THE MELOIDAE (COLEOPTERA) OF OKLAHOMA

By

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PREFACE

This thesis, a local fauna study, contains keys, descriptions, distribution records, and larval and adult host records for the blister beetles of Oklahoma. A total of sixty-six species and subspecies is known to occur in the state. Four others are included because their distribution is such that they should occur here.

I wish to thank my major adviser, Dr. W. A. Drew, and the other members of my advisory committee, Drs. D. E. Howell, J. H. Young, and U. T. Waterfall for criticism of the manuscript. I would also like to thank Dr. C. E. Hopla, Stovall Museum, University of Oklahoma, for the use of facilities and specimens; Dr. F. G. Werner, University of Arizona, Dr. R. B. Selander, University of Illinois, Dr. W. R. Enns, University of Missouri, Dr. J. M. Mathieu, Instituto Tecnologico de Monterrey, and Mr. J. D. Pinto, University of Illinois, for help in determining specimens; and the following for collecting specimens: J. H. Young, D. G. Bottrell, K. F. Schaefer, and R. D. Eikenbary.

Special thanks are expressed to my wife, Judy, for typing and for her patience, understanding, and encouragement during the course of this study and Mrs. Jean Culton, for final typing of the manuscript.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

Blister beetles may, at times, be quite important as crop pests. They are known to attack cotton, alfalfa, soybeans, peanuts, and a number of garden crops. They may also be an animal health hazard. Dead beetles in alfalfa hay have been known to kill horses. The members of the genus Epicauta and probably all of the Epicautina can be considered beneficial as larvae because they feed on the eggs of grasshoppers. All the other groups probably feed on the stored food and eggs of wild bees.

The life cycle of all the blister beetles for which the details are known is quite complex. The first instar larva is active and searches out a food supply. Later instars become more and more immobile until a hardened larval skin develops. The larva passes the winter thus protected. In the spring or summer the insect molts to a normal larva, pupates, and the adult emerges.

The arrangement of the higher taxa follows Selander (1964). The arrangement of the intrageneric taxa follows the latest worker in each genus.

As synonymy in most groups is readily available in the literature, it will not be presented in this paper. The distribution records listed for each species were also taken from the literature. Important papers

including synonymy and distribution are those of Dillon (1952), Enns (1956), Linsley (1942), MacSwain (1952, 1958), Selander (1955, 1960, 1963), VanDyke (1928, 1930), Werner (1943, 1945, 1949, 1953), and Werner, Enns, and Parker (1966).

COUNTY RECORDS

County records for each species are given as two letters (e.g., PH for panhandle, NW for northwest) followed by a number. This results in a combination such as NW 5. NW 5 refers to Woodward County, the fifth county in the northwest area of the state. Counties are listed alphabetically in the following list. Each is followed by its letter-number designation (also, see figure 1).

Adair	NE 11	Cimarron	PH 1	Garvin	SC 8
Alfalfa	NW 3	Cleveland	SC 3	Grady	SC 1
Atoka	SE 5	Coal	SC 10	Grant	NC 1
Beaver	PH 3	Comanche	SW 8	Greer	SW 5
Beckham	SW 1	Cotton	SW 10	Harmon	SW 4
Blaine	NW 9	Craig	NE 3	Harper	NW 1
Bryan	SC 17	Creek	NC 10	Haskell	SE 2
Caddo	SW 3	Custer	NW 10	Hughes	SC 6
Canadian	NC 11	Delaware	NE 7	Jackson	SW 7
Carter	SC 12	Dewey	NW 8	Jefferson	SC 11
Cherokee	NE 10	Ellis	NW 4	Johnston	SC 14
Choctaw	SE 8	Garfield	NC 4	Kay	NC 2

Kingfisher	NC 7	Muskogee	NE 13	Roger Mills	NW 7
Kiowa	SW 6	Noble	NC 5	Rogers	NE 5
Latimer	SE 4	Nowata	NE 2	Seminole	SC 5
LeFlore	SE 3	Okfuskee	NC 14	Sequoyah	NE 14
Lincoln	NC 13	Oklahoma	NC 12	Stephens	SC 7
Logan	NC 8	Okmulgee	NE 12	Texas	PH 2
Love	SC 15	Osage	NC 3	Tillman	SW 9
Major	NW 6	Ottawa	NE 4	Tulsa	NE 8
Marshall	SC 16	Pawnee	NC 6	Wagoner	NE 9
Mayes	NE 6	Payne	NC 9	Washington	NE 1
McClain	SC 2	Pittsburg	SE 1	Washita	SW 2
McCurtain	SE 7	Pontotoc	SC 9	Woods	NW 2
McIntosh	NE 15	Pottawatomie	SC 4	Woodward	NW 5
Murray	SC 13	Pushmataha	SE 6		

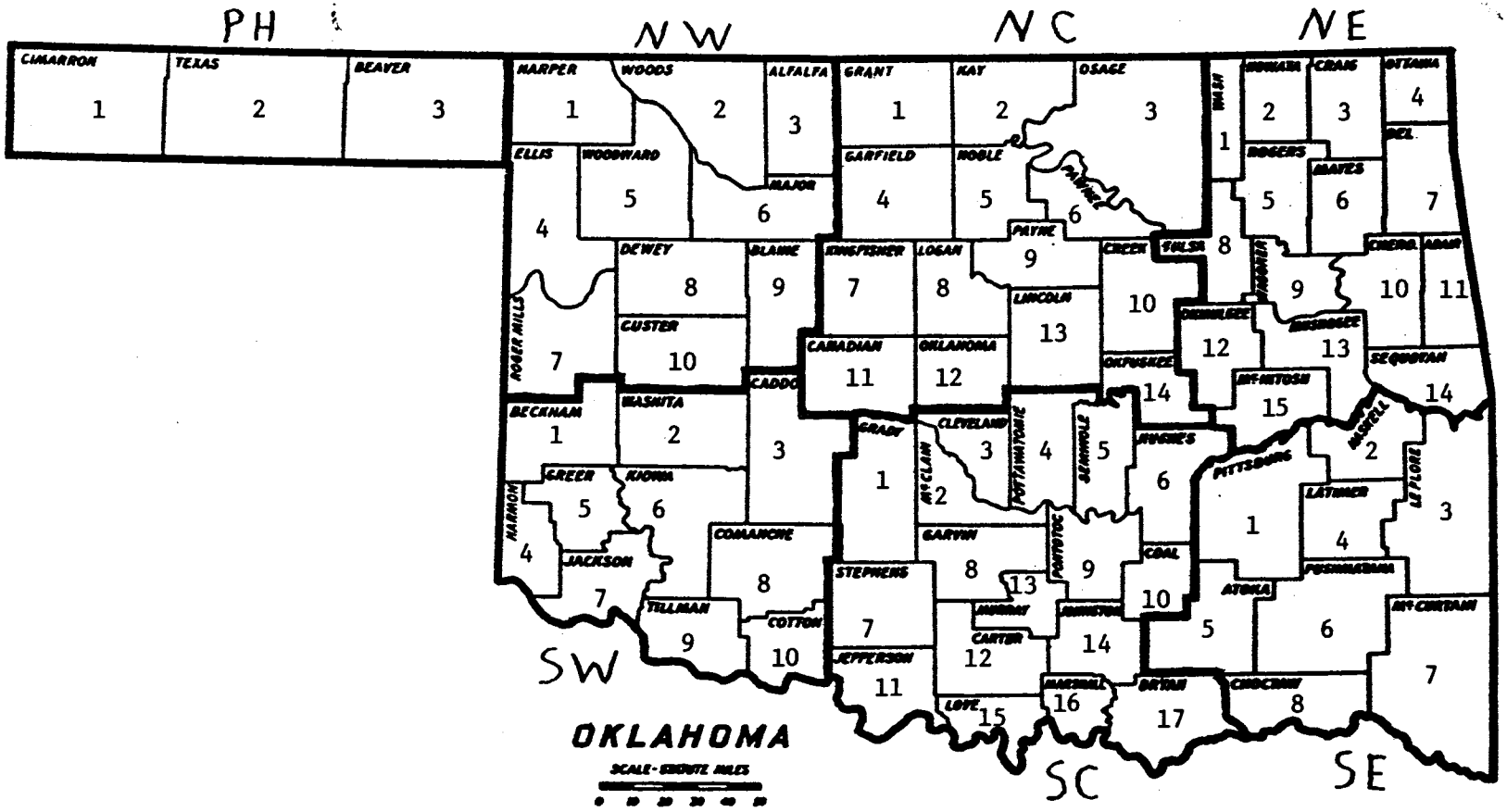

Figure 1: Area and number system used to designate counties for county records.

SYSTEMATICS

Meloidae

Characteristics: Head narrowed behind eyes into a neck; pronotum generally narrower than the base of the elytra, usually narrowest at apex; tarsal formula 5-5-4; tarsi slender, almost always with narrow pads beneath segments; claws each with a ventral blade, tooth, or spine, often with a double row of fine teeth ventrally; elytra entire or short, rarely connate along suture; wings normal, rarely reduced, or absent; abdomen with six visible sternites, the sutures entire; male genitalia of the modified sheath type, penis large, often with one to three hooks distally; female genitalia very short, lacking long membranous tube.

Key to the Subfamilies

1. Tarsal claws cleft to base, without serrations.....Meloinae (p. 1)

   Tarsal claws cleft to base, with serrations on upper blade (or simple, not serrate, with a much reduced tooth near base, and elytra very short).....Nemognathinae (p. 43)

Subfamily Meloinae

Characteristics: Head usually wider than prothorax; maxillae unmodified; spurs of pro- and mesotibiae as well as those of the metatibiae, often variously modified or entirely absent; claws divided but not serrate.

Key to the Genera

1. Profemora with patch of golden pubescence on under side.... 2

   Profemora without patch of golden pubescence..... 3

2. Elytra with raised costae.....Pleuropompha (p. 43)

   Elytra without raised costae.....Epicauta (p. 20)

3. Antennae filiform, several apical segments cylindrical.....

   .....Pyrota (p. 11)

   Antennae robust externally, several apical segments

   moniliform or flattened..... 4

4. Inner edge of protibiae covered with dense, sericeous, brownish

   pubescence.....Linsleya (p. 20)

   Inner edge of protibiae without sericeous pubescence..... 5

5. Elytra meeting along suture.....Lytta (p. 16)

   Elytra overlapping along suture near the base.....

   .....Meloe (p. 8)

Tribe Meloini

Meloe Linnaeus

Characteristics: Moderate sized; color black or metallic greenish, bluish, or purplish black; eye small, not prominent; elytra abbreviated, divergent apically, imbricate along suture; hind wings absent.

Key to the Species

1. Last four antennal segments more slender than those immediately preceding, male antennal segments VI and VII contorted.. 2

   Last four antennal segments thicker than those immediately preceding, the intermediate segments not contorted in the male ..... laevis (p. 10)

2. Prothorax somewhat broader than long... niger (p. 9)

   Prothorax as long as or longer than broad..... 3

3. Punctation of head and prothorax fine and rather sparse; color black..... americanus (p. 9)

   Punctation of head and prothorax coarse and somewhat dense in places; color greenish-black.... perplexus (p. 8)

Subgenus Meloe

Meloe perplexus LeConte

Characteristics: Color greenish-black, head and prothorax subopaque, elytra and abdomen more shining.

