide variety of plant hosts (Enns 1956).

Distribution: Mexico: Baja California (Enns 1956). United States: Oregon south to southern California southeast to southeastern Colorado and southwest Texas (Enns 1956). Colorado distribution: the eastern slope of the Rocky Mountains and southern Colorado, with records lacking from northeastern Colorado (Fig. 219).

Colorado Records: **Baca Co.:** Picture Canyon, May 30, 2002, Anderson, S. and J. Schmidt, 1, (CSUC); Regnier, (Enns 1956) **Boulder Co.:** Gregory Canyon, August 2, 1916, L.O. Jackson, 1, (CSUC) **El Paso Co.:** Colorado Springs, (Enns 1956) **Larimer Co.:** Fort Collins, July 1, 1983, D. Liewehr, 1, (CSUC); Glacier View, Mead, May 17, 1996, H.E. Evans, 1, (CSUC); Hewlett Gulch, July 24, 1988, Bergey and B. Kondratieff, 2, (CSUC); Phantom Canyon, July 20, 1993, S. Fitzgerald, 1, (CSUC) **Las Animas Co.:** Spool Ranch, Gotera Canyon, May 29, 1994, Kingery, K., Ellingson, A., Simonson, S., and P. Opler, 1, (CSUC); Spool Ranch, Upper Cobert Canyon, May 28, 1994, P.A. Opler, 1, (CSUC) **Lincoln Co.:** Westlake, July 7, 1900, 1, (CSUC) **Mesa Co.:** Liberty Cap

Trail, Colorado National Monument, May 27, 1988, B. Kondratieff, 2, (CSUC); Rough Canyon, June 9, 2004, M. Garhart, 1, (CSUC) **Moffat Co.:** Dinosaur National Monument, July 14, 1990, J. Welch, 1, (CSUC) **Montezuma Co.:** Morefield Canyon. Mile 2, Mesa Verde National Monument, August 6, 1999, Kondratieff, B., Wells, S., Cranshaw, W., and W. Painter, 3, (CSUC); Soda Canyon, Mesa Verde National Monument, June 29, 1999, Kondratieff, B. and D. Leatherman, 3, (CSUC) **Otero Co.:** Route 109, mile marker 42, August 11, 1990, DeJong, G., Kondratieff, B., Leatherman, D., and C. Rhoades, 1, (CSUC) **Park Co.:** Pike National Forest, Rampart Range, Indian Creek Campground, Highway 67, July 12, 2002, C. Harp, 1, (CSUC).

Nemognatha piazata bicolor LeConte

(Figs. 63, 64, 93, 220)

Diagnosis: Head and pronotum orange-brown. Elytra varying from slightly lighter in color from head and pronotum, to vittate or entirely black; all variations between color forms exist. Venter usually entirely black but varies to orange-brown in some specimens. Punctures on elytra dense and fine. Hind tibial spurs similar in shape, widened, and somewhat concave. Males of this species are unique in having abdominal segments IV and V medially excavated and lined with elongate erect setae (Fig. 93) (Enns 1956, Werner *et al.* 1966).

Comments: Three North American subspecies are recognized for this species; *N. p. bicolor*, *N. p. palliata* LeConte, and *N. p. piazata* (Fabricius), however, only *N. p. bicolor* occurs in Colorado (Enns 1956). Most specimens examined from Colorado are

towards the dark extreme for this subspecies and varied from completely black ventrally with black elytra (Fig. 63) to black ventrally and heavily vittae dorsally (Fig. 64). No lightly marked or immaculate specimens were examined from Colorado.

Distribution: Canada: southern Alberta. United States: *N. p. bicolor* ranges from Idaho east to Iowa south to Arizona and eastern Texas; *N. p. palliata* is recorded from southern Minnesota south to southern Missouri; *N. p. piazzata* occurs throughout the southeast from West Virginia south to southern Florida west to Mississippi (Enns 1956, Werner *et al.* 1966). Colorado distribution: distributed widely throughout the state (Fig. 220).

Colorado Records: **Bent Co.:** east of Road CC and Road 23.5, July 2, 1990, H.E. Evans, Fitzgerald, S., Kondratieff, B., and D. Leatherman, 1, (CSUC); County Road 37 off Route 50, rest stop, June 30, 1991, DeJong, G. and B. Kondratieff, 1, (CSUC); Road 26, along Caddoa Creek, July 7, 2004, Schmidt, J.P. and J. Owens, 3, (CSUC) **Kiowa Co.:** 8.5 miles north of Eads, July 1, 1990, Kondratieff, B., Kippenhan, M., and H.E. Evans, 1, (CSUC) **Larimer Co.:** Fort Collins, July 7, 1940, E.S. Sylvester, 1, (CSUC); Glacier View, Mead, June 22, 1985, H.E. and M.A. Evans, 1, (CSUC); Norfolk, roads 5 and 29, 17 miles north Wellington, July 15, 2001, P.A. Opler, 1, (CSUC) **Montezuma Co.:** Yucca House National Monument, July 5, 2001, Schmidt, J., Anderson, S., Kondratieff, B., and M. Weissmann, 5, (CSUC) **Otero Co.:** Horse Creek Reservoir State Wildlife Area, July 9, 1996, W. Cranshaw, 1, (CSUC); Rocky Ford, July 8, 1899, 2, (CSUC) **Weld Co.:** Nunn, Pawnee Grassland, pasture 23E, July 9, 1971, 2, (CSUC); Pawnee National Grassland, July 8, 2003, K. Hardwick, 3, (CSUC).

***Nemognatha selanderi* Enns**

Diagnosis: Body predominately black to dark brown except pronotum and scutellum yellow. Abdomen varies from yellow to black (Enns 1956). Hind tibial spurs equal, spatulate and broadly rounded apically. Galeae, very short, barely surpassin the length of the maxillary palpi. Males with abdominal sterna unmodified.

Comments: This species is likely to occur in Colorado given the New Mexico locality, San Jose, Rio Arriba County, listed in Enns (1956). It appears to inhabit higher elevations.

Werner *et al.* (1966) reports accounts of this species collected from alfalfa in Arizona. Most other records for this species are on Asteraceae (Enns 1956, Werner *et al.* 1966).

Distribution: Mexico: northern Mexico (Werner *et al.* 1966) United States: southwestern in distribution from southwest Texas west to southern Arizona north to northern New Mexico (Enns 1956). Colorado distribution: if inhabiting Colorado it is most likely to occur along the southwestern counties of Costilla west to Montezuma.

Colorado Records: None.

***Nemognatha scutellaris* LeConte**

(Figs. 65, 147, 221)

Diagnosis: Dorsal coloration yellow to orange-brown except elytral markings, head and scutellum dark. Head with varying degrees of black coloration, usually with

front and tempora black; vertex colored as pronotum. Elytra usually with apical margins and suture black. Entire venter black. Hind tibial spurs similar in shape, slender, triangular, and slightly rounded at apex (Fig. 147). Males with abdominal segments III and IV having shallow, densely punctate, ovate depressions lined with tufts of elongate setae. (Enns 1956, Werner *et al.* 1966)

Comments: Females of *N. scutellaris* are unique among the *Nemognatha* in having a distinct ovipositor, which is used to insert eggs between the florets of their host plants flowers (Linsley and MacSwain 1952, Enns 1956). Enns (1956) recorded this species on *Grindelia* sp.

Distribution: Mexico: Baja California (Radford 1960). United States: throughout the western states from Washington south to southern California west to South Dakota, Colorado, and Arizona (Enns 1956). Colorado distribution: one record from the Front Range and two records from the western slope (Fig. 221).

Colorado Records: **Denver Co.:** Denver, (Enns 1956) **Moffat Co.:** Dinosaur National Monument, May 9-11, 1987, R.W. Krauss, 5, (CSUC); same locality but, July 27, 1987, C.M. MacVean, 2, (CSUC) Maybell, June 17, 1907, 1, (CSUC).

Nemognatha sparsa LeConte

(Figs. 66, 145, 222)

Diagnosis: Elytra, tibia, tarsi, galeae, palpi, and antennae black; remainder of body, including head, varying from reddish-brown to yellow-brown. Hind tibial spurs

equal and spatulate (Fig. 145). Galeae short and stout; about twice length of the pronotum. Males, with unmodified abdominal sterna.

Comments: Plant host records for this species provided by Enns (1956) and Werner *et al.* (1966) are from the family Asteraceae, with most records on *Grindelia* sp. (gumweed). Interestingly, all Colorado records for *N. sparsa* either personally examined or from literature sources, are historical records with the most recent record from 1956. The two (CSUC) museum specimens examined were collected in 1893 and 1904. Further collecting of this species is necessary to evaluate its present occurrence.

Distribution: United States: western Wyoming east to South Dakota south to northern Arizona and New Mexico (Enns 1956). Colorado distribution: locality records only indicate distribution from the eastern slope of the Rocky Mountains east to the Kansas border; however, given its distribution in Utah it should occur state wide (Fig. 222).

Colorado Records: **Boulder Co.:** Boulder, (Enns 1956) **Denver Co.:** Denver, (Enns 1956) **El Paso Co.:** Colorado Springs, (Enns 1956) **Huerfano Co.:** La Veta, August 5, 1904, James, M. and U. Lanham, 1, (CSUC) **Jefferson Co.:** Golden, (Enns 1956) **Larimer Co.:** Fort Collins, August 26, 1893, C.P. Gillette, 1, (CSUC); same locality but, August 9, 1892, C. Baker, 3, (CSUC) **Logan Co.:** Crook, (Enns 1956) **Otero Co.:** La Junta, (Enns 1956) **Sedgwick Co.:** Julesburg, (Enns 1956) **Yuma Co.:** Wray, (Enns 1956).

Genus *Pyrota* Dejean

Pyrota Dejean is a New World genus occurring primarily in temperate arid regions. In the United States, *Pyrota* are most abundant in the deserts of the southwest and the Great Plains (Selander 1964a). *Pyrota* are separated from other meloid genera in Colorado by their bright orange to yellow body coloration with various black markings, relatively short and thick antennae, with the first antennal segment narrow basally and broadening apically (Fig. 84), simple tarsal claws, pronotum distinctly longer than wide, and usually by the large body size with length from 7 mm to 35 mm, averaging around 15 mm (Dillon 1952, Selander 1964a).

Larvae in this genus are thought to feed on the larval cells of bees. Adults feed on a wide variety of Fabaceae and Asteraceae plants, largely preferring the buds and flowers. Many species may be seen actively feeding during the day. Some species are attracted to lights at night and may be seen in dense aggregations on their host plants. Most species occur during the spring and summer months, tapering dramatically in numbers towards fall (Selander 1964a, 1982b, 1983).

Key to the species of adult Colorado *Pyrota*

- 1 Elytra each with two well-defined longitudinal vittae which may be connected apically; elytra creamy yellow, much lighter in color than body; last segment of male maxillary palpi only slightly different than female.....
.....*Pyrota bilineata* Horn (p. 152)

- 1' Elytra with three horizontal fascia, median fascia may elongated and fused to apical and basal fascia appearing black with varying degrees of yellow-orange markings, not much lighter than head and pronotum; last segment of male maxillary palpi greatly enlarged and pyriform2
- 2 (1') Median fascia elongate, may be fused with basal and apical fascia; occiput and tempora black; legs and venter completely black
.....*Pyrota insulata* (LeConte) (p. 155)
- 2' Median fascia subequal to apical and basal fascia, never fused; occiput sometimes with a small median black spot, tempora not marked with black; venter and legs orange with black markings.....*Pyrota concinna* Casey (p. 154)

***Pyrota bilineata* Horn**

(Fig. 67, 223)

Diagnosis: A small species (5-10 mm). Head, pronotum, legs and venter orange in coloration. Antennae, palpi, eyes, and tarsi black. Black markings on venter and apices of femora and tibia; protibia sometimes with black extending beyond middle. Pronotum usually with two small round black maculae on each side of midline. Elytra pale yellow, much lighter than body; with two vittae usually extending from base to apex. Vittae sometimes connected apically but may be faded or lost basally. Male maxillary palpi largely unmodified, only slightly widened, and similar to female.

Comments: This is a very common species of *Pyrota* in Colorado, most often occurring from August to September on sunflowers. This species exhibits considerable

variation in body size and the amount of black coloration on the abdominal sternites and metasternum.

Distribution: Mexico: Durango. United States: throughout the Great Plains from Nebraska south to Texas west to Utah and Arizona (Dillon 1952; Selander 1964a; Werner *et al.* 1966). Colorado distribution: almost state wide with an absence of records from the northwestern portion of the state (Fig. 223).

Colorado Records: **Adams Co.:** northeast of Tower Road and Pena Blvd., July 21, 1994, D. Leatherman, 1, (CSUC) **Alamosa Co.:** Medano Ranch, Elk Wetlands, August 12, 1998, Nosaka, T.M. and P. Pineda, 6, (CSUC) **Bent Co.:** Road GG (Caddoa Creek), John Martin Reservoir, August 26, 2001, Schmidt, J. and S. Anderson, 6, (CSUC) **Larimer Co.:** Fort Collins, August 10, 1901, 1, (CSUC) **Las Animas Co.:** 1 mile west of Adrix, August 21, 2002, V.A. Scott, 1, (UCMC) **Montezuma Co.:** McElmo Canyon Anazasi State Recreation Management Area, G. Road, August 25, 1992, Kondratieff, B., Painter, B., and D. Leatherman, 1, (CSUC) **Prowers Co.:** Lamar, Road CC, woods, August 14, 2000, D. Leatherman, 1, (CSUC); Lamar, Fairmount Cemetery, August 27, 2003, D. Leatherman, 2, (CSUC) **Saguache Co.:** 5 miles north Hooper on Highway 17, August 14, 1983, R. Gemmill, 4, (BGPC); Indian Springs Natural Area, near Great Sand Dunes National Monument, October 8, 1999, Nevins, T.G. and P. Pineda, 8, (CSUC) **Washington Co.:** Akron, Road GG, September 11, 2003, H. Miller, 1, (CSUC) **Weld Co.:** Road 386, 0.2 miles south Highway 34, August 13, 2003, P.A. Opler, 7, (CSUC); Road 386, 3 miles north Roggen, August 21, 1990, Harris, M. and B. Kondratieff, 1, (CSUC); Road 386, southeast Roggen, August 13, 2003, P.A. Opler, 6, (CSUC); Road 91, north of I-76, August 13, 2003, P.A. Opler, 10, (CSUC); Nunn, August 12, 1987, B.

Kondratieff, 2, (CSUC) **Yuma Co.:** Kirk, August 12, 1986, B. Kondratieff, 1, (CSUC).

***Pyrota concinna* Casey**

(Fig. 68, 224)

Diagnosis: A large species rarely smaller than 11 mm. Body orange with black markings on abdominal sternites, apices of femora, tibia, and may have a small black maculae on occiput. Pronotum orange with two black maculae on either side of midline. Antennae, palpi and tarsi entirely black. Elytra orange only slightly lighter in color than body with three well-defined, horizontal, black fascia all sub-equal in width. Basal fascia rarely broken into large spots. Last segment of male maxillary palpi pyriform, enlarged, and with a large ventral membranous area. Females have only slightly thickened maxillary palpi; palpi never pyriform.

Comments: Most specimens in Colorado were taken from *Grindelia squarrosa* (Pursh) Dunal (curlycup gumweed) along the eastern plains.

Distribution: Mexico: Chihuahua, Sonora, and Zacatecas. United States: Utah and Nevada east to Nebraska, southeast to Arkansas and southern Texas. Colorado distribution: occurs throughout the Great Plains to the eastern slope of the Rocky Mountains and south central portion of the state (Fig. 224).

Colorado Records: **Alamosa Co.:** Chimney Gulch, (Selander 1982) **Arapahoe Co.:** Denver, (Selander 1982b) **Baca Co.:** Picture Canyon, August 25, 2001, Schmidt, J. and S. Anderson, 5, (CSUC) **Bent Co.:** 1 mile north of Caddoa Creek, September 8, 1990, P.A. Opler, 2, (CSUC) Road 26, along Caddoa Creek, August 17, 1995, Cranshaw,

W., Leatherman, D., and B. Kondratieff, 1, (CSUC) **Chaffee Co.:** Salida, (Selander 1982b) **Jefferson Co.:** Golden, (Selander 1982b) **La Plata Co.:** Durango, (Selander 1982b) **Las Animas Co.:** western portion of county, (Selander 1982b) **Logan Co.:** Crook, (Selander 1982b) **Morgan Co.:** Wiggins, (Selander 1982b) **Otero Co.:** La Junta, (Selander 1982b); Rocky Ford, August 11, 1992, W. Cranshaw, 1, (CSUC) **Prowers Co.:** Granada, (Selander 1982b); Holly, August 8, 1898, 1, (CSUC); Lamar, August 2, 1996, D. Leatherman, 1, (CSUC) **Pueblo Co.:** Pueblo, August 21, 1949, G. Nelson, 3, (UCDC); Pueblo, September 15, 1998, 1, (CSUC) **Yuma Co.:** 24 miles north of Wray, September 6, 1995, W. Cranshaw, 1, (CSUC); Wray, (Selander 1982b).

***Pyrota insulata* (LeConte)**

(Figs. 69, 84, 225)

Diagnosis: A large species, rarely smaller than 11mm. Head except large orange frontal area, legs and entire venter black. Pronotum orange with variable black markings; usually with two large ovate maculae on either side of medial line which may be fused, and up to four small maculae on side of disc. Elytra orange-yellow, trifasciate to highly fused and appearing largely black. Elytral markings, in Colorado specimens, usually with one or two well-separated basal fascia, an elongated median fascia, and a thin crescent shaped apical fascia. Last segment of male maxillary palpi pyriform, greatly enlarged, and with a large ventral membranous area. Females have only slightly thickened maxillary palpi and are never pyriform.

Comments: This species is one of the very few *Pyrota* active in the early spring, and is one of the more commonly encountered species in this genus throughout its geographical range.

Distribution: Mexico: Durango east to Tamaulipas. United States: South Dakota and western Iowa south to southern Texas west to Colorado and New Mexico with isolated records in southwestern Montana and southeastern Utah (Selander 1982b). Colorado distribution: along the Great Plains and in the southern portion of the state (Fig. 225).

Colorado Records: **Alamosa Co.:** Chimney Gulch, (Selander 1982b) **Baca Co.:** Southern Colorado Research Center, May 11, 1990, J. George, 4, (CSUC) **Boulder Co.:** Beech, short grass, May 8, 1996, P. Pineda, 1, (CSUC) **Chaffee Co.:** Salida, (Selander 1982b) **Denver Co.:** Denver, (Selander 1982b) **Douglas Co.:** Castlewood Canyon Road, 2 miles south Franktown, May 22, 1993, R. Gemmill, 2, (BGPC) **Jefferson Co.:** Golden, June 11, 1983, D. Liewehr, 2, (CSUC); North Bear Creek Reservoir, May 24, 1990, J. Scott, 1, (CSUC) **Larimer Co.:** Cherokee Park, May 26, 1974, 1, (CSUC); Fort Collins, June 10, 1898, 1, (CSUC) **Lincoln Co.:** northeast Jumbo Lake, May 11, 1996, 1, (CSUC) **Morgan Co.:** County Road 8, 0.5 miles south of County Road 66, June 9, 1992, D. Leatherman, 1, (CSUC); Wiggins, (Selander 1982b) **Weld Co.:** Fort Lupton, June 11, 1900, 1, (CSUC); near Owl Creek, 15 km north northeast of Nunn, Pawnee National Grassland, May 25, 1977, Wagner, 3, (CSUC); Pawnee Buttes trailhead, June 14, 1999, D. Leatherman, 1, (CSUC); Pawnee National Grassland, Pasture 33, Nunn, May 25, 1972, S. Dennis, 2, (CSUC).

Genus *Rhyphonemognatha* Enns

This genus is easily recognized by its pectinate tarsal claws, long filiform antennae, scarcely modified galeae, small nearly transverse eyes, and aedeagus not bilobed. The aedeagus is similar in structure to *Nemognatha*. *Rhyphonemognatha* is primarily distributed throughout Central and South America with only *R. rufa* occurring in North America (Enns 1956, Werner *et al.* 1966, Pinto and Bologna 1999). The larval bee hosts are unknown.

Rhyphonemognatha rufa (LeConte)

(Figs. 70, 98, 226)

Diagnosis: Body coloration brick red covered with red pubescence. Eyes, antennae, mouthparts, tarsi, and femoral apices black. Hind tibial spurs dissimilar; outer spur wider than inner spur with apex rounded. Head uniquely elongate (Fig. 98), similar to some species of *Gnathium* (Enns 1956).

Comments: Adults have been recorded feeding on groundcherry (*Physalis* sp.), a weedy plant in the nightshade family Solanaceae (Enns 1956, Werner *et al.* 1966). This species has not been previously recorded from Colorado and the following record represents a new state record for the genus.

Distribution: Mexico: throughout. United States: from southern Arizona north to northern Colorado east to western Iowa and central Texas (Enns 1956, Werner *et al.*

1966). Colorado distribution: a lone record exists in north-central Larimer County (Fig. 226).

Colorado Records: Larimer Co.: south of Westridge Estates, July 5, 1992, D. Leatherman, 1, (CSUC).

Genus *Spastonyx* Selander

(Fig. 71)

The genus *Spastonyx* is readily recognized by the presence of an unguis on the tarsal claws; a long, flattened spine-like process arising from the base of the ventral blade of the tarsal claw. Additionally, the dorsal and ventral blades of the tarsal claws are fused basally with the ventral blade shorter than the dorsal blade giving the claws a tooth-like appearance (Selander 1954, Pinto and Bologna 1999).

One specimen of *S. nemognathoides* (Horn) in the CSUC collection is labeled “Larimer Cty. CO Horsetooth Res., Sept. 20, 1988, C. Palmer”. This specimen is most likely mislabeled given the previous known habitat preference and distributional range of this species. It is known from southeastern California east to Arizona and northwestern Mexico and occurs at lower elevations in the Sonoran Desert. If this species were to inhabit the state, it would be much more likely to occur in the extreme southwestern portion of the state (Selander 1954, Werner *et al.* 1966).

Other than the previously listed generic characters, *S. nemognathoides* may be distinguished from other Colorado meloids by the body coloration and hind tibial spurs. The body and elytra are entirely black with the pronotum orange to orange-brown and the

hind tibial spurs dissimilar. The outer hind tibial spur is wider than the inner spur and obliquely truncate; the inner spur is more slender and has acute apices.

Genus *Tricrania* LeConte

The genus *Tricrania* is unique among other North American genera by having moniliform antennae, pectinate tarsal claws, non-modified galeae, a strongly triangular head, and the body is black in coloration contrasting with brick-red elytra (Parker and Boving 1924, Pinto and Bologna 1999).

Adults are non-feeding and are usually found near the host nests of the larvae. Larvae feed on the nest provisions and larvae of bees from the families Megachilidae, Colletidae, and Apidae (Parker and Boving 1924, Pinto and Bologna 1998).

***Tricrania stansburyi* (Haldeman)**

(Figs. 72, 227)

Diagnosis: Body black. Elytra orange-brown to brick-red with blackening towards the apices common in Colorado specimens. Head and pronotum densely punctate. Pronotum much wider than long. Hind wings of full length. Hind tibial spurs similar in shape, spatulate, outer spur only slightly wider than inner spur.

Comments: Linsley and MacSwain (1951) and Werner *et al.* (1966) noted that adults are usually found under debris, rocks, cow dung, and logs. Also noted, males may occasionally be seen in flight. Two males collected during this study were captured in

flight with one landing on the author's shirt. This species, although probably distributed throughout the state, is not commonly collected.

Distribution: Canada: British Columbia. United States: throughout the western states from Washington south to southern California east to Montana and Arizona (Linsley and MacSwain 1951, Werner *et al.* 1966). Colorado distribution: spotty records exist throughout the northern and western portion of the state (Fig. 227).

Colorado Records: **Boulder Co.:** Eldorado Springs, May 15, 1979, K. Best, 2, (UCMC) **Jefferson Co.:** Green Mountain, May 21, 1980, J. Scott, 1, (CSUC); south of Eldorado Springs, April 29, 1969, U. Lanham, 1, (UCMC) **Larimer Co.:** Fort Collins, June 10, 1904, 1, (CSUC); Glacier View, Mead, April 1, 1989, H.E. Evans, 1, (CSUC); Glacier View, Mead, March 26, 1989, H.E. Evans, 1, (CSUC); Hewlett Gulch, June 18, 1979, A. Hook, 2, (CSUC); Highway 14, road to Pingree Park, May 8, 2004, J. Schmidt, 2, (JSPC) **Moffat Co.:** Dinosaur National Monument, April 27, 1987, C. MacVean, 1, (CSUC) **Montezuma Co.:** Mesa Verde National Park, July 5, 1929, P. Franke, 1, (CSUC) **Weld Co.:** County Road 49, north of County Road 108, April 18, 1993, D. Leatherman, 1, (CSUC); Pawnee National Grasslands, Central Plains Experiment Range near Nunn, May 13, 1971, R. Lavigne, 1, (ESUW).

Genus *Zonitis* Fabricius

Zonitis may be separated from other Colorado meloid genera by the pectinate tarsal claws, filiform to submoniliform antennae, scarcely modified galeae (Fig. 91) which are lobiform or modified into a sucking structure (Fig. 90), and moderately large

eyes (Enns 1956, Pinto and Bologna 1999). In Colorado, *Zonitis* species that have the galeae modified into a sucking organ can usually be separated from species in the similar genus *Nemognatha* by the coarse and sparse to dense punctures on the elytra (Fig. 97), lack of modifications to the male abdominal terga, and the similar, usually equal, and spatulate hind tibial spurs.

