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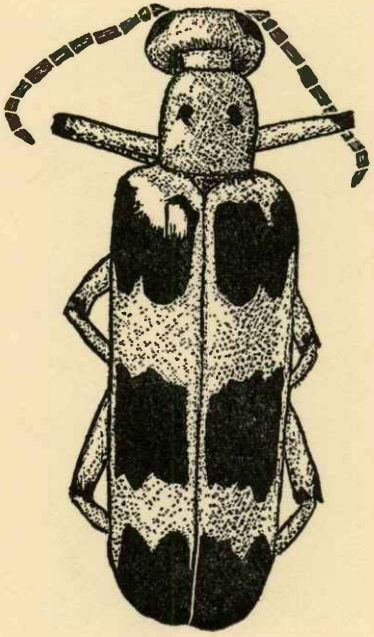

The Meloidae of Arizona

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The Meloidae of Arizona

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OUR COVER PICTURE — More than 100 drawings of members of the Meloidae family, or insect parts identifying various members of that family, are shown in plates at the end of this bulletin. The drawings are by Martha L. Noller of the Entomology Department. The one used on the cover is of *Pyrota palpalis*, also shown in Plate VIII. All plates are grouped, as we said, at the end of this bulletin.

Introduction

Beetles of the family Meloidae, commonly known as blister beetles, form a conspicuous element of the insect fauna of the deserts of the Southwest. The family is not easily defined, although it is easily recognizable in the field. The adults are mostly soft-bodied, often brightly colored. They have the head inclined, hypognathous and strongly constricted behind the eyes into a "neck" that does not fit entirely into the prothorax.

The anterior coxal cavities are widely open behind, the anterior and middle coxae large, conical and contiguous, and the posterior coxae transverse. The tarsi are heteromerous, five-segmented on the anterior and middle legs, four-segmented on the posterior legs.

In most members of the family the tarsal claws are cleft into two blades, with the upper blade simple or bearing a double row of fine teeth on its lower edge; in a few sections of the family the claws are simple, with a basal tooth or cleft. For general recognition the combination of soft body, constriction of head behind eyes, heteromerous tarsi and divided tarsal claws serves to distinguish most of the species commonly encountered.

The adults of many species feed on the foliage or blossoms of plants during the daytime and are thus quite conspicuous. Some other species are largely nocturnal and are rarely seen except when they congregate at lights. A few species have cryptic habits, the members of the genus *Hornia* rarely being found outside the burrows of solitary bees as adults. The species that feed on plant parts are often very specific in their preferences. Plants of the families Solanaceae, Leguminosae, Amaranthaceae, and Compositae are generally favored, but other plant families are used by some.

A species sometimes feeds on only a single genus or species of plant, or even just on certain parts. Almost all the members of the subfamily Nemognathinae probably feed on nectar and pollen, and are usually found on blossoms. Many of the species in this subfamily have the galeae modified into a sucking tube. Most of the rest of the Meloidae have normal, chewing mouthparts and devour leaves, petals, etc.

The food plant preference of the adults may appear very narrow under certain circumstances and very general under others. Each species apparently has definite preferences. If the most preferred plant is available, almost all the individuals of the species in a region are on this kind of plant. If the most preferred plant is absent, other related plants may be accepted. In some cases totally unrelated plants are devoured if the more highly preferred plants are not available.

A few of our species are in bad repute from an agricultural standpoint. If there is a large hatch of adults in an agricultural area, they may feed on such plants as alfalfa and potato, even though these are not among the preferred species. In the eastern half of the country there are several species that seem to prefer crop plants and some of these have become serious pests. The species that affect crop plants in Arizona have thus far caused only local damage.

It is sometimes difficult to assess the food plant preference of a species in an area. When the adults first emerge, they often band together and crawl over any vegetation that may be present. By a week later they have

usually settled down to their preferred food plant and started to feed. At this time closely related species may become very strictly segregated onto different host plants. The collector who is interested in getting food plant information must make sure that the beetles are actually feeding and that he has not disturbed them. When he walks through mixed vegetation, most of the blister beetles drop to the ground and may or may not crawl back onto their preferred plants.

The life cycle of all the blister beetles for which the details are known is quite complex. The first instar larva is an active "triungulin," so-called because there are three slender appendages at the tip of each leg. It is up to the triungulin to reach a very definite kind of food supply.

All of the members of the genus *Epicauta* and probably all of the Epicautini feed on the eggs of grasshoppers in the larval stage; all the other groups probably feed on the stored food and eggs of wild bees. The method of gaining entry to the food supply varies. In the Epicautini, the larvae wander over the ground until they find a grasshopper egg pod. In the Meloinae and many Nemognathinae, the triungulins climb onto blossoms and ride back to the nest on visiting bees. The larval food and behavior are unknown for the Pyrotini and Tetraonycinae. The larvae of Lyttini feed on the stored food and eggs of bees, but the triungulin must search for the nest in the ground.

If the first instar larva has been successful in finding food, it feeds and soon molts into an essentially immobile form. Later instars are likewise immobile. One of the later instars develops a hardened skin and passes the winter thus protected. Details of the life cycle vary in the different groups. In *Epicauta*, the larva moves out of the food supply for a short distance before forming the hardened skin. The following year it responds to the proper moisture and temperature conditions by molting again into a normal larva, then pupating and finally emerging as an adult.

In the groups associated with bees the transformations normally take place in the cell of the bee. In most species the life cycle apparently takes approximately one year, but it has been surmised that some of the species are able to remain in the stage with the hardened skin for two or more years if soil moisture does not reach a certain level.

Importance of Blister Beetles

Medical Importance

Many, perhaps all, of the blister beetles are able to cause the formation of blisters on the skin of people who contact them. In Arizona this contact is most likely with the species that come to light at night. Several species found at lower elevations produce sizable blisters; *Epicauta tenella* and *Epicauta lauta* are the ones most often encountered. The blisters that are produced may be up to several inches long, and may spread if the fluid from a blister is allowed to touch unexposed skin. They soon disappear if the liquid is removed.

The active principle is a substance called cantharidin. This material is present in the body, including the blood, and the main chance of human contact comes when the beetles are disturbed, at which time they can release blood through the joints of the legs. Cantharidin has a long history of use as a vesicant and as an aphrodisiac. *Lytta vesicatoria,* a common species in Europe, is gathered, killed and dried to form the "Spanish fly" of commerce.

Agricultural Importance

As has already been mentioned, several species of Arizona blister beetles have been known to attack cultivated plants as adults. The main offenders in this regard have been *Epicauta pardalis*, on alfalfa and potato, *Epicauta andersoni* on potato, and *Epicauta longicollis* on alfalfa. *Epicauta bispinosa* was involved in severe damage to tomatoes in one area in New Mexico in 1956. Several other species have been incriminated in damage to blossoms of garden flowers and leaves of shade trees, but this damage has been very local.

Perhaps of greater importance is the role played by the groups other than Epicautini as "parasites" of native bees. Where these bees are of actual or potential importance as pollinators of crop and important range plants, the beetles must have a decided detrimental effect. *Zonitis atripennis flavida* has been shown to parasitize the alkali bee, *Nomia melanderi*, an important pollinator of alfalfa in Utah. The adult beetles frequent the blossoms of the spider plant, *Cleome*, which the alkali bees also visit for nectar. Triungulins of the *Zonitis* produced from eggs laid on the plants ride back to the nests of *Nomia* as passengers on the bees and complete their development there, to the detriment of the bee population. Destruction of spider plants near alkali bee nesting sites has been suggested as a means of increasing bee populations (Selander and Bohart, 1954). Much remains to be learned about the relationship between bees and blister beetles and about the importance of native bees in Arizona.

Because their larvae eat grasshopper eggs, members of the tribe Epicautini must be entered on the credit side of the ledger wherever grasshoppers cause damage to crop or range plants. Since not all grasshoppers eat valuable plants, and since some may even be beneficial by eating worthless or poisonous plants, it cannot be stated without qualification that all Epicautini are beneficial. Very little is known about the food preferences of the larvae. However, there have been studies, especially on the Great Plains, that show that certain of the *Epicauta* species do devour the eggs of noxious grasshopper species in the larval stage.

Parker and Wakeland (1957) have published a summary of many years of investigation by the U. S. Department of Agriculture of predators of grasshopper egg pods. They found that the larvae of bee flies, blister beetles and certain ground beetles accounted for substantial reductions in the numbers of surviving grasshopper eggs during some years and in certain places, and a general, low-level, reduction most years.

In the Arizona study areas reported by them, at Tempe and Yuma in crop areas and at Chino Valley in a crop and range area, the destruction of egg pods was low, with an average of 0.4% by bee fly, 1.76% by blister beetle, and 3.14% by ground beetle larvae during the study period, with the highest destruction by all three combined 16.7% in the Tempe study area. That a higher percentage is possible is shown by a combined average destruction of 55% of the grasshopper egg pods in Santa Cruz county in 1939, as shown by an egg pod survey in connection with chemical control operations.