Prothorax as long as or slightly longer than broad, broadest one-third from apex, punctures rather dense anteriorly, sparser and more irregular posteriorly; elytra rather finely but distinctly rugose; length to end of elytra 13 mm.

Distribution: Eastern United States, as far west as Texas and Oklahoma.

Oklahoma County Records: NC 8, 9, 12; SW 8; SC 3. Taken in November, February, and April.

Larval Hosts: Unknown.

Meloe americanus Leach

Characteristics: Color black, with at most a slight purplish luster, dull.

Prothorax longer than broad, broadest one-third distance from apex, rather finely, sparsely punctate, more abundantly near base and apex; elytra rather finely, inconspicuously punctured, moderately rugose and longitudinally strigulose; length to end of elytra 16 mm.

Distribution: Iowa, Oklahoma, and Texas east to the Atlantic Ocean.

Oklahoma County Records: NC 9; NE 6. One specimen in April, two in December.

Larval Hosts: Unknown.

Meloe niger Kirby

Characteristics: Color ranges from dull black with a slight

bluish cast to black with a bluish or greenish luster.

Prothorax somewhat broader than long, greatest breadth one-fourth distance from apex, rather coarsely and densely punctured at sides and in front, more sparsely at center where there may be rather definite inpunctate areas; elytra distinctly though not coarsely rugulose-strigulose; length to end of elytra 8 to 15 mm.

Distribution: Eastern Canada and the Middle Atlantic States, west to Wyoming and Arizona.

Oklahoma County Records: One specimen, Stillwater, Payne Co., 20 April 1947, W. C. Rhoades.

Larval Hosts: Unknown.

Subgenus Treiodous

Meloe laevis Leach

Characteristics: Color dull black, subopaque.

Prothorax variable, slightly to a full millimeter broader than long, very finely and sparsely punctured; elytra rather finely, quite obscurely rugulose, surface as a result almost smooth; length to end of elytra 12 to 15 mm.

Distribution: Costa Rica north through the highlands of Central America and Mexico to Arizona, Colorado, and Nebraska.

Oklahoma County Records: None, but should occur here.

Larval Hosts: Unknown.

Tribe Lyttini

Subtribe Pyrotina

Pyrota LeConte

Characteristics: Elongate, moderately slender, mostly moderate in size; body coloring mostly yellowish, spotted or striped with blackish; eyes transverse; pronotum always longer than wide; maxillary palpi in male variable in shape in the different species, sometimes unmodified, sometimes greatly expanded.

Key to the Species

1. Elytra maculate..... 2

   Elytra vittate..... 5

2. Elytra with median fascia occupying two-fifths length of disk, basally each with two maculae, the humeral one very small or absent.....terminata (p. 14)

   Elytra with median fascia occupying only one-fifth length of disk, each basally with a fascia, or if bimaculate, the outer macula nearly as large as the inner..... 3

3. Metatibiae with both spurs rather robust, the outer one not twice as broad as inner; male with terminal segment of palpi scarsely enlarged, about equal to half width of labrum.....perversa (p. 13)

   Metatibiae with inner spur less than half as broad as outer; male with terminal segment of palpi strongly expanded,

at least as wide as labrum..... 4

4. Antennal segment I at most nine-tenths as long as frontal interocular distance in male, four-fifths as long in female.....concinna (p. 12)

Antennal segment I longer than frontal interocular distance in male, nine-tenths as long in female..deceptiva (p. 13)

5. Elytra with suture pale.....bilineata (p. 15)

Elytra with suture dark..... 6

6. Scutellum, legs, and body beneath blackish...invita (p. 15)

Scutellum, legs largely, and body beneath in part, yellowish .....discoidea (p. 14)

Pyrota concinna Casey

Characteristics: Color yellow; there are three transverse black bands on the elytra, the first often broken into four spots, two small black spots on the prothorax, and scattered black markings on the underside.

Metatibiae with outer spurs rather acute at apex; length 10 to 14 mm.

Distribution: Zacatecas through Chihuahua, Mexico and south Texas north to southern Montana, east to Arkansas, west to southern Nevada, and south into northeastern Sonora, Mexico.

Oklahoma County Records: PH 2, 3; NW 1, 3, 4, 5, 6, 8, 10; NC 1, 2, 3, 4, 5, 9, 12; NE 1, 2; SW 2, 3, 7, 10; SC 1, 2, 3, 5, 9,

16; SE 2. June to September.

Larval Hosts: Unknown

Pyrota deceptiva Selander

Characteristics: Color as in P. concinna except there are usually more black markings on the underside, the black marks on the prothorax are larger, there are usually two black spots on each side of the prothorax, and there are often black markings on the head.

Outer hind tibial spur greatly thickened and obliquely truncate, two to three times as wide as inner spur, which is somewhat thickened; length 10 to 20 mm.

Distribution: Neuvo Leon, Mexico, eastern Texas, and Oklahoma.

Oklahoma County Records: NW 5; NC 9; SW 7, 10; SC 1. August and September.

Larval Hosts: Unknown.

Pyrota perversa Dillon

Characteristics: Color essentially as in P. deceptiva.

Metatibial spurs robust, concave, the inner oval, the outer less than twice as broad, ovate; length 13 to 18 mm.

Distribution: Parts of Texas, Oklahoma, Kansas, and Nebraska.

Oklahoma County Records: NW 6; NC 4, 12; NE 3; SW 7. July to September.

Larval Hosts: Unknown.

Pyrota terminata LeConte

Characteristics: Elytra, pronotum, and front of head yellow; rest of body and legs black; black markings as follows: two small maculae between eyes; two maculae on pronotum and usually several smaller spots on edges; elytra each with a large black macula near the scutellar angle and sometimes a small macula near the humeral angle, a broad fascia from the basal two-fifths to the apical fifth, and a narrow lunule at the apical margin.

Metatibial spurs with apices obliquely truncate, concave, the inner one narrowly so, acute, the outer one broadly ovate, about twice as broad as inner; length 13 to 18 mm.

Distribution: From Indiana and Mississippi to the Rocky Mountains.

Oklahoma County Records: PH 2; NC 5, 9; SC 3. Three records in May, one in September.

Larval Hosts: Unknown.

Pyrota discoidea LeConte

Characteristics: Color orange; elytra with three black stripes, one being along the suture, and two black spots near the scutellar angles; pronotum with two small black spots.

Metatibial spurs acute, inner very slender, outer robust; length 6.5 to 11 mm.

Distribution: Kansas to Texas.

Oklahoma County Records: PH 2, 3; NW 1, 2, 4, 5, 8, 9; NC 5, 12; SW 1, 3, 6, 8; SC 3, 11, 13, 15. May to July, one record in September.

Larval Hosts: Unknown.

Pyrota invita Horn

Characteristics: Color pale yellow; elytra with three broad black stripes, one being along the suture, and two large black spots near the scutellar angles; prothorax with a large black spot; head mostly black.

Metatibial spurs flattened on inner face, inner slender, outer robust, the apex narrowly oval; length 8 to 16 mm.

Distribution: Texas and Oklahoma.

Oklahoma County Records: PH 3; NW 6, 7; NC 9; NE 6; SW 1, 3, 6; SC 16, 17. June and July.

Larval Hosts: Unknown.

Pyrota bilineata Horn

Characteristics: Elytra pale yellow with four longitudinal black stripes; head and thorax orange, usually with two small black spots on thorax.

Metatibial spurs with apices strongly obliquely truncate, the inner blunt, parallel-sided, the outer four times as wide, its apex acute; length 6 to 10 mm.

Distribution: Great Plains in Colorado and Nebraska to West Texas and northern Durango, Mexico, west through New Mexico and

Arizona to southwestern Utah.

Oklahoma County Records: PH 1, 3; NW 1; NC 3, 9; SC 1. August and September.

Larval Hosts: Unknown.

Subtribe Lyttina

Lytta Fabricius

Characteristics: Head broader than long; antennae basically moniliform; tarsal claws cleft to base; male sixth abdominal sternite emarginate, the emargination triangular or rounded.

Key to the Species

1. Labrum deeply emarginate; femora orange..... aenea (p. 18)

   Labrum shallowly emarginate; femora black..... 2

2. Elytra black, strongly reticulate..... reticulata (p. 18)

   Elytra orange or yellow, not reticulate..... 3

3. Elytra entirely orange..... fulvipennis (p. 16)

   Elytra yellow with black spots or short vittae..... biguttata (p. 17)

Subgenus Paralytta

Lytta fulvipennis LeConte

Characteristics: Color black except for elytra which are orange;

head with a diamond-shaped orange frontal spot.

Pronotum generally wider than long, widest at middle; metatibiae with outer spur robust, truncate and concave apically, apex subrotund, much longer than inner spur, which is sublinear; length 11 to 26 mm.

Distribution: Southern Texas to southwestern Nebraska and west to Arizona.

Oklahoma County Records: NW 1, 2, 4, 5, 6, 8 , 9; NC 7, 8, 9, 11; SW 3, 4, 6, 7, 10; SC 1, 2, 3. May to July.

Larval Hosts: Unknown.

Lytta biguttata LeConte

Characteristics: Elytra yellow, each with a brown or black spot or short vitta at apical fourth; pronotum orange, finely margined with black, usually with a black spot on each side just before middle.

Pronotum subcircular, nearly as wide as head; metatibiae with outer spur robust, its apex truncate, concave, broadly ovate, longer than inner, which is narrow and acute; length 7 to 12 mm.

Distribution: State of Mexico north to southern Utah and western Texas, thence north on the Great Plains to South Dakota and Montana.

Oklahoma County Records: One specimen, Blaine Co., 22 May 1960, D. C. Bailey.

Larval Hosts: Unknown.

Lytta reticulata Say

Characteristics: Entirely black, no pale frontal spot on head. Pronotum subcircular, barely to one-tenth wider than long, disk convex; elytra coarsely reticulate, most cells 0.5 mm or more in diameter; outer metatibial spur no longer than inner spur, two to three times as wide; length 11 to 22 mm.

Distribution: Texas, north to Nebraska and Wyoming.

Oklahoma County Records: PH 2; NW 5. June.

Larval Hosts: Unknown.

Subgenus Pomphopoea

Lytta aenea Say

Characteristics: Elytra usually metallic blue or green but may be metallic copper-green; femora and tibiae orange, the femora often black at apex.

Pronotum as long as wide, one-ninth narrower than head, sides subparallel to apical third, thence strongly narrowed to apex; metatibial spurs short, truncate, and excavated at apex, the outer one somewhat more robust than inner; length 9 to 16 mm.

Distribution: The range of this species appears to be divided into two major segments, one extends from New Hampshire south to Alabama and west to Missouri, the other includes Oklahoma, eastern Texas, and northwestern Louisiana.

Oklahoma County Records: NW 7; NC 6, 7, 9; SW 4; SC 11, 13.

March and April, two records in July.

Larval Hosts: Unknown.

Subtribe Epicautina

Linsleya MacSwain

Characteristics: Color black or metallic green or blue; antennae strongly compressed, rather short; metatibial spurs equally slender, acute, the inner spur longer; there is one species in Oklahoma.

Subgenus Linsleya

Linsleya convexa (LeConte)

Characteristics: Color black except elytra which are dark metallic blue or greenish-blue.

Pronotum more or less bell-shaped; male protibiae usually lacking spurs; male profemora each with a large spinose tubercle ventrally at base; length 5.5 to 14 mm.