This is a cosmopolitan genus. Adults are present in early summer throughout the season to mid-fall. They feed primarily on the pollen of flowers, mostly in the family Asteraceae, with the most common Colorado species preferring *Cleome* sp., *Rudbeckia* sp., and *Helianthus* sp. Larvae are parasites on bees in the family Megachilidae, Halictidae, Colletidae, and Andrenidae. Interestingly, the larvae are capable of spinning silk and using the thread as a safety line when trying to attach to a host bee (Selander and Bohart 1954, Enns 1956, Pinto and Bologna 1999).

Key to the species of adult Colorado *Zonitis*

Modified in part from Enns (1956)

- 1 Galeae lobiform or largely unmodified (Fig. 91).....2
- 1' Galeae modified into a sucking organ (Fig. 90)5
- 2 (1) Eyes with ventral margin extending to, or beyond outer margin of maxillae.....3
- 2' Ventral margin of eyes not reaching outer margin of maxillae4
- 3 (2) Elytra vermiculate; black with a blue or purple metallic luster (Fig. 148)
..... *Zonitis vermiculata* Schaeffer (p. 171)
- 3' Elytra smooth; brown in coloration *Zonitis hesperis* Selander (p. 168)

- 4 (2') Elytra moderately densely punctate, smooth between punctures (Figs. 96, 97); not usually much lighter in color than head and pronotum; ranging in color from black, testaceous, or testaceous cleanly tipped with black apically, never vittate*Zonitis atripennis* (Say) (p. 163)
- 4' Elytra rugose-punctate; usually much lighter in color than head and pronotum but varying from off white to less commonly, nearly black. Colorado specimens usually with a pair of light brown vittae*Zonitis bilineata* Say (p. 166)
- 5 (1') Galeae only as long, or slightly longer than, maxillary palpi*Zonitis dunniana* Casey (p. 168)
- 5' Galeae much longer than maxillary palpi (Fig. 90)6
- 6 (5') Pronotum extremely sparsely and shallowly punctate7
- 6' Pronotum at least moderately densely punctate8
- 7 (6) Elytra densely rugose punctate (Fig. 149); color testaceous, testaceous with median vittate, or dark brown*Zonitis punctipennis* (LeConte) (p. 169)
- 7' Elytra sparsely and coarsely punctate (Fig. 97); color lemon-yellow, green-yellow, to testaceous in older specimens*Zonitis sayi* Wickham (p. 170)
- 8 (6') Pronotum transversely oval; punctures coarse and dense*Zonitis cribricollis* (LeConte) (p. 167)
- 8' Pronotum with sides sub parallel; punctures fine and dense*Zonitis vittigera* (LeConte) (p. 172)

***Zonitis atripennis* (Say)**

(Figs. 73, 74, 79, 91, 96, 228)

Diagnosis: Body testaceous to rufo testaceous except antennae, palpi, tips of mandibles, apices of femora, tibia, and tarsi black. Venter variably colored from wholly testaceous to predominately black; usually with at least basal abdominal segments and part of thoracic sternum dark. Elytra varying from completely black, except scutellum, to wholly testaceous or testaceous cleanly tipped with black depending on subspecies, see comments below. Little intergradations between forms have been noted (Enns 1956). Galeae lobiform and short (Fig. 91). Elytra with shallow, distinct, and moderately dense punctures; area between punctures smooth and shiny (Fig. 96).

Comments: Enns (1956) proposed three subspecies for *Z. atripennis*: *Z. a. atripennis* (Fig. 71), *Z. a. terminalis* Enns, and *Z. a. flavida* LeConte (Fig. 74). Subspecific identification is based on elytral coloration. *Zonitis a. atripennis* is applied to individuals with completely black elytra and is the predominate subspecies distributed throughout the eastern portion of the species range. *Zonitis a. atripennis* is the only subspecies occurring from South Dakota south to Oklahoma. *Zonitis a. terminalis* includes specimens with the elytral coloration testaceous and cleanly tipped with black. This subspecies occurs throughout the western portion of the species range and is the only subspecies occurring in California and Nevada. *Zonitis a. flavida* is applied to individuals that possess completely testaceous elytra and is distributed throughout the central portion of the species range. Enns (1956) showed that there is much overlap in the distributions of these subspecies especially from Idaho and Wyoming south to New

Mexico. All three subspecies are reported from Colorado, with the nominate form comprising the majority of the specimens examined in this study. A comprehensive review is needed to verify the status of these three forms. Only one specimen of *Z. a. terminalis* was recorded from the state. Capinera *et al.* (1985) showed that this species has very low levels of cantharidin, averaging 0.055 mg per beetle out of five males and five females tested.

Distribution: Mexico: Baja California and Chihuahua. United States: throughout the Great Plains and western United States from Idaho southwest to southern California east to South Dakota, Oklahoma, and western Texas (Enns 1956). Colorado distribution: statewide (Fig. 228).

Zonitis atripennis atripennis (Say)

Colorado Records: **Moffat Co.:** Deerlodge Park, Dinosaur National Monument, August 24, 1990, Kondratieff, B. and K. Darrow, 7 (CSUC); Echo Park, Dinosaur National Monument, August 18, 1993, Kondratieff, B., Durfee, R., and S. Fitzgerald, 1 (CSUC) **Adams Co.:** Barr Lake, September 5, 1989, J. Scott, 2, (CSUC) **Alamosa Co.:** 10 miles northeast Alamosa, Blanca Reservoir. Management Area, July 23, 1992, M. Weissman, 1, (CSUC); 16 miles east Mosca, Zapata Ranch, July 30, 1992, M. Weissman, 2, (CSUC) **Bent Co.:** Caddoa Creek, Road CC, John Martin Reservoir, July 18, 2001, Schmidt, J. and B. Kondratieff, 4, (CSUC); John Martin Reservoir south shore, July 2, 2001, Anderson, S. and J. Schmidt, 1, (CSUC) **Chaffee Co.:** Chalk Creek; Nathrop; Salida, (Enns 1956); **Costilla Co.:** county label only, July 1, 1920, 1, (CSUC) **El Paso Co.:** Manitou, (Enns 1956) **Gilpin Co.:** Pleasant Valley, (Enns 1956) **Huerfano Co.:** 3 miles west of Walsenburg, August 8, 1975, Rubbink, W. and H.E. Evans, 1, (CSUC)

Pictou Arroyo, off I-25, August 17, 2003, Schmidt, J., Kondratieff, B., Owens J., and D. Leatherman, 17, (CSUC); Walsenburg, August 8, 1975, Rubbink, W. and H.E. Evans, 2, (CSUC) **Larimer Co.:** County Road 80, west of Park Creek Reservoir, August 7, 1992, D. Leatherman, 1, (CSUC); Mishawauka, (Enns 1956); Norfolk, roads 5 and 29, 17 miles north of Wellington, July 15, 2001, P.A. Opler, 2, (CSUC); Poudre River, (Enns 1956) **Las Animas Co.:** Hoehne, (Enns 1956); Trinidad, (Enns 1956) **Lincoln Co.:** county label only, (Enns 1956) **Mesa Co.:** Grand Junction, June 21, 1931, L. Davis, 1, (CSUC) **Moffat Co.:** Deerlodge Park, Dinosaur National Monument, August 24, 1990, Kondratieff, B. and K. Darrow, 7, (CSUC); Echo Park, Dinosaur National Monument, August 18, 1993, Kondratieff, B., Durfee, R., and S. Fitzgerald, 1, (CSUC) **Otero Co.:** La Junta, (Enns 1956) **Pueblo Co.:** Pueblo Chemical Depot, August 13, 2001, Anderson, S. and J. Schmidt, 4, (CSUC) **Rio Blanco Co.:** White Rocks, (Enns 1956) **Saguache Co.:** Indian Springs Natural Area, near Great Sand Dunes National Monument, August 10, 1999, Nevins, T.G. and P. Pineda, 15, (CSUC) **Washington Co.:** Akron, July 25, 1990, J. George, 1, (CSUC) **Weld Co.:** Central Plains Experiment Range off Road 114, 0.5 miles off Highway 85, July 17, 2003, Schmidt, J. and B. Kondratieff, 12, (CSUC); Pawnee, National Grasslands, July 23, 1984, J. Capinera, 10, (CSUC) **Yuma Co.:** Wray, (Enns 1956).

Zonitis atripennis flavida LeConte

Alamosa Co.: San Luis Valley, (Enns 1956) **Chaffee Co.:** Chalk Creek, (Enns 1956); Nathrop, (Enns 1956); Salida, (Enns 1956) **Delta Co.:** Delta, (Enns 1956) **Huerfano Co.:** Pictou Arroyo, off I-25, August 17, 2003, Schmidt, J., Kondratieff, B., Owens, J., and D. Leatherman, 4, (CSUC) **Las Animas Co.:** Hoehne, (Enns 1956) **Mesa Co.:**

Grand Junction, (Enns 1956) **Saguache Co.:** Great Sand Dunes National Monument, (Enns, 1956).

Zonitis atripennis terminalis

Bent Co.: Road CC, southwest of Caddoa, August 17, 1995, Cranshaw, W., Leatherman, D., and B. Kondratieff, 1, (CSUC).

***Zonitis bilineata* Say**

(Fig. 75, 229)

Diagnosis: Body light red-brown except antennae black; apices of femora, tibia, and sides of metasterna dark brown. Elytra lighter in color than body, light yellow-brown to almost ivory. Elytra of males usually with two thin vittae; vittae broader in females (Enns 1956). Galeae short, lobiform. Punctures on pronotum usually moderately dense; those on elytra usually distinct with areas between weakly rugose. Males, with abdominal sterna slightly modified, densely and finely punctate, and with short pubescence (Enns 1956).

Comments: This wide-ranging species is apparently uncommon in Colorado. It has been recorded from a variety of host plants including *Solidago* sp., *Medicago* sp., *Cirsium* sp., and *Helianthus* sp. (Enns 1956, Werner *et al.* 1966).

Distribution: Canada: Ontario. United States: widespread throughout the country from Idaho southwest to southern California east to New York and South Carolina (Enns 1956). Colorado distribution: few records exist, but based on its

widespread distribution in the United States, this species probably occurs throughout the state (Fig. 229).

Colorado Records: **Moffat Co.:** county record only (CSUC) **Otero Co.:** Rocky Ford, July 31, 1966, G. Propp, 2, (CSUC) **Yuma Co.:** county label only, August 12, 1987, B. Kondratieff, 2, (CSUC).

Zonitis cribricollis (LeConte)

(Fig. 230)

Diagnosis: Body light brown-red to brown-yellow except antennae, tips of palpi and mandibles, galeae, metasternum, apices of femora, most of tibia, and tarsi brown to black (Enns 1956). Elytra with margin and suture paler than ground color. Galeae produced into a sucking tube. Pronotum with sides rounded, coarsely, moderately densely punctate. Elytra densely and coarsely punctate (Enns 1956).

Comments: Only one record of this species was listed by Enns (1956) from Colorado. No specimens from the state were available for examination.

Distribution: United States: Colorado east to Illinois south to Texas and Florida (Enns 1956). Colorado distribution: one isolated record exists from northcentral Denver County (Fig. 230).

Colorado Records: Denver, (Enns 1956).

***Zonitis dunniana* Casey**

(Fig. 231)

Diagnosis: As in *Z. sayi* except galeae only slightly longer than mandibles, at most as long as the maxillary palpi. Mandibles longer and pronotum, finely and sparsely punctured (Enns 1956).

Comments: This species has been taken from the blossoms of *Baileya* sp., *Chrysothamnus* sp., *Eriogonum* sp., *Sideranthus* sp., and *Verbesina* sp. (Werner *et al.* 1966).

Distribution: Mexico: northeastern portion of the Central Plateau. United States: southwestern Arizona east to central Texas and north to northern Colorado (Enns 1956). Colorado distribution: one record is known from north-central Colorado (Fig. 231).

Colorado Records: Boulder Co.: Boulder, (Enns 1956).

***Zonitis hesperis* Selander**

Diagnosis: As in *Z. vermiculata* except elytra nearly smooth, not vermiculate, and dark brown in coloration. Legs dark brown in coloration (Enns 1956). Tarsal claws with 5-8 teeth along the inner row; *Z. vermiculata* has 13-14 teeth along inner row (Werner *et al.* 1966).

Comments: No specimens have been examined from Colorado; however, given the type locality, Utah, Uintah County, Wild's Ranch, Hill Creek, collected on August 5

and 6, 1937 by George E. Wallace, a location less than 64 km to Rio Blanco County Colorado, it is likely that this species could occur in the state.

Distribution: United States: southern California to northeastern Utah (Enns 1956, Werner et al 1966). Colorado distribution: if occurring in the state, it is most likely to be found in the northwestern counties of Moffat and Rio Blanco.

Colorado Records: None

Zonitis punctipennis punctipennis (LeConte)

(Figs. 76, 149, 232)

Diagnosis: Body light brown-yellow to red-brown. Males, with elytra about the same color as body; tarsi only slightly darkened. Females, with dark brown or red-brown elytra marked with wide dark brown vittae; most of tibia and tarsi dark brown. Antennae, except segment I and sometimes II, and tips of mandibles dark brown. Galeae produced into a moderately long sucking tube usually reaching the hind coxae. Elytra with dense and deep punctures.

Comments: Two subspecies are recognized for this species; *Zonitis p. punctipennis* (LeConte) and *Zonitis p. californica* Enns. Only the nominate *Z. p. punctipennis* occurs in Colorado. Adults are usually taken from sunflowers *Helianthus* sp. (Enns 1956, Werner *et al.* 1966).

Distribution: United States: southern Utah southwest to southern California east to central Kansas and western Texas (Enns 1956). Colorado distribution: the known

distribution of this species indicates that it should occur throughout the southern portion of the state (Fig. 232).

Colorado Records: Pueblo Co.: Pueblo, (Enns 1956).

***Zonitis sayi* Wickham**

(Figs. 77, 90, 97, 233)

Diagnosis: Body including elytra, ranging from pale yellow-brown to light yellow-green. Antennae excluding segment I and II, palpi, tips of mandibles, galeae, sometimes metasternum, apices of femora, tibia, and tarsi dark brown to black. Galeae produced into a moderately long sucking tube (Fig. 90); usually reaching hind coxae or nearly so. Pronotum very finely, sparsely punctate. Elytra with sparse, coarse punctures (Fig. 97) (Enns 1956).

Comments: This species is very common in Colorado and is often collected from the flowers of *Helianthus* sp., and it is usually found in association with *G. minimum*.

Distribution: Canada: Alberta east to Manitoba. United States: Idaho east to Wisconsin south to Arizona and southwestern Texas (Enns 1956). Colorado distribution: widespread throughout the state (Fig. 233).

Colorado Records: Arapahoe Co.: Box Elder Creek, August 11, 1984, J. Scott, 1, (CSUC) **Boulder Co.:** near Rowena, August 3, 1922, L. Jackson, 1, (CSUC) **Fremont Co.:** Royal Gorge, July 29, 1997, D. Leatherman, 1, (CSUC) **Gilpin Co.:** 1 mile up North Fork Clear Creek, July 16, 1988, J. Scott, 1, (CSUC) **Huerfano Co.:** Walsenburg,

July 25, 1974, H.E. Evans, 2, (CSUC) **Larimer Co.:** Dickson Reservoir, August 6, 2002, M. Camper, 1, (CSUC); Fort Collins, August 14, 1956, 3, (CSUC); Glacier View, Mead, July 9, 1991, H.E. Evans, 1, (CSUC); Livermore, July 15, 2000, 1, (CSUC) **Lincoln Co.:** mile marker 52, State Route 71, August 12, 1992, W. Cranshaw, 2, (CSUC) **Mesa Co.:** No Thoroughfare Canyon, Colorado National Monument, July 28, 1988, B. Kondratieff, 1, (CSUC); Unaweep Canyon, July 20, 1996, 1, (CSUC) **Moffat Co.:** Castle Park, Dinosaur National Monument, July 17, 1948, H. Rodeck, 1, (CSUC); Dinosaur National Monument, July 7, 1987, C. MacVean, 3, (CSUC) **Montezuma Co.:** Morefield Canyon, Mile 2, Mesa Verde National Monument, August 6, 1999, Kondratieff, B., Wells, S., Painter, W., and W. Cranshaw, 4, (CSUC) **Park Co.:** Pike National Forest, Rampart Range, Indian Creek Campground, Highway 67, July 6, 2001, C. Harp, 1, (CSUC) **Routt Co.:** Riffle Falls State Park, August 6, 1993, W. Cranshaw, 3, (CSUC) **Sedgwick Co.:** Julesburg, August 4, 1899, 1, (CSUC) **Weld Co.:** Road 114 and Road 37, Pawnee National Grasslands, July 25, 1999, J. Bishop, 3, (CSUC); Central Plains Experimental Range, 8 km north of Nunn, July 26, 1976, J. Scott, 3, (CSUC).

***Zonitis vermiculata* Schaeffer**

(Figs. 78, 148, 234)

Diagnosis: Body orange-yellow. Tips of antennae and mandibles, palpi, apices of femora, tibia, and tarsi black. Elytra vermiculate in sculpturing (Fig. 148); black and usually with metallic blue luster. Eyes large; ventral margin extending to outer margin of maxillae. Punctures on pronotum sparse and fine. Galeae short, lobiform.

Comments: Adults are known to feed on the flowers of Yellow Cleome, *Isocoma vernonioides* (Enns 1956, Werner *et al.* 1966). All Colorado records are from mid to late August.

Distribution: United States: from Washington to southern California east to Montana, Arizona and Colorado (Enns 1956). Colorado distribution: along the western slope and southeastern Colorado (Fig. 234).

Colorado Records: **Conejos Co.:** Antonito, August 5, 1899, 1, (CSUC) **Kiowa Co.:** Road 36, 0.5 miles south of State Route 96, north of Horse Creek Reservoir, August 23, 1996, Kondratieff, B. and D. Leatherman, 1, (CSUC) **Larimer Co.:** Hewlett Gulch, August 16, 1991, B. Kondratieff, 1, (CSUC) **Mesa Co.:** Colorado National Monument, August 28, 1988, B. Kondratieff, 3, (CSUC) **Moffat Co.:** Echo Park, Dinosaur National Monument, August 18, 1993, Kondratieff, B., Fitzgerald, S., and R. Durfee, 2, (CSUC); Gates of Lodore, Dinosaur National Monument, August 13, 1992, D. Leatherman, 1, (CSUC) **Otero Co.:** Horse Creek Reservoir State Wildlife Area, August 22, 1996, Kondratieff, B. and D. Leatherman, 1, (CSUC) **Saguache Co.:** Poncha, (Enns 1956).

Zonitis vittigera (LeConte)

Diagnosis: Body light brow-red to brown-yellow in coloration. Antennae, palpi, tips of mandibles, galeae, apices of femora, most of tibia, and tarsi black. Elytra varying from light yellow-brown to nearly completely black; usually light brown with two black vittae (Enns 1956). Galeae produced into a sucking tube that reaches to the hind coxae in the nominate form *Zonitis v. vittigera* and only slightly longer than the maxillary palpi in

Zonitis v. propinqua; see comments below. Elytra rugose, with moderately dense and shallow punctures.

Comments: Two subspecies of *Zonitis vittigera* are known for North America; *Z. v. vittigera* (LeConte) and *Z. v. propinqua* MacSwain. Both subspecies have recorded distributions that indicate occurrence in the state. Separation of the two subspecies is based on elytral pubescence, length of galeae, and dorsal coloration. *Zonitis v. propinqua* has denser elytral pubescence, shorter galeae and paler dorsal coloration than the nominate form (Enns 1956).

Distribution: United States: Nebraska south to New Mexico east to Michigan and Florida (Enns 1956). Colorado distribution: likely occurring in the state east of the Rocky Mountains.

Colorado Records: One specimen examined by Enns (1956) bears an incomplete state label “Col.” and was determined to be *Z. v. propinqua*.

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Appendix 1. Checklist to the Meloidae of Colorado. *indicates possibly as occurring in the state.

	<i>Epicauta andersoni</i> Werner
<i>Cordylospasta fulleri</i> Horn	<i>Epicauta apache</i> Pinto
	<i>Epicauta aspera</i> Werner
* <i>Cysteodemus wislizeni</i> LeConte	<i>Epicauta atrata</i> (Fabricius)
	<i>Epicauta atropos</i> Pinto
<i>Epicauta alastor</i> Skinner	<i>Epicauta bispinosa</i> Werner
<i>Epicauta albida</i> (Say)	<i>Epicauta callosa</i> LeConte
* <i>Epicauta atrivittata</i> (LeConte)	<i>Epicauta cinerea</i> (Forster)
<i>Epicauta fabricii</i> (LeConte)	<i>Epicauta corvina</i> (LeConte)
<i>Epicauta immaculata</i> (Say)	* <i>Epicauta costata</i> (LeConte)
<i>Epicauta ingrata</i> Fall	<i>Epicauta ferruginea</i> (Say)
<i>Epicauta longicollis</i> (LeConte)	* <i>Epicauta fortis</i> Werner
<i>Epicauta murina</i> (LeConte)	<i>Epicauta funebris</i> Horn
<i>Epicauta ochrea</i> (LeConte)	<i>Epicauta jeffersi</i> Pinto
<i>Epicauta parkeri</i> Werner	<i>Epicauta maculata</i> (Say)
<i>Epicauta segmenta</i> (Say)	<i>Epicauta normalis</i> Werner
* <i>Epicauta subglabra</i> (Fall)	<i>Epicauta occidentalis</i> Werner
<i>Epicauta uniforma</i> Werner	<i>Epicauta oregona</i> Horn
<i>Epicauta valida</i> (LeConte)	<i>Epicauta parvula</i> (Haldeman)
<i>Epicauta abadona</i> Skinner	<i>Epicauta pensylvanica</i> (DeGeer)

<i>Epicauta pruinosa</i> LeConte	<i>Lytta nigrocyanea</i> Van Dyke
* <i>Epicauta punctipennis</i> Werner	<i>Lytta nuttalli</i> Say
<i>Epicauta sericans</i> LeConte	<i>Lytta puberula</i> LeConte
<i>Epicauta stuarti</i> LeConte	<i>Lytta reticulata</i> Say
<i>Epicauta ventralis</i> Werner	<i>Lytta viridana</i> LeConte
	* <i>Lytta vulnerata</i> (LeConte)
* <i>Eupompha edmundsi</i> (Selander)	
<i>Eupompha viridis</i> (Horn)	<i>Megetra vittata</i> (LeConte)
<i>Gnathium minimum</i> (Say)	<i>Meloe afer</i> Bland
<i>Gnathium nitidum</i> (Horn)	<i>Meloe angusticollis</i> Say
	* <i>Meloe bitoricollis</i> Pinto and Selander
<i>Hornia minutipennis</i> Riley	<i>Meloe carbonaceus</i> LeConte
<i>Hornia mexicana neomexicana</i> Cockerell	* <i>Meloe dianella</i> Pinto and Selander
	<i>Meloe exiguus</i> Pinto and Selander
<i>Linsleya convexa</i> (LeConte)	<i>Meloe impressus</i> Kirby
<i>Linsleya sphaericollis</i> (Say)	<i>Meloe laevis</i> Leach
	<i>Meloe niger</i> Kirby
<i>Lytta biguttata</i> LeConte	<i>Meloe occultus</i> Pinto and Selander
* <i>Lytta cyanipennis</i> (LeConte)	<i>Meloe vandykei</i> Pinto and Selander
<i>Lytta deserticola</i> Horn	
<i>Lytta fulvipennis</i> LeConte	<i>Nemognatha cribraria</i> LeConte
<i>Lytta navajo</i> Werner	<i>Nemognatha lurida</i> LeConte

<i>Nemognatha lutea</i> LeConte	<i>Spastonyx nemognathoides</i> (Horn)
* <i>Nemognatha nebrascensis</i> Enns	Doubtful record
<i>Nemognatha nigripennis</i> LeConte	
<i>Nemognatha piazzata bicolor</i> LeConte	<i>Tricrania stansburyi</i> (Haldeman)
* <i>Nemognatha selanderi</i> Enns	
<i>Nemognatha scutellaris</i> LeConte	<i>Zonitis atripennis</i> (Say)
<i>Nemognatha sparsa</i> LeConte	<i>Zonitis bilineata</i> Say
	<i>Zonitis cribricollis</i> (LeConte)
<i>Pyrota bilineata</i> Horn	<i>Zonitis dunniana</i> Casey
<i>Pyrota concinna</i> Casey	* <i>Zonitis hesperis</i> Selander
<i>Pyrota insulata</i> (LeConte)	<i>Zonitis p. punctipennis</i> (LeConte)
	<i>Zonitis sayi</i> Wickham
<i>Rhyphonemognatha rufa</i> (LeConte)	<i>Zonitis vermiculata</i> Schaeffer ⁴⁷
	* <i>Zonitis vittigera</i> (LeConte)

Appendix 2. Glossary of terms used.