Parker and Wakeland note that predatism of grasshopper eggs was higher in crop areas than it was in purely grassland areas, basing their observations on the total area surveyed, mostly in the Great Plains but extending from Michigan to California. In their discussion of this phenomenon they make the following statements:

"The fact that most species of range grasshoppers scatter their egg pods more widely than species of crop grasshoppers, thus making it more difficult for predators to find them, may be one reason for the lower percentage of egg pods destroyed in grasslands. This is in agreement with the fact that predatism on the study area was highest during years of greatest egg-pod numbers. . . .

"Another possible explanation of the higher predatism in cropped areas is the fact that bee fly adults frequently gather in large numbers to feed on the blooms of annual plants growing on disturbed ground along roadsides and fence rows, and swarms of blister beetle adults feed on legumes such as alfalfa and sweetclover. Having concentrated in such places for feeding, it seems reasonable to believe that they would stay for egg laying."

The reference to blister beetles congregating on crop plants probably was not based on observations in Arizona. But a similar situation could well apply on roadsides, where the preferred food plants of many of our blister beetles are more abundant or more luxuriant than they are in grazed areas. It seems possible that the concentration of vigorous, blooming plants along roadsides promotes the increase in number of both bee flies and blister beetles in the immediate area and thus has a depressing effect on grasshopper populations.

Classification

The following key to species includes the 143 species that are known to have been collected in Arizona, and fourteen others that probably occur here. The name is bracketed in the latter case. The key is "artificial" and is designed to facilitate identification rather than show relationships. Some species appear more than once, so that the various forms of variable species can be distinguished from the other species they most closely resemble. Hard-to-see details have been avoided as much as possible, but the use of some magnification is necessary in most cases.

Following the key to species, each subfamily, tribe, genus and species is described and discussed in some detail. The arrangement shows relationship. A selected list of references is included where appropriate, to enable the student to find the principal sources of further information. Each species is characterized as fully as is necessary for identification.

Following the description there is a summary of known bionomics, food plant preference, behavior, etc., this information being original unless accompanied by a literature citation. The known total range of the species is outlined and then the range in Arizona. Localities in Arizona are arranged in geographic sequence as far as possible. Finally, dates of collection are grouped by month, with the number of collections in parentheses following each month.

KEY TO SPECIES

1		Elytra at least twice as long as prothorax	2
		Elytra shorter than prothorax. Rare species, found only in the nests of solitary bees. Nemognathinae (*Hornia*)	162
2	(1)	Upper blade of tarsal claws smooth along its lower margin, sometimes without a lower blade but merely toothed near base. (Fig. 45). Lyttinae, Meloinae, and Tetraonycinae.	3
		Upper blade of tarsal claws with a double row of fine teeth along its lower margin (Fig. 1). Some species with galeae of maxillae greatly elongated (Fig. 2). Nemognathinae (all but *Hornia*).	120
3	(2)	Lower division of tarsal claws arising from the ventral surface of the upper blade and only partly separated from it, varying from a long blade (Fig. 3) to a basal tooth (Fig. 4) in different genera. (In *Eupompha*, subgenus *Spastonyx*, there is a long ventral blade with a slender appendage parallel to it and arising from the outer surface of its base, this appendage very fragile and often broken off (Fig. 5). Lyttinae: Eupomphini.	4
		Lower blade of tarsal claws arising from the outer side of the base of the upper, separate for most of its length and almost as long as the upper blade (Fig. 45). Lyttinae (except Eupomphini), Meloinae, and Tetraonycinae.	21
4	(3)	Hind wings present. Elytra not abbreviated or greatly puffed out from body.	5
		Hind wings absent. Elytra either abbreviated or greatly puffed out from body (Fig. 63, 64).	17

5 (4) Vertex of head sharply pointed. Body color opaque black, without noticeable pale pubescence on elytra (Fig. 62). ..... *Phodaga alticeps* LeConte

Vertex of head rounded or truncate. 6

6 (5) Elytra with suture, margins and four ridges sharply elevated (Figs. 60, 61). *Pleurospasta.* 7

Elytra without longitudinal ridges. 8

7 (6) Very tip of elytra yellow. Elytral ridges complete from base to apex and very regular (Fig. 60). .... *Pleurospasta mirabilis* (Horn)

Very tip of elytra brown. Elytral ridges irregular in region of brown fascia behind middle, there coalescing by cross ridges (Fig. 61).....[*Pleurospasta reticulata* Van Dyke]

8 (6) Elytra with coarse, heavy raised yellow reticulations, on a background that is almost black (Fig. 59). .... *Tegrodera erosa aloga* Skinner

Elytra without strong reticulations of contrasting color. 9

9 (8) Black, with irregular patches of cinereous pubescence that produce a spotted appearance (Fig. 58). .... *Negalius marmoratus* Casey

Variously colored but not all black, and without patches of contrasting pubescence. *Eupompha.* 10

10 (9) Tarsal claws without a slender lateral appendage. Variously colored but not as in the following. *Eupompha* (*Eupompha*). 11

Tarsal claws with a slender lateral appendage. Head and pronotum rufous, the elytra black, or whole body brownish black. *Eupompha* (*Spastonyx*). 16

11 (10) Head with base rounded, and with at least a feeble median impression on the frons in the ♂. Prothorax narrowed anteriorly, the dorsal surface depressed in this region. 12

Head quadrate, with the base almost straight, and the frons not impressed in the ♂. Prothorax quadrate and almost flat dorsally. 15

12 (11) Elytra bluish black, with some contrasting rufous or yellow markings (Fig. 56). ..... *Eupompha elegans* (LeConte)

Elytra entirely metallic green, roughened; head rufous. 13

Elytra pale, smooth and shiny. 14

13 (12) Head and pronotum rufous. Small, without striking modifications in ♂. ..... *Eupompha wenzeli* (Skinner)

Head rufous, prothorax and elytra metallic green. ♂ with head deeply cleft and front tarsi modified (Fig. 57) ..... *Eupompha fissiceps* LeConte

14 (12) Head and pronotum rufous, elytra yellow. .... *Eupompha imperialis* (Wellman)

Head and elytra rufous, pronotum black. .... *Eupompha schwarzi* (Wellman)

15 (11) Whole body and elytra metallic green. Elytra with intervals not raised. ..... *Eupompha viridis* (Horn)

Elytra pale fulvous, forebody metallic green to fulvous, but whole upper surface somewhat obscured by rather dense luteous to rufous pubescence. Elytra with intervals between the feebly indicated costulae elevated, especially in larger specimens. .... *Eupompha edmundsi* (Selander)

16 (10) Distal antennal segments 1⅔ as long as wide. Head and pronotum rufous, elytra black. ..... *Eupompha nemognathoides* (Horn)
Distal antennal segments twice as long as wide. Color similar but less contrasting and tending to be suffused with paler, sometimes all brown. ..... *Eupompha macswaini* (Selander)

17 (4) Elytra abbreviated, exposing much of abdomen. Head and elytra with rufous or yellow markings (Fig. 63). ..... *Megetra.* 18
Elytra greatly swollen but not greatly abbreviated. Color uniformly dark, except for pale mineral incrustations on elytra of some specimens (Fig. 64). *Cysteodemus.* 20

18 (17) Elytra with distinctly flattened disc, separated from sides by well-developed ridges. 19
Elytra almost evenly rounded, the disc barely differentiated from the sides and not separated from them by ridges. Yellow on elytra slightly reticulated but confined to a regular line (Fig. 63). .....*Megetra punctata* Selander

19 (18) Yellow on elytra reticulated and diffused along middle, not in a regular line. ..... *Megetra cancellata* (Brandt & Erichson)
Yellow on elytra slightly reticulated but confined to a regular line. .....*Megetra vittata* (LeConte)

20 (17) Elytra with strong, irregular raised reticulations. Prothorax with strong lateral spines. Opaque black or bluish black, often with yellow or white mineral incrustations on the elytral reticulations (Fig. 64). Abundant ..... *Cysteodemus armatus* LeConte
Elytra very deeply punctured, not reticulate. Prothorax strongly produced at middle of sides but not spinose. Shiny blue, purple, green or bronzed, not incrusted. Rare in Arizona. .....*Cysteodemus wislizeni* LeConte

21 (3) Side of anterior femur facing the tibia straight, or slightly excavated beyond middle, but without transverse silky pubescence in the excavation (Fig. 6). Lyttinae (Lyttini, Pyrotini, Epicautini: *Linsleya*), Meloinae, and Tetraonycinae. 22
Side of anterior femur facing tibia excavated beyond middle, the excavation clothed with appressed silky pubescence, at least part of which is transverse (Fig. 7). Lyttinae: Epicautini (except *Linsleya*). 54

22 (21) Elytra uniformly colored, black with the base rufous, or luteous with a small subapical dark spot on each. 23
Elytra variously striped or banded but not with a single small subapical spot on each. Lyttinae: Pyrotini: *Pyrota.* 45