Distribution: Chihuahua, Mexico and southern New Mexico to the Oklahoma Panhandle and Central Texas.

Oklahoma County Records: PH 1; SW 4. June.

Larval Hosts: Unknown.

Epicauta Dejean

Characteristics: Small to rather large, usually slender forms; profemora with a dense patch of sericeous pubescence; elytra normal except in E. conferta where they are abbreviated and connate along the suture; hind wings present, except in E. conferta.

Key to the Species

1. Second segment of antennae one-half as long as third or shorter. 2

   Second segment of antennae two-thirds as long as third or longer 30

2. Pubescence gray, denuded in a number of spots..... 3

   Pubescence not denuded in small spots..... 6

3. Spots small to medium, not confluent..... 4

   Spots large, in part confluent.....andersoni (p. 35)

4. Male with two spurs on protibiae, as in female.....

   .....bispinosa (p. 35)

   Male with one stout, slightly curved spur on protibiae..... 5

5. Male maxillary palpi expanded, the last segment orbicular in outline.....maculata (p. 34)

   Male maxillary palpi not expanded.....normalis (p. 34)

6. Elytra with one or more vittae..... 7

   Elytra without vittae..... 9

7. Vittae marked on elytra as well as in pubescence..... 8

   Vittae marked only in pubescence.....atrata (p. 40)

8. Outer edge of protibiae and tarsi smooth, denuded, shiny; antennae flattened toward middle...occidentalis (p. 30)

   Protibiae and tarsi not shiny, moderately densely pubescence; antennae not flattened.....lemniscata (p. 30)

9. At least the third to fifth abdominal sternites with a median black spot..... 10

Abdominal sternites without spots..... 12

10. Scutellar and humeral spots present..... 11

Scutellar and humeral spots absent; elytra black across base ..... ficta (p. 28)

11. Abdominal sternites broadly black-pubescence apically; scutellar and humeral spots connected by a black area across the base..... nigritarsis(p. 33)

Spots on abdominal sternites rounded, small; scutellar and humeral spots not connected.....aspera (p. 36)

12. Pubescence orange; each elytron with two large black spots .....stuarti (p. 37)

Not so marked..... 13

13. Pubescence black over body, white to gray on the suture and margins of the elytra..... 14

Not so colored..... 15

14. Metatibial spurs slender, spiniform.....cinerea (p. 27)

Metatibial spurs broadened.....pestifera (p. 29)

15. With uniform black pubescence, at least above..... 16

Pubescence mainly gray to tan..... 20

16. Outer spur of metatibiae somewhat broadened, never spiniform or sticklike..... 17

Outer spur of metatibiae spiniform or sticklike.....
.....corvina (p. 25)

17. Wings absent; elytra fused.....conferta (p. 27)

Wings present; elytra not fused..... 18

18. Inner spur of protibiae noticeably longer and stouter than the outer.....funebris (p. 25)

Inner spur of protibiae not stouter than the outer..... 19

19. Visible portion of scutellum very small; antennae tapering toward apex.....pennsylvanica (p. 28)

Visible portion of scutellum normal in size; antennae not tapering toward apex; head black or red...atrata (p. 40)

20. With black markings at base of elytra..... 21

No black markings at base of elytra..... 25

21. With black scutellar and humeral spots...nigritarsis (p. 33)

No humeral and scutellar spots, black across base of elytra..... 22

22. Outer spur of metatibiae broadened..... 24

Outer spur of metatibiae slender..... 23

23. First segment of antennae swollen, intermediate segments thickened..... cinerea (p. 27)

First segment of antennae not greatly swollen, intermediate segments only moderately thickened...floridensis (p. 29)

24. First segment of antennae swollen, intermediate segments thickened.....ficta (p. 28)

First segment of antennae not swollen, intermediate segments longer, only slightly thickened..... pestifera (p. 29)

25. A pair of denuded callosities on pronotum..... 26

No denuded callosities on pronotum..... 27

26. Apical antennal segments longer than broad.. callosa (p. 38)

Apical antennal segments as broad as long... fortis (p. 38)

27. Outer metatibial spur broad..... 28

Outer metatibial spur slender, spiniform, or sticklike.....

..... sericans (p. 39)

28. Third segment of antennae as long as first..... 29

Third segment of antennae almost as long as first two.....

..... atrata (p. 40)

29. Apical antennal segments longer than broad.....

..... ferruginea (p. 37)

Apical antennal segments as broad as long... fortis (p. 38)

30. Second segment of antennae distinctly longer than third... 31

Second segment of antennae equal to third or slightly shorter

..... 37

31. Basal two segments of antennae not markedly paler than the rest..... 32

Basal two segments of antennae orange, rest darker.....

..... albida ♂ (p. 33)

32. First segment of antennae attaining occiput..... 33

First segment of antennae reaching beyond eye in some but not coming near the occiput..... 35

33. One spur on protibiae; antennae curved, S-shaped.....
.....torsa ♂ (p. 41)

Two spurs on protibiae..... 34

34. Second segment of antennae distinctly shorter than the following three.....fabricii ♂ (p. 40)

Second segment of antennae as long as next three.....
.....murina ♂ (p. 32)

35. Second segment of antennae about equal to third.....
.....fabricii ♀ (p. 40)

Second segment of antennae longer than third..... 36

36. Second segment of antennae four-fifths as long as first, third and following two-thirds as long as second.....
.....murina ♀ (p. 32)

Second segment of antennae three-fifths as long as first, third and following three-fourths as long as second..
.....torsa ♀ (p. 41)

37. With vittae on the elytra.....albida ♀ (p. 33)

Elytra without vittae..... 38

38. Ground color black; antennae filiform..... 39

Ground color brown; antennae moniliform..ochrea (p. 42)

39. Elytra entirely black-pubescent; hind margin of pronotum with white pubescence.....segmenta (p. 31)

Elytra not black-pubescent..... 40

40. Antennae with first two segments paler than the rest.....

.....albida ♀ (p. 33)

Antennae uniform in color.....immaculata (p. 31)

Subgenus Epicauta

Group I

Epicauta corvina (LeConte)

Characteristics: General color is black with rather dense but short black pubescence, elytra are without markings.

Pronotum subquadrate, almost as broad as long; exposed portion of scutellum smaller than normal; elytra with four indistinctly raised lines; tibial spurs all spiniform; length 13 to 24 mm.

Distribution: South Dakota south into Mexico, and west to Arizona and Colorado.

Oklahoma County Records: PH 1; NW 1. June and July.

Larval Hosts: Unknown.

Epicauta funebris Horn

Characteristics: General color black, sparsely clothed with short black pubescence.

Pronotum subquadrate, one-fifth longer than broad, sides parallel for the basal four-fifths, then converging abruptly; protibiae with two spiniform spurs, the inner somewhat longer and stouter than the

outer; metatibial spurs flattened, the outer more blunt than the inner, both moderately broad; length 11 to 18 mm.

Distribution: Kansas, Arkansas, Oklahoma, Texas, and New Mexico.

Oklahoma County Records: PH 1; NW 1, 3, 5, 7, 8; NC 2, 3, 4, 5, 6, 9; NE 3, 6, 11, 12, 13, 14; SW 6, 7; SC 1, 3; SE 7. June to October.

Larval Hosts: Predator of the eggs of Melanoplus differentialis (Thos.) and M. bivittatus (Say) in Arkansas (Horsfall, 1943).

Epicauta pennsylvanica (DeGeer)

Characteristics: General color black, with short, sparse black pubescence, no markings on elytra.

Pronotum quadrate, slightly broader at the front angles; visible portion of scutellum very small; posterior tibial spurs flattened, pointed, the outer broader, neither is narrow enough to be called sticklike; length 6 to 12 mm.

Distribution: Maine to Florida, west to Montana and Texas.

Oklahoma County Records: PH 3; NW 1, 4, 5, 8, 9; NC 3, 5, 8, 9, 12; NE 2, 3, 4, 5, 6, 7, 8, 9, 11, 14; SC 1, 2, 3, 4, 6, 8, 10, 13; SE 3, 5, 6, 7, 8. June to November.

Larval Hosts: Parker and Wakeland (1957) list this species as a predator of grasshopper eggs in Iowa, Montana, Nebraska, and Wyoming, Melanoplus sanguinipes (F.) (as M. mexicanus mexicanus

(Sauss.)) was the dominant grasshopper species in the Montana study area; Horsfall (1943) lists M. differentialis (Thos.) in Arkansas.

Epicauta conferta (Say)

Characteristics: General color black with sparse black pubescence, two triangular orange spots usually visible on sides of abdomen near apex.

Pronotum quadrate, as broad as long, sides converging at the apical fifth, base somewhat excavated before scutellum; elytra fused along suture and shorter than the abdomen; wings absent; inner spur of metatibiae spiniform, outer flattened but not very broad; length 8 to 15 mm.

Distribution: Iowa and Arkansas, west to the Rocky Mountains and south into Mexico.

Oklahoma County Records: PH 1; NW 2, 3, 4, 5, 6, 8; NC 1, 2, 3, 4, 5, 6, 7, 9, 12, 13, 14; NE 1, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14; SW 7, 8; SC 1, 2, 3, 4, 6, 8, 9, 10, 13, 16, 17; SE 2, 3, 4, 5, 6, 7, 8. May to October.

Larval Hosts: Larvae will feed on the eggs of Melanoplus differentialis (Thos.) and M. bivittatus (Say) in the laboratory (Gilbertson and Horsfall, 1940); the above species are hosts in the field in Arkansas (Horsfall, 1943).

Epicauta cinerea (Forster)

Characteristics: Elytra black, one form has entirely ash-

colored pubescence except on the base of the elytra, another has black pubescence on the elytra except on the margins and suture and a pair of black marks on the head and pronotum, a third form is entirely black pubescent.

Pronotum subquadrate, slightly broader apically; metatibiae with spurs spiniform, quite slender but outer broader; length 9 to 13 mm.

Distribution: Coastal states from New Hampshire to South Carolina, west to Iowa and Oklahoma.

Oklahoma County Records: NW 4; NC 9; NE 6, 7, 11, 13, 14; SC 3; SE 6, 7. May to October.

Larval Hosts: Melanoplus differentialis (Thos.) in Arkansas (Horsfall, 1943).

Epicauta ficta Werner

Characteristics: Elytra black, densely clothed with ash-colored to yellowish ash-colored pubescence, narrowly black at base; some specimens have a row of median black spots on the apical edge of the abdominal sternites.

Pronotum subquadrate, slightly longer than broad; metatibial spurs broadened, the outer slightly the broader and longer; length 9 to 12 mm.

Distribution: Oklahoma and Texas.

Oklahoma County Records: NW 1, 3; NC 6, 9; NE 2, 7; SW 5,

6, 7; SC 1; SE 7. July to November.

Larval Hosts: Unknown.

Epicauta pestifera Werner

Characteristics: Elytra black, usually densely clothed with black pubescence except on the suture and margins which have ash-colored pubescence; another form is entirely covered with ash-colored pubescence except for the extreme base of the elytra which is black.

Pronotum subquadrate, slightly broader apically; inner metatibial spur flattened, pointed, outer broader and with a blunt tip; length 6 to 16 mm.

Distribution: From the Atlantic Coast to the Rocky Mountains, south as far as Oklahoma.

Oklahoma County Records: NC 3, 12; NE 7, 14; SC 3; SE 4. July to October.