Apterous	wingless condition
Bisinate	bent or curved
Cephalic sulcus	a furrow on the head
Cinereous	a light grey color
Clavate	gradually thickening towards apex, appearing clubbed
Costae	with elevated ridges
Cuticle	the hard outer covering of the beetle
Denude	with out hair or scales
Emarginate	notched
Fascia	a dark colored transverse band
Ferruginous	reddish brown color
Filiform	threadlike
Fuscous	very dark brown
Glabrous	integument without hair or scales
Hind tibial comb	a comb like structure present on the inside of the hind tibia
Humeral spot	a patch of dark colored hair at the base of the elytra towards the outer edges, near the fore legs
Imbricate	partially overlapping
Lobiform	lobe shaped
Luteocinereous	light brown gray
Maculae	dark spot
Moniliform	beadlike antennae

Obliquely truncate	appearing as if end was abruptly cut off at a right angle
Obsolescent	hardly visible
Orbicular	circular in shape
Pectinate	appearing comb-like
Phoretic	carried on the bodies of larger insects
Piceous	black, may be slightly reddish
Punctulate	condition of integument covered with small punctures
Pyriform	shaped like a pear
Reticulate	integument surface appearing to have a net-like network of raised Lines
Rufous	reddish in coloration
Rugose	integument surface appearing wrinkled
Sclerites	sections of integument separated by membranous area
Scutellar spot	a patch of dark colored hair at the base of the elytra near the Scutellum
Setae	hair-like cuticular projections
Sinuate	with curved edges
Spatulate	long, thin, and flat increasing in width apically
Spiniform	sticklike
Squamiform	scale-like in form
Testaceous	brownish red
Tibial spur	spine-like process at apex of tibia
Transverse	wider than long
Ungual spine	spine like process arising from the base of the ventral tooth and

	extending parallel to the outer surface of each claw
Vertex	top of head including the front and occiput
Vestiture	surface covering of setae
Vermiculate	integument surface appearing to have a network of raised “worm-like” tracks
Vittae	longitudinal stripe
Vittate	striped
Xeric	arid conditions

Plate 1. Figures 1-16. Species of Meloidae. Pictures taken at 300 mm focal length unless otherwise indicated. 1. *Cysteodemus wislizeni*. 2. *Epicauta abadona*. 3. *Epicauta alastor*. 4. *Epicauta albida*. 5. *Epicauta andersoni*. 6. *Epicauta apache*. 7. *Epicauta aspera*. 8. *Epicauta atrata* (7x). 9. *Epicauta atropos* (7x). 10. *Epicauta atrivittata*. 11. *Epicauta callosa*. 12. *Epicauta cinerea*. 13. *Epicauta corvina*. 14. *Epicauta costata*. 15. *Epicauta fabricii*. 16. *Epicauta ferruginea* (7x).



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Plate 2. Figures 17-32. Species of Meloidae. Pictures taken at 300 mm focal length unless otherwise indicated. 17. *Epicauta funebris*. 18. *Epicauta immaculata*. 19. *Epicauta ingrata* (7x). 20. *Epicauta longicollis*. 21. *Epicauta maculata*. 22. *Epicauta murina*. 23. *Epicauta normalis*. 24. *Epicauta occidentalis*. 25. *Epicauta ochrea*. 26. *Epicauta parvula*. 27. *Epicauta pensylvanica*. 28. *Epicauta pruinosa* (7x). 29. *Epicauta segmenta*. 30. *Epicauta sericans*. 31. *Epicauta stuarti*. 32. *Epicauta uniforma*.



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Plate 3. Figures 33-48. Species of Meloidae. Pictures taken at 300 mm focal length unless otherwise indicated. 33. *Epicauta ventralis*. 34. *Eupompha edmundsi* (7x). 35. *Eupompha viridis* (7x). 36. *Gnathium minimum* (7x). 37. *Gnathium nitidum* (7x). 38. *Hornia minutipennis* (7x). 39. *Lytta biguttata*. 40. *Lytta cyanipennis*. 41. *Lytta deserticola*. 42. *Lytta fulvipennis*. 43. *Lytta navajo*. 44. *Lytta nigrocyanea*. 45. *Lytta nuttalli*. 46. *Lytta puberula* (7x). 47. *Lytta reticulata*. 48. *Lytta viridana*.



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Plate 4. Figures 49-64. Species of Meloidae. Pictures taken at 300 mm focal length unless otherwise indicated. 49. *Lytta vulnerata*. 50. *Linsleya sphaericollis*. 51. *Meloe angusticollis*. 52. *Meloe dianella*. 53. *Meloe exiguus*. 54. *Meloe impressus*. 55. *Meloe laevis*. 56. *Meloe niger*. 57. *Meloe occultus*. 58. *Megetra vittata*. 59. *Nemognatha cribraria*(7x). 60. *Nemognatha lurida*. 61. *Nemognatha lutea* (7x). 62. *Nemognatha nigripennis* (7x). 63. *Nemognatha piazata bicolor*, dark phase. 64. *Nemognatha piazata bicolor*, light phase.



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Plate 5. Figures 65-78. Species of Meloidae. Pictures taken at 300 mm focal length unless otherwise indicated. 65. *Nemognatha scutellaris* (7x). 66. *Nemognatha sparsa* (7x). 67. *Pyrota bilineata*. 68. *Pyrota concinna*. 69. *Pyrota insulata*. 70. *Rhyphonemognatha rufa* (7x). 71. *Spastonyx nemognathoides* (7x). 72. *Tricrania stansburyi* (7x). 73. *Zonitis a. atripennis*. 74. *Zonitis a. terminalis*. 75. *Zonitis bilineata*. 76. *Zonitis p. punctipennis*. 77. *Zonitis sayi*. 78. *Zonitis vermiculata*.



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Plate 6. Figures 79-94. Species of Meloidae. Tarsal claw (79-81): 79. *Zonitis a. atripennis*. 80. *Epicauta fenubris*. 81. *Eupompha viridis*. 82. *Epicauta uniforma*, transverse setae in excavation. 83. *Hornia minutipennis*, squamiform elytra. 84. *Pyrota insulata*, first antennal segment. 85. *Lytta viridana*, male antennae. 86. *Lytta nuttalli*, hind tibial spurs. Elytra (87-88): 87. *Cysteodemus wislizeni*. 88. *Megetra vittata*. Galeae (89-91): 89. *Nemognatha sp.* 90. *Zonitis sayi*. 91. *Zonitis a. atripennis*. Male abdominal modifications (92-93). 92. *Nemognatha nigripennis*. 93. *Nemognatha piazzata bicolor*. 94. *Nemognatha lutea*, hind tibial spurs.



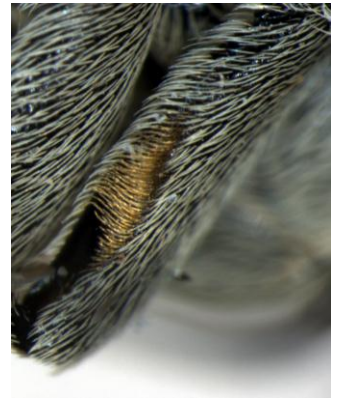
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Plate 7. Figures 95-110. Species of Meloidae. 95. *Nemognatha lurida* tarsal claw. Elytra punctation (96-97). 96. *Zonitis a. atripennis*. 97. *Zonitis sayi*. 98. *Rhyphonemognatha rufa*, head capsule. 99. *Epicauta uniforma*, hind tibial comb. 100. *Epicauta longicollis*, male antennae. Eyes (101-102): 101. *Epicauta uniforma*. 102. *Epicauta pruinosa*. 103. *Epicauta fabricii*, male antennal segment 2. Coxal position (104-105): 104. *Epicauta segmenta*. 105. *Epicauta valida*. 106. *Epicauta fabricii*, pubescence on elytra. 107. *Epicauta murina*, male antennal segment 2. 108. *Epicauta murina*, pubescence on elytra. 109. *Epicauta parkeri*, head capsule. 110. *Epicauta longicollis*, base of elytra.



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Plate 8. Figures 111-126. Species of Meloidae. 111. *Epicauta ingrata*, antennae. 112. *Epicauta oregona*, pronotum. Antennae (113-114): 113. *Epicauta punctipennis*. 114. *Epicauta apache*. 115. *Epicauta apache*, middle tibia. 116. *Epicauta apache*, last segment of male maxillary palpi. 117. *Epicauta jeffersi*, pygidium. 118. *Epicauta costata*, pronotum. 119. *Epicauta occidentalis*, male antennae. 120. *Epicauta sericans*, eye, Hind tibial spurs (121-123): 121. *Epicauta punctipennis*. 122. *Epicauta apache*. 123. *Epicauta pruinosa*. 124. *Epicauta fenubris*, last segment of male maxillary palpi. 125. *Epicauta cinerea*, male antennae. 126. *Epicauta ferruginea*, hind tibial spurs.



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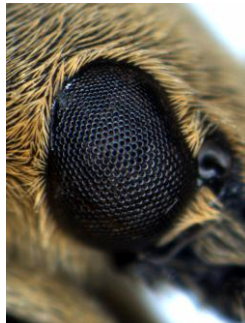
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118



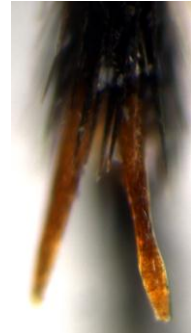
119



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Plate 9. Figures 127-142. Species of Meloidae. 127. *Epicauta callosa*, pronotum. 128. *Epicauta atrata*, head capsule. *Gnathium* pronotum (129-130). 129. *Gnathium minimum*. 130. *Gnathium nitidum*. 131. *Linsleya convexa*, spine on base of fore femora. 132. *Lytta reticulata*, elytra sculpturing. Pronotum (133-134): 133. *Lytta vulnerata*. 134. *Lytta deserticola*. 135. *Lytta nigrocyanea*, spine on hind trochanter. 136. *Lytta viridana*, contorted first tarsal segment. 137. *Lytta puberula*, pronotum. 138. *Meloe laevis*, head capsule. 139. *Meloe angusticollis*, scutellum. Male antennal segments 5 and 6 (140-141): 140. *Meloe impressus*. 141. *Meloe dianella*. 142. *Meloe niger*, head capsule.



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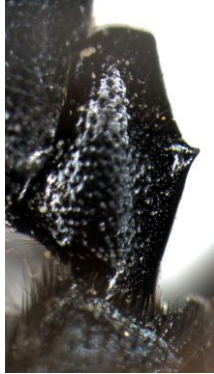
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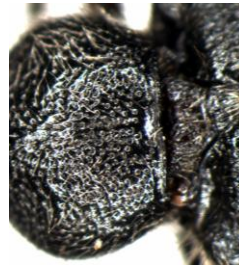
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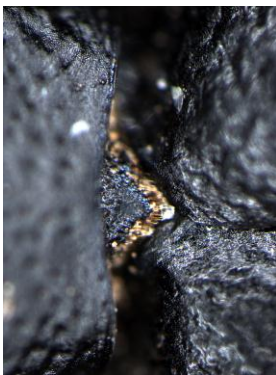
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Plate 10. Figures 143-149. Species of Meloidae. Head capsule (143-144): 143. *Meloe exiguus*. 144. *Meloe occultus*. 145. *Nemognatha sparsa*, hind tibial spurs. 146. *Nemognatha nigripennis*, head capsule. 147. *Nemognatha scutellaris*, hind tibial spurs. Elytra sculpturing (148-149): 148. *Zonitis vermiculata*. 149. *Zonitis p. punctipennis*.



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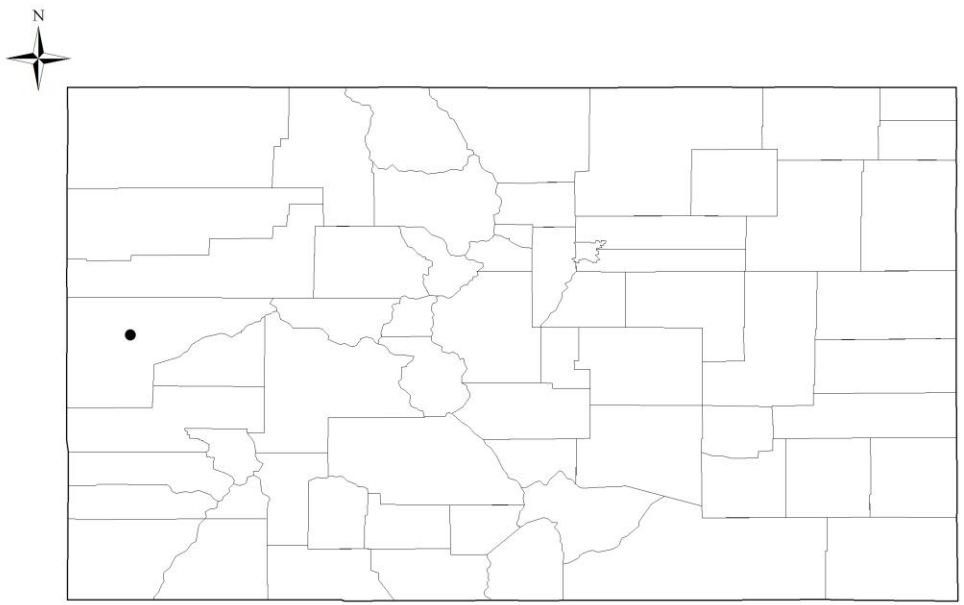


148



149

Figures 150-151. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 150. *Cordylospasta fulleri*. 151. *Cysteodemus wislizeni*.

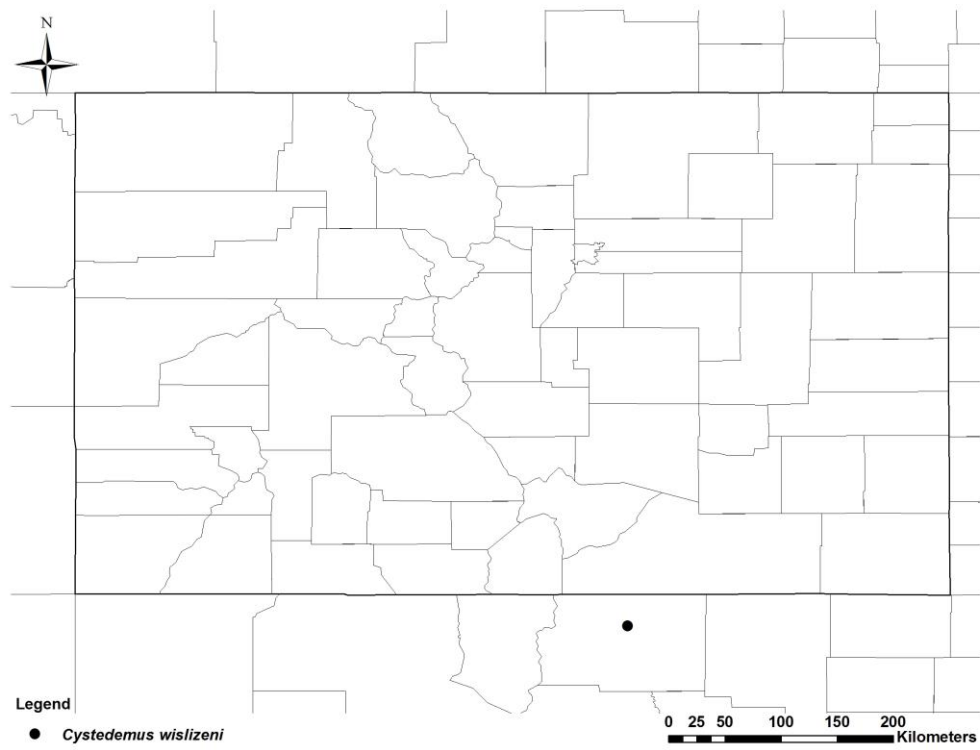


Legend

● *Cordylospasta fulleri*

0 25 50 100 150 200
Kilometers

150



Legend

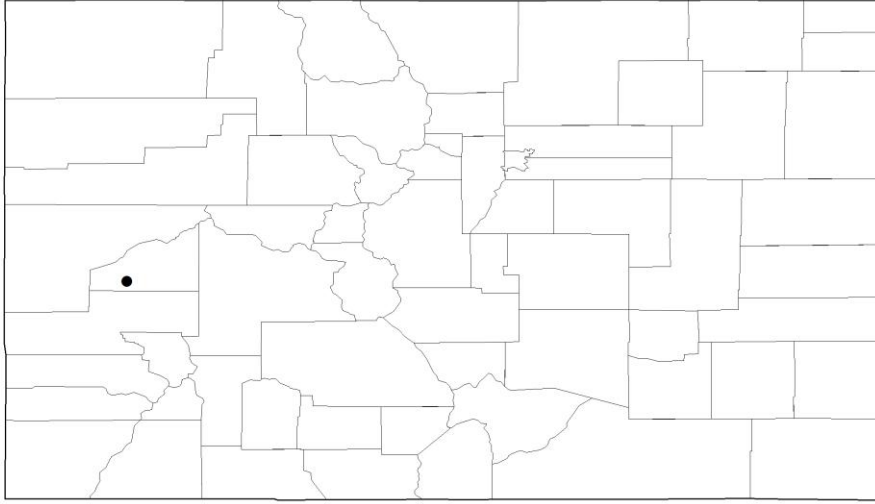
● *Cystedemus wislizeni*

0 25 50 100 150 200
Kilometers

151

210

Figures 152-153. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 152. *Epicauta abadona*.
153. *Epicauta alastor*.

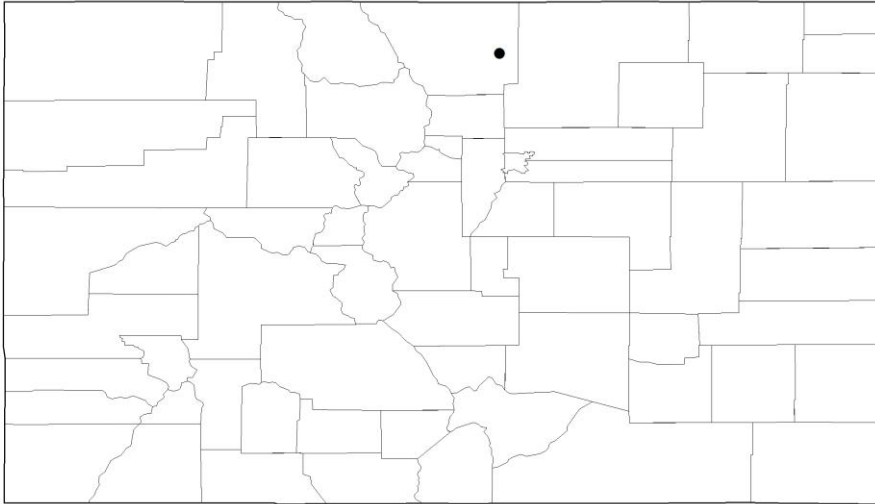


Legend

- *Epicauta abadona*

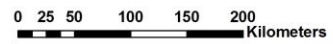


152



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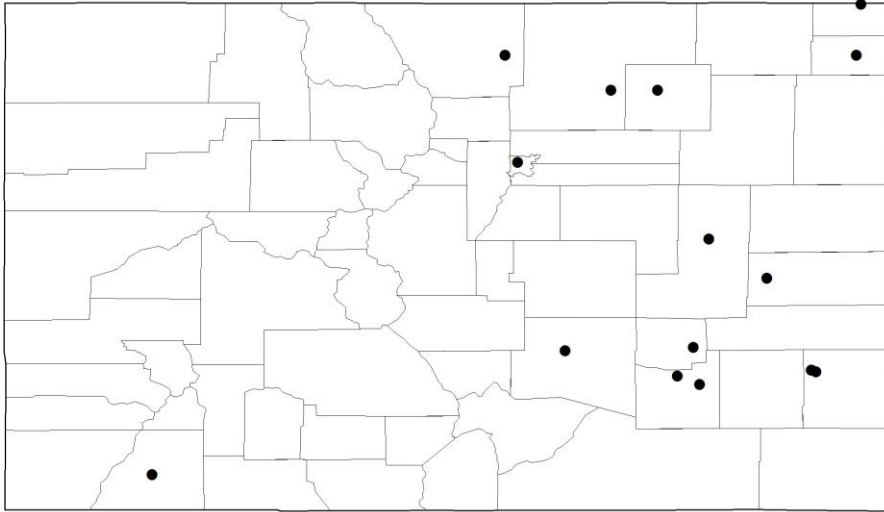
- *Epicauta alator*



153

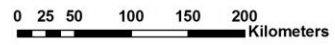
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Figures 154-155. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 154. *Epicauta albida*.
155. *Epicauta andersoni*.

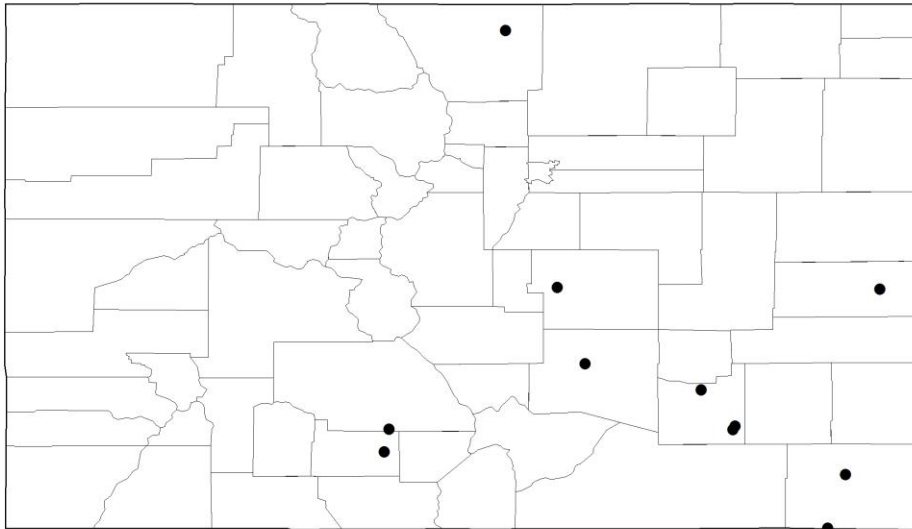


Legend

● *Epicauta albida*

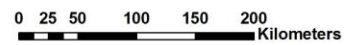


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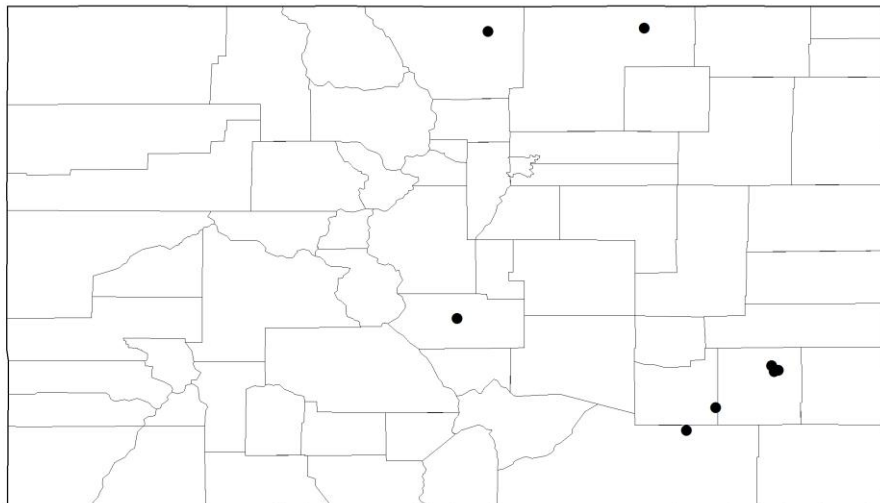
● *Epicauta andersoni*



155

214

Figures 156-157. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 156. *Epicauta apache*.
157. *Epicauta aspera*.

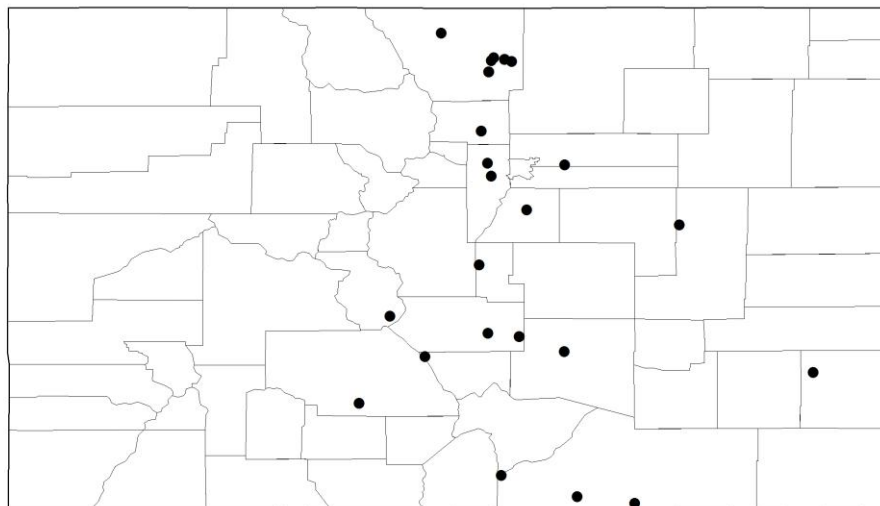


Legend

● *Epicauta apache*

0 25 50 100 150 200
Kilometers

156



Legend

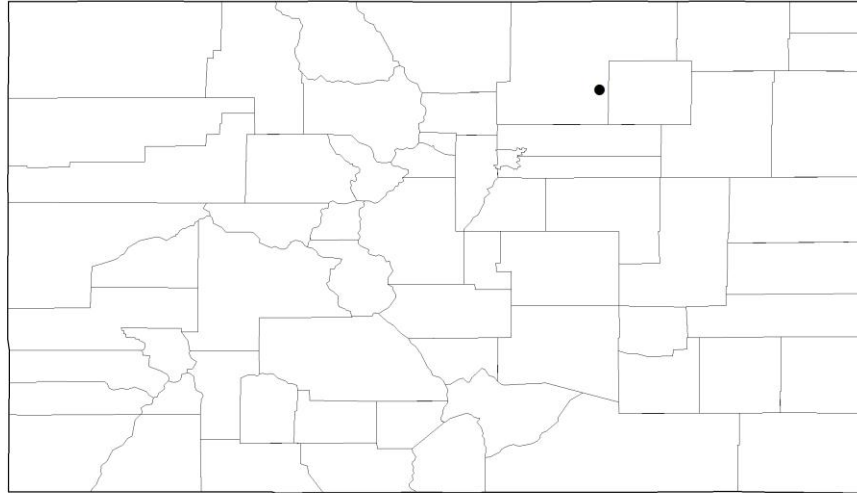
● *Epicauta aspera*

0 25 50 100 150 200
Kilometers

157

216

Figures 158-159. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 158. *Epicauta atrata*.
159. *Epicauta atrivittata*.