23 (22) Elytra predominantly pale, rufous to yellow. 24
Elytra predominantly black or metallic. 27

24 (23) Head and prothorax black, the former with a median pale spot; elytra rufous. Rare in Arizona. ..... *Lytta fulvipennis* LeConte
Prothorax and at least most of head rufous to luteous. 25

25 (24) Elytra luteous, often with a small subapical spot on each; head, prothorax and legs slightly rufous or brunneous. Shiny, with sparse pubescence (Fig. 95). ..... *Lytta biguttata* LeConte

Light rufous with contrasting black markings on legs. Broad (Fig. 97). Tetraonycinae: *Tetraonyx*. 26

26 (25) Front of head and all of tibiae black. Dorsal surface rather closely punctured. Scarce. ... *Tetraonyx femoralis* Dugès

Front of head and part of tibiae pale. Dorsal surface only moderately densely punctured (Fig. 97). Abundant. .... *Tetraonyx fulvus* LeConte

27 (23) Entire upper surface dark, except for a small spot on middle of front of head in some species. 28

At least part of upper surface pale. 39

28 (27) Elytra short, covering only a part of the swollen abdomen in most specimens, overlapping at base (Fig. 96). Meloinae: *Meloe*. 29

Elytra of normal length, covering most of abdomen and meeting on midline. 31

29 (28) Last 4 antennal segments thicker than those immediately preceding, the intermediate segments not contorted in the ♂ (Figs. 8, 96). ..... *Meloe laevis* Leach

Last 4 antennal segments more slender than those immediately preceding. ♂ antennal segments 6 and 7 contorted (Fig. 9). 30

30 (29) Prothorax distinctly longer than broad. Surface subopaque but not roughened, and without dense, coalescing punctures. A late summer and fall species. ..... *Meloe impressus* Kirby

Prothorax about as broad as long. Surface opaque, roughened and with dense coalescing punctures. A spring and early summer species. ..... *Meloe niger* Kirby

31 (28) Side of anterior tibia facing femur with short, suberect, silky pubescence (Fig. 10). Lyttinae: Epicautini: *Linsleya*. 32

Side of anterior tibia facing femur with pubescence similar to that on rest of surface. Lyttinae: Lyttini (part). 34

32 (31) Large, entirely black. ♂ with one spur on anterior tibia (Fig. 65). ..... *Linsleya suavissima* (Wellman)

Smaller, at least partly metallic or bluish. 33

33 (32) Subopaque, black with dark metallic blue elytra. ♂ with no spur on anterior tibiae. ..... [*Linsleya convexa* (LeConte)]

Shiny, green or bronze. ♂ with two spurs on anterior tibiae. ..... [*Linsleya sphaericollis* (Say)]

34 (31) Upper surface all black, at most faintly bluish. 35

Upper surface brilliant metallic blue to green or bronzed..... 37

35 (34) Upper and lower surfaces clothed with sparse but conspicuous pale pubescence. Head entirely black. ..... *Lytta puberula* LeConte

Upper surface appearing glabrous macroscopically. Head with a pale spot on front. 36

36 (35) Elytra with fine but distinct raised reticulations. Intermediate antennal segments not modified in ♂. ..... *Lytta navajo* Werner

Elytra only feebly wrinkled, shiny. Pads present on tarsi of fore and middle legs. Mandibles and tarsal claws strongly curved. ..... *Lytta melaena* LeConte

37 (34) Antennae markedly longer in ♂ than in ♀ and with intermediate segments not thickened. Lower elevations in S. Arizona. ..... *Lytta stygica* (LeConte)

Antennae longer in ♂ than in ♀ but with the intermediate segments thickened. Higher elevations from White Mts. to San Francisco Peaks. 38

38 (37) Elytra blue to green, sometimes bronze. ♂ with intermediate antennal segments pilose anteriorly and with hind trochanters not spinose. ..... *Lytta viridana* LeConte

Elytra purple or with purplish reflections. ♂ with intermediate antennal segments not pilose and with hind trochanters spinose (Fig. 11). ..... *Lytta nuttalli* Say

39 (27) Pronotum entirely black. Vertex of head rufous. Elytra black, often with a greenish cash. ..... *Lytta auriculata* Horn

Pronotum rufous or yellow, sometimes with black markings. 40

40 (39) Head black; pronotum rufous; elytra black or black with base rufous, subopaque, with fine raised reticulations. ..... *Lytta arizonica* Selander

Head rufous, at least behind the eyes. 41

41 (40) Legs entirely black. 42

Legs partly or mostly rufous. 44

42 (41) Head, prontoum and base of elytra rufous. ..... *Lytta agrestis* (Fall)

Elytra entirely black. 43

43 (42) Prothorax widest before middle, not angulate. Head between eyes, and all of dorsum of pronotum rufous. ♂ with antennal segments 4 and 5 distorted (Fig. 12). Elytra finely rugose, not reticulate (Fig. 93). Abundant. ..... *Lytta mutilata* (Horn)

Prothorax widest at middle, there angulate. Head black between eyes and prontoum with at least a small black area at middle of apex. ♂ antennae not distorted. Elytra with raised reticulations. ..... [*Lytta vulnerata* (LeConte)]

44 (41) Femora and tibiae rufous. Elytra coarsely reticulate. Tarsi without pads, but with the ventral surface glabrous between the lateral fringes of stiff setae. Often abundant. (Fig. 94). ..... *Lytta magister* Horn

Tibiae black, femora rufous across middle. Elytra finely reticulate. Tarsi with pads. Rare. ..... *Lytta deserticola* Horn

45 (22) Black markings on elytra reaching apex, consisting of subbasal, postmedian and apical fasciae, the first often broken up into two elongate spots, and the others indented near the middle (Fig. 91). 46

Apex of elytra with at least a narrow pale border. 48

46 (45) Postmedian fascia at least half as long as elytra and tending to connect with the sub-basal and apical fasciae. Last segment of ♂ maxillary palpi almost as in ♀. ..... *Pyrota terrestris* Selander

Postmedian fascia ca. ⅓ of elytral length and separated from the others. Base of last segment of ♂ maxillary palpi with a distinct lateral lobe. 47

47 (46) Elytra smooth, shiny, scarcely alutaceous even near apex, noticeably paler than rest of body (Fig. 91). ..... *Pyrota palpalis* Champion

Elytra dull and distinctly alutaceous, especially toward apex, and of almost the same hue as the rest of the body. ..... *Pyrota concinna* Casey

48 (45) Elytra striped or mostly black with only margins pale, in which case there may be an oblique pale mark across middle. 49

Elytra with isolated fasciae. 52

49 (48) Elytra with only the margin pale, or with an oblique line across the middle in addition. 50

Each elytron with one or two stripes. 51

50 (49) Shiny, brick red and black, the elytra black, each completely margined with brick red (Fig. 89). Abundant. ..... *Pyrota akhurstiana* Horn

Subopaque, yellow and black, each elytron black, narrowly margined with yellow and often with an oblique yellow line across middle. (Fig. 90). ..... *Pyrota obliquefascia* Schaeffer

51 (49) Pale yellow, shiny, each elytron with two narrow dark stripes, which are often abbreviated at base and apex (Fig. 92). ..... *Pyrota bilineata* Horn

Yellow, each elytron with a black spot at base near suture and a sinuate black stripe from humerus to near apex. ..... *Pyrota trochanterica werneri* Selander

52 (48) Each elytron with a small postmedian black fascia and a small subapical lunule. ..... *Pyrota fasciata* Selander

Each elytron with a large postmedian black fascia but without a subapical marking. 53

53 (52) Postmedian elytral fascia quadrate, not much longer than broad. Elytra very shiny, with the intervals between the very feeble costulae very flat. ..... *Pyrota postica* LeConte

Postmedian elytra fascia elongate-oval. Elytra subopaque, with intervals between the feeble costulae slightly convex. ..... *Pyrota plagiata* (Haag-Rutenburg)

54 (21) Each elytron with 3 or 4 strong ridges (Figs. 87, 88). ♂ with intermediate antennal segments elongate and shiny, in contrast with those next to them (Figs. 13, 14). *Pleuropompha.* 55

Elytra without strong ridges. If feeble ridges are present, the ♂ antennae are not as above. *Epicauta.* 56

55 (54) Each elytron with 4 strong ridges (Fig. 87). ♂ with intermediate antennal segments much elongated (Fig. 13). ..... *Pleuropompha costata* (LeConte)

Each elytron with 3 strong ridges (Fig. 88). ♂ with intermediate antennal segments only slightly elongated (Fig. 14). ..... *Pleuropompha tricostata* Werner

56 (54) Pubescence cinereous to luteous, with many glabrous spots that appear black or brown. 57

Not spotted, except for a pair of glabrous spots on pronotum of a few species. 65

57 (56) Legs rufous in ground color, in contrast with black or brown body (Fig. 85). ♂ antennal segment 1 much elongated and curved (Fig. 15). ..... *Epicauta maculifera* (Maydell)