Larval Hosts: Melanoplus differentialis (Thos.) and M. bivittatus (Say) in Arkansas (Horsfall, 1943).

Epicauta floridensis Werner

Characteristics: Color is black, densely clothed with ash-colored pubescence.

Pronotum subquadrate, one-fourth longer than broad; metatibial spurs slender, spiniform; length 6 to 11 mm.

Distribution: Known from Oklahoma, Mississippi, Florida, and New Jersey.

Oklahoma County Records: NC 5. June.

Larval Hosts: Unknown.

Epicauta lemniscata (Fabricius)

Characteristics: General color brownish-yellow with three black stripes per elytron, pronotum with two longitudinal black stripes, head with two curved black marks on the occiput.

Antennae slender, slightly flattened but not broadened; pronotum one-third longer than broad, sides parallel for the basal three-fourths, then converging gradually; outer edge of protibiae and tarsi not shiny, moderately pubescent; inner metatibial spur flattened, sticklike, outer flattened and somewhat broadened; length 8 to 16 mm.

Distribution: New Jersey and Florida to Nebraska and Texas, probably extending far into Mexico.

Oklahoma County Records: NC 2, 5, 6, 9; NE 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 14; SW 3, 7, 10; SC 1, 3, 8, 12, 16; SE 2, 3, 7, 8. May to September.

Larval Hosts: Melanoplus differentialis (Thos.) and M. bivittatus (Say) in Arkansas (Horsfall, 1943); listed as a predator of grasshopper eggs in Iowa by Parker and Wakeland (1957).

Epicauta occidentalis Werner

Characteristics: This species is identical with E. lemniscata except for the broadened, flattened antennae and smooth, shiny outer edge of the protibiae and tarsi.

Distribution: Nebraska and Colorado, south to Texas and Louisiana.

Oklahoma County Records: NW 1, 6; NC 3, 4, 6, 9, 12; NE 1, 3, 5, 6, 7, 8, 11, 14; SW 3, 7, 10; SC 1, 3, 8, 12, 16; SE 2, 3, 4, 7. May to August, one record in October.

Larval Hosts: Unknown.

Group II

Epicauta immaculata (Say)

Characteristics: Elytra are black, rather densely clothed with rusty red-brown to ash-colored pubescence, there are no black markings on the elytra.

Pronotum quadrate, slightly bulging; visible portion of scutellum small; metatibial spurs slender, spiniform; length 12 to 20 mm.

Distribution: From Indiana and Kentucky west to New Mexico.

Oklahoma County Records: PH 1, 2, 3; NW 1, 2, 3, 4, 5, 6, 7, 8, 9; NC 3, 4, 5, 6, 9, 12, 13; NE 1, 2, 3, 5, 6, 7, 12; SW 1, 2, 4, 5, 6, 7, 8, 9; SC 1, 3, 4, 7, 8, 9, 10, 12, 13, 15, 16, 17; SE 3. June to September.

Larval Hosts: Several species of grasshoppers, chief of which are Melanoplus bivittatus (Say) and M. differentialis (Thos.) in South Dakota (Gilbertson and Horsfall, 1940)

Epicauta segmenta (Say)

Characteristics: Color black; pubescence mostly black, there

is always white pubescence on the posterior margin of the pronotum and usually on the coxae, thoracic segments, back part of the head, and posterior margins of the abdominal sternites.

Pronotum subquadrate, a little longer than broad; tibial spurs long and sticklike on all tibiae; length 12 to 20 mm.

Distribution: States of Sinaloa, Durango, and Chihuahua, Mexico through West Texas to the Great Plains, north to South Dakota; west through New Mexico to Arizona.

Oklahoma County Records: PH 1, 2; NW 2, 9; NE 7; SW 1, 3, 7, 8; SC 13. May to August.

Larval Hosts: The larvae have been associated with eggs of Melanoplus sanguinipes (F.), M. differentialis (Thos.), and M. bivittatus (Say) (MacSwain, 1956).

Epicauta murina (LeConte)

Characteristics: Color is black, clothed with rather sparse short brown hairs, causing a dark gray color.

Pronotum one-fourth longer than broad, slightly bell-shaped; metatibial spurs slender, spiniform, equal; length 7 to 11 mm.

Distribution: New Brunswick, Canada and Montana, south to Iowa and Oklahoma.

Oklahoma County Records: NC 9, 13: NE 4. May and June.

Larval Hosts: Unknown.

Group III

Epicauta albida (Say)

Characteristics: Elytra black, with dense ash-colored pubescence; with oblique black markings on at least some of the abdominal sternites and usually two longitudinal black marks on the pronotum; first two antennal segments brownish-yellow, the rest darker brown; elytra with black humeral and scutellar spots.

Pronotum subquadrate, slightly longer than broad; metatibial spurs slender, inner pointed, outer blunt; length 13 to 24 mm.

Distribution: Kansas to Colorado, southward into Mexico.

Oklahoma County Records: PH 1, 2, 3; NW 1, 3, 4, 5, 6, 9, 10; NC 9; NE 13; SW 1, 5, 6, 7, 8, 10; SC 1, 3, 8, 13, 15, 16, 17. June to October.

Larval Hosts: Parker and Wakeland (1957) list this species as a predator of grasshopper eggs in Colorado, Kansas, and New Mexico.

Group IV

Epicauta nigritarsis (LeConte)

Characteristics: Upper surfaces are tan, with rather dense ash-colored pubescence; brown humeral and scutellar spots are present; lower surfaces are mainly black, with ash-colored pubescence; legs are tan, with apices of the segments brown.

Pronotum quadrate, slightly broader than long; metatibial spurs slender, sticklike, the inner long, the outer shorter; length 7 to 13 mm.

Distribution: Tamaulipas, Mexico to southwestern Oklahoma and west to Arizona.

Oklahoma County Records: SW 4, 6, 7, 9. July and August.

Larval Hosts: Unknown.

Epicauta maculata (Say)

Characteristics: Elytra are black, quite densely clothed with ash-colored to yellowish ash-colored pubescence except for small denuded spots above and below.

Pronotum quadrate, rather rotund; protibiae of the male with a single short, stout, incurved spur; metatibial spurs slender, spiniform, the inner longer; length 6 to 12 mm.

Distribution: North Dakota south into Mexico, east to Iowa and Missouri, and west to the Rocky Mountains.

Oklahoma County Records: PH 1, 2, 3; NW 1, 2, 3, 4, 5, 7; NC 4, 5, 9, 12; SW 3, 6, 8; SC 1, 2, 3, 8, 9; SE 3. May to October.

Larval Hosts: Melanoplus sanguinipes (F.) (as M. mexicanus (Sauss.)) in South Dakota (Gilbertson and Horsfall, 1940); Parker and Wakeland (1957) list it as a predator of grasshopper eggs in Colorado, Iowa, Kansas, Montana, Nebraska, North Dakota, South Dakota, and Wyoming.

Epicauta normalis Werner

Characteristics: This species is very similar to E. maculata except the maxillary palpi of the male are not expanded and the pads

of segment one of the protarsi are confined to the apical fifth of the segment.

Distribution: Rocky Mountains and Black Hills west to Washington and California east of the Cascades and Sierras, south across Nevada and Utah to northern New Mexico and Arizona, and east to western Oklahoma.

Oklahoma County Records: PH 1. June.

Larval Hosts: Reared from an egg pod of Aulocara elliotti (Thos.) in Montana by Lavigne and Pfadt (1966); meloid larvae, possibly this species, were also taken in egg pods of Ageneotettix deorum (Scud.) and Cordillacris occipitalis (Thos.)

Epicauta bispinosa Werner

Characteristics: This species is very similar to E. maculata except the maxillary palpi of the male are not expanded and the protibiae have two spurs, as in the female.

Distribution: West Texas, western Oklahoma, New Mexico, and Arizona.

Oklahoma County Records: PH 1; NW 5, 8; NC 9; SW 7; SC 1, 3, 8. May to July.

Larval Hosts: Unknown.

Epicauta andersoni Werner

Characteristics: Elytra black, densely clothed with ash-colored pubescence except for fairly large round denuded spots, which are in

part confluent.

Pronotum as broad as long, sides parallel for the basal three-fourths, then converging abruptly; protibiae of male with a single short, incurving spur; inner spur of metatibiae quite long, spiniform, outer shorter, flattened, sticklike; length 7 to 11 mm.

Distribution: Known from northern Mexico, West Texas, New Mexico, Oklahoma, southern Utah, and Arizona.

Oklahoma County Records: PH 1. June to August.

Larval Hosts: Unknown.

Group V

Epicauta aspera Werner

Characteristics: Color black, densely clothed with ash-colored pubescence; elytra with a black scutellar spot extended narrowly across the base; abdominal sternites with a median row of black spots.

Sides of pronotum subparallel for the basal two-thirds, then converging abruptly; metatibial spurs sticklike, rather long; length 7 to 10 mm.

Distribution: Colorado and western Oklahoma to West Texas and Arizona.

Oklahoma County Records: PH 3; NW 1, 4, 8, 10. September.

Larval Hosts: Unknown.

Epicauta stuarti LeConte

Characteristics: Elytra black, densely covered with long orange pubescence, two large black maculae per elytron; pronotum with two large black maculae, usually convergent medially; head black down to level of eyes and orange between eyes.

Pronotum almost twice as broad as long, flat, gradually narrowed forward; metatibial spurs flattened, sticklike, the outer slightly broader than the inner; length 6 to 11 mm.

Distribution: Colorado and Kansas, south to Texas, New Mexico, and Arizona.

Oklahoma County Records: PH 2, 3; NW 1, 4, 5, 8. All in September.

Larval Hosts: Unknown.

Group VI

Epicauta ferruginea (Say)

Characteristics: Elytra are black, densely clothed with rather long rusty red-brown pubescence and are without markings.

Pronotum subquadrate, as broad as long, bulging somewhat, the sides converge three-fourths from the base; outer spur of metatibiae broad, inner slender; length 6 to 9 mm.

Distribution: Iowa to Idaho, south to Texas and Arizona.

Oklahoma County Records: PH 2, 3; NW 1, 3, 4, 5, 10; NC 5, 9; NE 1, 3, 5, 7, 8; SW 6, 7; SC 1, 2. June to October.

Larval Hosts: Listed as a predator of grasshopper eggs in Iowa and Montana by Parker and Wakeland (1957), Melanoplus sanguinipes (F.) (as M. m. mexicanus (Sauss.)) was the dominant grasshopper in the Montana study area.

Epicauta fortis Werner

Characteristics: Color black, densely clothed with ash-colored pubescence.

Pronotum broad, at broadest part almost as wide as head, as broad as long, broadly bell-shaped; outer spurs of metatibiae broad and flattened; length 6 to 9 mm.

Distribution: Coahuila and Baja California, Mexico, Arizona, California, New Mexico, Texas, and Oklahoma.

Oklahoma County Records: PH 2, 3. September.

Larval Hosts: Unknown.

Epicauta callosa LeConte

Characteristics: Elytra black, densely clothed with tannish to rusty red-brown pubescence; pronotum always with a pair of small, slightly raised, denuded areas, showing as black spots.

Pronotum one-fourth longer than broad, bell-shaped; metatibial spurs slender, sticklike, the outer sometimes a little broader; length 7 to 10 mm.

Distribution: South Dakota, Nebraska, Kansas, Oklahoma, and Texas, into Mexico; also west to Arizona.