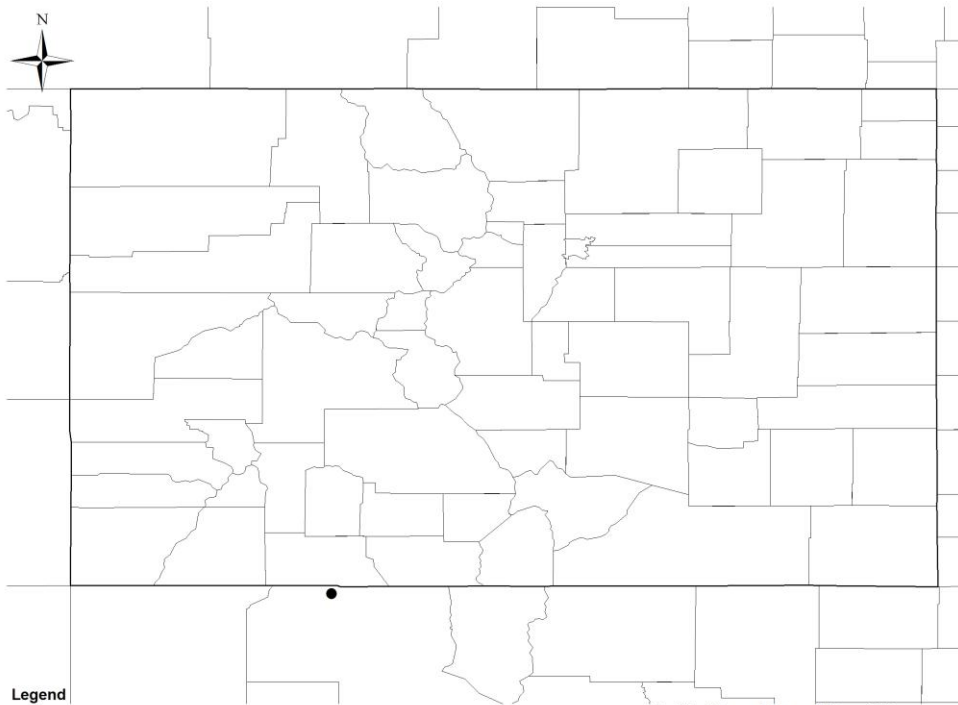


Legend

- *Epicauta atrtata*

0 25 50 100 150 200 Kilometers

158



Legend

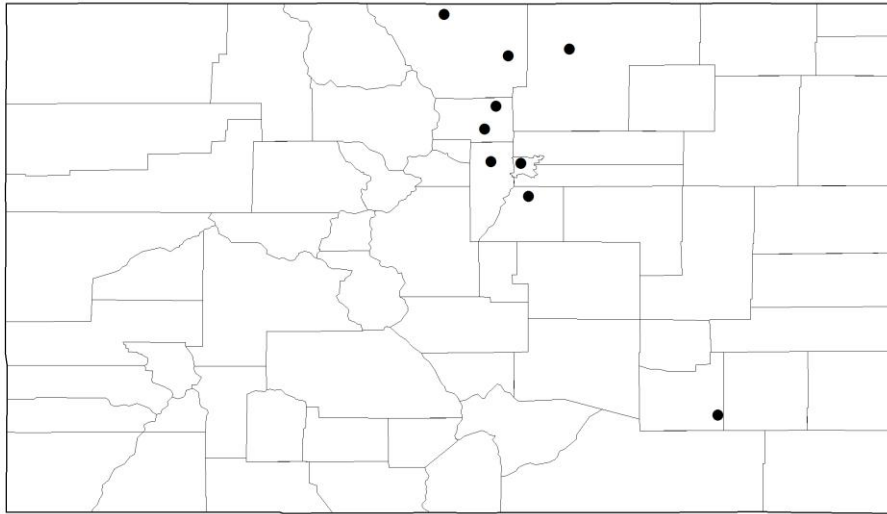
- *Epicauta atrivittata*

0 25 50 100 150 200 Kilometers

159

218

Figures 160-161. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 160. *Epicauta atropos*.
161. *Epicauta callosa*.

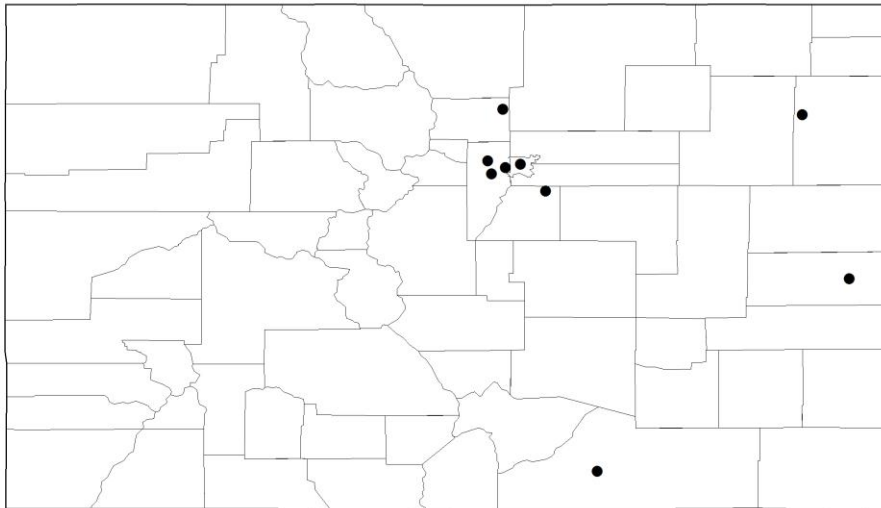


Legend

- *Epicauta atropos*



160



Legend

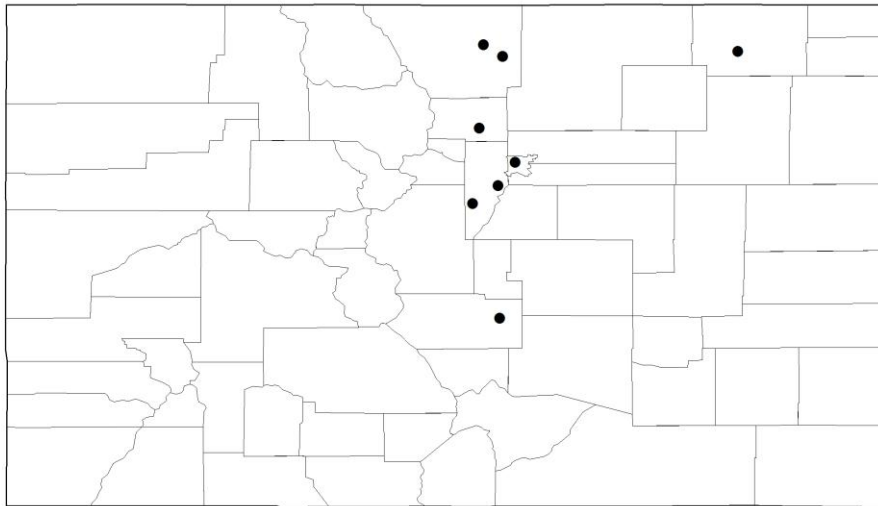
- *Epicauta callosa*



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Figures 162-163. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 162. *Epicauta cinerea*.
163. *Epicauta corvina*.

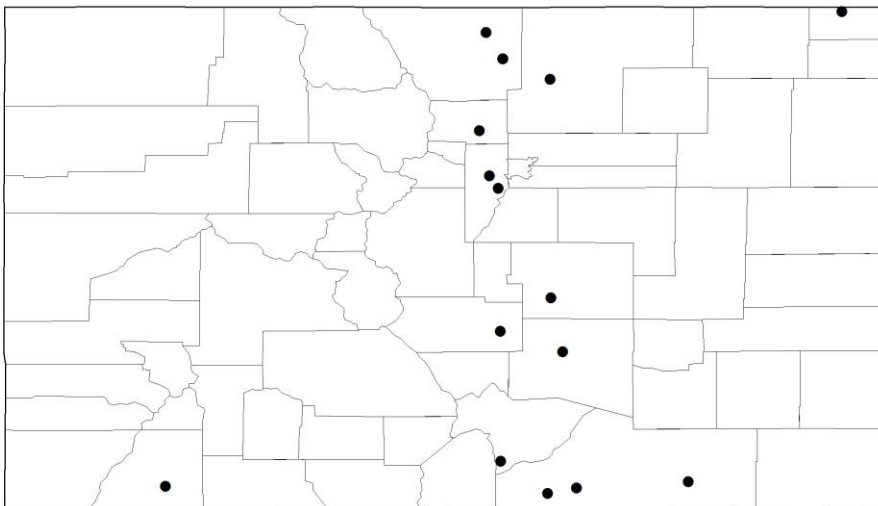


Legend

● *Epicauta cinerea*

0 25 50 100 150 200 Kilometers

162



Legend

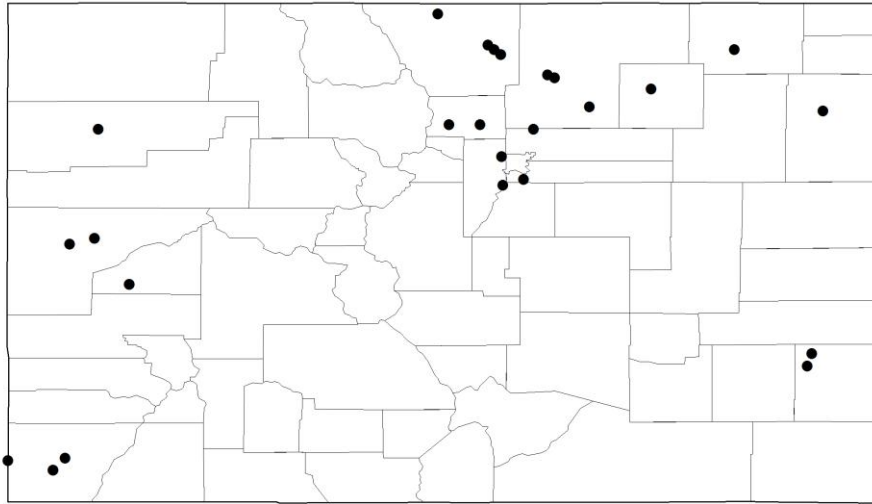
● *Epicauta corvina*

0 25 50 100 150 200 Kilometers

163

222

Figures 164-165. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 164. *Epicauta fabricii*.
165. *Epicauta ferruginea*.

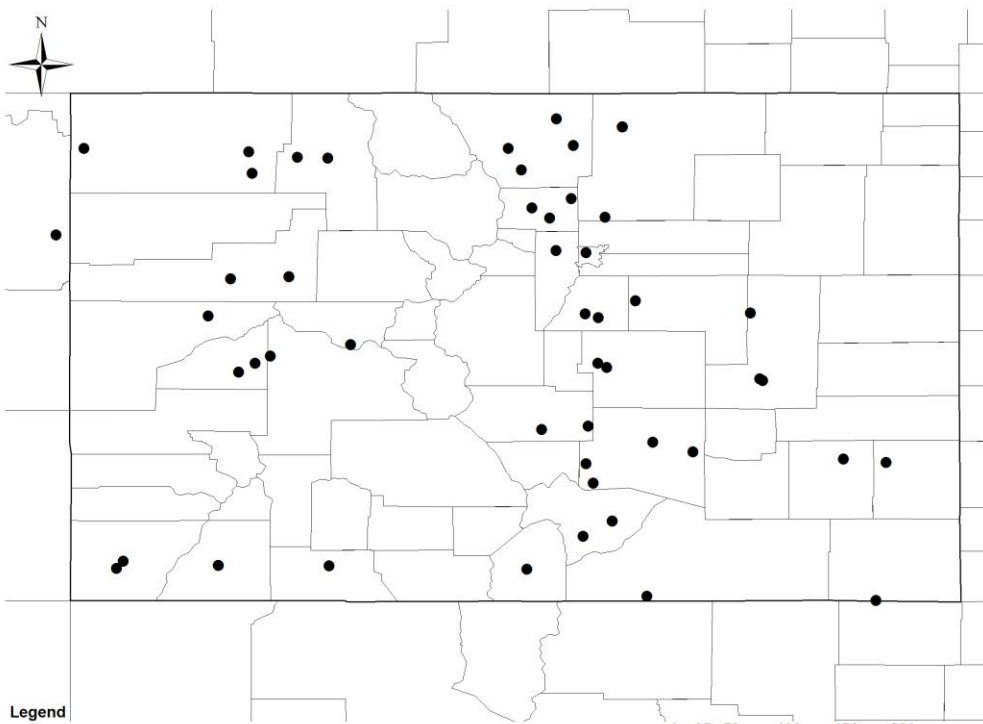


Legend

● *Epicauta fabricii*

0 25 50 100 150 200 Kilometers

164



Legend

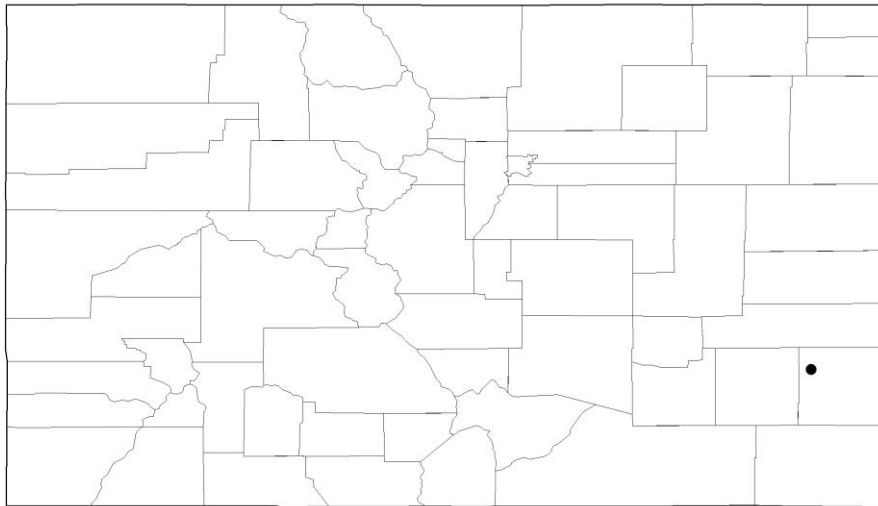
● *Epicauta ferruginea*

0 25 50 100 150 200 Kilometers

165

224

Figures 166-167. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 166. *Epicauta funebris*.
167. *Epicauta immaculata*.

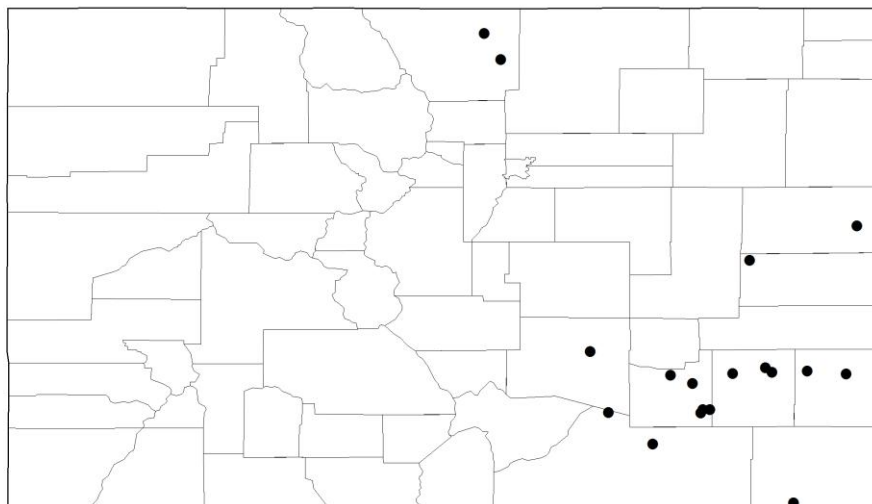


Legend

● *Epicauta funebris*

0 25 50 100 150 200 Kilometers

166



Legend

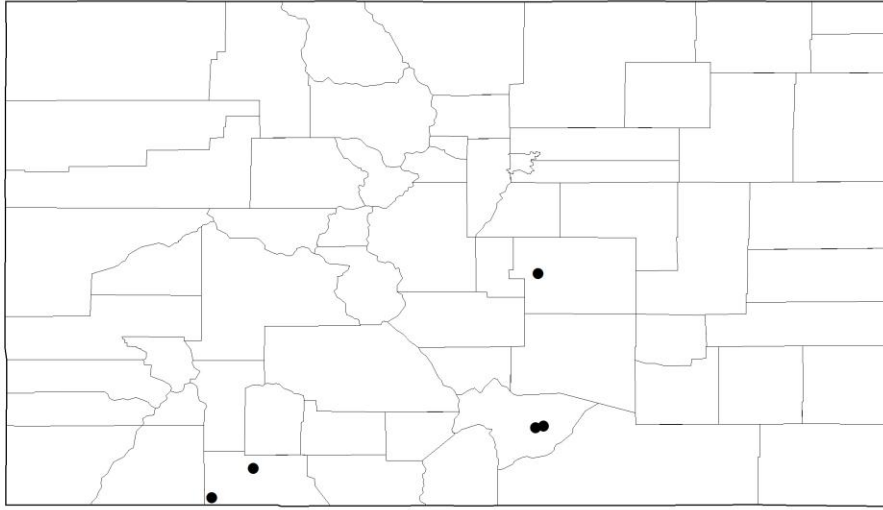
● *Epicauta immaculata*

0 25 50 100 150 200 Kilometers

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Figures 168-169. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 168. *Epicauta ingrata*.
169. *Epicauta jeffersi*.

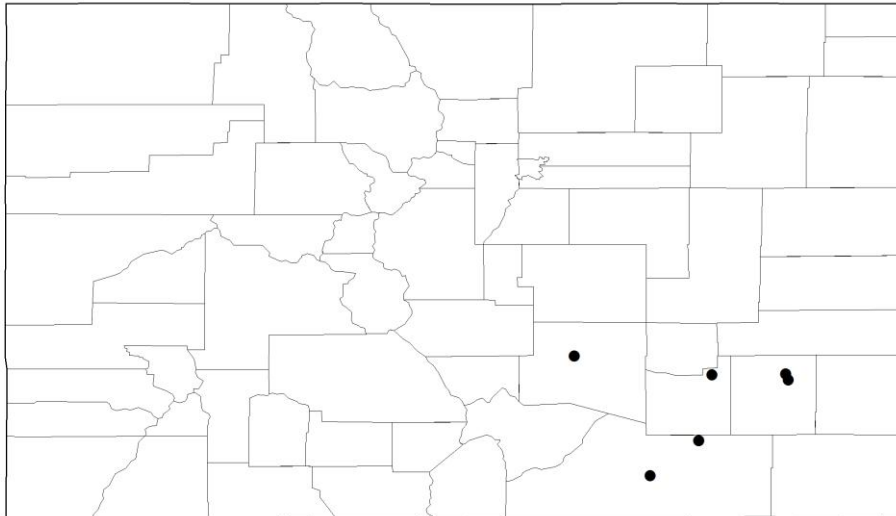


Legend

● *Epicauta ingrata*

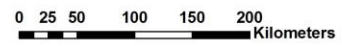


168



Legend

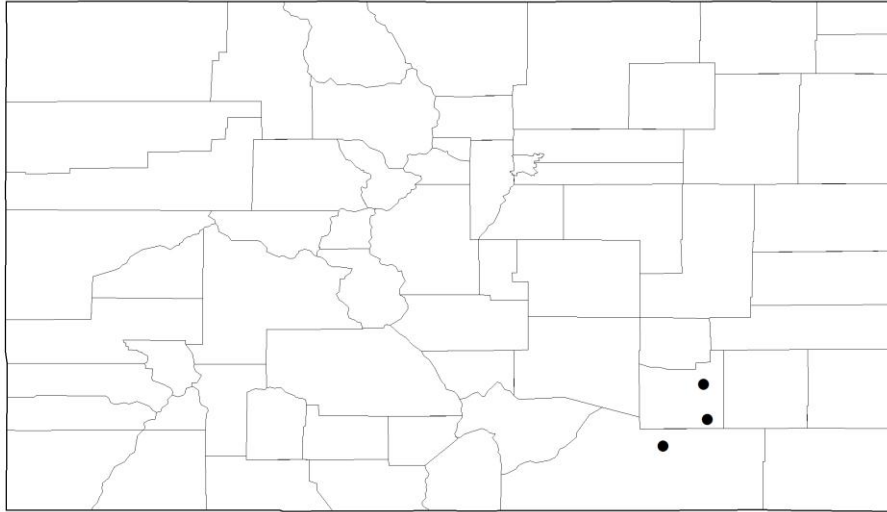
● *Epicauta jeffersi*



169

228

Figures 170-171. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 170. *Epicauta longicollis*.
171. *Epicauta maculata*.

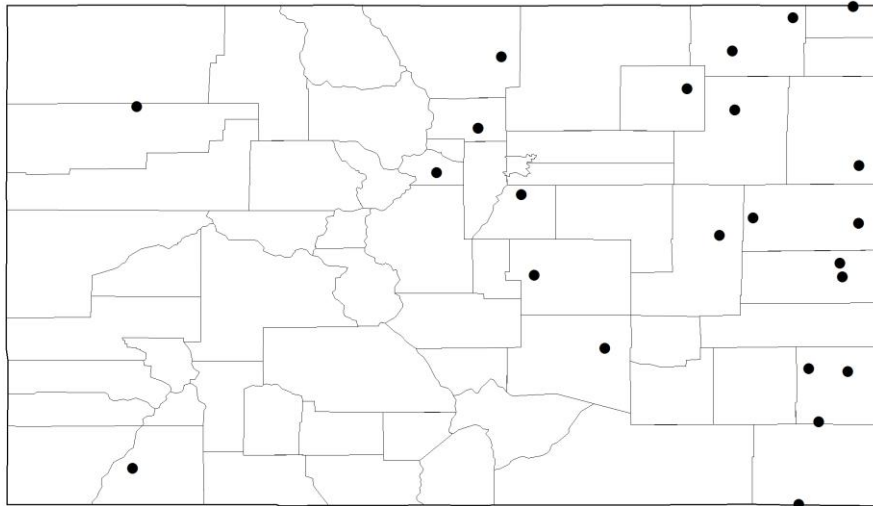


Legend

- *Epicauta longicollis*



170



Legend

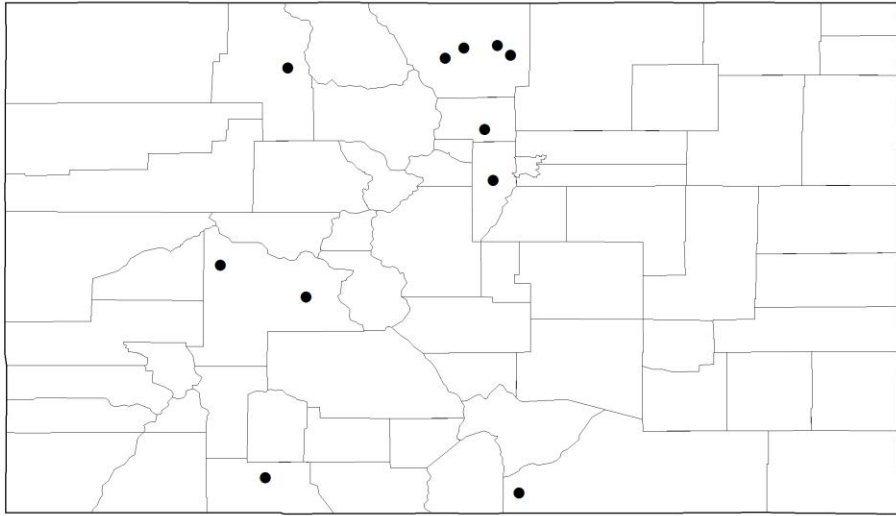
- *Epicauta maculata*



171

230

Figures 172-173. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 172. *Epicauta murina*.
173. *Epicauta normalis*.

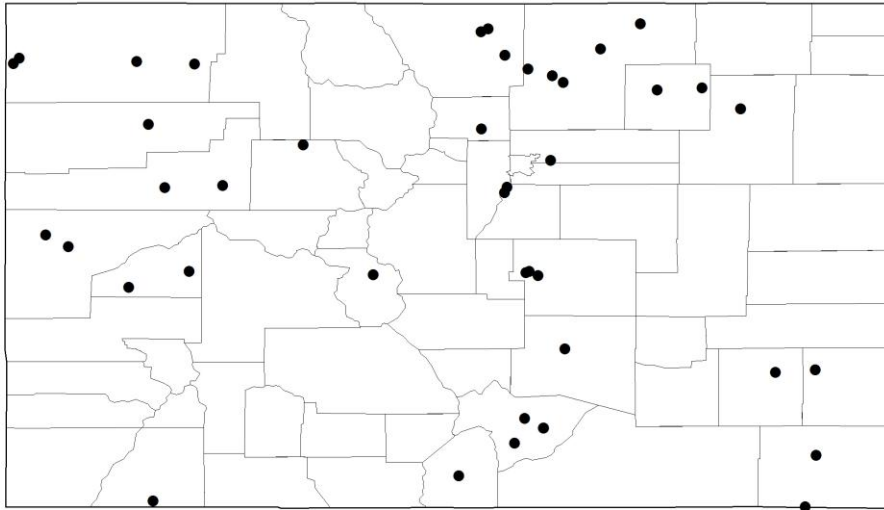


Legend

● *Epicauta murina*

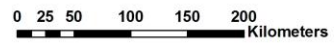


172



Legend

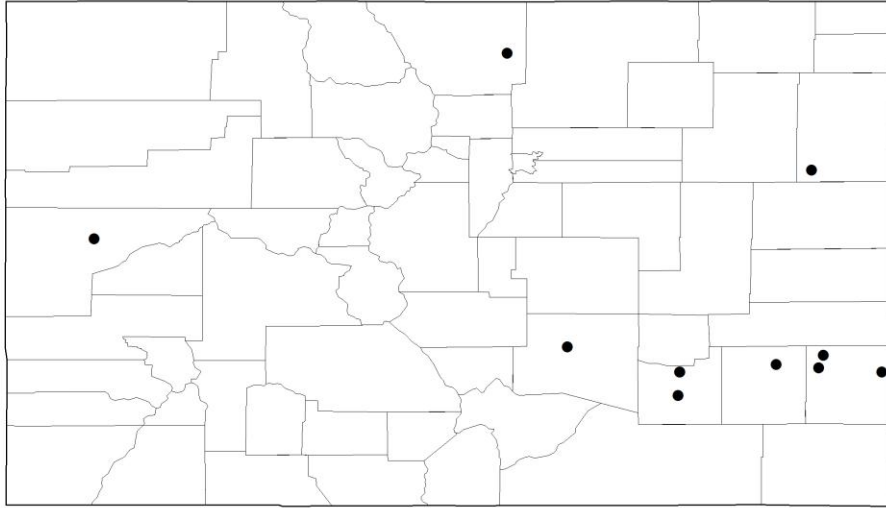
● *Epicauta normalis*



173

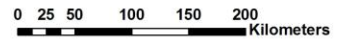
232

Figures 174-175. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 174. *Epicauta occidentalis*. 175. *Epicauta ochrea*.