Legs of color similar to rest of body. Antennal segment 1 not enlarged. 58

58 (57) Spots on elytra large enough to be confluent, at least in part (Fig. 78). 59

Spots on elytra small, not confluence (Figs. 75-77) 60

59 (58) ♂ (anterior tibia with 1 spur) with last segment of both maxillary and labial palpi expanded (Fig. 16). ..... *Epicauta andersoni* Werner

♂ with last segment of palpi not expanded, subtriangular (Figs. 17, 78). ..... *Epicauta pardalis* LeConte

60 (58) ♂ with 2 spurs on anterior tibia, as in ♀. 61

♂ with 1 stout, slightly curved spur on anterior tibia 62

61 (60) Pubescence sparse, not concealing ground color. ♂ antennae ensiform (Fig. 18). ..... *Epicauta oregona* Horn

Pubescence moderately dense, largely concealing ground color, as in Fig. 75. ♂ antennae slender, as in ♀. ..... *Epicauta bispinosa* Werner

62 (60) ♂ maxillary palpi expanded, the last segment orbicular in outline (Figs. 19, 75). ..... *Epicauta maculata* (Say)

♂ palpi not expanded, or, if slightly expanded, last segment of maxillary palpi subtriangular. 63

63 (62) ♂ with segment 1 of anterior tarsus narrow at base, without pad except on apical fourth (Fig. 20). ..... *Epicauta normalis* Werner

♂ with segment 1 of anterior tarsus provided with a pad almost to base (Fig. 21). 64

64 (63) Spots on elytra noticeably larger than those on head and pronotum and quite uniform in size. Elytra somewhat swollen, rounded apically (Fig. 77). ..... *Epicauta phoenix* Werner

Spots on elytra very similar in size to those on head and pronotum, usually variable in size. Elytra slightly truncate, not swollen (Fig. 76). ..... *Epicauta nogales* Werner

65 (56) Elytra with one or more stripes or lines, marked either in ground color, differently colored pubescence, denser pubescence, or a combination of these. 66

Elytra without stripes or lines. They may be margined with lighter or darker pubescence or have large black areas. 76

66 (65) Ground color black. 67

Ground color tan to brown. 70

67 (66) Antennal segment 2 as long as 3 or longer. ♂ antennal segment 1 elongate and curved (Figs. 22, 23). 68

Antennal segment 2 shorter than 3. ♂ antennal segment 1 not elongate. 69

68 (67) Elytra black-pubescent, with a single white line down the middle of each (Fig. 84). .....*Epicauta purpurea* (Horn)
Elytra cinereous-pubescent, with two wide black stripes down each, these connected behind (Fig. 73). .....*Epicauta atrivittata* (LeConte)

69 (67) Each elytron with 3 lines, suture and margins pale-pubescent, often with some pale suffusion between (Fig. 67). .....*Epicauta albolineata* Dugès
Each elytron with an obscure line of denser pale pubescence down the middle, in addition to slightly denser pale pubescence on suture and margins. .....*Epicauta parkeri* Werner, in part

70 (66) Each elytron with 2 well-defined black stripes, marked in ground color and pubescence, on a luteous background (Fig. 74). .....*Epicauta abadona* Skinner
Lines on elytra formed by denser pale pubescence. 71

71 (70) Each elytron with 4 narrow lines of denser pubescence, on very feeble ridges (Fig. 70). ♂ with antennal segment 2 longer than 3 (Fig. 24). .....*Epicauta tenuilineata* (Horn)
Each elytron with a single line of denser pubescence. ♂ with antennal segment 2 shorter than 3. 72

72 (71) Each elytron with a small quadrate black or brown spot next to the scutellum and another narrower mark at humerus (Fig. 86). 73
No such marks at base of elytra (Fig. 82). 74

73 (72) ♂ with antennal segment 1 as long as 4 following together (Fig. 25). Posterior trochanters of both sexes normal, without a tuft of pubescence in ♂. .....*Epicauta virgulata* (LeConte)
♂ with antennal segment 1 only as long as 3 following together (Fig. 26). Hind margin of posterior trochanters of both sexes bulging, with a median tuf of pubescence in ♂ (Fig. 86). ..... *Epicauta hirsutipubescens* (Maydell)

74 (72) 14 mm. long or longer. ♂ anterior tibia without a spur (very rarely with 1 spur) (Fig. 82). .....*Epicauta alastor* Skinner
12 mm. long or shorter. ♂ anterior tibia with 1 spur. 75

75 (74) ♂ middle tarsi same as others. Ground color of head and pronotum dark, usually black, of elytra tan. .....*Epicauta insignis* Horn, in part
♂ middle tarsi much swollen, glabrous (Fig. 27). Ground color often uniformly tan but sometimes with head and pronotum clouded with brown to dark brown. .....*Epicauta crassitarsis* Maydell

76 (65) Pubescence yellowish; each elytron with 2 large black markings. (Fig. 80). .....*Epicauta stuarti* LeConte
Not so marked. 77

77 (76) Pubescence rufous to luteous on pronotum, paler, from cinereous to almost luteous, on rest of body (Fig. 79). ..... *Epicauta wheeleri* Horn

Not so marked. 78

78 (77) Black, suture and margins of elytra with a narrow border of contrasting cinerous to luteous pubescence (Fig. 68). ..... *Epicauta ruidosana* Fall

Not so marked. 79

79 (78) Black; base of pronotum almost always with a narrow margin of white pubescence and underside of body with some markings of same color. Many specimens have the apices of the abdominal sterna white-pubescent (Fig. 69) ..... *Epicauta segmenta* (Say)

Variously colored, including black, but without contrasting white markings on body. 80

80 (79) Uniformly black. 81

Not uniformly black. 83

81 (80) Antennal segment 2 longer than 3, segments 1 and 2 elongate in ♂ (Fig. 28). Upper surface with very short and sparse dark pubescence that is invisible macroscopically. ..... *Epicauta subglabra* (Fall)

Antennal segment 2 much shorter than 3. 82

82 (81) Outer spur of hind tibia somewhat broader than inner, never spiniform or sticklike (Fig. 29). ..... *Epicauta pennsylvanica* (DeGeer)

Outer spur of hind tibia slender, sticklike (Fig. 30). A large, stout species (Fig. 66) ..... *Epicauta corvina* (LeConte)

83 (80) All of body black except elytra, which are very dark rufous brown; pubescence all black. ..... *Epicauta jimenezi* Dugès

Not so colored. Pubescence mainly pale, even though sparse in some species and not concealing ground color. 84

84 (83) Antennal segment 2 longer than 3. 85

Antennal segment 2 shorter than 3. 90

85 (84) Ground color of body, including elytra, black or blackish. 86

Ground color of body or elytra pale to rufous. 87

86 (85) Antennae with segments 1 and 2 luteous, 1 much elongated and bowed in ♂ (Fig. 31). Pubescence dense, luteocinereous to cinereous (Fig. 71). ..... *Epicauta texana* Werner

Antennae all black; ♂ with segments 1 and 2 elongate and shiny, 1 straight, 2 shorter than 1 but as long as 3 and 4 together (Fig. 32). Pubescence moderately dense, cinereous. ..... *Epicauta fabricii* (LeConte)

87 (85) Ground color of elytra noticeably paler than head and pronotum, which are black or very dark brown. ♂ antennal segments 1 and 2 elongate, together equal to 3 to 11 together (Fig. 33). ..... *Epicauta polingi* Werner

Elytra not noticeably paler than rest of body. 88

88 (87) Brown, margins of elytra paler, due partly to denser pubescence. ♂ antennal segments 1 and 2 together longer than 3 to 11 together (Fig. 34) ..... *Epicauta liebecki* Werner

Body and elytra entirely luteous to ferrugineous in ground color. 89

89 (88) Legs brown, not contrasting with rest of body. ♂ antennal segments 1 and 2 elongate, but together shorter than 3 to 11 together (Fig. 35). ♀ antennal segments 1 and 2 with some cinereous pubescence. ..... *Epicauta arizonica* Werner

Legs partly black, in contrast with body. Basal antennal segments not enlarged in either sex and without cinereous pubescence (Figs. 36, 83). ..... *Epicauta lauta* (Horn)

90 (84) Ground color of head, pronotum and legs rufous, of elytra black, the whole with moderately sparse cinereous pubescence that affects the ground color (Fig. 81). ..... *Epicauta tenella* (LeConte)

Elytra not darker than head and pronotum. 91

91 (90) At least part of abdominal sterna with a median black spot, and/or head with a deep pit at inner margin of each eye. 92

Abdominal sterna without median black spots and head without a pit at inner margin of each eye. 94

92 (91) Head without a pit near inner margin of each eye and eyes not margined by a conspicuously glabrous area. ..... *Epicauta aspera* Werner, in part

Head with a conspicuous pit near inner margin of each eye and a glabrous area at least part way around the eye. 93