Oklahoma County Records: PH 1, 2, 3; NW 1, 2, 3, 4, 5, 6, 7; NC 1, 4, 5, 6, 9, 11, 12; NE 10; SW 2, 3, 4, 6, 7, 8, 9, 10; SC 1, 2, 3, 4, 8, 9, 15; SE 6, 7, 8. May to October.

Larval Hosts: Melanoplus sanguinipes (F.) (as M. mexicanus (Sauss.)) in South Dakota (Gilbertson and Horsfall, 1940); listed as a predator of grasshopper eggs in South Dakota by Parker and Wakeland (1957), dominant grasshopper species were M. sanguinipes (F.) (as M. m. mexicanus (Sauss.)), M. differentialis (Thos.), and M. femur-rubrum (DeG.); has been associated with egg pods of M. sanguinipes (F.) by MacSwain (1956).

Epicauta sericans LeConte

Characteristics: Elytra black, densely clothed with ash-colored pubescence, there are no black markings.

Pronotum stout, almost as wide as the head, as broad as long, subquadrate, sides parallel for the basal three-fourths, then converging abruptly; metatibial spurs slender, sticklike; length 7 to 11 mm.

Distribution: Indiana and Alabama, west to the Rocky Mountains, and from Alberta and Saskatchewan, Canada to Texas.

Oklahoma County Records: PH 1, 2, 3; NW 1, 2, 3, 4, 5, 6, 8; NC 3, 6, 9, 13; NE 3, 7, 9; SW 3, 5, 6, 7, 8, 9; SC 1, 2, 3, 8, 11, 12, 13, 15, 16, 17. May to November.

Larval Hosts: Parker and Wakeland (1957) list it as a predator of grasshopper eggs in North Dakota, the dominant grasshopper species

in the study area were Melanoplus sanguinipes (F.) (as M. m. mexicanus (Sauss.)) and M. differentialis (Thos.).

Epicauta atrata (Fabricius)

Characteristics: Elytra black, usually with black pubescence, but pubescence may be ash-colored or ash-colored with black vittae; head usually bright red but occasionally black.

Pronotum slightly broader than long, sides parallel for the basal four-fifths, then converging abruptly; scutellum normal in size; inner spur of metatibiae slender, spiniform, outer somewhat broad, flattened; length 6 to 12 mm.

Distribution: From Maryland and North Carolina to Nebraska and Texas.

Oklahoma County Records: NW 2, 10; NC 4, 5, 6, 9, 10, 12; NE 2, 3, 5, 6, 9, 13, 14, 15; SW 6, 8; SC 1, 3, 13, 14, 15, 16; SE 1, 2, 3, 4, 5, 7, 8. Most common in May and June but can be taken until October.

Larval Hosts: Unknown.

Subgenus Gnathospasta

Fabricii Group

Epicauta fabricii (LeConte)

Characteristics: Elytra black, fairly densely clothed with ash-colored pubescence, black humeral and scutellar spots present.

Pronotum one-fourth longer than broad, bell-shaped; metatibial spurs flattened, spiniform, the outer broader; length 9 to 15 mm.

Distribution: Maine to Florida, west to Montana and New Mexico; also in Manitoba, in southern Canada.

Oklahoma County Records: NW 3, 7; NC 9; NE 3, 4, 6, 7, 10, 11; SW 3; SC 3, 8; SE 4, 7. May and June, one record in August.

Larval Hosts: Melanoplus sanguinipes (F.) (as M. mexicanus (Sauss.)) in South Dakota (Gilbertson and Horsfall, 1940); Parker and Wakeland (1957) list this species as a predator of grasshopper eggs in Montana, Minnesota, Nebraska, North Dakota, and South Dakota, M. sanguinipes (F.) (as M. m. mexicanus (Sauss.)) is a dominant grasshopper species in Montana, North Dakota, and South Dakota; M. differentialis (Thos.) and M. bivittatus (Say) are hosts in Arkansas (Horsfall, 1943).

Torsa Group

Epicauta torsa (LeConte)

Characteristics: Elytra are black, rather sparsely clothed with short ash-colored pubescence; there are black, rather indistinct, humeral and scutellar spots.

First antennal segment large, S-shaped in the male; pronotum quadrate, as broad as long, with the sides parallel for the basal three-fourths, then converging abruptly; protibiae of male with a single spiniform spur; inner spur of metatibiae spiniform, the outer

sticklike, shorter; length 7 to 11 mm.

Distribution: From Texas and Oklahoma to Florida and North Carolina, also Massachusetts.

Oklahoma County Records: NW 6, 7; NC 9, 10, 12, 13; NE 6, 7, 8, 11; SW 8; SC 2, 3, 8, 12, 13, 14, 16; SE 6, 7. April to June.

Larval Hosts: Unknown.

Ochrea Group

Epicauta ochrea (LeConte)

Characteristics: General color rusty red-brown, rather sparsely clothed with rusty red-brown pubescence; elytra with indistinct humeral and scutellar spots.

Antennae distinctly moniliform; pronotum quadrate, one-third longer than broad; protibiae of male with a single stout, spiniform spur; metatibial spurs rather stout, sticklike, the outer shorter; length 9 to 14 mm.

Distribution: Oklahoma Panhandle to West Texas, west to California, extends into northern Mexico.

Oklahoma County Records: One specimen, Kenton, Cimarron Co., 26 June 1933, E. E. Ivy.

Larval Hosts: Unknown.

Pleuropompha LeConte

Characteristics: Eyes elongate, narrow; elytra each with four

strongly elevated costae; all tibiae with two spurs; there is one species in Oklahoma.

Pleuropompha costata (LeConte)

Characteristics: Color black or dark brown, densely clothed above with flattened white hairs and below with ordinary white pubescence.

Pronotum elongate bell-shaped, two-thirds longer than broad; elytra with the suture, side margins, and four ridges on each sharply elevated; outer spur of metatibiae broad, flattened; length 7 to 16 mm.

Distribution: Durango and Chihuahua, Mexico, West Texas, New Mexico, Arizona, and the Oklahoma Panhandle.

Oklahoma County Records: One specimen, Guymon, Texas Co., 16 July 1966, L. Quinn.

Larval Hosts: Unknown.

Subfamily Nemognathinae

Characteristics: Head usually narrower than prothorax; maxillae often with elongate processes, in many cases filamentous, as long as head or even as long as body, in other cases short, flattened, and scarsely visible; spurs of pro- and mesotibiae unmodified, those of metatibiae usually expanded and truncate or concave apically; tarsi with claws divided, usually with serrations on the upper blade.

Key to the Species

1. Elytra entirely covering abdomen..... 3

   Elytra covering at most the first abdominal tergite..... 2

2. Basal spine of tarsal claw short or absent, at most attaining middle of claw.....*Hornia minutipennis* (p. 62)

   Basal spine of tarsal claw long, conspicuous, attaining apical three-fourths of claw..*Hornia mexicana neomexicana*.... (p. 62)

3. Antennae gradually enlarged toward apex..... 4

   Antennae equal in width throughout..... 6

4. Pronotum coarsely to moderately coarsely and moderately densely punctate, most punctures separated by, at most, three times their diameter..... 5

   Pronotum finely and sparsely punctate, most punctures separated by at least five times their diameter..... .....*Gnathium francilloni* (p. 53)

5. Pronotum about as wide as long, coarsely punctured..... .....*Gnathium texanum* (p. 52)

   Pronotum much longer than wide, moderately coarsely punctured.....*Gnathium minimum* (p. 53)

6. Eyes extremely large, protuberant, strongly produced beneath head..... 7

   Eyes rarely, if ever, produced beneath head and then not strongly..... 8

7. Femora dark at middle, pale at apices and bases.....
..... Pseudozonitis longicornis (p. 54)

Femora pale at middle, dark at apices and bases.....
..... Pseudozonitis pallida (p. 54)

8. Galeae lobiform..... 9

Galeae produced into a sucking organ..... 11

9. Metatibial spurs slender, concave, apices subacute.....
..... Rhyphonemognatha rufa (p. 61)

10. Pronotum one-sixth wider than long..Zonitis bilineata (p. 48)

Pronotum distinctly longer than wide.....
..... Zonitis atripennis atripennis (p. 48)

11. Galeae stout, no longer than maxillary palpi.....
.....Zonitis perforata (p. 50)

Galeae distinctly longer than maxillary palpi, usually
reaching or exceeding the metacoxae..... 12

12. Galeae reach to or beyond the metacoxae..... 15

Galeae do not reach to the metacoxae..... 13

13. Pronotum impunctate except for a few fine, sparse punctures
at sides ..... Zonitis sayi (p. 51)

Pronotum at least moderately densely punctate..... 14

14. Pronotum with coarse, irregular punctures.....
.....Zonitis cribricollis (p. 50)

Pronotum densely, finely punctate.....
..... Zonitis vittigera propinqua (p. 50)

15. Metatibial spurs dissimilar, outer wider than inner..... 16

Metatibial spurs equal or subequal in width..... 17

16. Outer metatibial spur more than twice, usually three times, as wide as inner; galeae reaching only to third abdominal segment..... Nemognatha lurida lurida (p. 56)

Outer metatibial spur, at most, twice as wide as inner; galeae reaching apex of abdomen.....
..... Nemognatha lutea lutea (p. 57)

17. Galeae reach to or slightly beyond metacoxae but do not reach apex of abdomen..... 18

Galeae reach to apex of abdomen.....
..... Nemognatha piazata bicolor (p. 60)

18. Metatibial spurs slender, spiniform, apices acute; small species ..... Nemognatha nemorensis (p. 59)

Metatibial spurs flattened, parallel-sided, or spatulate, subacute or rounded at apices; larger species..... 19

19. Elytra black,..... 20

Elytra pale, reddish, or yellowish, may have darker vittae. 23

20. Metatibial spurs short, subequal, somewhat flattened, apices subacute or bluntly rounded..... 21

Metatibial spurs broadly spatulate, similar and equal..... 22

21. Abdominal sterna brownish-yellow.....
..... Nemognatha nebrascensis (p. 58)

Abdominal sterna black.....Nemognatha bifoveata (p. 59)

22. Elytra densely, coarsely rugose-punctate, with three feebly raised discal costae.....
.....Zonitis punctipennis punctipennis (p. 51)

Elytra moderately densely punctate basally becoming scabrous-punctate apically, without raised discal costae ..... Nemognatha sparsa (p. 55)

23. Pronotum extremely sparsely punctate.....
..... Zonitis punctipennis punctipennis (p. 51)

Pronotum at least moderately densely punctate..... 24

24. Third antennal segment three times as long as seond or longer..... Nemognatha cribraria cribraria (p. 57)

Third antennal segment, at most, twice as long as second.. 25

25. Third antennal segment twice as long as second.....
..... Nemognatha nebrascensis (p. 58)

Third antennal segment one-third longer than second.....
..... Zonitis vittigera vittigera (p. 49)

Tribe Nemognathini

Subtribe Zonitina

Zonitis Fabricius

Characteristics: Eyes variable in size, rarely produced beneath head; galeae lobiform or produced into a short sucking organ; spurs of metatibiae usually spatulate but somewhat variable; fifth and sixth abdominal sternites usually modified in the males; aedeagus a sclerotized, bilobed structure, apex of tegmen usually compressed, sides not sclerotized.

Subgenus Neozonitis

Zonitis bilineata Say

Characteristics: Color of head, prothorax, legs, and abdomen usually reddish-brown; elytra usually pale gray or white, female usually with discal black vittae, rarely entirely black, male with vittae obsolete or absent.