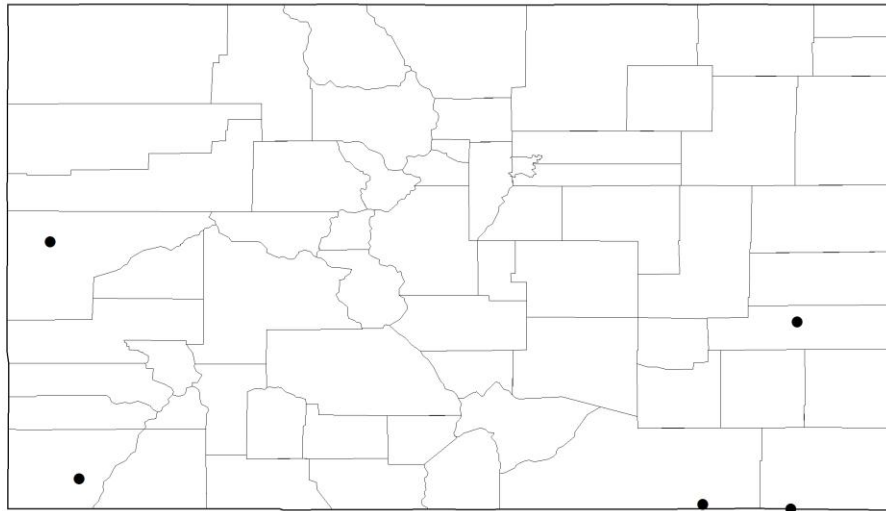


Legend

● *Epicauta occidentalis*



174



Legend

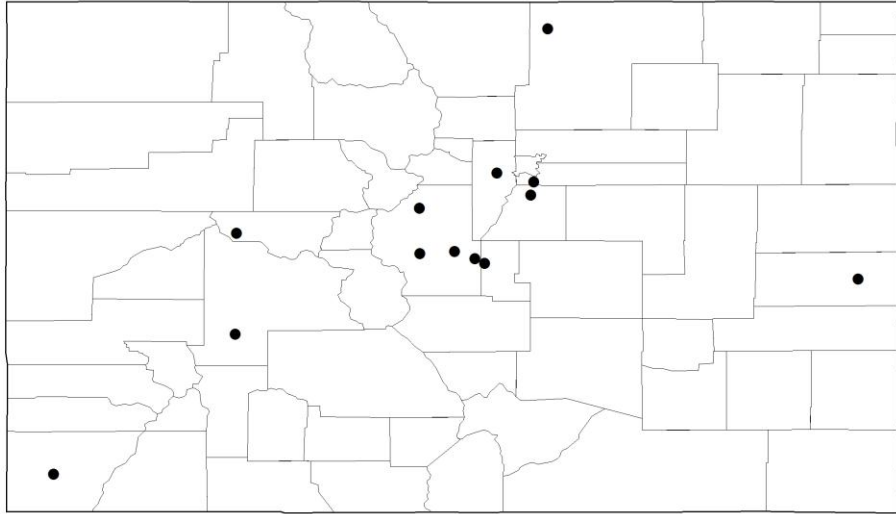
● *Epicauta ochrea*



175

234

Figures 176-177. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 176. *Epicauta oregona*.
177. *Epicauta parkeri*.

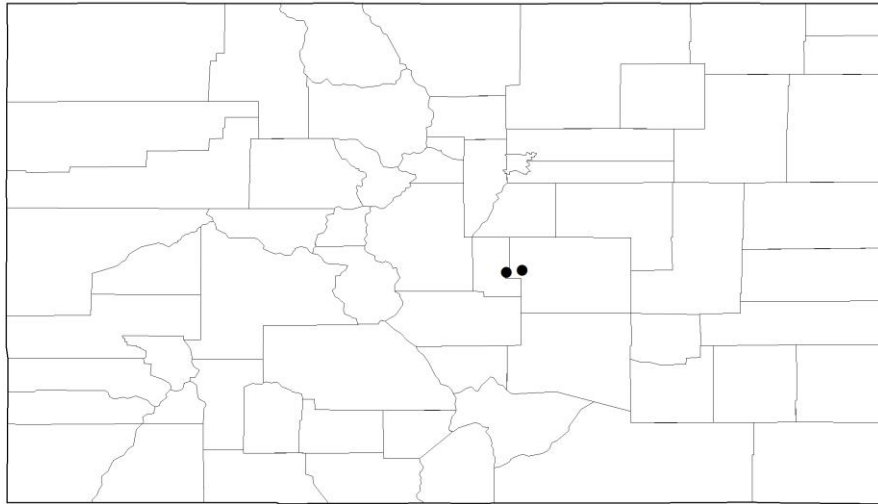


Legend

● *Epicauta oregona*



176



Legend

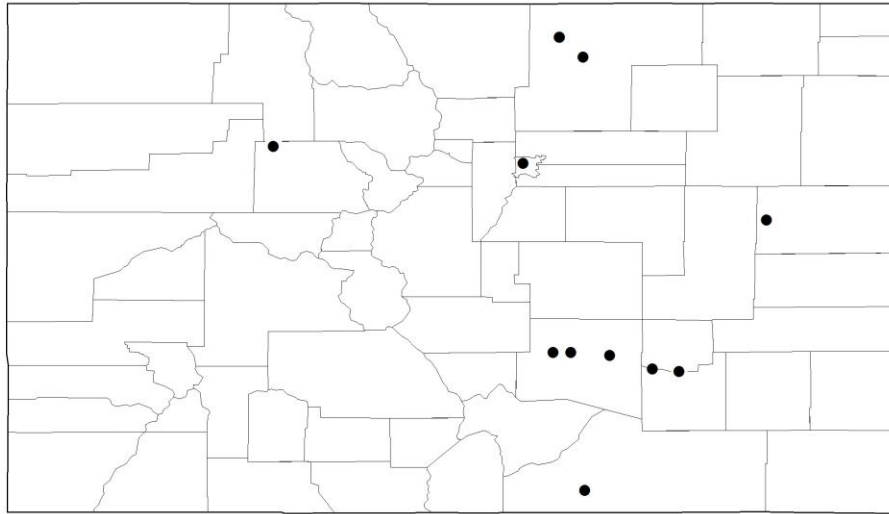
● *Epicauta parkeri*



177

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Figures 178-179. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 178. *Epicauta parvula*. 179. *Epicauta pensylvanica*.

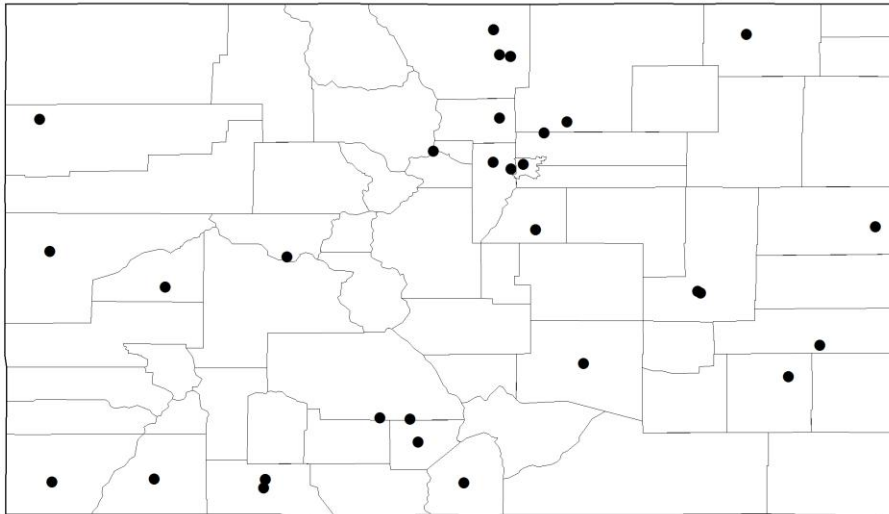


Legend

● *Epicauta parvula*

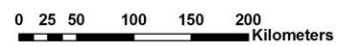


178



Legend

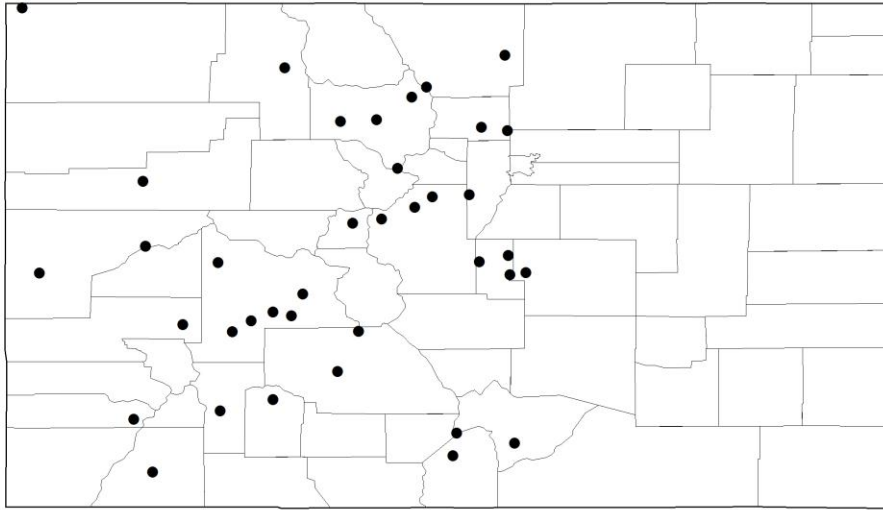
● *Epicauta pensylvanica*



179

238

Figures 180-181. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 180. *Epicauta pruinosa*.
181. *Epicauta segmenta*.

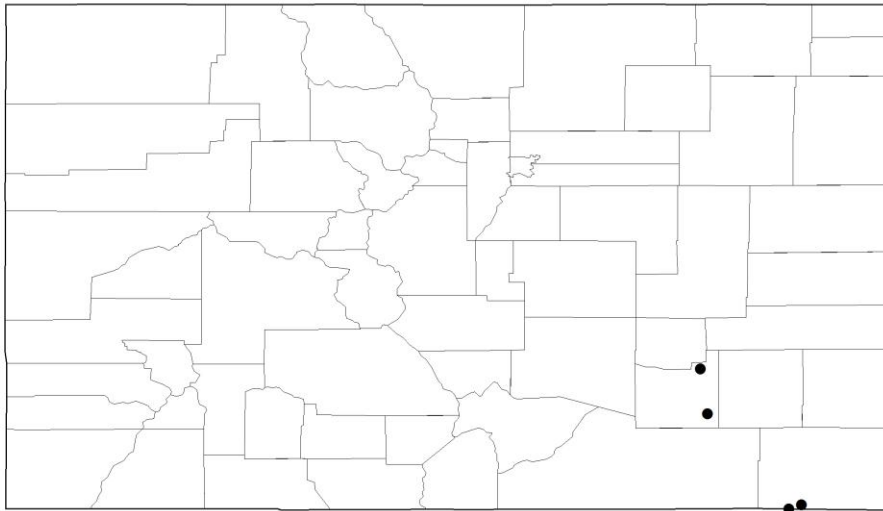


Legend

● *Epicauta pruinosa*

0 25 50 100 150 200
Kilometers

180



Legend

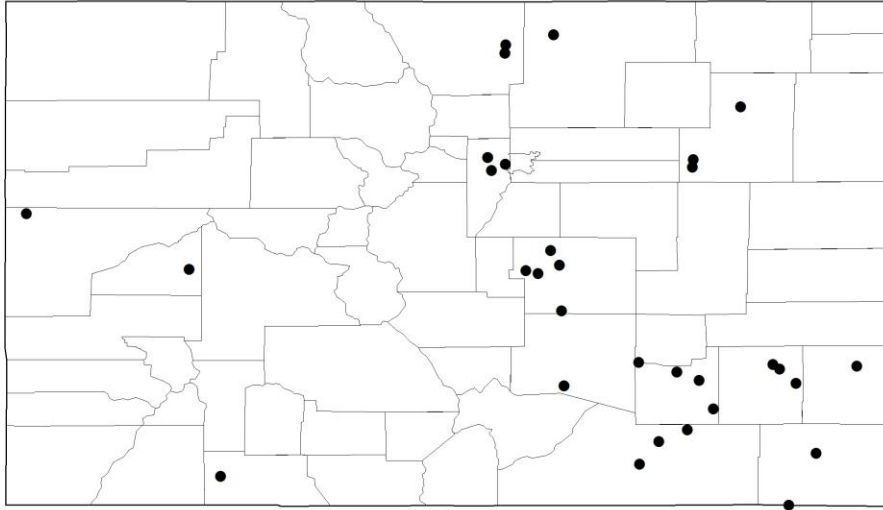
● *Epicauta segmenta*

0 25 50 100 150 200
Kilometers

181

240

Figures 182-183. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 182. *Epicauta sericans*.
183. *Epicauta stuarti*.

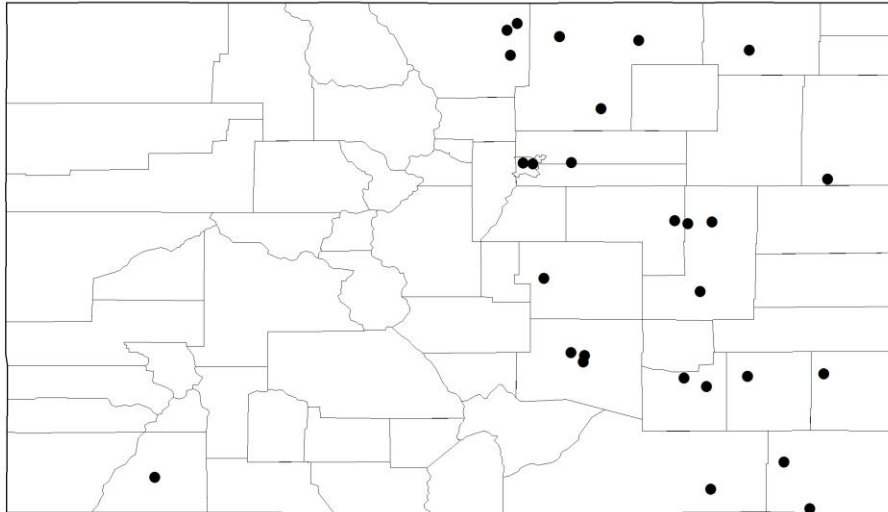


Legend

● *Epicauta sericans*

0 25 50 100 150 200 Kilometers

182



Legend

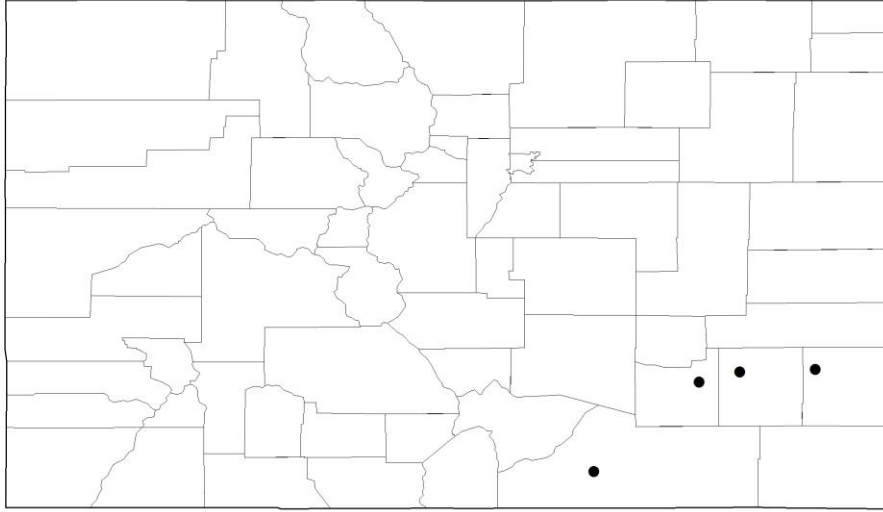
● *Epicauta stuarti*

0 25 50 100 150 200 Kilometers

183

242

Figures 184-185. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 184. *Epicauta uniforma*.
185. *Epicauta valida*.

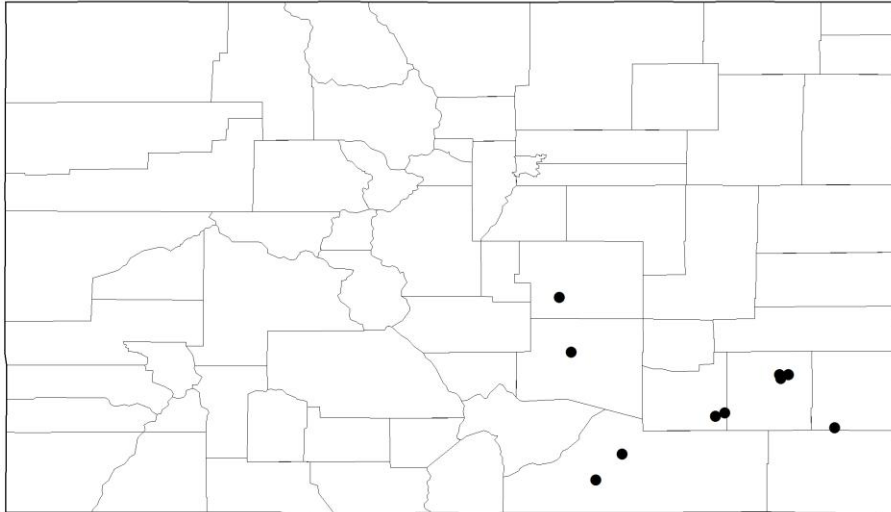


Legend

● *Epicauta uniforma*

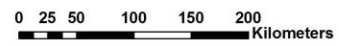


184



Legend

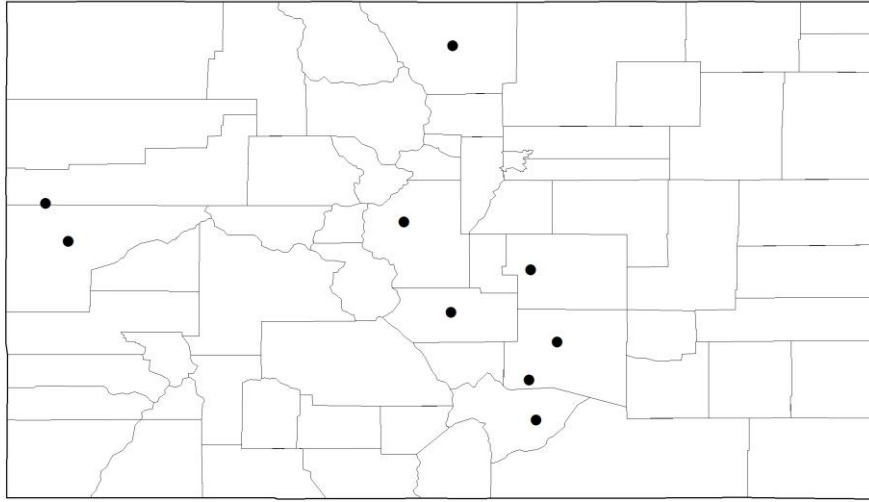
● *Epicauta valida*



185

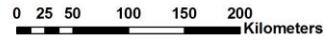
244

Figures 186-187. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 186. *Epicauta ventralis*.
187. *Eupompha edmundsi*.

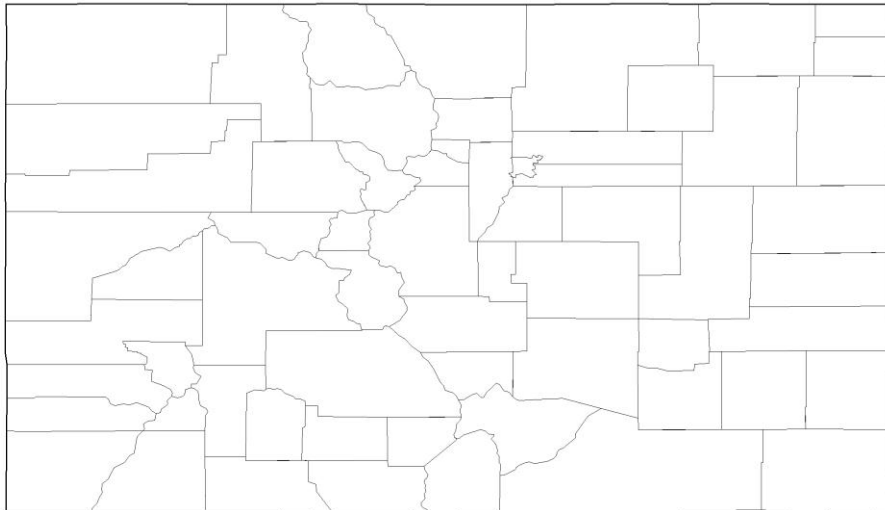


Legend

- *Epicauta vertralis*

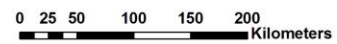


186



Legend

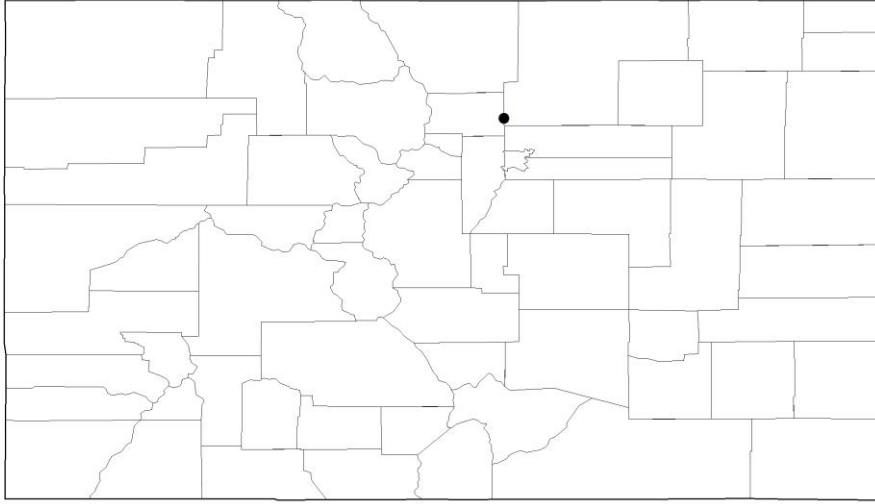
- *Eupompha edmundsi*



187

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Figures 188-189. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 188. *Eupompha viridis*.
189. *Gnathium minimum*.

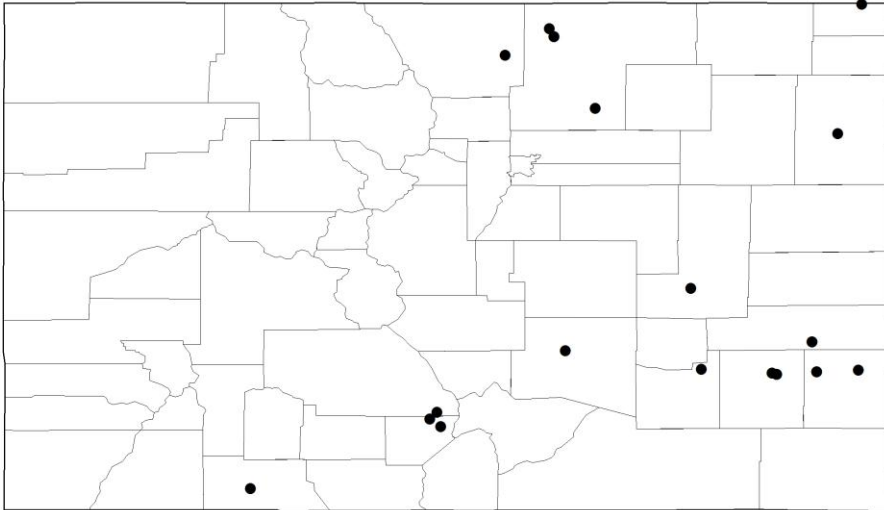


Legend

- *Eupompha viridis*

0 25 50 100 150 200 Kilometers

188



Legend

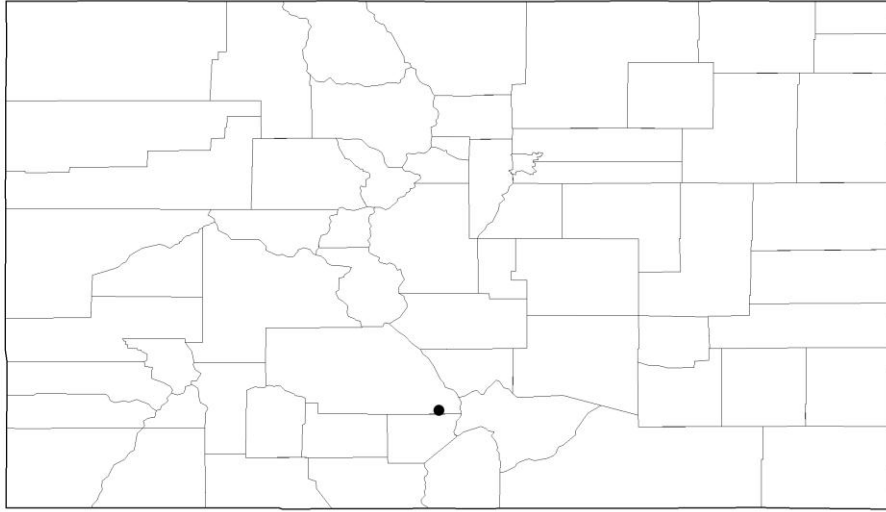
- *Gnathium minimum*

0 25 50 100 150 200 Kilometers

189

248

Figures 190-191. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 190. *Gnathium nitidum*.
191. *Hornia minutipennis*.