93 (92) Pit at inner margin of each eye deep and well-defined. Head without prominent occipital callosities. (Fig. 37). ..... *Epicauta rileyi* Horn

Pit at inner margin of eye shallow and open laterally. Head with a pair of prominent occipital callosities (Fig. 38). ..... *Epicauta caviceps* Horn

94 (91) Legs luteous in ground color, in contrast to black or very dark brown of rest of body. 95

Legs not contrastingly paler than rest of body. 96

95 (94) Labrum deeply excised, mandibles long and slender (Fig. 39). Pubescence long, moderately dense, cinereous. ..... *Epicauta balli* Werner

Labrum and mandibles normal. Pubescence short and inconspicuous, quite sparse. ♂ antennae subensiform (Fig. 40). ..... *Epicauta tenebrosa* Werner

96 (94) Antennal segment 3 noticeably shorter than 4; ♂ with segment 1 elongate and curved (Fig. 41). ..... *Epicauta linearis* (LeConte)

Antennal segment 3 as long as 4 or longer. 97

97 (96) Pronotum with a pair of small glabrous spots. 98

No glabrous spots on pronotum. 99

98 (97) Pubescence rufous, rarely paler, not shaggy. Antenna as in Fig. 42. ..... *Epicauta callosa* LeConte

Pubescence cinereous, long and shaggy. ..... *Epicauta senilis* Werner

99 (97) Tibial spurs all heavy, curved, blunt (Fig. 43). ..... *Epicauta emarginata* Champion

Tibial spurs of at least fore and middle legs slender, spiniform. 100

100 (99) Elytra with some black or very dark pubescence at very base, sometimes only a few setae but usually extending most of the way across, and sometimes with a black or dark spot next to scutellum and another narrower mark at humeri (Fig. 72). 101
No black or dark pubescence at base of elytra. 109

101 (100) Ground color light tan, sometimes with head and pronotum darker; pubescence also tan. Antennae moniliform (Fig. 44). .....*Epicauta ochrea* (LeConte)
Ground color and pubescence not both tan. 102

102 (101) Ground color of upperside and legs tans, of underside black, all surfaces with sparse cinereous pubescence that affects the color. Antennae tapered. Rare in Arizona. .....*Epicauta nigritarsis* LeConte
Not so marked. 103

103 (102) Ground color of head and pronotum black or very dark brown, of elytra tan; pubescence cinereous. .....*Epicauta insignis* Horn, in part
Ground color uniform or elytra slightly paler but not tan. 104

104 (103) Dark pubescence at base of elytra limited to very base, not in marks next to scutellum and at humeri. Ground color dark, brown to piceous, elytra sometimes slightly paler. ♂ with segment 1 of fore tarsi broad and bearing a very full pad (Fig. 45). .....*Epicauta brunnea* Werner
Dark pubescence at base of elytra including spots near scutellum and at humeri. 105

105 (104) Length more than 15 mm. Antennae moderately stout, black, with segment 1 elongate, curved and shiny in ♂ (Figs. 46, 72). .....*Epicauta longicollis* (LeConte)
Length less than 12 mm. Antennal segment 1 of ♂ not long and curved. 106

106 (105) Antennae very slender; segment 5 ca. 4 times as long as wide (Fig. 47). .....*Epicauta ingrata* Fall
Antennae not very slender; segment 5 ca. twice as long as wide. 107

107 (106) Head triangular, the mandibles long and extending about ⅓ their length beyond labrum. Elytra margined with denser pale pubescence. ♂ with segment 1 of fore tarsi short and contorted. ....*Epicauta parkeri* Werner, in part
Head subquadrate and mandibles normal. 108

108 (107) Elytra sparsely pale-pubescent except on more densely pubescent margins. ♂ with antennal segment 1 stout and reaching beyond middle of eye (Fig. 48) and segment 1 of fore tarsi short and contorted. .....*Epicauta gissleri* (Horn)
Elytra evenly and rather densely pale-pubescent. Antennal segment 1 short in both sexes and ♂ fore tarsi normal. .....*Epicauta aspera* Werner, in part

109 (100) Antennae tapering gradually, the apical segments noticeably more slender than the intermediate segments. 110
Antennae almost uniform in thickness, the apical segments barely narrower, or even broader, than the intermediate segments (Figs. 42, 52). 116

110 (109) Ground color black, only partly obscured by sparse cinereous pubescence. 111
Ground color pale or dark but, if dark, obscured by dense pale pubescence. 112

111 (110) Pubescence sparse, cinereous, uniform. Small specimens of ..... *Epicauta oregona* Horn, in part
Pubescence sparse and pale, but denser on margins of elytra. ..... *Epicauta gissleri* (Horn), in part

112 (110) Ground color pale or body brown and elytra pale, not concealed by the sparse tan pubescence. Antennae moniliform; ♂ with segment 1 curved and extending well beyond eye (Fig. 44), and with segment 1 of fore tarsus short and contorted. ..... *Epicauta ochrea* (LeConte), in part
Ground color dark or pale but well concealed by dense pubescence. Antennae not moniliform. 113

113 (112) Head with a weak ridge from inner margin of each eye to near occiput. ..... *Epicauta rehni* Maydell
Head without such ridges. 114

114 (113) Head subtriangular (Fig. 49). Antennal segment 1, especially in ♂, with a trace of an external excavation near apex. Ground color of elytra paler than rest of body but well concealed. ..... *Epicauta alpina* Werner
Head subquadrate, normal (Fig. 50). 115

115 (114) Pubescence dense enough to obscure the dark ground color. ♂ hind tibia with a small comb on inner side of apex (Fig. 51). ..... *Epicauta uniforma* Werner
Pubescence not dense enough to completely obscure ground color. ♂ with hind tibia normal and with fore tarsus broad and heavily padded (Fig. 45). ..... *Epicauta brunnea* Werner, in part

116 (109) Apical antennal segments, except last, at least as broad as long (Fig. 52). ..... *Epicauta fortis* Werner
Apical antennal segments longer than broad. 117

117 (116) Outer spur of hind tibia broadened (Fig. 53). ..... *Epicauta ferruginea* (Say)
Outer spur of hind tibia slender, spiniform or sticklike (Fig. 54). 118

118 (117) Median impressed line on pronotum shallow, indistinct, not set off as a glabrous line. ..... *Epicauta sericans* LeConte
Median impressed line on pronotum deep, though narrow, and sharply set off as a glabrous line. Pubescence sparse, not concealing dark ground color. 119

119 (118) Tibial spurs very long and slender (Fig. 55). No small glabrous spots anywhere on body. ..... *Epicauta pruinosa* LeConte
Tibial spurs more normal, though slender. Small glabrous spots usually present somewhere on body. ..... *Epicauta oregona* Horn, in part

120 (2) Antennae short, moniliform. Black, with bright rufous elytra (Fig. 103). ..... *Tricrania stansburyi* (Haldeman)
Antennae at least moderately long, not moniliform; color combinations various but different from above. 121

121 (120) Galeae of maxillae elongated to form a sucking organ of varying length (Fig. 2). 122
Galeae sometimes lobiform, but not elongated into a sucking organ. 150

122 (121) Very slender species as small as 3 mm. long. Antennae somewhat thickened apically. Head usually markedly elongate, with a flat front. *Gnathium*. 123
Stouter species, rarely less than 6 mm. long. Head usually broadly triangular, with the front not flat. Antennae not thickened apically. 129

123 (122) Pronotum moderately densely punctured, most punctures separated by no more than 3 times their diameter. Elytra with suture elevated, the pubescence moderately dense and noticeably denser along suture. Length from 4 to 6.5 mm. in Arizona samples; usually dull pale rufous with suture and sides of elytra darker. ..... *Gnathium minimum* (Say)
Pronotum sparsely punctured, most punctures separated by at least 5 times their diameter. Elytra with suture not elevated and pubescence sparse and even. Most specimens 4 mm. long or less and pale, but 2 species with dark heads and one of these often with dark elytra. 124

124 (123) Head short and almost evenly rounded behind eyes..... 125
Head somewhat elongate behind eyes and with distinct tempora. 127

125 (124) Pronotum slightly longer than wide. Very close to the following species but averages slightly larger. Occurs in fall. ..... [*Gnathium eremicola* MacSwain]
Pronotum at least as wide as long. 126

126 (125) Claws of hind tarsi with teeth short and oblique. Process of galea short, ca. twice as long as pronotum. Occurs in fall. ..... *Gnathium nitidum* Horn
Claws of hind tarsi with teeth long and subtransverse, forming a definite comb. Process of galea ca. 3 times as long as pronotum. Occurs in fall. ..... *Gnathium obscurum* MacSwain

127 (124) Process of galea short, ca. 1.5 times as long as pronotum. Head pale. Elytra with short unequal setae on disc, those on base extremely short. Occurs in spring. ..... *Gnathium caviceps* MacSwain
Process of galea longer, at least twice as long as pronotum. Head usually brown or black. 128