Galeae lobiform, with a fringe of pale, coarse hairs; pronotum one-sixth wider than long, sides usually evenly rounded; metatibial spurs large, concave, similar and equal; length 6.5 to 12 mm.

Distribution: New England to South Carolina, west to Idaho and southern California.

Oklahoma County Records: NC 2, 3. July and August.

Larval Hosts: Unknown.

Zonitis atripennis atripennis (Say)

Characteristics: Head, prothorax, most of legs, and at least apical abdominal segments yellow; elytra and apices of leg segments

black.

Galeae lobiform, short, densely fringed with short, pale hairs; pronotum longer than wide, sides parallel to apical fourth; metatibial spurs large, unequal, the outer about one-third wider than inner with flared apex, inner spur narrow, apex not flared; length 6 to 12 mm.

Distribution: Texas and South Dakota, west to Arizona and Idaho.

Oklahoma County Records: PH 1, 2, 3; NW 1, 4; NC 4; NE 10. July to October.

Larval Hosts: Unknown.

Subgenus Parazonitis

Zonitis vittigera vittigera (LeConte)

Characteristics: Color typically brownish-yellow with a broad, black discal vitta on each elytron; varies to pale brownish-yellow with elytra not vittate or rarely with elytra entirely black except for narrow margins.

Galeae stout, reaching the metacoxae; pronotum scarsely wider than head, about one-sixth wider than long; metatibial spurs subequal, stout, broad, with rounded apices; length 7 to 12 mm.

Distribution: Northern Great Plains and Michigan southeastward to Louisiana and Florida.

Oklahoma County Records: NW 4; NE 2, 3; SW 8; SE 1. June to August.

Larval Hosts: Unknown.

Zonitis vittigera propinqua MacSwain

Characteristics: As in subspecies vittigera except color usually somewhat paler and the galeae usually do not reach the metacoxae.

Distribution: Missouri and Nebraska to south Texas and western New Mexico.

Oklahoma County Records: NC 4, 10; NE 2, 3, 7, 12, 15; SW 7; SC 3; SE 1. June to August.

Larval Hosts: Unknown.

Zonitis perforata Casey

Characteristics: Head and pronotum yellow; elytra pale red; tibiae and tarsi mostly black.

Galeae stout, no longer than maxillary palpi; pronotum about as wide as long, slightly widened toward base; metatibial spurs similar and equal, large, apices rounded; length 10 to 14 mm.

Distribution: Texas to Nebraska and northwestern Missouri.

Oklahoma County Records: Two specimens, Cotton County, 1 June 1953.

Larval Hosts: Unknown.

Zonitis cribricollis (LeConte)

Characteristics: Color usually brownish-yellow with metasternum, tibiae, and tarsi dark brown.

Galeae slender, not reaching metacoxae; pronotum transverse, about one-fifth wider than long, sides usually evenly rounded; metatibial spurs similar and equal, rather long, parallel-sided; length 5 to 11 mm.

Distribution: Texas and eastern Colorado to Ohio and Florida.

Oklahoma County Records: NW 3, 6, 8; NC 1, 9, 12; NE 2, 7, 13; SW 3, 8; SE 1, 7. May to July.

Larval Hosts: Unknown.

Zonitis sayi Wickham

Characteristics: Color variable, greenish to pale brownish-yellow except apices of femora and tibiae and entire tarsi black.

Galeae almost reaching metacoxae; pronotum scarsely broader than long, sides parallel to subsinuate; metatibial spurs moderately large, inner narrower than outer and usually shorter; length 8 to 12 mm.

Distribution: Great Plains from southern Canada to West Texas, east to eastern Minnesota and Kansas, west to Idaho, western Utah, and eastern Arizona.

Oklahoma County Records: Reported from Guymon, Texas County by Enns (1956).

Larval Hosts: Has been taken from Nomia nests in Utah (Enns, 1956).

Zonitis punctipennis punctipennis (LeConte)

Characteristics: Male usually entirely pale brownish-yellow with brown or black tarsi; female usually with elytra entirely black or dark brown or broadly vittate and with ventral surface and appendages black in part.

Galeae nearly twice as long as maxillary palpi; pronotum less than one-sixth wider than long, sides usually evenly rounded; metatibial spurs subequal in length, short, apices rounded, outer spur usually distinctly wider than inner; length 8 to 14 mm.

Distribution: Kansas and West Texas to southern California.

Oklahoma County Records: PH 1, 2, 3; NW 3, 4, 5; NC 3; NE 10; SW 2; SC 3. July to September.

Larval Hosts: Unknown.

Gnathium Kirby

Characteristics: Small, slender species; maxillary processes filamentous, at least as long as antennae; metatibiae with outer spur broader than inner; antennae distinctly enlarged toward apex, rather short.

Gnathium texanum Horn

Characteristics: Color brownish-yellow with abdomen and sterna in part darker brown.

Galeae about one and one-half times length of pronotum; pronotum about as wide as long; metatibial spurs unequal, the outer broader

and longer; length 4.5 to 6 mm.

Distribution: Kansas to eastern Texas.

Oklahoma County Records: NW 3; NC 12; NE 12, 13; SE 7, 8. June.

Larval Hosts: Unknown.

Gnathium minimum (Say)

Characteristics: Color usually brownish-yellow.

Galeae about three times as long as pronotum; pronotum much longer than wide, sides broadly arcuate; metatibial spurs equal in length, the outer usually about twice as broad as the inner; length 3.5 to 6.5 mm.

Distribution: Alberta, Canada to Louisiana, west to Arizona in the south.

Oklahoma County Records: PH 1, 2, 3; NW 1, 2, 3, 4, 5, 6, 8; NC 3, 4, 6, 8, 9, 11; SW 2, 3, 4, 6, 7, 9; SC 1, 3; SE 7. May to October.

Larval Hosts: Unknown.

Gnathium francilloni Kirby

Characteristics: Color bright red-brown to dark brown; pronotum brownish-yellow.

Galeae about three times as long as pronotum; pronotum one-seventh longer than wide, much broader than head; metatibial spurs

unequal, the outer broad, the inner slender, subspiniform; length 3.5 to 4.5 mm.

Distribution: Georgia to Arizona and north to Wyoming.

Oklahoma County Records: PH 2; NW 3; NC 1, 2, 4, 5, 8; NE 1, 4, 5, 6, 9, 10. July to September.

Larval Hosts: Unknown.

Pseudozonitis Dillon

Characteristics: Antennae rather long and attenuate; eyes large, protuberant, strongly produced beneath head; galeae lobiform, metatibial spurs broad, spatulate.

Pseudozonitis longicornis (Horn)

Characteristics: Pronotum brownish-yellow with a median reddish macula; elytra predominantly brown with sutures, margins, and narrow discal vittae pale yellow; underside mostly brown.

Galeae triangular lobiform, short, inner margins with a dense fringe of coarse hairs; pronotum distinctly wider than long, median macula irregularly rectangular; metatibial spurs short, broad, equal; length 10 to 12 mm.

Distribution: Kansas to Texas and east to Florida.

Oklahoma County Records: NC 9; SC 16. July.

Larval Hosts: Unknown.

Pseudozonitis pallida Dillon

Characteristics: Head, thorax, legs, and abdomen pale brownish-yellow; elytra usually brownish-yellow with broad dark brown subsutural and submarginal vittae usually united near apices.

Galeae lobiform, pronotum about as long as broad, slightly wider than head; metatibial spurs subequal, short; length 14 to 17 mm.

Distribution: West Texas to Florida and north into Oklahoma.

Oklahoma County Records: PH 3; NC 14; SW 7; SC 6, 16.

June and July.

Larval Hosts: Unknown.

Subtribe Nemognathina

Nemognatha Illiger

Characteristics: Galeae produced into a sucking tube, in some longer than the body, in others quite short; metatibial spurs usually modified; males with various modifications of the abdominal sternites; aedeagus and tegmen almost entirely semimembranous, aedeagus not bilobed, often spinulate at apex.

Subgenus *Pronemognatha*

Nemognatha sparsa LeConte

Characteristics: Elytra, mesothorax, metathorax, tibiae, and tarsi black; head, prothorax, scutellum, coxae, and femora yellow to light yellow-brown.

Galeae attaining metacoxae; pronotum scarsely wider than long, widest just before middle; male abdominal sterna two to five not modified; metatibial spurs broadly spatulate, similar and equal; length 6 to 7.5 mm.

Distribution: Great Plains from South Dakota to northern New Mexico, west to southwestern Utah and northern Arizona.

Oklahoma County Records: None, but should occur in the Panhandle.

Larval Hosts: Unknown.

Subgenus Meganemognatha

Nemognatha lurida lurida (LeConte)

Characteristics: Color varies from yellow to mostly black, but most commonly is brown to reddish-brown.

Galeae distinctly exceed metacoxae; pronotum about one-seventh wider than long, margins straight, almost imperceptibly but regularly widened from anterior angles to base; male fourth abdominal sternum with a broad, triangular punctulate area medially, fifth with a broad, median, punctulate area and a small, round glabrous impression medially at apex; outer metatibial spurs usually three times as wide as inner spurs; length 6.5 to 15 mm.

Distribution: From Durango, Mexico north to North Dakota and from the Mississippi River west to Arizona and Wyoming.

Oklahoma County Records: PH 1, 2, 3; NW 1, 3, 4, 5, 6; NC 1,

2, 3, 4, 5, 6, 9, 11, 12; NE 1, 2, 3, 6, 8; SW 2, 4, 7, 9; SC 1, 2, 3, 8. June to October.

Larval Hosts: Recorded by Mickel (1928) from cells of Anthophora occidentalis Cresson in Colorado; associated with Megachile occidentalis Fox in New Mexico (Linsley and MacSwain, 1952).

Nemognatha lutea lutea LeConte

Characteristics: Color variable, usually with head, prothorax, and elytra yellow or brownish-yellow.

Galeae attaining apex of abdomen; pronotum transverse, one-sixth wider than long, side margins rounded, slightly convergent to base; male third abdominal sternum with a very small, triangular, punctulate area medially at apex, fourth with a large, triangular, median, punctulate impression; outer metatibial spurs at least twice as wide as inner spurs; length 8 to 14 mm.

Distribution: Western North Dakota, central Nebraska, and west Texas, west to western Montana, eastern Nevada, and Arizona.

Oklahoma County Records: Listed as occurring in Oklahoma by Enns (1956).

Larval Hosts: Unknown.

Subgenus Pauronemognatha

Nemognatha cribraria cribraria LeConte

Characteristics: Pronotum yellow, with or without dark brown spots on basal third; elytra yellow with a dark stripe of varying length

at apices, usually abbreviated into a cresent-shaped mark on apical fourth; mostly dark brown or black ventrally.

Galeae slender, reaching metacoxae; pronotum one-fifth wider than long, sides rounded, gradually narrowed basally, varying to sinuate; male fourth and fifth abdominal sterna with median tufts of hair in large, shallow, broadly oval, punctulate impressions; metatibial spurs similar, subacute at apex; length 7 to 10 mm.

Distribution: Southern New Mexico and western Kansas to California and Oregon.

Oklahoma County Records: None, but should occur in the Panhandle.

Larval Hosts: Unknown.