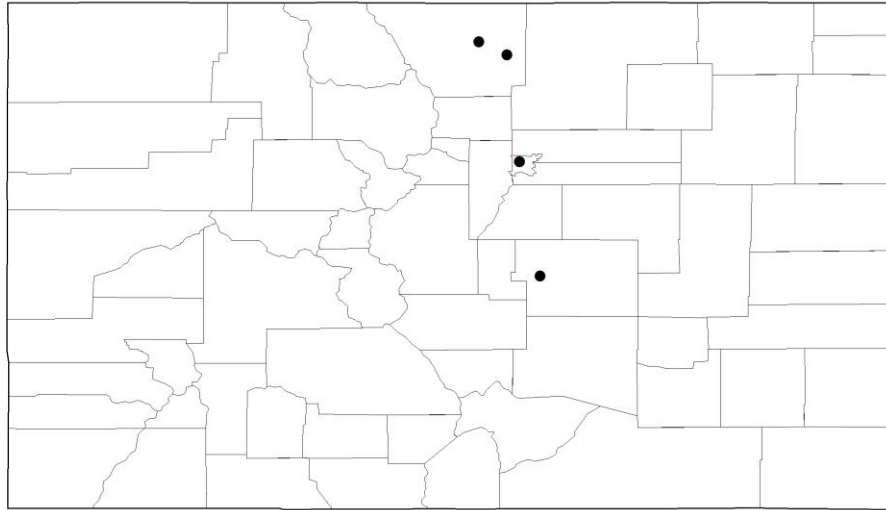


Legend

● *Gnathium nitidum*

0 25 50 100 150 200
Kilometers

190



Legend

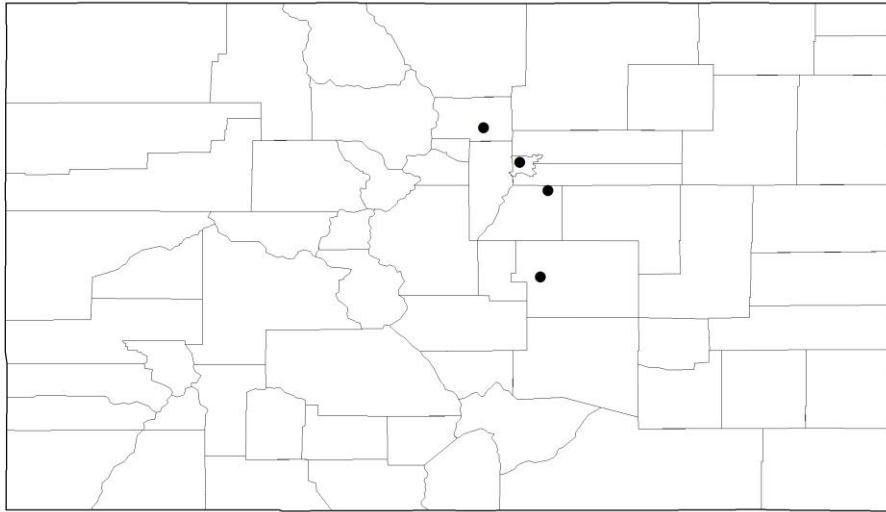
● *Hornia minutipennis occidentalis*

0 25 50 100 150 200
Kilometers

191

250

Figures 192-193. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 192. *Hornia mexicana neomexicana*. 193. *Linsleya convexa*.

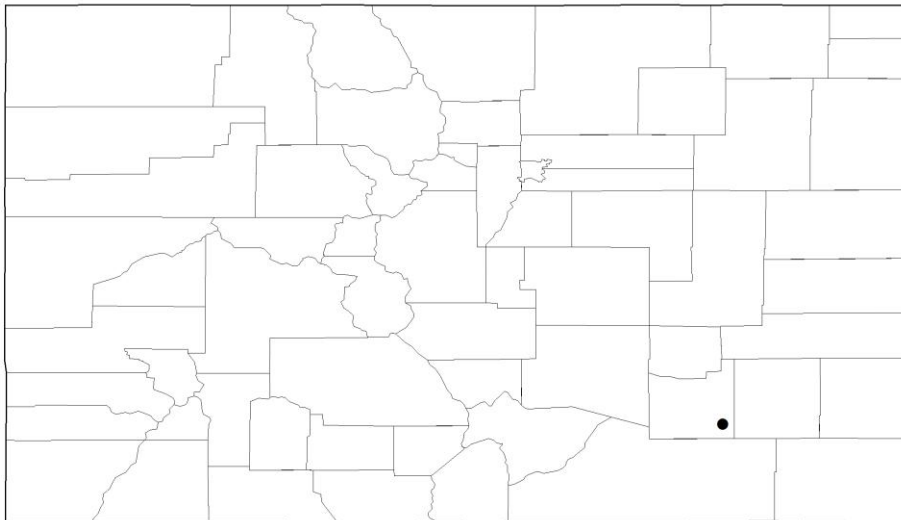


Legend

● *Hormia neomexicana*

0 25 50 100 150 200
Kilometers

192



Legend

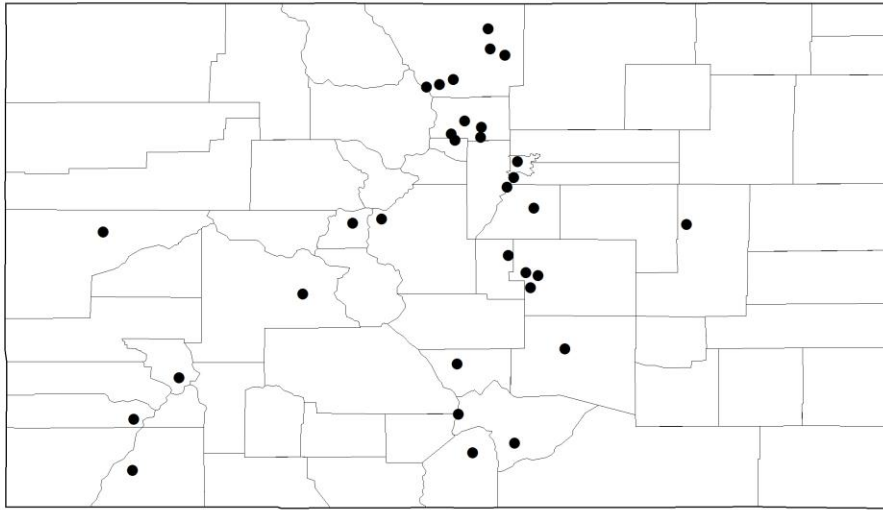
● *Linsleya convexa*

0 25 50 100 150 200
Kilometers

193

252

Figures 194-195. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 194. *Linsleya sphaericollis*. 195. *Lytta biguttata*.

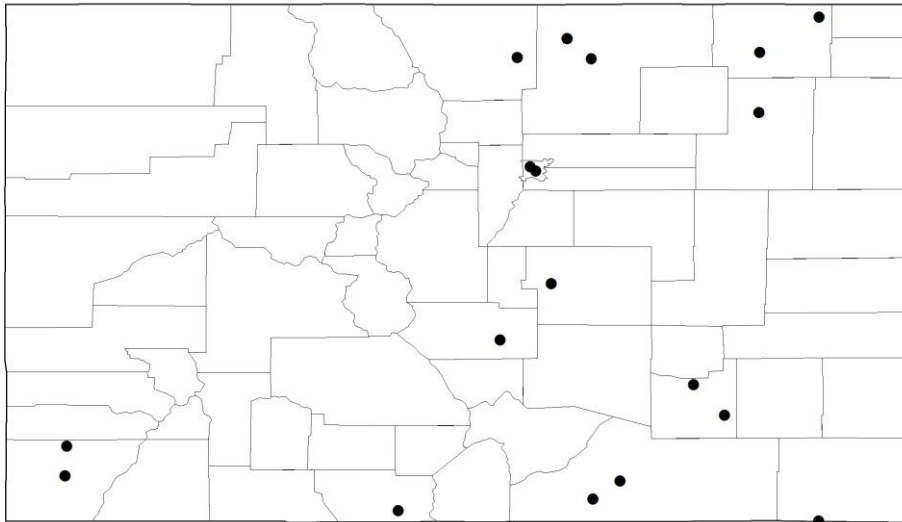


Legend

● *Linsleya sphaericollis*

0 25 50 100 150 200
Kilometers

194



Legend

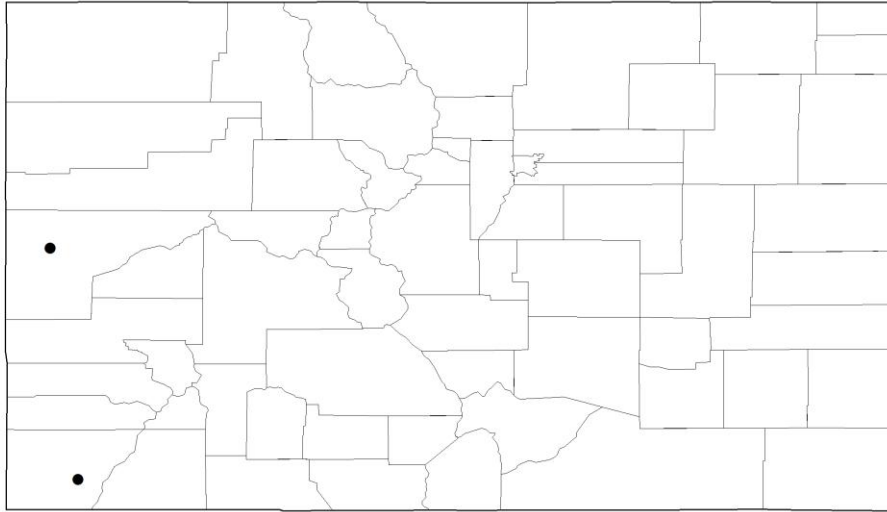
● *Lytta biguttata*

0 25 50 100 150 200
Kilometers

195

254

Figures 196-197. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 196. *Lytta deserticola*.
197. *Lytta fulvipennis*.

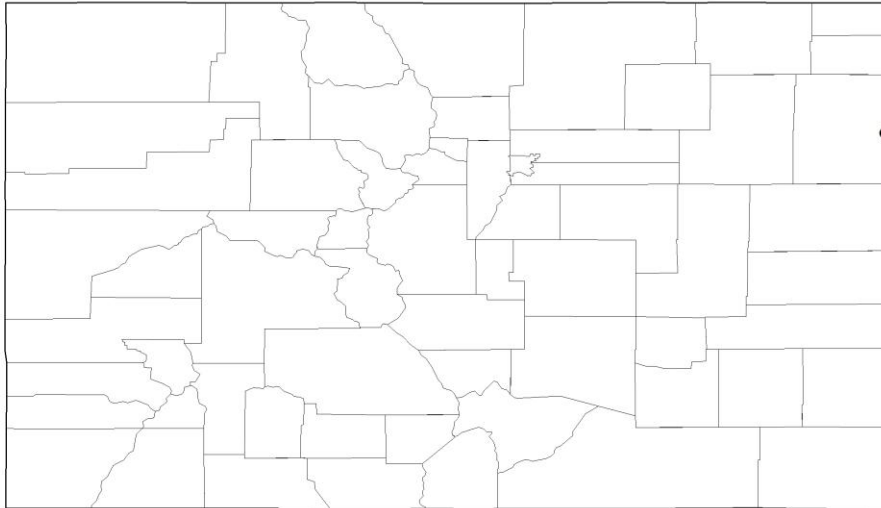


Legend

- *Lytta deserticola*

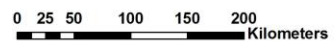


196



Legend

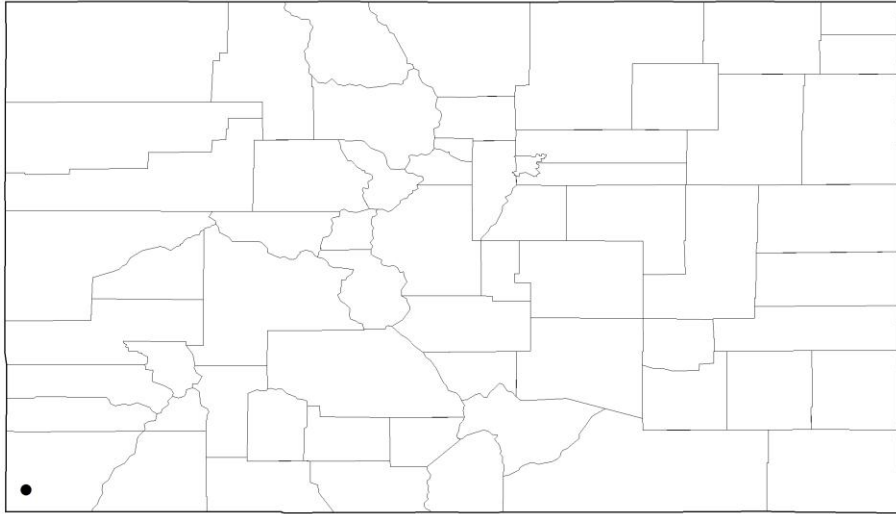
- *Lytta fulvipennis*



197

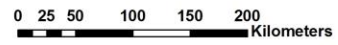
256

Figures 198-199. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 198. *Lytta navajo*. 199. *Lytta nigrocyanea*.

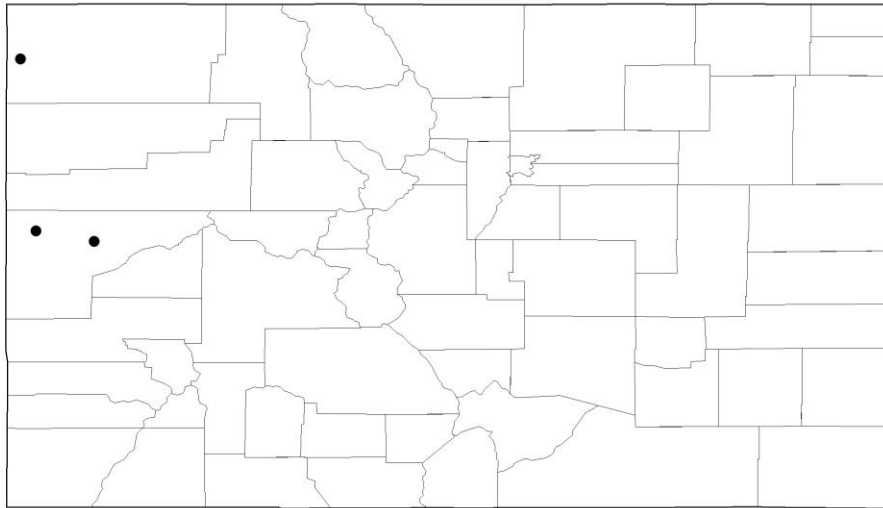


Legend

● *Lytta navajo*

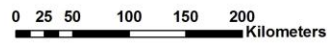


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Legend

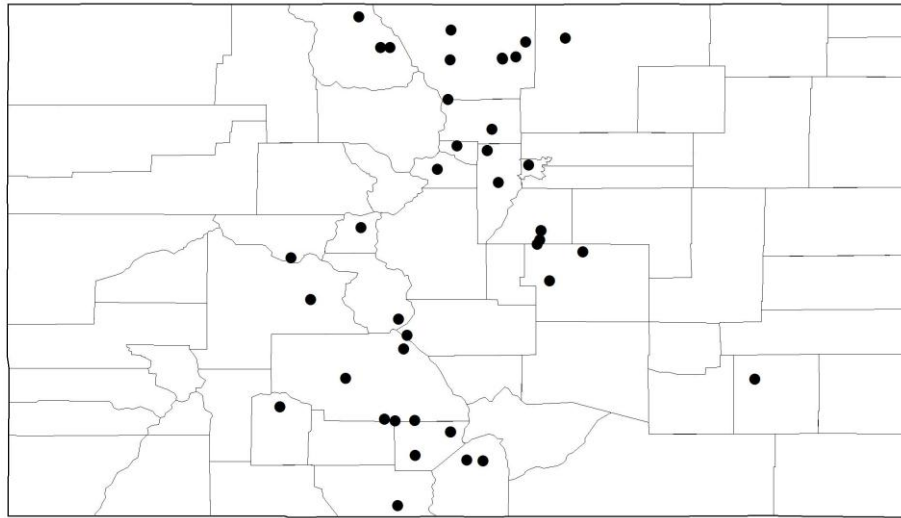
● *Lytta nigrocyanea*



199

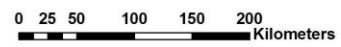
258

Figures 200-201. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 200. *Lytta nuttalli*. 201. *Lytta puberula*.

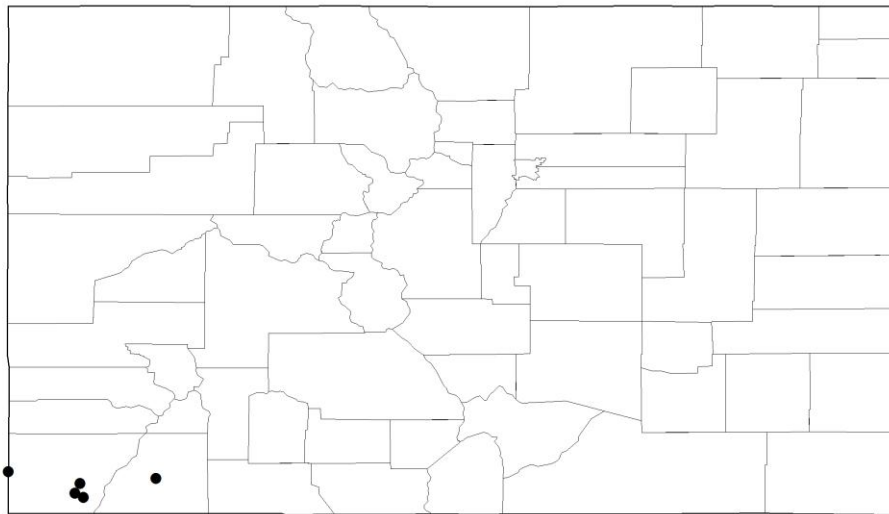


Legend

- *Lytta nuttalli*



200



Legend

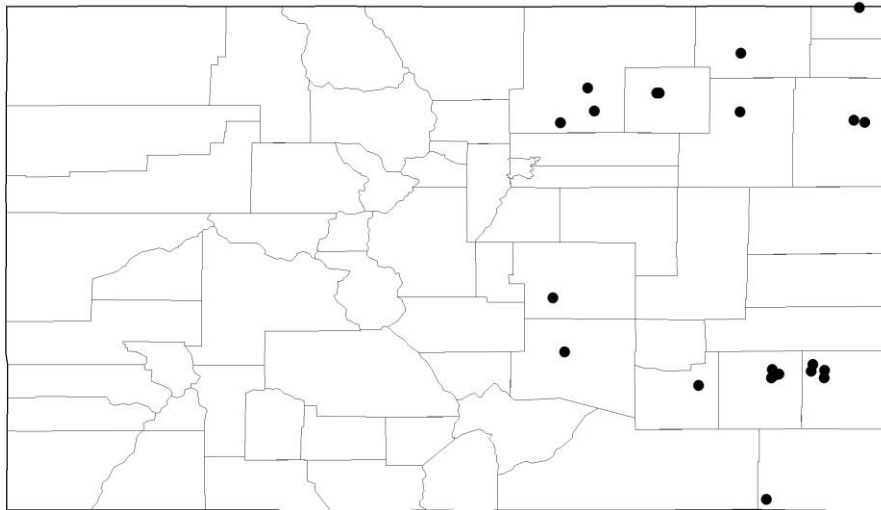
- *Lytta puberula*



201

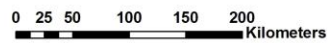
260

Figures 202-203. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 202. *Lytta reticulata*.
203. *Lytta viridana*.

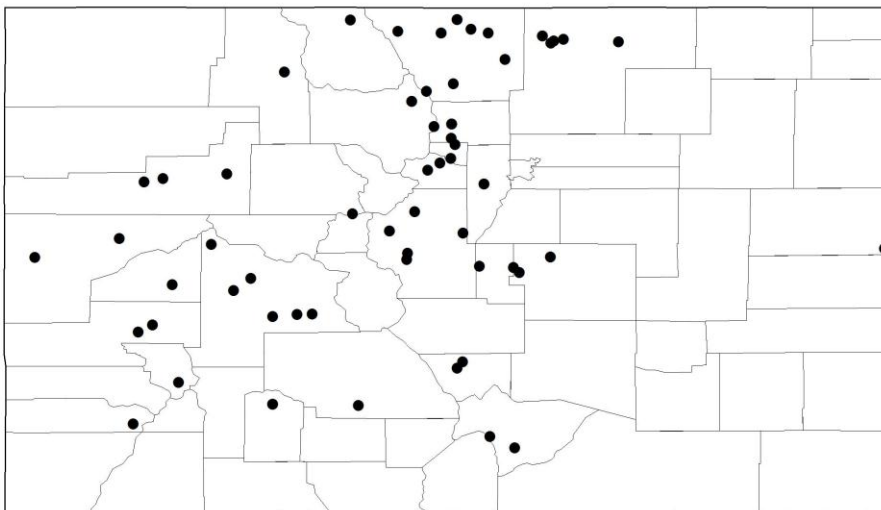


Legend

● *Lytta reticulata*

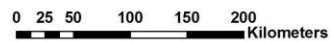


202



Legend

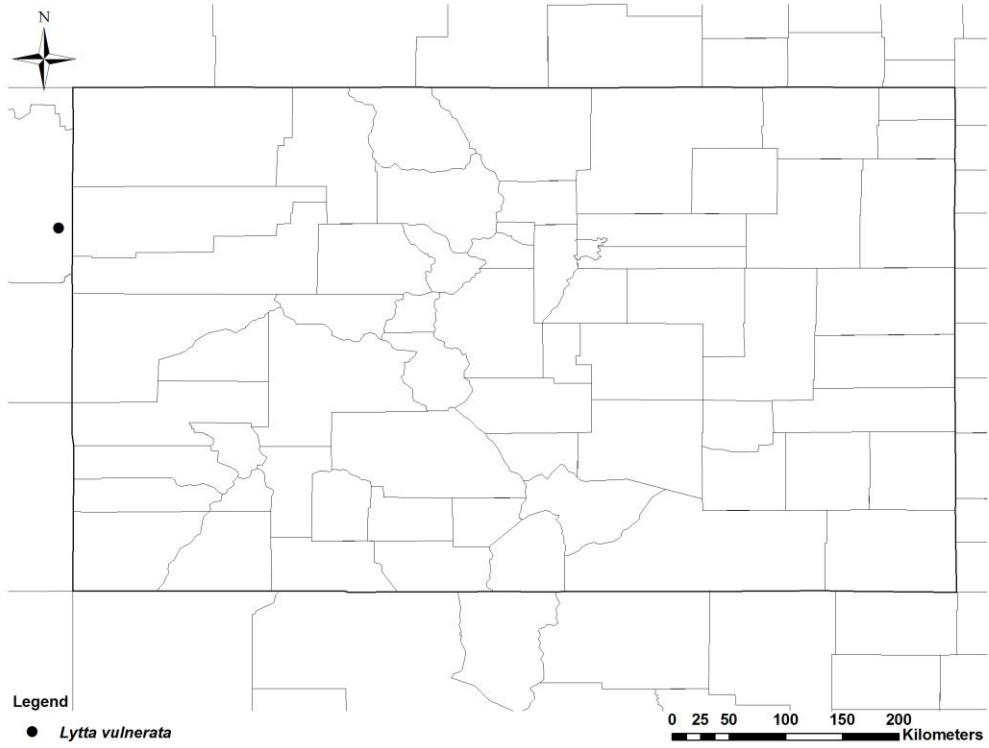
● *Lytta viridana*



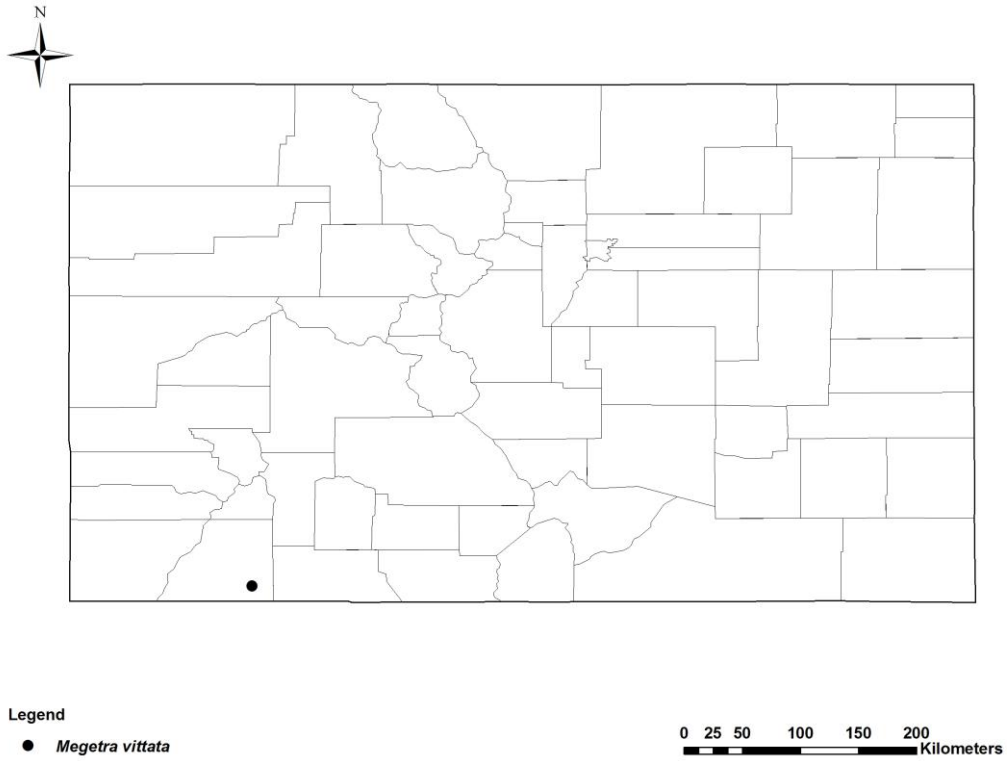
203

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Figures 204-205. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 204. *Lytta vulnerata*.
205. *Megetra vittata*.