128 (127) Elytra extremely sparsely pubescent, pale. Occurs in spring. ..... *Gnathium vandykei* MacSwain
Elytra sparsely pubescent, but not extremely so, black to pale. Occurs in the fall. ..... *Gnathium francilloni* Kirby

129 (122) Punctures on elytra extremely coarse, from sparse to dense. *Zonitis* (*Parazonitis*), in part..... 130
Elytra impunctate, finely punctured or densely punctulate. 133

130 (129) Galeae longer than mandibles, extending to hind coxae. 131
Galeae not longer than mandibles, rarely extending beyond middle coxae. 132

131 (130) Elytra densely rugose-punctate, subopaque, yellow, broadly vittate or all black. ..... *Zonitis punctipennis punctipennis* LeConte

Elytra sparsely and coarsely punctured, shiny, always yellow. ..... *Zonitis sayi* Wickham

132 (130) Elytra fulvous, with intervals distinctly microreticulate and subopaque (ssp. *tarasca*) or black and shiny (ssp. *borealis* Enns). ..... *Zonitis tarasca* (Dugès)

Elytra pale yellow or slightly greenish, somewhat translucent, shiny (Fig. 99). Abundant. ..... *Zonitis dunniana* Casey

133 (129) Spurs of hind tibiae broadly spatulate, similar and equal in length. ♂ abdominal sterna not modified. 134

Spurs of hind tibiae dissimilar, or similar and not broadly spatulate. ♂ with at least abdominal sternum 4 modified. 137

134 (133) Upperside testaceous to rufous, the elytra sometimes with a median dark stripe. ..... [*Zonitis vittigera propinqua* MacSwain]

Head and/or elytra black. ♂ aedeagus semimembranous, not dorsoventrally bilobed. 135

135 (134) Head and prothorax yellow, elytra black. Galeae distinctly longer than pronotum. ..... *Nemognatha sparsa* LeConte

Head black. Galeae scarcely as long as pronotum. 136

136 (135) Elytra at least partly yellowish. Pubescence golden. Length usually more than 9 mm. ..... *Nemognatha cantharidis* MacSwain

Elytra entirely black. Pubescence black. Length 8 mm. or less. Frequent. ..... *Nemognatha selanderi* Enns

137 (133) Spurs of hind tibiae elongate, parallel-sided, concave, usually similar and equal. ♂ abdominal sterna 4 and 5 excavated medially. *Nemognatha* (*Nemognatha*). 138

Spurs of hind tibiae dissimilar, or similar and triangular or spiniform. ♂ abdominal sterna 4 and 5 modified but not excavated. 139

138 (137) Black, pronotum, upper half of head and base of scutellum pale rufous. Galeae moderately long, not reaching tip of abdomen. ♂ with deep round or oval median excavations on sterna 4 and 5, these lined with fine setae that point to a common center. ..... [*Nemognatha bifoveata* Enns]

Pale rufous, rufous with a black stripe on each elytron, or black with pronotum, all of head and often base of scutellum rufous. Galeae usually reaching tip of abdomen. ♂ with elongate, parallel-sided median excavations on sterna 4 and 5, these lined with setae that point to the midline. ..... *Nemognatha piazata bicolor* LeConte

139 (137) Spurs of hind tibiae similar, spiniform and slender, or triangular and concave with acute apices. ♂ with transversely oval, tufted, punctulate areas on at least sterna 4 and 5, or 3 and 4. *Nemognatha* (*Pauronemognatha*). 140

Spurs of hind tibiae usually dissimilar, with rounded apices. ♂ with a transverse to trapezoidal punctulate area on sterna 4 and 5. *Nemognatha* (*Meganemognatha*). 143

140 (139) Spurs of hind tibiae extremely slender, spiniform, rarely feebly flattened and concave, with acute apices. Mandibles extremely short, giving head a subglobose appearance. Small and slender, rufous, elytra sometimes black at apex or all black (Fig. 100). Abundant. ..... *Nemognatha nigripennis* LeConte

Spurs of hind tibiae distinctly flattened, usually concave, their apices acute or not. Mandibles large and stout; head triangular with somewhat inflated tempora. 141

141 (140) Elytra with long, extremely fine, suberect pale setae, uniformly finely and densely punctured. Pale flavous with reddish-brown or fuscous elytral vittae. ..... [*Nemognatha capillaris* Enns]

Pubescence dark. 142

142 (141) Entire underside black, shiny. Head black with pale triangle on vertex; elytra yellow to reddish-yellow, usually with suture and margins narrowly black. ..... *Nemognatha scutellaris* LeConte

Underside at least partly yellow; vertex of head black. Elytra yellow with median dark vittae or apical crescents dark, but margins pale. ..... *Nemognatha cribraria cribraria* LeConte

143 (139) Outer spur of hind tibiae greatly enlarged and flared, usually 3 times as wide as inner. 144

Outer spur of hind tibiae at most twice as wide as inner, often scarcely wider, with apex moderately or not flared. 145

144 (143) Galeae moderately stout and extending well beyond hind coxae. Flavous, to black with head and prothorax rufous, through forms that are rufous with dark-tipped or dark-tipped and subvittate elytra. Elytral pubescence usually dark. Pronotum scarcely broader than long. (Ssp. *lurida*: punctures on sides of pronotum often contiguous and anterior angles of pronotum often abrupt; pubescence dark or pale. Ssp. *apicalis* LeConte: punctures on side of pronotum usually separated by their own diameters and anterior angles of pronotum broadly rounded; pubescence dark.) (Fig. 101). Abundant. ..... *Nemognatha lurida* LeConte

Galeae extremely slender and barely exceeding hind coxae. Elytral pubescence and whole body flavous, rarely pale testaceous. Pronotum usually about 1/5 wider than long, irregularly and sparsely punctured. ..... [*Nemognatha pallens* LeConte]

145 (143) Entire body densely clothed with long, pale, silky pilosity, which obscures the pale surface. ..... *Nemognatha bridwelli* Wellman

Body not pilose and the sculpture of the elytra distinctly visible. 146

146 (145) ♂ elytra finely and extremely densely punctulate, ♀ elytra shiny, shallowly and moderately densely punctured. ..... *Nemognatha macswaini* Enns

Elytra not densely punctulate, from finely and densely punctured to shallowly rugose-punctate, the sculpture similar in the sexes. 147

147 (146) Elytra shallowly rugose-punctuate. Rare. ..... *Nemognatha lutea lutea* LeConte
Elytra distinctly, usually finely and densely, punctured. 148

148 (147) Outer spurs of hind tibiae flared. Pubescence reddish or black. ♂ with tufts of setae on transverse punctulate areas on sterna 4 and 5. ..... *Nemognatha miranda* Enns
Outer spurs of hind tibiae not flared, usually narrowed at apex. Dorsal pubescence pale golden or light rufous. ♂ with the finely pubescent and punctulate areas on sterna 4 and 5 trapezoidal or subtriangular. 149

149 (148) Pronotum moderately densely and rather coarsely punctured. Rufo-testaceous, usually with piceous elytral vittae. Pubescence golden. Lenth usually more than 10 mm. (Fig. 102). ..... *Nemognatha nitidula* Enns
Pronotum extremely finely, sparsely punctured. Flavous or pale testaceous, the elytra vittate or not. Pubescence pale. Length usually less than 10 mm. ..... *Nemognatha meropa* Enns

150 (121) Head and pronotum bright rufous, shiny, elytra from pale to dark rufous. ..... *Rhyphonemognatha rufa* (LeConte)
Whole dorsal surface not rufous. 151

151 (150) Antennal segment 6 less than 3 times as long as wide; eyes not enlarged and produced below head, except in *Zonitis flohri;* tegmen of ♂ with sides not sclerotized and with apex compressed. 152
Antennal segment 6 at least 3 times as long as wide. Eyes greatly enlarged and produced below head. 156

152 (151) Eyes almost touching below, separated there by less than half the distance between them on front. Rufous, the elytra blue-black, finely scabrous and opaque; antennae, tibiae and apices of femora black. Rare. ..... *Zonitis flohri* Dugès
Eyes widely separated below, the distance 2/3 or more that across front. 153

153 (152) Eyes reaching outer margin of maxillae below. 154
Eyes not exceeding lower margin of mandibular condyles below. 155

154 (153) Elytra black, with bluish or bronze luster, shiny, vermiculate; hind tarsal claws with more than ten teeth in inner row. ..... *Zonitis vermiculata* Schaeffer
Elytra brown, nearly smooth. Hind tarsal claws with less than 10 teeth in inner row. ....[*Zonitis hesperis* Selander]

155 (153) Elytra rugose-punctate, almost white, often with a narrow median dark vitta, but sometimes all pale or all black. Stout. ..... *Zonitis bilineata* Say
Elytra distinctly and moderately densely punctured, with the intervals smooth and shiny. Moderately slender. Yellow, the elytra either yellow, yellow with black apex, or all black, the three known under the subspecific names of *flavida* LeConte, *terminalis* Enns, and *atripennis*, respectively. Abundant. ..... *Zonitis atripennis* (Say)