Nemognatha nebrascensis Enns

Characteristics: Color variable, usually light yellow-brown except eyes, antennae, palpi, galeae, scutellum, thoracic sterna, and legs reddish-black or black; elytra may be entirely brownish-yellow, brownish-yellow with dark discal vittae, or entirely black.

Galeae stout, scarsely reaching metacoxae; pronotum about a sixth wider than long; male fourth and fifth abdominal sterna with median tufts of hair in large, shallow, broadly oval, punctulate impressions; metatibial spurs similar, short, stout, with apices bluntly rounded; length 7 to 9 mm.

Distribution: Nebraska, Kansas, and Oklahoma.

Oklahoma County Records: NW 4. July.

Larval Hosts: Unknown.

Nemognatha nemorensis Hentz

Characteristics: Mesothorax, metathorax, legs, abdomen, and elytra black; pronotum yellow to brownish-yellow, usually with three black spots placed transversely in a row on basal third.

Galeae exceeding metacoxae; pronotum a fourth wider than long, side margins rounded; male third, fourth, and fifth abdominal sterna with median tufts of hair in shallow, broadly oval, densely punctulate impressions; metatibial spurs similar, slender, spiniform, apices acute; length 5 to 9 mm.

Distribution: Oklahoma and Nebraska east to Florida and Pennsylvania.

Oklahoma County Records: NW 3; NE 6, 12; SE 1, 5, 7. June to August.

Larval Hosts: Unknown.

Subgenus Nemognatha

Nemognatha bifoveata Enns

Characteristics: Color black except pronotum and top of head which are yellow.

Galeae reaching metacoxae; pronotum usually one-fifth wider than long, sides subparallel at middle, oblique from anterior fourth

to apex; male fourth and fifth abdominal sterna with deep, circular, median cavities densely lined with long, fine hairs; metatibial spurs short, subequal, somewhat flattened; length 6 to 12 mm.

Distribution: Kansas and Texas to Utah and possibly southern California.

Oklahoma County Records: None, but should occur over most of the state.

Larval Hosts: Unknown.

Nemognatha piazata bicolor LeConte

Characteristics: Color ranges from entirely pale brownish-yellow to black with reddish head and prothorax; two black stripes are present on the elytra in the darker forms.

Galeae usually reach the apex of the abdomen; pronotum usually a sixth wider than long, widest at anterior angles, almost imperceptibly narrowed to base; male fourth and fifth abdominal sterna with broad, median, elongate, parallel-sided excavations which are lined with long, silky hairs; metatibial spurs subequal, somewhat flattened, concave; length 7 to 15 mm.

Distribution: Minnesota and eastern Texas to Idaho, Utah, and Arizona.

Oklahoma County Records: PH 1, 2; NW 2, 3, 4, 6, 7; NC 4; SW 1, 6; SC 3. June to August.

Larval Hosts: Anthophora occidentalis Cresson (Porter, 1951);

larvae have been taken in New Mexico by Linsley and MacSwain (1952) on Centris caesalpiniae (Cockerell), Diadasia rinconis Cockerell, and Anthophora californica texana Cresson and they might serve as hosts.

Rhyphonemognatha Enns

Characteristics: Eyes small; galeae scarsely modified, usually feebly lobiform, extremely short; metatibial spurs moderately short, slender, concave, apices subacute; tegmen and aedeagus semimembranous, aedeagus not bilobed, apex of tegmen compressed.

Rhyphonemognatha rufa (LeConte)

Characteristics: Color is a bright, pale red.

Galeae lobiform, extremely short; head markedly elongated, somewhat flattened; pronotum scarsely longer than wide, widest at anterior third; metatibial spurs dissimilar, the outer broader than the inner; length 7 to 9 mm.

Distribution: Arizona to southern Texas, northeastward to Iowa and northern Illinois.

Oklahoma County Records: NC 4, 9. April to August.

Larval Hosts: Unknown.

Hornia Riley

Characteristics: Wings vestigial or entirely absent; elytra reduced to scales which do not even cover the first abdominal tergum; abdomen large and sac-like, with variably sclerotized plates on terga

and sterna; galeae unmodified; claws simple, with a much reduced tooth near base.

Hornia minutipennis Riley

Characteristics: Color of head, thorax, and legs pale red to red-brown; elytra brownish-yellow; abdomen creamy white with paired, rectangular, dark brown tergal and sternal plates.

Galeae are unmodified; pronotum nearly as long as broad, subquadrate; elytra barely extending over basal margin of first abdominal tergite; length 14 to 17 mm.

Distribution: Ranges from northeastern United States to California, also southern Canada.

Oklahoma County Records: NC 9. May.

Larval Hosts: Taken from cells of Anthophora occidentalis Cresson in Oklahoma; also reported from this host by Mickel (1928) and Selander and Bohart (1955); other hosts are Anthophora bomboides Kirby (Linsley, 1942), A. bomboides sodalis Cresson (Hocking, 1949), A. bomboides neomexicana Cockerell (Bohart and Selander, 1955; MacSwain, 1958), A. bomboides stanfordiana Cockerell (Linsley, 1942; MacSwain, 1956), and A. abrupta Say (Riley, 1877; Rau, 1926).

Hornia mexicana neomexicana (Cockerell)

Characteristics: Color of head, thorax, and legs black or dominantly black; elytra brownish-yellow; abdomen dark brown with narrow

pale margins on tergites and sternites.

Galeae are unmodified; pronotum varies from a little wider than long to nearly one and one-third times as wide as long; elytra nearly reaching apical margin of first abdominal tergite; length 13 to 15 mm.

Distribution: Known from Kansas, Colorado, Oklahoma, Texas, and New Mexico.

Oklahoma County Records: Listed as occurring in Oklahoma by Knaus (1928).

Larval Hosts: Anthophora occidentalis Cresson (Hungerford and Williams, 1912; Mickel, 1928; MacSwain, 1958), A. vallorum (Cockerell) (Cockerell, 1899), and A. bomboides neomexicana Cockerell (Cockerell, 1905; Hicks, 1926).

ADULT HOST INDEX

This index is presented in two sections. In section I, meloid species are listed alphabetically with the host plants given for each. In section II, host plants are listed alphabetically with the meloid species given for each. An attempt was made to include only those plants on which the beetles were feeding, but there is some doubt about some of the older collections. Plant species listed include only those on which the beetles have been taken in Oklahoma. Fernald (1950) and Waterfall (1962) were used to identify plant species.

SECTION I

Epicauta albida (Say

Gossypium sp. (cotton)

Solanum sp. (nightshade)

Solanum Torreyi Gray, forma Torreyi

Tribulus terrestris L. (punctureVine)

Epicauta aspera Werner

Gutierrezia Sarothrae (Pursh) Britton & Rusby

Solidago sp. (goldenrod)

Solidago canadensis L., var. gilvocanescens Rydb.

Epicauta atrata (Fab.)

Callirhoe alcaeoides (Michx.) Gray

Cirsium sp. (thistle)

Coreopsis grandiflora Hogg

Coreopsis grandiflora Hogg, var. Harveyana (Gray) Sherff

Coreopsis tinctoria Nutt., var. tinctoria

Gossypium sp. (cotton)

Oenothera speciosa Nutt.

Pyrrhopappus Geiseri Shinners

Rudbeckia hirta L., var. pulcherrima Farwell

Epicauta bispinosa Werner

Medicago sativa L. (alfalfa)

Epicauta callosa LeConte

Centaurea americana Nutt.

Coreopsis grandiflora Hogg

Gaillardia pinnatifida Torr.

Gossypium sp. (cotton)

Haplopappus ciliatus (Nutt.) DC.

Helianthus sp. (sunflower)

Helianthus annuus L.

Helianthus petiolaris Nutt.

Medicago sativa L. (alfalfa)

Rudbeckia amplexicaulis Vahl

Solidago missouriensis Nutt., var. fasciculata Holz.

Epicauta conferta (Say)

Gossypium sp. (cotton)

Lespedeza stipulacea Maxim.

Lycopersicum esculetum Mill. (tomato)

Medicago sativa L. (alfalfa)

Epicauta corvina (LeConte)

Helianthus sp. (sunflower)

Epicauta ferruginea (Say)

Haplopappus ciliatus (Nutt.) DC.

Gutierrezia Sarothrae (Pursh) Britton & Rusby

Helianthus sp. (sunflower)

Helianthus annuus L.

Solidago sp. (goldenrod)

Solidago canadensis L., var. gilvocanescens Rydb.

Solidago missouriensis Nutt., var. fasciculata Holz.

Epicauta ficta Werner

Amaranthus retroflexus L.

Amaranthus tamarascinus Nutt.

Haplopappus ciliatus (Nutt.) DC.

Medicago sativa L. (alfalfa)

Tribulus terrestris L. (puncturevine)

Epicauta floridensis Werner

Schrankia uncinata Willd.

Epicauta fortis Werner

Gutierrezia Sarothrae (Pursh) Britton & Rusby

Epicauta funebris Horn

Medicago sativa L. (alfalfa)

Melilotus alba Desv. (sweet clover)

Solanum Torreyi Gray, forma Torreyi

Tribulus terrestris L. (punctureVine)

Epicauta immaculata (Say)

Arachis hypogaea L. (peanut)

Asclepias tuberosa L.

Chamaesaracha coniodes (Moric.) Britt.

Medicago sativa L. (alfalfa)

Schrankia uncinata Willd.

Solanum sp. (nightshade)

Solanum Torreyi Gray, forma Torreyi

Tribulus terrestris L. (punctureVine)

Epicauta lemniscata (Fab.)

Arachis hypogaea L. (peanut)

Chenopodium album L. (lambs-quarter)

Glycine Max (L.) Merr. (soybean)

Medicago sativa L. (alfalfa)

Salsola Kali L., var. tenuifolia Tausch (tumbleweed)

Epicauta maculata Say

Glycine Max (L.) Merr. (soybean)

Kallstroemia hirsutissima Vail

Medicago sativa L. (alfalfa)

Salsola Kali L., var. tenuifolia Tausch (tumbleweed)

Schrankia uncinata Willd.

Epicauta murina (LeConte)

Medicago sativa L. (alfalfa)

Raphanus sativus L. (radish)

Epicauta occidentalis Werner

Arachis hypogaea L. (peanut)

Chenopodium album L. (lambs-quarter)

Glycine Max (L.) Merr. (soybean)

Medicago sativa L. (alfalfa)

Salsola Kali L., var. tenuifolia Tausch (tumbleweed)

Epicauta pennsylvanica (DeGeer)

Achillea lanulosa Nutt. (yarrow)

Amaranthus tamarascinus Nutt.

Aster praealtus Poir.

Eupatorium serotinum Michx.

Gutierrezia dracunculoides (DC.) Blake

Gutierrezia Sarothrae (Pursh) Britton & Rusby

Haplopappus ciliatus (Nutt.) DC.

Medicago sativa L. (alfalfa)

Salsola Kali L, var. tenuifolia Tausch (tumbleweed)

Solidago sp. (goldenrod)

Solidago canadensis L.

Solidago canadensis L., var. gilvocanescens Rydb.

Solidago missouriensis Nutt., var. fasciculata Holz.

Epicauta sericans LeConte

Arachis hypogaea L. (peanut)

Callirhoe alcaeoides (Michx.) Gray

Callirhoe involucrata (Nutt. ex Torr.) Gray

Cirsium sp. (thistle)

Convolvulus sp. (bindweed)

Convolvulus arvensis L.

Englemannia pinnatifida T. & G.