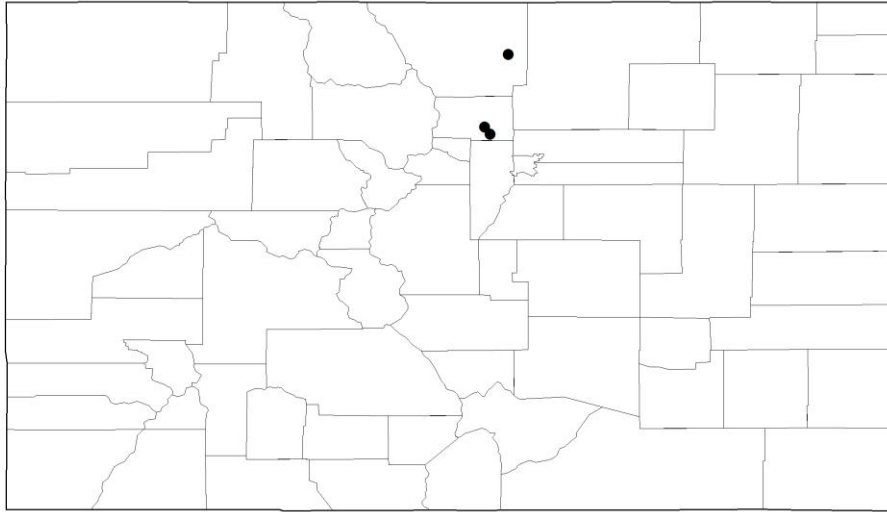
204



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Figures 206-207. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 206. *Meloe afer*. 207. *Meloe angusticollis*.

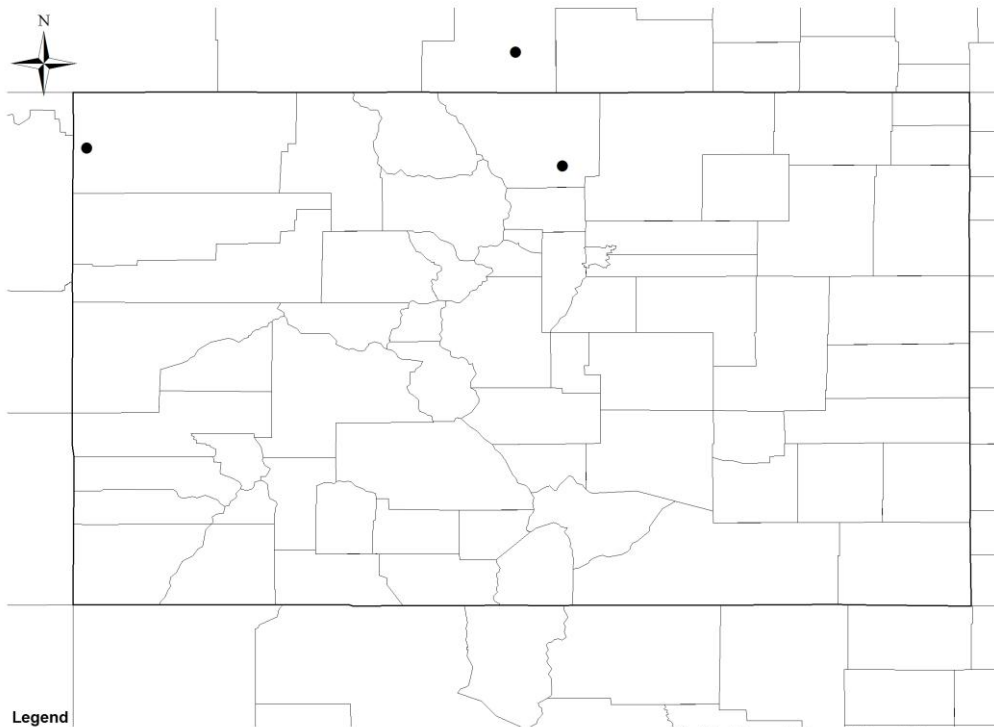


Legend

● *Meloe afer*

0 25 50 100 150 200
Kilometers

206



Legend

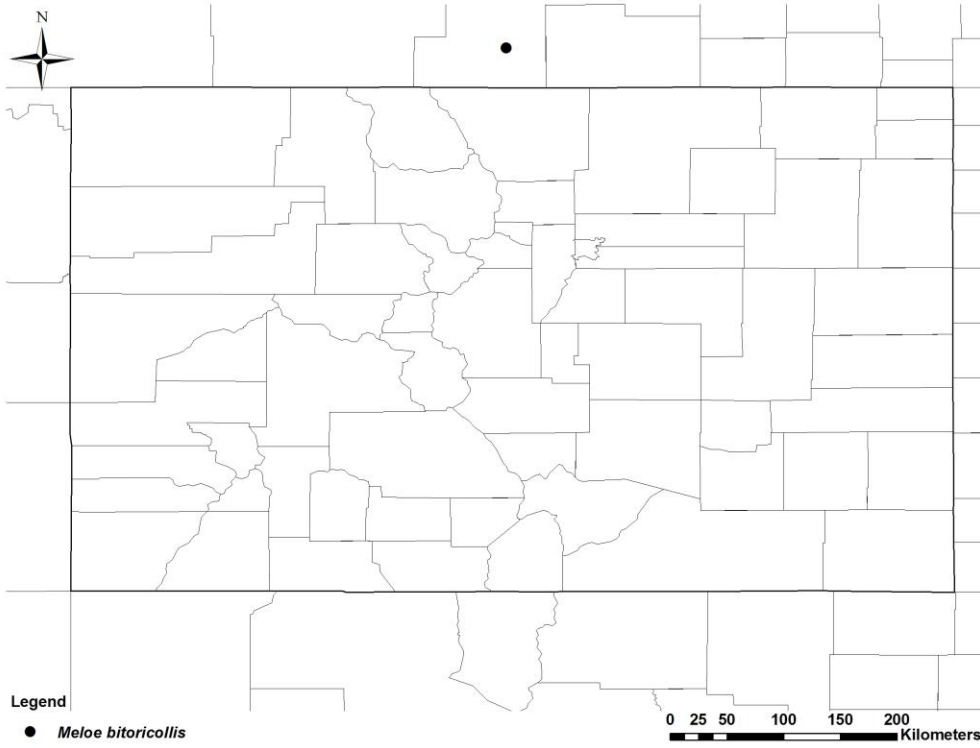
● *Meloe angusticollis*

0 25 50 100 150 200
Kilometers

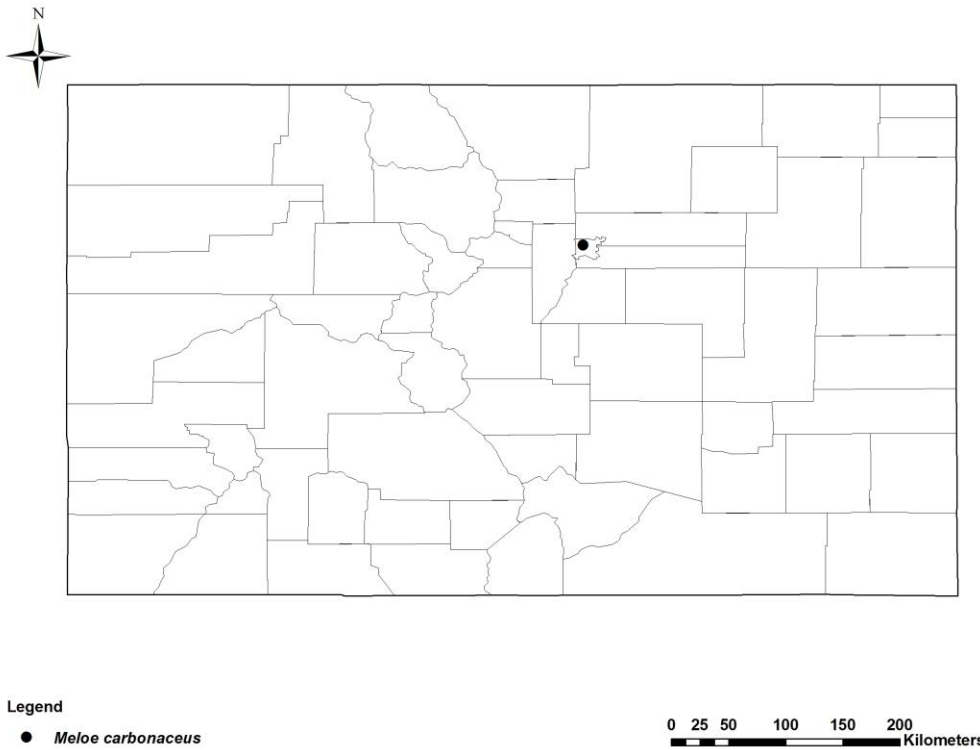
207

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Figures 208-209. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 208. *Meloe bitoricollis*.
209. *Meloe carbonaceus*.



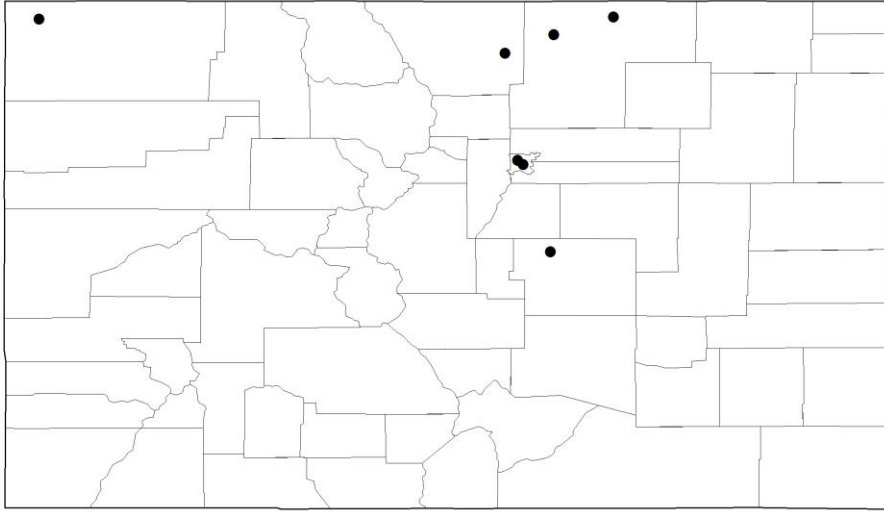
208



209

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Figures 210-211. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 210. *Meloe exiguus*. 211. *Meloe impressus*.

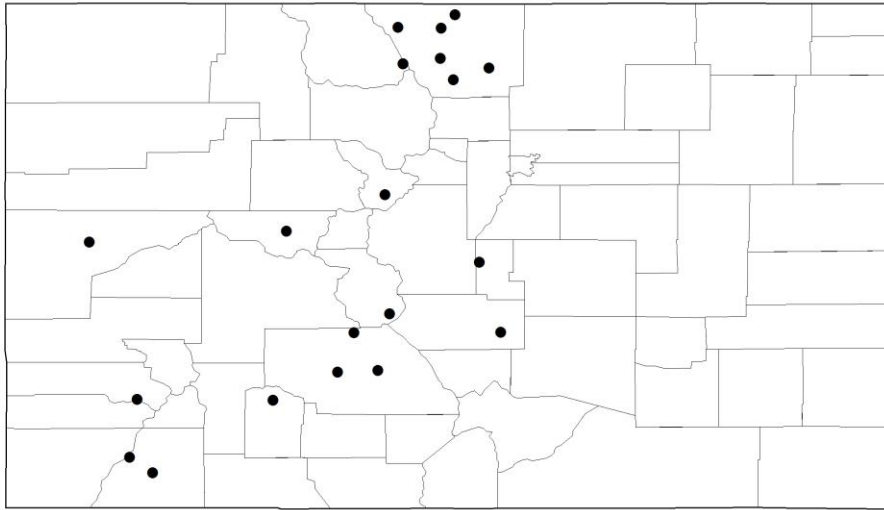


Legend

● *Meloe exiguus*

0 25 50 100 150 200
Kilometers

210



Legend

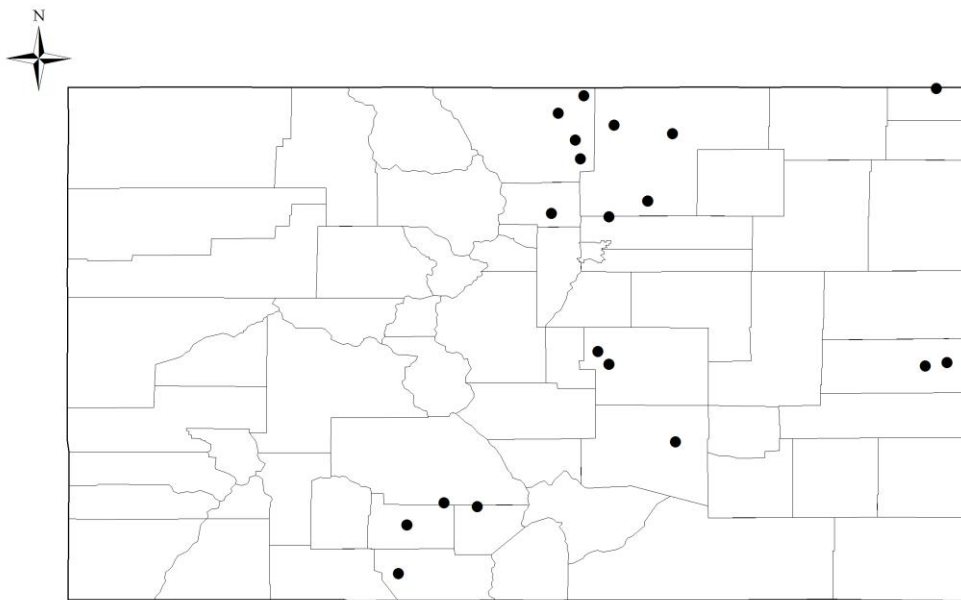
● *Meloe impressus*

0 25 50 100 150 200
Kilometers

211

270

Figures 212-213. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 212. *Meloe laevis*. 213. *Meloe niger*.

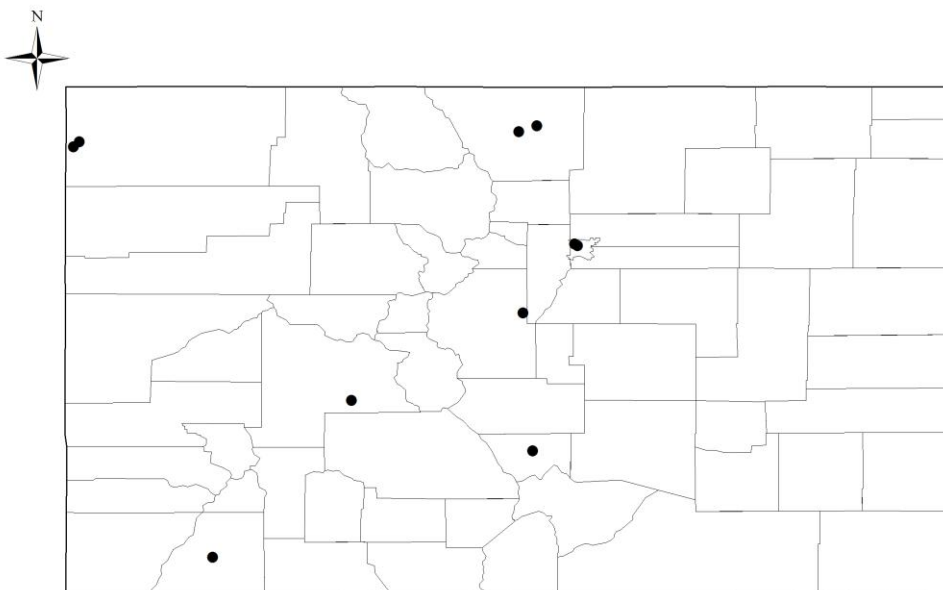


Legend

● *Meloe laevis*



212



Legend

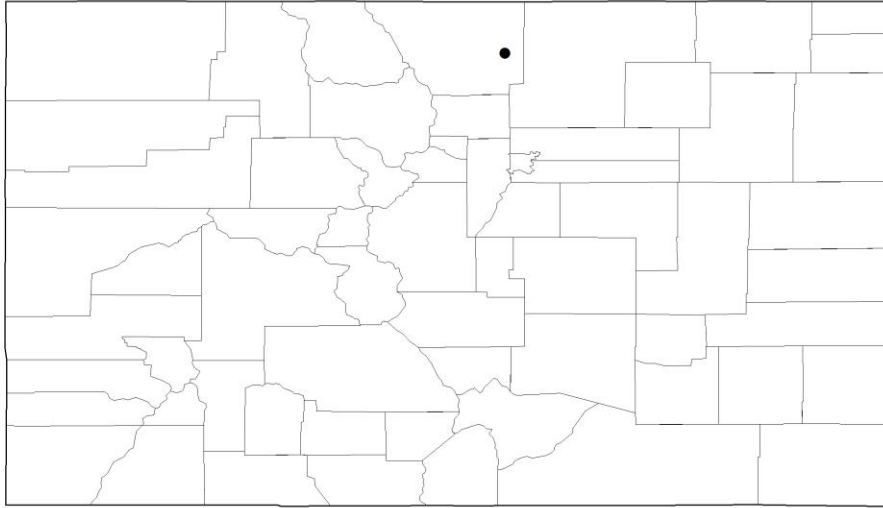
● *Meloe niger*



213

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Figures 214-215. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 214. *Meloe occultus*.
215. *Meloe vandykei*.

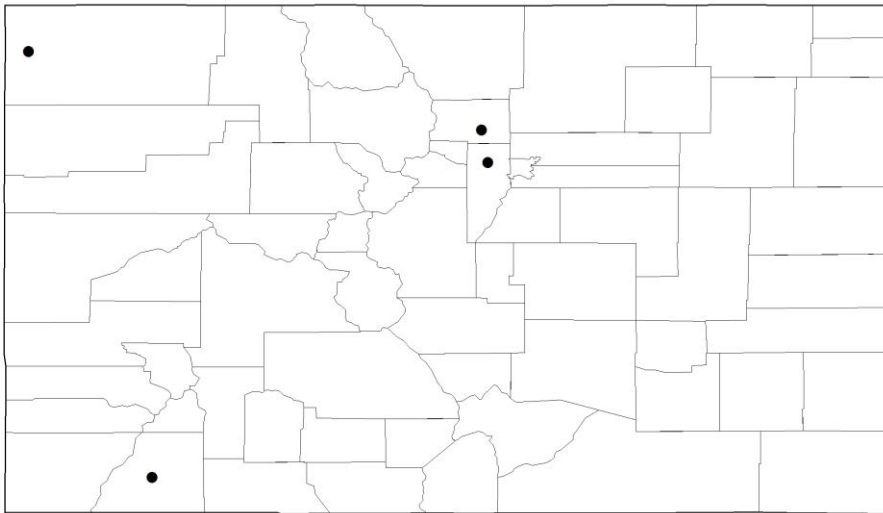


Legend

● *Meloe occultus*

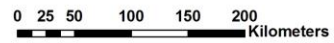


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Legend

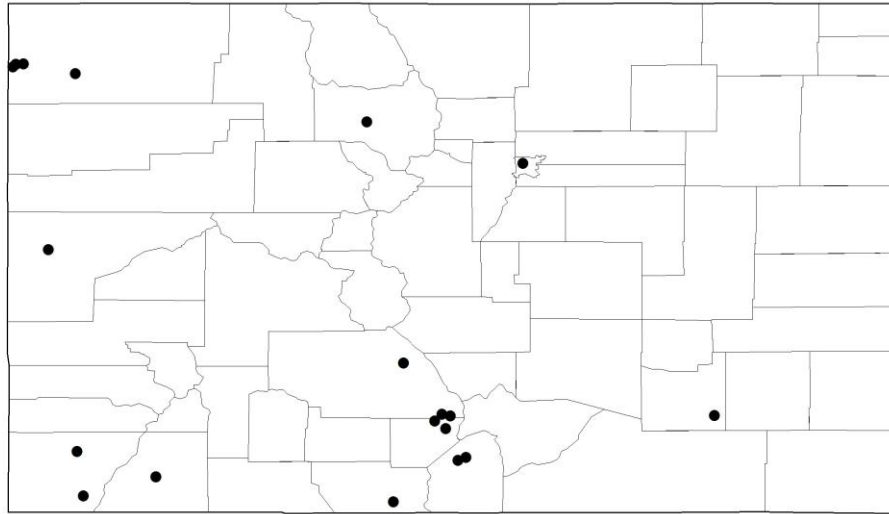
● *Meloe vandykei*



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Figures 216-217. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 216. *Nemognatha cribraria*. 217. *Nemognatha lurida*.

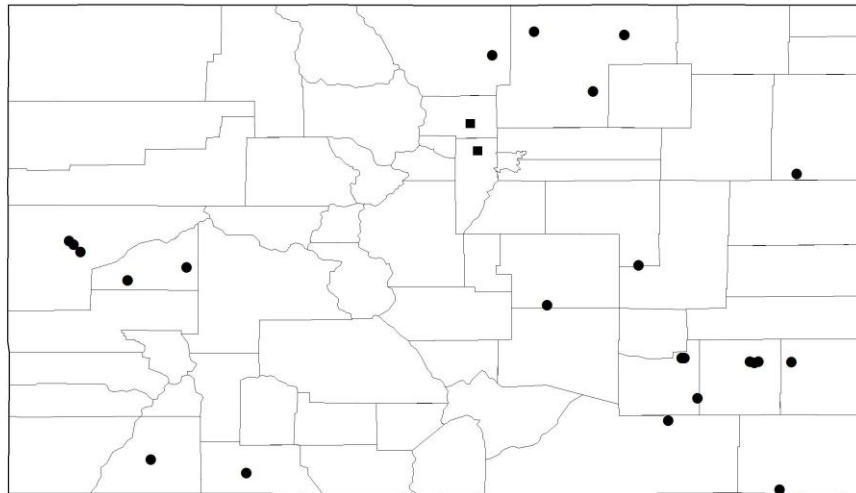


Legend

- *Nemognatha cribraria cribraria*

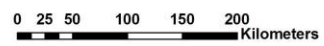


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Legend

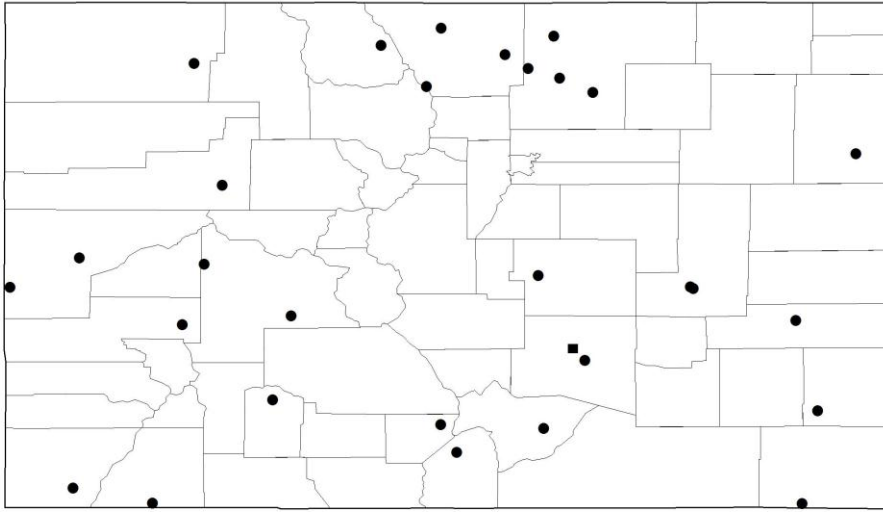
- *Nemognatha lurida apicalis*
- *Nemognatha lurida lurida*



217

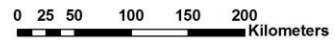
276

Figures 218-219. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 218. *Nemognatha lutea*.
219. *Nemognatha nigripennis*.