156 (151) Spurs of hind tibiae unequal, inner slender and outer slightly broader. Flavous, the elytra deep fuscous, rugose-punctuate. Rare. ..... *Zonitis interpretis* Enns
Spurs of hind tibiae similar, broader and slightly spatulate. *Pseudozonitis*. 157

157 (156) Eyes separated below by half or less the distance between them on front. Head pale. 158
Eyes separated below by more than half the distance between them on front. Head black. ..... *Pseudozonitis martini* (Fall)

158 (157) Elytra uniformly pale yellow, or with very feebly indicated vittae near suture and side margins. Length usually 11 mm. or more. Rare. ..... *Pseudozonitis arizonica* (VanDyke)
Elytra at least partly black or fuscous, often vittate. If elytra pale, length less than 10 mm. 159

159 (158) Elytra feebly rugose, impunctate, shiny, yellow with a brown stripe near suture and side margin of each. ..... *Pseudozonitis vittipennis* (Horn)
Elytra distinctly punctured or rugose-puncate, not shiny; vittate or not. 160

160 (159) Length 11 mm. or more. Pronotum with a broad, transverse reddish area in anterior portion, this produced onto sides and on midline to base (Fig. 98) ..... *Pseudozonitis vaurieae* Enns
Length usually 10 mm. or less. Pronotum uniformly pale yellow or with a reddish median macula, which is rarely produced onto the sides. 161

161 (160) Pronotum with reddish median macula. Head abruptly narrowed behind hind margin of eyes. ..... *Pseudozonitis stroudi* Enns
Pronotum immaculate. Head with distinct tempora behind eyes. ..... *Pseudozonitis brevis* Enns

162 (1) Head, prothorax and legs rufous or pale ferrugineous, the elytra testaceous. Pubescence short, brownish. Length 14-16 mm. ..... [*Hornia minutipennis minutipennis* Riley]
Head, prothorax and legs mainly black, the elytra rufous or testaceous. Pubescence black. 163

163 (162) Tarsal claws with a long basal spine, which attains at least the apical ¼ of the claw. Pubescence short, that on legs about ½ as long as width of tibia. Length 13-15 mm. ..... [*Hornia mexicana neomexicana* Cockerell]
Tarsal claws simple or with an inconspicuous basal spine that reaches the middle of the claw at most. Pubescence long and coarse, that on legs longer than width of tibia. Length 7.5-11 mm. ..... [*Hornia boharti* Linsley]

Family Meloidae

The arrangement of subfamilies, tribes and genera used here is that adopted by MacSwain (1956), with some changes in nomenclature. There may be some difference of opinion as to the weight that should be given the divisions, but this arrangement seems to come closest to showing the degree of relationship among the various groups. Some of the reasons for these assignments derive from characteristics of the first instar larva and may not be very apparent when only the adults are compared. The reader is referred to MacSwain's excellent paper for fuller explanation. He recognizes five subfamilies: Lyttinae, Meloinae, Tetraonycinae, Horiinae, and Nemognathinae (as Zonitinae). All the subfamilies but Horiinae are represented in the Arizona fauna.

Subfamily Lyttinae

This is the largest subfamily of Meloidae. It has usually been referred to as Meloinae, but MacSwain gives reasons for the removal of *Meloe* to a separate subfamily, a move that necessitates the substitution of the name Lyttinae for the larger group. He believes that the Meloinae, as he uses the name, have been derived from the Lyttinae. The most striking difference is in the behavior of the first instar larva. In the Lyttinae, the larvae run over the surface of the soil in search of their specialized food supply. In the Meloinae they make their way to blossoms, where they attach themselves to visiting bees, riding back to the nest clinging to the body or legs of the bees.

MacSwain recognizes four tribes of Lyttinae in our fauna: Eupomphini (as Calospastini), Epicautini, Pyrotini, and Lyttini. The larval food is either the egg and stores of bees (tribe Lyttini and probably tribes Eupomphini and Pyrotini), or grasshopper eggs (tribe Epicautini). Grasshopper eggs apparently make up the diet of the Old World tribe Mylabrini also.

Tribe Eupomphini

Selander, 1955b

This tribe is most highly developed in the deserts of the southwestern United States and northwestern Mexico, only a few species being found outside this region, and those all in North America. The most distinctive feature of the adults is the attachment of the lower division of the tarsal claws to the ventral side of the upper division, the lower division apparently arising from a ventral groove in the upper but firmly attached to it. All other Meloidae have the ventral division (absent in some species of *Hornia*) attached to the side of upper.

The first instar larva is not basically different from that of the rest of the Lyttinae, so MacSwain treats this group as a tribe of that subfamily. For diversity of form the tribe is unexcelled in the family anywhere in the World, some species of *Eupompha* and the genera *Phodaga, Cysteodemus* and *Megetra* showing grotesque modifications of several parts of the body. The two species of *Eupompha,* subgenus *Spastonyx,* have an unusual development of the tarsal claws. The ventral division arises from the ventral surface of the upper, but there is in addition a thin blade arising from the outer side of the ventral division. This structure is called an "ungual

spine" by Selander (1954a). If it were attached to the upper blade, it would be equivalent to the lower blade of most Meloidae.

Genus Eupompha LeConte

Selander has recently (1954a, 1955b) divided this genus into two subgenera, *Eupompha*, s. str., and *Spastonyx* Selander. In the nominate subgenus, *imperialis, schwarzi* and *elegans* are found in Arizona in the spring at low elevations; *viridis, wenzeli* and *fissiceps* at intermediate elevations and later in the season; *edmundsi* has been taken only in extreme northern Coconino Co., in June. Both species of the subgenus *Spastonyx* occur at low elevations in the spring. Most of the species have formerly been known under the generic name *Calospasta*, which is now regarded as a junior synonym of *Eupompha* (Selander, 1955b).

Eupompha imperialis (Wellman)

4-8 mm; pale rufous with luteous elytra, the antennae rufous and the underside brownish; shiny, the elytra feebly rugulose; pubescence pale but sparse and not affecting color. Imperial and Palo Verde Valleys, California, and Arizona: YUMA Co.: Yuma (Mar. and Apr.) Rare. Taken by F. H. Parker near Blythe, California under a prostrate blue-flowered annual plant (*Coldenia*?).

Eupompha schwarzi (Wellman)

7-10 mm; head rufous, pronotum, appendages and underside black, elytra brownish-rufous; shiny, the elytra moderately feeby rugulose; pubescence of scattered setae that do not affect the color. Found near the Colorado River in southern California and Arizona: YUMA Co.: Alamo Crossing (16 Apr. 1960, C. E. Benson), and Wellton (15 Apr. 1938, F. H. Parker). Parker took this species in numbers at Wellton on blossoms of *Encelia* and *Amsinckia*. MacSwain (1956) reports it from blossoms of *Geraea* and *Encelia* near Needles, California.

Eupompha wenzeli (Skinner)

5-10 mm; head, pronotum and legs rufous, elytra metallic green to blue, antennae black, underside metallic blue medially, rufous laterally; shiny, the elytra rugulose; pubescence cinereous, moderately dense, suberect and rather long on pronotum and elytra, but not affecting color greatly because it is very fine. Sonoran Desert in Sonora, Mexico (Guaymas, 10 Sept. 1938, R. H. Crandall, in Crandall Coll.) and Arizona: YUMA Co.: Salome. MARICOPA Co.: Phoenix. PIMA Co.: Quijotoa, Marana, Tucson. July (1), Aug. (4), Sept. (1). Apparently rare and very local. Taken on *Kallstroemia* at Salome.

Eupompha elegans (LeConte) Fig. 56

5.5-12 mm; bluish to purplish black, with some orange to yellow markings on elytra; shiny, the elytra rugulose; pubescence cinereous, moderately long and suberect but sparse, not affecting color. The pale spots on the elytra usually consist of three blotches on each elytron, humeral, slightly postmedian, and subapical, extending from sides to near suture, leaving a

subquadrate spot before the middle and an irregular band toward the apex dark; some specimens (Horn's var. *humeralis*) have an elongate humeral spot on each elytron and no other markings. Abundant in desert region of southern California.

There are specimens in The University of Arizona collection from San Felipe, northeastern Baja California, and Sonoyta and Puerto Peñasco, Sonora, Mexico. Arizona: at lower elevations in south: YUMA Co.: Yuma, Ehrenberg, Roll, Dateland, Aztec. MOHAVE Co.: Bullhead City. MARICOPA Co.: Theba, Gila Bend. PINAL Co.: Stanfield, Florence and 10 mi. S., Picacho. PIMA Co.: Ajo, Organ Pipe Cactus Nat. Mon., "Baboquivari Mts.," Rillito, Tucson. Mar. (1), Apr. (12), May (1). Most frequent on blossoms of *Sphaeralcea* but taken occasionally on blossoms of *Larrea* and Compositae (*Verbesina, Encelia, Baileya, Geraea, Palafoxia* and others not identified to genus).