Gaillardia pulchella Foug.

Gossypium sp. (cotton)

Ipomoea leptophylla Torr.

Lygodesmia juncea (Pursh) D. Don

Medicago sativa L. (alfalfa)

Oenothera laciniata Hill, var. grandiflora (Wats.) Robinson

Opuntia imbricata (Haw.) DC.

Opuntia tortispina Engelm.

Solidago sp. (goldenrod)

Epicauta stuarti LeConte

Gutierrezia Sarothrae (Pursh) Britton & Rusby

Solidago sp. (goldenrod)

Solidago canadensis L.

Solidago missouriensis Nutt., var. fasciculata Holz.

Epicauta torsa (LeConte)

Albizzia sp. (mimosa)

Medicago sativa L. (alfalfa)

Robinia Pseudo-Acacia L. (black locust)

Sapindus Drummondii H. & A. (soapberry)

Gnathium francilloni Kirby

Grindelia lanceolata Nutt.

Haplopappus ciliatus (Nutt.) DC.

Helianthus sp. (sunflower)

Gnathium minimum (Say)

Helianthus sp. (sunflower)

Helianthus annuus L.

Helianthus petiolaris Nutt.

Gnathium texanum Horn

Redbeckia hirta L., var. pulcherrima Farwell

Lytta aenea Say

Pyrus sp. (pear)

Lytta fulvipennis LeConte

Argemone polyanthemos (Fedde) G. B. Ownb.

Pyrrhopappus scaposus DC.

Lytta reticulata Say

Psoralea lanceolata Pursh

Meloe perplexus LeConte

Medicago sativa L. (alfalfa)

Nemognatha lurida lurida LeConte

Haplopappus ciliatus (Nutt.) DC.

Helianthus sp. (sunflower)

Helianthus annuus L.

Helianthus mollis Lam.

Helianthus petiolaris Nutt.

Nemognatha nemorensis Hentz

Helianthus mollis Lam.

Nemognatha piazata bicolor LeConte

Centaurea americana Nutt.

Cirsium ochrocentrum (Gray) Gray

Pyrota bilineata Horn

Helianthus sp. (sunflower)

Pyrota concinna Casey

Gutierrezia Sarothrae (Pursh) Britton & Rusby

Haplopappus ciliatus (Nutt.) DC.

Helianthus sp. (sunflower)

Helianthus annuus L.

Heterotheca latifolia Buckl.

Solidago sp. (goldenrod)

Pyrota deceptiva Selander

Medicago sativa L. (alfalfa)

Pyrota discoidea LeConte

Ambrosia sp. (ragweed)

Callirhoe digitata Nutt.

Callirhoe involucrata (Nutt. ex Torr.) Gray

Callirhoe leiocarpa Martin

Oenothera lavandulaefolia T. & G.

Oenothera serrulata Nutt.

Pyrota perversa Dillon

Gutierrezia dracunculoides (DC.) Blake

Haplopappus ciliatus (Nutt.) DC.

Zonitis cribricollis (LeConte)

Rudbeckia hirta L., var. pulcherrima Farwell

Zonitis punctipennis punctipennis (LeConte)

Helianthus sp. (sunflower)

Zonitis vittigera propinqua MacSwain

Rudbeckia hirta L., var. pulcherrima Farwell

SECTION II

Achillea lanulosa Nutt.

Epicauta pennsylvanica (DeGeer)

Albizzia sp.

Epicauta torsa (LeConte)

Amaranthus retroflexus L.

Epicauta ficta Werner

Amaranthus tamarascinus Nutt.

Epicauta ficta Werner

Epicauta pennsylvanica (DeGeer)

Ambrosia sp.

Pyrota discoidea LeConte

Arachis hypogaea L.

Epicauta immaculata (Say)

Epicauta lemniscata (Fab.)

Epicauta occidentalis Werner

Epicauta sericans LeConte

Argemone polyanthemos (Fedde) G. B. Ownb.

Lytta fulvipennis LeConte

Asclepias tuberosa L.

Epicauta immaculata (Say)

Aster praealtus Poir.

Epicauta pennsylvanica (DeGeer)

Callirhoe alcaeoides (Michx.) Gray

Epicauta atrata (Fab.)

Epicauta sericans LeConte

Callirhoe digitata Nutt.

Pyrota discoidea LeConte

Callirhoe involucrata (Nutt. ex Torr.) Gray

Epicauta sericans LeConte

Pyrota discoidea LeConte

Callirhoe leiocarpa Martin

Pyrota discoidea LeConte

Centaurea americana Nutt.

Epicauta callosa LeConte

Nemognatha piazata bicolor LeConte

Chamaesaracha coniodes (Moric.) Britt.

Epicauta immaculata (Say)

Chenopodium album L.

Epicauta lemniscata (Fab.)

Epicauta occidentalis Werner

Cirsium sp.

Epicauta atrata (Fab.)

Epicauta sericans LeConte

Cirsium ochrocentrum (Gray) Gray

Nemognatha piazata bicolor LeConte

Convolvulus sp.

Epicauta sericans LeConte

Convolvulus arvensis L.

Epicauta sericans LeConte

Coreopsis grandiflora Hogg

Epicauta atrata (Fab.)

Epicauta callosa LeConte

Coreopsis grandiflora Hogg, var. Harveyana (Gray) Sherff

Epicauta atrata (Fab.)

Coreopsis tinctoria Nutt., var. tinctoria

Epicauta atrata (Fab.)

Englemannia pinnatifida T. & G.

Epicauta sericans LeConte

Eupatorium serotinum Michx.

Epicauta pennsylvanica (DeGeer)

Gaillardia pinnatifida Torr.

Epicauta callosa LeConte

Gaillardia pulchella Foug.

Epicauta sericans LeConte

Glycine Max (L.) Merr.

Epicauta lemniscata (Fab.)

Epicauta maculata Say

Epicauta occidentalis Werner

Gossypium sp.

Epicauta albida (Say)

Epicauta atrata (Fab.)

Epicauta callosa LeConte

Epicauta conferta (Say)

Epicauta sericans LeConte

Grindelia lanceolata Nutt.

Gnathium francilloni Kirby

Gutierrezia dracunculoides (DC.) Blake

Epicauta pennsylvanica (DeGeer)

Pyrota perversa Dillon

Gutierrezia Sarothrae (Pursh) Britton & Rusby

Epicauta aspera Werner

Epicauta fortis Werner

Epicauta ferruginea (Say)

Epicauta pennsylvanica (DeGeer)

Epicauta stuarti LeConte

Pyrota concinna Casey

Haplopappus ciliatus (Nutt.) DC.

Epicauta callosa LeConte

Epicauta ferruginea (Say)

Epicauta ficta Werner

Epicauta pennsylvanica (DeGeer)

Gnathium francilloni Kirby

Nemognatha lurida lurida LeConte

Pyrota concinna Casey

Pyrota perversa Dillon

Helianthus sp.

Epicauta callosa LeConte

Epicauta corvina (LeConte)

Epicauta ferruginea (Say)

Gnathium francilloni Kirby

Gnathium minimum (Say)

Nemognatha lurida lurida LeConte

Pyrota bilineata Horn

Pyrota concinna Casey

Zonitis punctipennis punctipennis (LeConte)

Helianthus annuus L.

Epicauta callosa LeConte

Epicauta ferruginea (Say)

Gnathium minimum (Say)

Nemognatha lurida lurida LeConte

Pyrota concinna Casey

Helianthus mollis Lam.

Nemognatha lurida lurida LeConte

Nemognatha nemorensis Hentz

Helianthus petiolaris Nutt.

Epicauta callosa LeConte

Gnathium minimum (Say)

Nemognatha lurida lurida LeConte

Heterotheca latifolia Buckl.

Pyrota concinna Casey

Ipomoea leptophylla Torr.

Epicauta sericans LeConte

Kallstroemia hirsutissima Vail

Epicauta maculata Say

Lespedeza stipulacea Maxim.

Epicauta conferta (Say)

Lycopersicum esculetum Mill.

Epicauta conferta (Say)

Lygodesmia juncea (Pursh) D. Don

Epicauta sericans LeConte

Medicago sativa L.

Epicauta bispinosa Werner

Epicauta callosa LeConte

Epicauta conferta (Say)

Epicauta ficta Werner

Epicauta funebris Horn

Epicauta immaculate (Say)

Epicauta lemniscata (Fab.)

Epicauta maculata Say

Epicauta murina (LeConte)

Epicauta occidentalis Werner

Epicauta pennsylvanica (DeGeer)

Epicauta sericans LeConte

Epicauta torsa (LeConte)

Meloe perplexus LeConte

Pyrota deceptiva Selander

Melilotus alba Desv.

Epicauta funebris Horn

Oenothera laciniata Hill, var. grandiflora (Wats.) Robinson

Epicauta sericans LeConte

Oenothera lavandulaefolia T. & G.

Pyrota discoidea LeConte

Oenothera serrulata Nutt.

Pyrota discoidea LeConte

Oenothera speciosa Nutt.

Epicauta atrata (Fab.)

Opuntia imbricata (Haw.) DC.

Epicauta sericans LeConte

Opuntia tortispina Engelm.

Epicauta sericans LeConte

Psoralea lanceolata Pursh

Lytta reticulata Say

Pyrrhopappus Geiseri Shinners

Epicauta atrata (Fab.)

Pyrrhopappus scaposus DC.

Lytta fulvipennis LeConte

Pyrus sp.

Lytta aenea Say

Raphanus sativus L.

Epicauta murina (LeConte)

Robinia Pseudo-Acacia L.

Epicauta torsa (LeConte)

Rudbeckia amplexicaulis Vahl

Epicauta callosa LeConte

Rudbeckia hirta L., var. pulcherrima Farwell

Epicauta atrata (Fab.)

Gnathium texanum Horn

Zonitis cribricollis (LeConte)

Zonitis vittigera propinqua MacSwain

Salsola Kali L., var. tenuifolia Tausch

Epicauta lemniscata (Fab.)

Epicauta maculata Say

Epicauta occidentalis Werner

Epicauta pennsylvanica (DeGeer)

Sapindus Drummondii H. & A.

Epicauta torsa (LeConte)

Schrankia uncinata Willd.

Epicauta floridensis Werner

Epicauta immaculata (Say)

Epicauta maculata Say

Solanum sp.

Epicauta albida (Say)

Epicauta immaculata (Say)

Solanum Torreyi Gray, forma Torreyi

Epicauta albida (Say)

Epicauta funebris Horn

Epicauta immaculata (Say)

Solidago sp.

Epicauta aspera Werner

Epicauta ferruginea (Say)

Epicauta pennsylvanica (DeGeer)

Epicauta sericans LeConte

Epicauta stuarti LeConte

Pyrota concinna Casey

Solidago canadensis L.

Epicauta pennsylvanica (DeGeer)

Epicauta stuarti LeConte

Solidago canadensis L., var. gilvocanescens Rydb.

Epicauta aspera Werner

Epicauta ferruginea (Say)

Epicauta pennsylvanica (DeGeer)

Solidago missouriensis Nutt., var. fasciculata Holz.

Epicauta callosa LeConte

Epicauta ferruginea (Say)

Epicauta pennsylvanica (DeGeer)

Epicauta stuarti LeConte

Tribulus terrestris L.

Epicauta albida (Say)

Epicauta ficta Werner

Epicauta funebris Horn

Epicauta immaculata (Say)

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