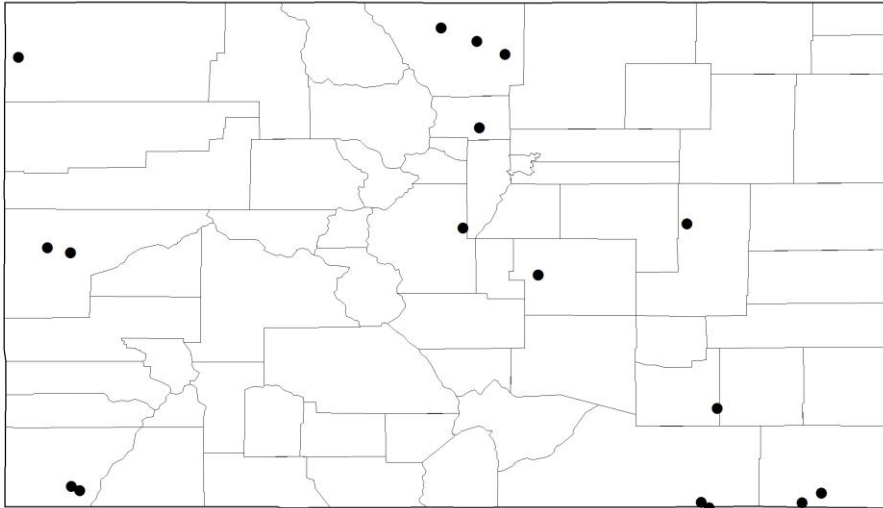


Legend

- *Nemognatha lutea lutea*
- *Nemognatha lutea dichroa*

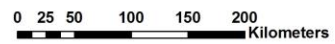


218



Legend

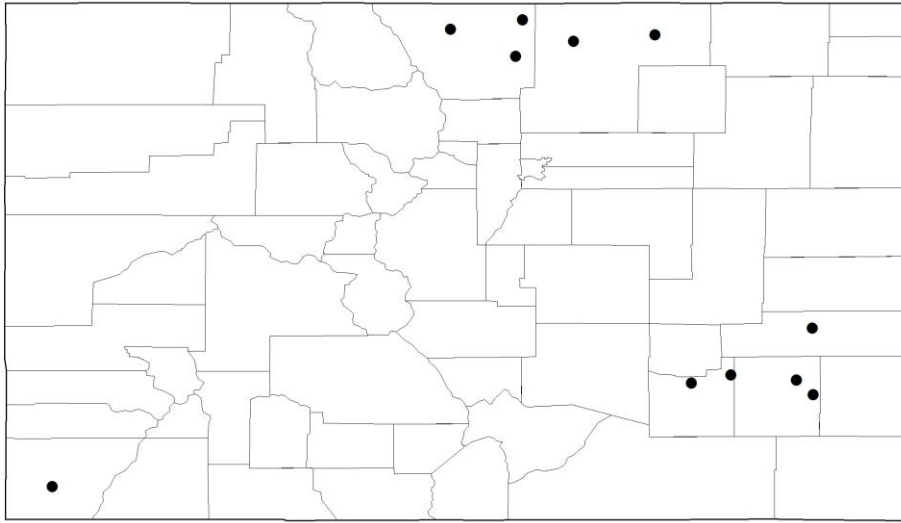
- *Nemognatha nigripennis*



219

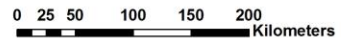
278

Figures 220-221. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 220. *Nemognatha piazata* *bicolor*. 221. *Nemognatha scutellaris*.

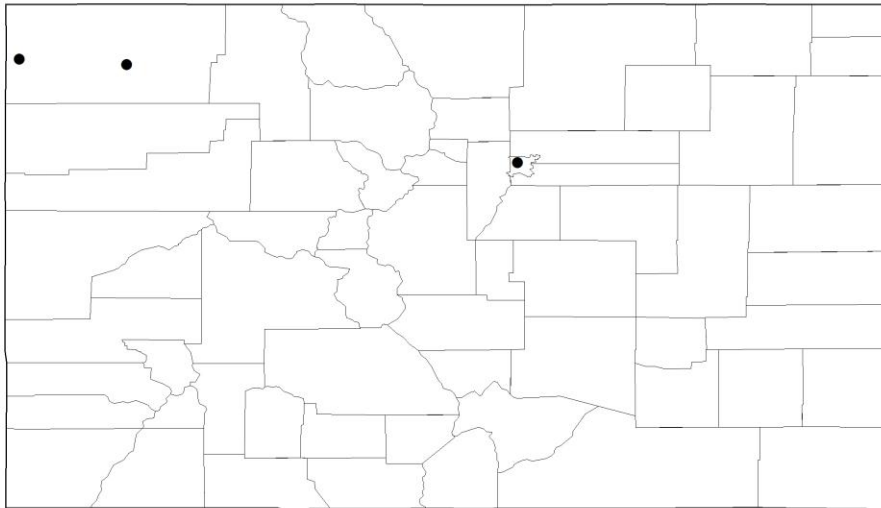


Legend

● *Nemognatha piazzata bicolor*

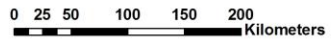


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Legend

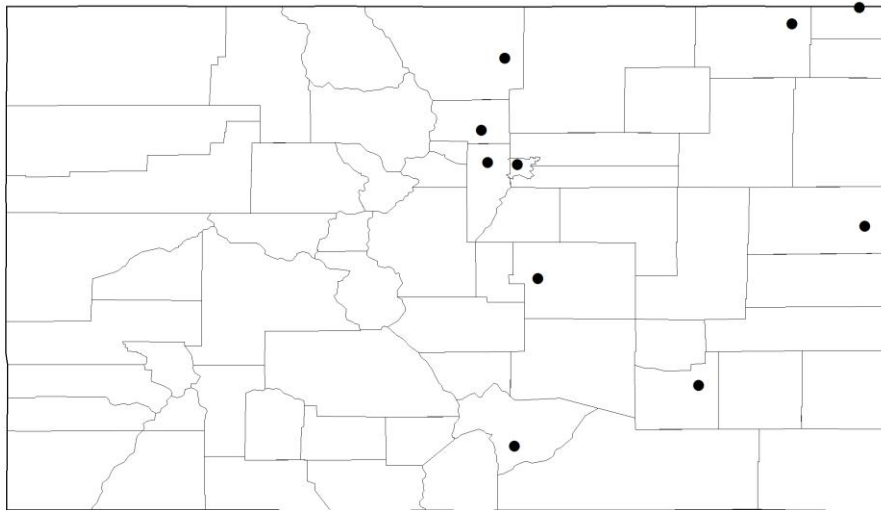
● *Nemognatha scutellaris*



221

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Figures 222-223. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 222. *Nemognatha sparsa*. 223. *Pyrota bilineata*.

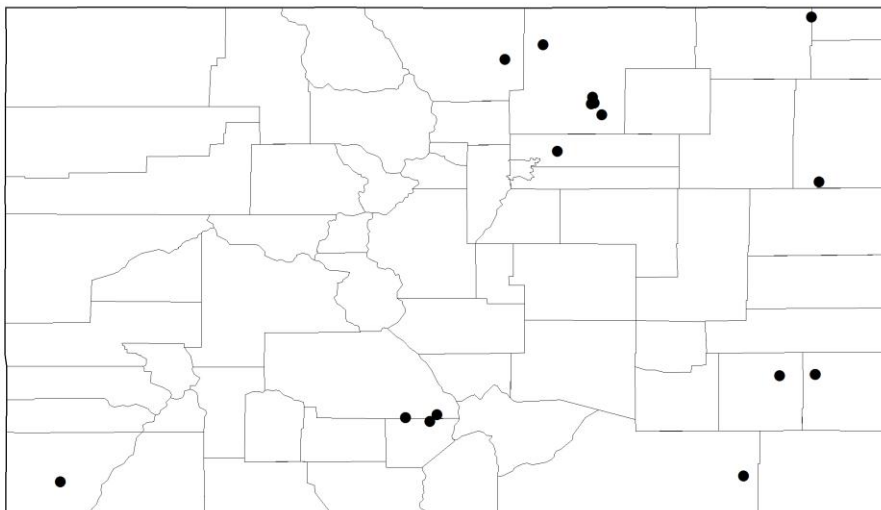


Legend

● *Nemognatha sparsa*

0 25 50 100 150 200
Kilometers

222



Legend

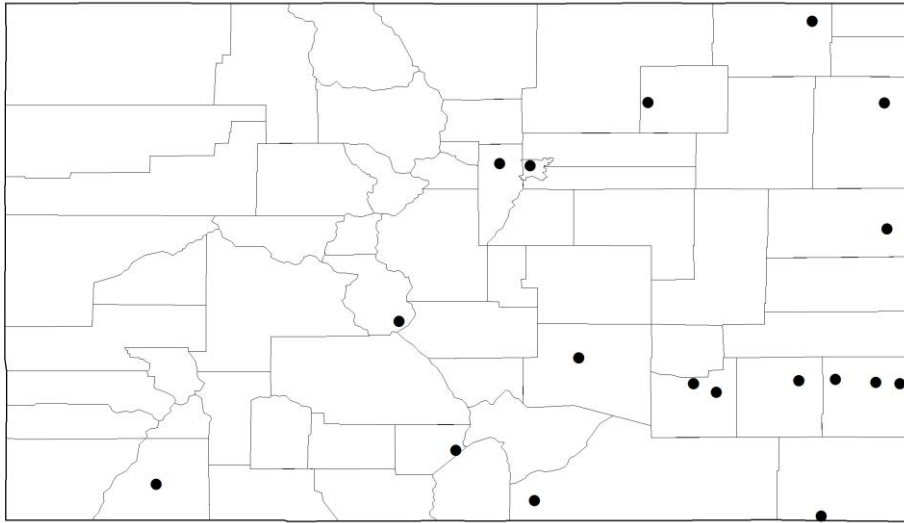
● *Pyrota bilineata*

0 25 50 100 150 200
Kilometers

223

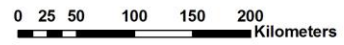
282

Figures 224-225. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 224. *Pyrota concinna*.
225. *Pyrota insulata*.

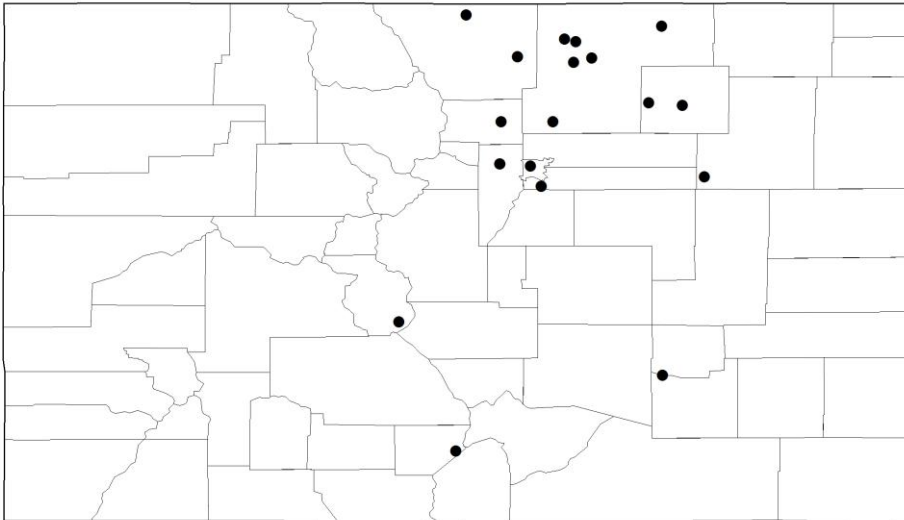


Legend

● *Pyrota concinna*

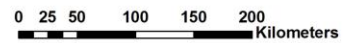


224



Legend

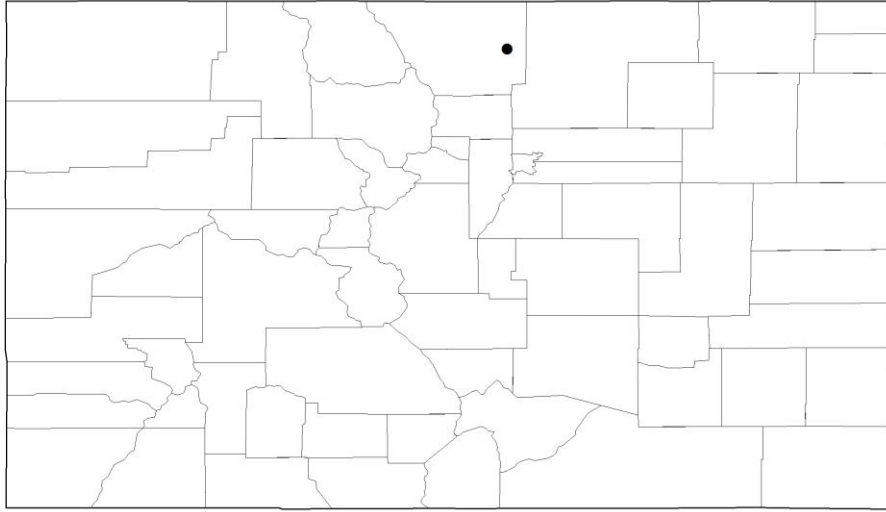
● *Pyrota insulata*



225

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Figures 226-227. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 226. *Rhyphonemognatha rufa*. 227. *Tricrania stansburyi*.

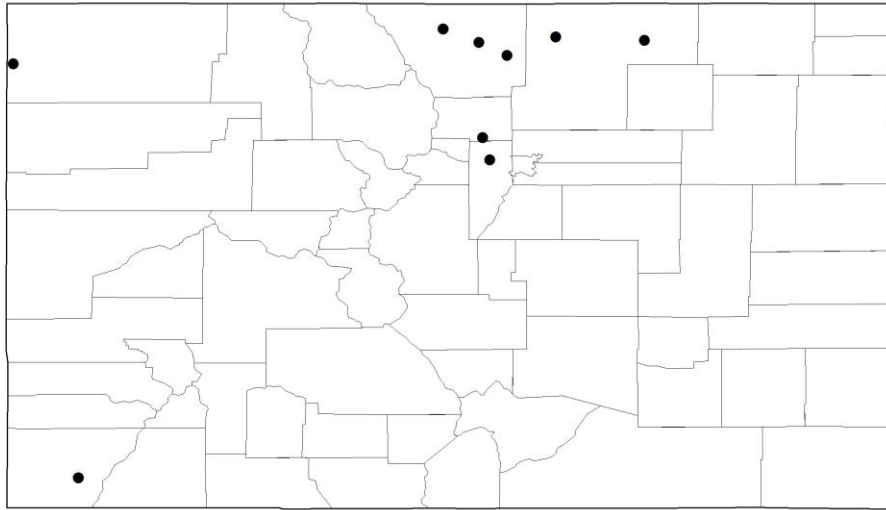


Legend

● *Rhyphonemognatha ru fa*

0 25 50 100 150 200
Kilometers

226



Legend

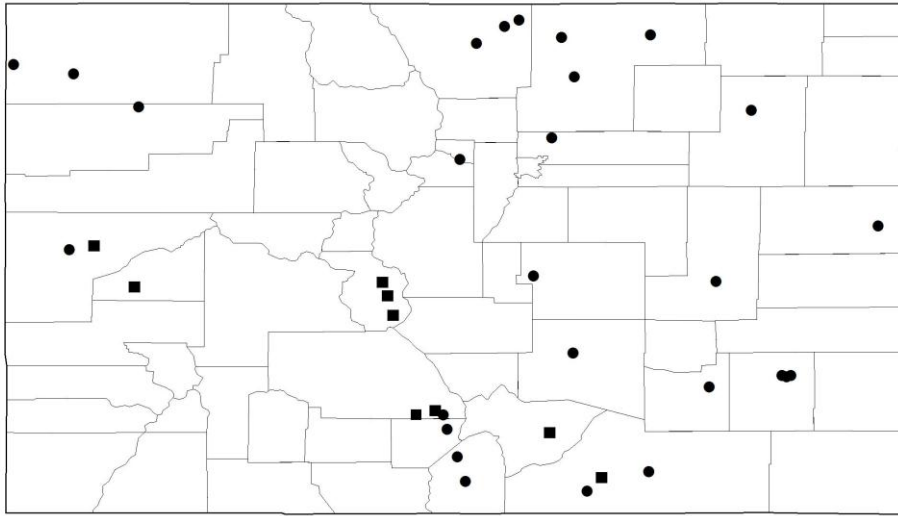
● *Tricrania stansburyi*

0 25 50 100 150 200
Kilometers

227

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Figures 228-229. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 228. *Zonitis atripennis*. 229. *Zonitis bilineata*.

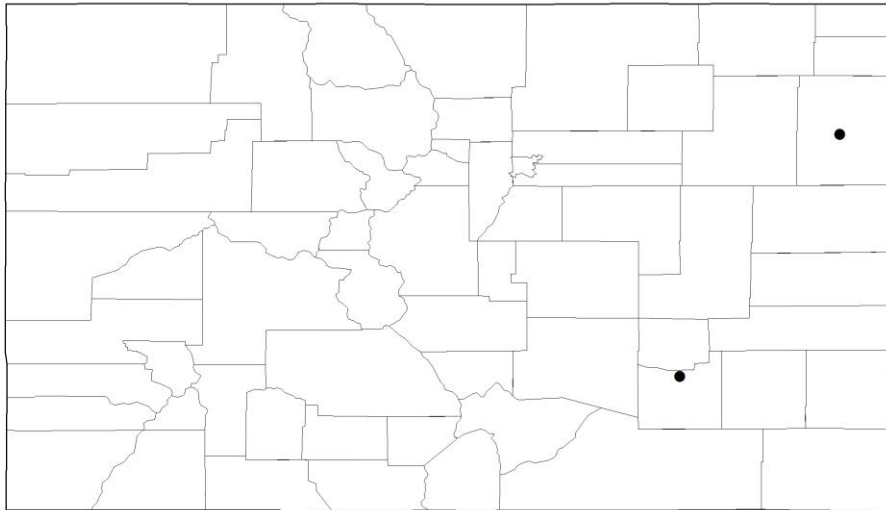


Legend

- *Zonitis atripennis atripennis*
- *Zonitis atripennis flavida*

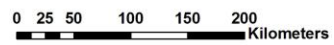


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Legend

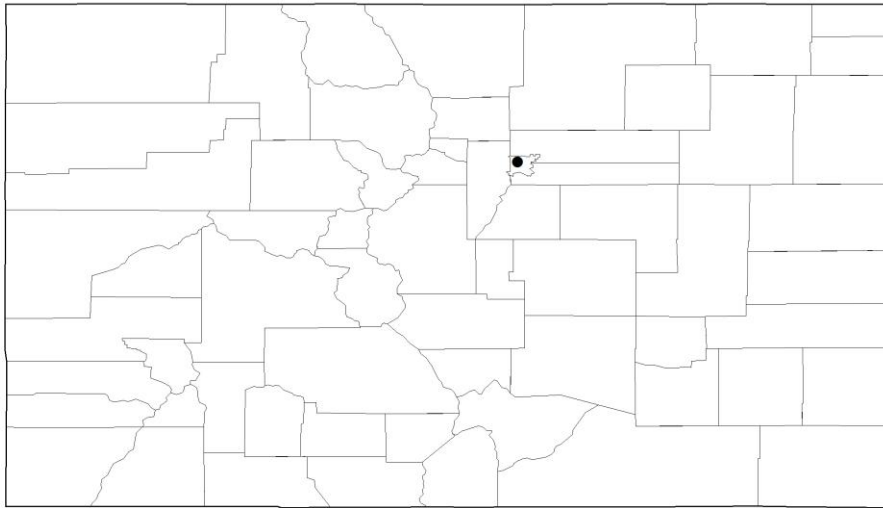
- *Zonitis bilineata*



229

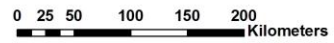
288

Figures 230-231. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 230. *Zonitis cribricollis*.
231. *Zonitis dunniana*.

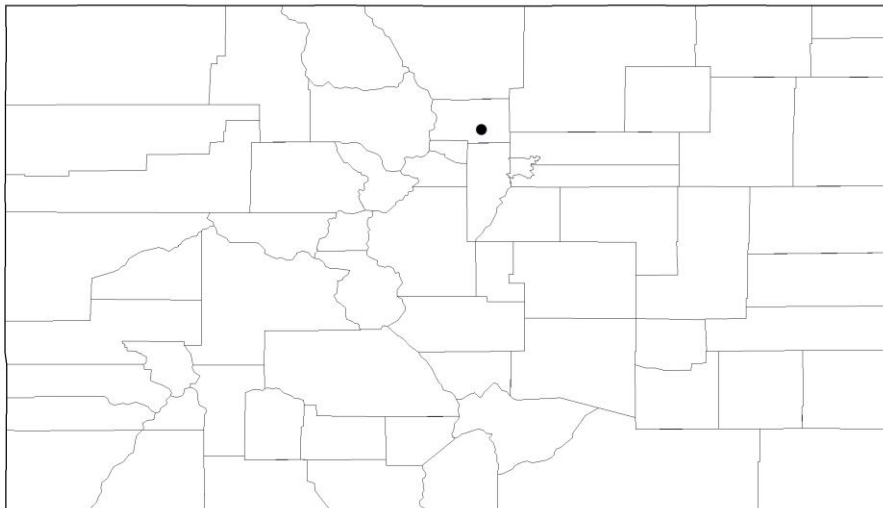


Legend

● *Zonitis cribricollis*



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Legend

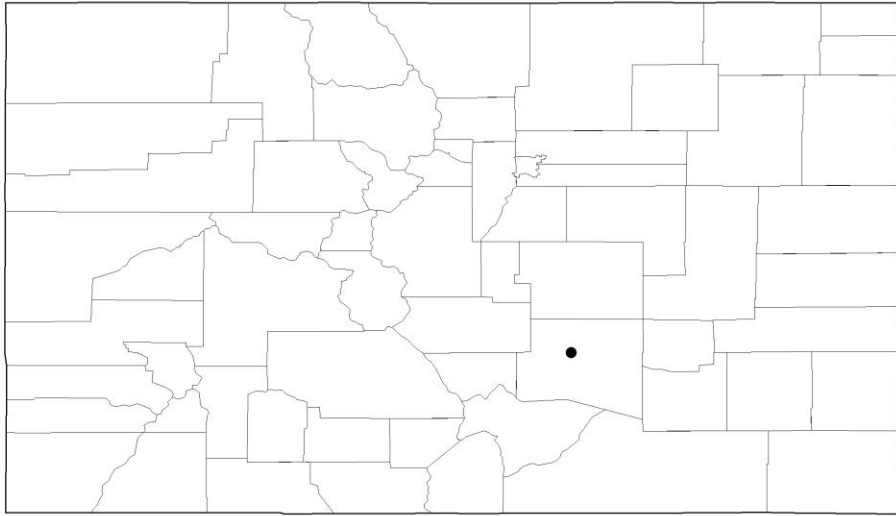
● *Zonitis dunniana*



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Figures 232-233. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 232. *Zonitis punctipennis*.
233. *Zonitis sayi*.

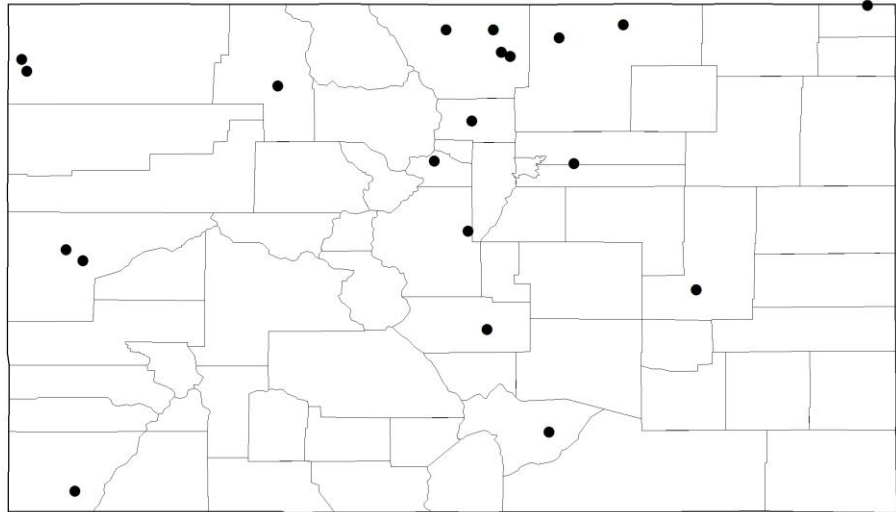


Legend

● *Zonitis punctipennis*



232



Legend

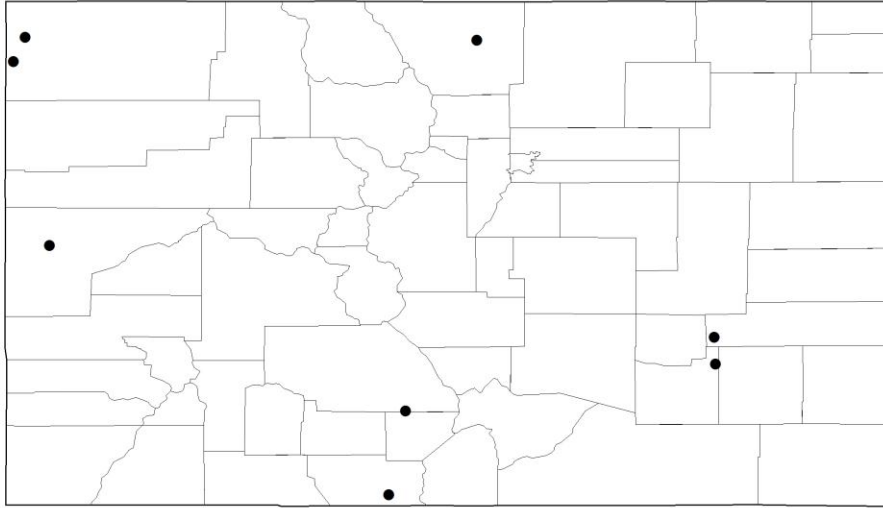
● *Zonitis sayi*



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Figures 234. Distribution of Colorado Meloidae. Solid shapes represent specific localities, for complete data see individual species treatments. 234. *Zonitis vermiculata*.



Legend

- *Zonitis vermiculata*



Figures 235. Colorado county map. Map taken from the department of local affairs GIS section [dola.colorado.gov/ demog/GIS/MapGallery.htm](http://dola.colorado.gov/demog/GIS/MapGallery.htm).

COLORADO COUNTIES



Map Compilation: Colorado Division of Local Government, 2001