Eupompha fissiceps LeConte Fig. 57

13-22 mm; head and appendages rufous, elytra metallic green to blue; shiny, the elytra rugose; upperside glabrous, underside with some short, fine pubescence. Male: head deeply grooved medially; fore tibiae slightly twisted beyond middle; segments 1-3 of fore tarsi swollen, grooved externally. Mexico (Saltillo, Coahuila; Villa Lerdo, Durango; and Chihuahua — Vaurie, 1950) to West Texas. Arizona: COCHISE Co.: 5 mi. E. San Simon, 3 Aug. 1946, Parker. GRAHAM Co.: Safford (14 Aug. 1959, R. S. Beal, in Arizona State University collection), and 5 mi. N. (22 July 1965, P. D. Gerhardt). Apparently very local in Arizona. The adults are closely associated with creosote-bush (*Larrea*), probably feeding mainly on the blossoms. They are very agile and shy, and remarkably inconspicuous on the food plant, the green body blending with the shiny leaves and the head with the yellow blossoms.

Eupompha viridis (Horn)

6-8 mm; entirely metallic brassy green to greenish blue; shiny, the elytra finely rugulose; pubescence pale and sparse, not affecting color but appearing as a slight bloom. Northern Chihuahua, Mexico (44 mi. S. Juarez, Selander, 1954b), West Texas, New Mexico, and Arizona: COCHISE Co.: Ramsey Canyon, Huachuca Mts., 1-2 Sept. 1937, J. C. Bradley). Selander records feeding on pollen of species of *Helianthus, Baileya* and *Linum.*

Eupompha edmundsi (Selander) Selander, 1953

5.7-10.6 mm; head and pronotum from black with a coppery sheen to rufous, elytra pale rufous, underside blue-black but abdomen partly to mostly rufous if forebody pale; pubescence quite dense, luteous to rufous, concealing surface to some extent. Each elytron with three low, rounded, longitudinal ridges, especially noticeable in larger specimens. Male: fore tarsi thickened slightly. Described from a single specimen from Johnson, Kane Co., in southern Utah. Arizona: COCONINO Co.: Wahweap Cn., N. of Page, 20 June 1965, Werner and family. The Arizona series, of 112 specimens, was taken on blossoms of *Helianthus anomalus*, det. C. T. Mason, University of Arizona Herbarium. Of this sample, 43 have the forebody dark, 46 dark with some pale markings, and 23 largely pale. The pale specimens average larger than the rest.

Eupompha (Spastonyx) nemognathoides (Horn) Selander, 1954a

5-8 mm; black with rufous prothorax; shiny, the elytra finely granulose; glabrous above. Southern California deserts (1000 Palms, Riverside Co., and Owens Valley, Inyo Co. — Selander) and Arizona: at lower elevations in Sonoran Desert: YUMA Co.: Yuma and 10 mi. E., Roll, Wellton. MARICOPA Co.: Theba, Gila Bend, Phoenix (Selander). Mar (1), Apr. (4), May (2). Sometimes abundant on blossoms of *Sphaeralcea*, and recorded from S. *orcutti* and *emoryi*. Also taken once or twice on blossoms of *Larrea*.

Eupompha (Spastonyx) macswaini (Selander)

4.5-5.5 mm; head rufous to brownish black, pronotum rufous to brownish black but usually paler than head, elytra and body brownish black, appendages partly obscurely fulvous; pubescence pale but sparse and inconspicuous (modified from Selander, 1954a). Known only from the type-series. Arizona: YUMA Co.: Yuma, 26 Mar. 1940, R. H. Crandall.

Genus Negalius Casey

This genus contains only a single species.

Negalius marmoratus Casey Fig. 58

6-16 mm; opaque black with a variegated pattern of cinereous pubescence in the bottom of reticulations on the elytra, and some on sides of head and pronotum and on underside. Antennae short, strongly compressed. Male: segment 1 of fore tarsi with a conspicuous median projection, segments 2-3 triangular. West Texas to Baja California (VanDyke, 1928), south to Guaymas, Sonora, Mexico. Arizona: at intermediate and lower elevations: COCHISE Co.: Pinery Cn.-Chiricahua Mts., McNeal, Elfrida, Pearce. GRAHAM Co.: Safford, Bonita. STA. CRUZ Co.: "Atascosa Mts." PIMA Co.: 5 mi. E. Continental, Baboquivari Mts.-nr. Brown Cn., Tucson, Sabino Cn.-Sta. Catalina Mts. PINAL Co.: Redrock, Florence and 20 mi. S. GILA Co.: Globe. MARICOPA Co.: Litchfield Park, Gila Bend and 20 mi. E. YUMA Co.: Salome. YAVAPAI Co.: Ashfork. July (5), Aug. (12), Sept. (2), Oct. (1). Usually found walking on the ground or climbing on low vegetation.

Genus Tegrodera LeConte

Three species and one "variety" have been assigned here, all occurring in the region of southern California, northern Baja California, northern Sonora and central and southwestern Arizona. Of the lot only *T. latecincta* stands out as distinct. The rest vary in the extent of the dark markings on the elytra and may very well be local races of the same species. Only one is found in Arizona.

Tegrodera erosa aloga (Skinner) Fig. 59

16-24 mm; head rufous, the antennae darker, pronotum rufous, but black anteriorly and narrowly to broadly along midline, elytra yellow but brown to black in the bottoms of the coarse reticulations, in a slightly antemedian band, along the suture anterior to the band, and in an apical

crescent; underside and legs blackish. Shiny and glabrous, the head and pronotum flattened, the latter with a somewhat irregular surface. Male: head with a pair of semilongitudinal grooves. Northern Sonora, Mexico, and Arizona: at lower elevations in southcentral portion: PIMA Co.: Sahuarita, Tucson, Rillito, Quinlan Mts., Sells. PINAL Co.: Eloy. GILA Co.: Winkelman, Hayden. MARICOPA Co.: Phoenix, Salt River Mts. YAVAPAI Co.: 5 mi. N. Wickenburg. April (6), May (12), July (1).

The food plant of the adult in the Tucson area is *Eriastrum diffusum* ssp. *jonesi*. Beetles confined with this plant fed mainly on the blossoms and buds. Selander (1958) reports a population from the Pinacate lava cap, 35 mi. W. of Sonoyta, Sonora, in which the head and pronotum are dark brown and the yellow on the elytra is "relatively drab." The nominate form, which has the elytral band narrower, is found in southern California.

Genus Pleurospasta Wellman

Vaurie, 1950

Two species are assigned to this genus, both having strong costae on the elytra and brilliant yellow and brown color patterns. One species has been found in Arizona and the other may occur here.

Pleurospasta mirabilis (Horn) Fig. 60

6-10 mm; head, pronotum, underside and appendages reddish tan, elytra whitish yellow with tan to brown markings consisting of two (rarely one) spots on each elytron near the scutellum, a jagged transverse band just before the middle, and a feeble, interrupted band just before the apex. Surface subopaque, generally glabrous but with some short golden pubescence on sides of head and prothorax. Elytra separately rounded at apex, with suture, side margins and four longitudinal costae on each sharply elevated, and with scattered transverse costae developed beyond the middle in some specimens.

Desert region of southern California, north to Nevada and southwestern Utah, south to near San Felipe, northwestern Baja California, Mexico, and east into Arizona: YUMA Co.: Yuma, Wellton, Parker. MARICOPA Co.: Gila Bend, Phoenix. PINAL Co.: Picacho. PIMA Co.: Ajo, Tucson and 10 mi. N. Mar. (2), Apr. (8), May (1), July (1). Sometimes abundant in Pantano Wash at Tucson, devouring the blossoms of *Nama hispidum*. Parker has taken large numbers on one occasion under *Cercidium*, when the petals were on the ground. One specimen is recorded from *Coldenia*.

Pleurospasta reticulata VanDyke Fig. 61

8-10 mm; similar to *mirabilis* but the body color darker, the elytral costae joined by elevated reticulations behind the middle, the dark elytral band slightly postmedian, broad and almost confluent with apical marking, and these markings reddish brown with some black along the edges or black with only the costae and reticulations reddish brown. Each elytron with a single spot near the scutellum. States of Tamaulipas and Coahuila, Mexico; and Loving, White's City (Eddy Co.) and near Lordsburg, New Mexico. The University of California summer entomology camp personnel took the specimens from near Lordsburg in Aug. 1958. The only other recorded date is in June. The species should range into eastern Cochise Co.

Genus Phodaga LeConte

This genus was established for one very unusual species, which remains the only species in the genus. The lower division of the tarsal claws is about ⅔ the length of the upper. The inside of the anterior tibiae is densely pubescent, as it is in *Tegrodera*.

Phodaga alticeps LeConte Fig. 62

10-23 mm; opaque black, the sides of the head, hind coxae and apices of abdominal sterna with some obscure cinereous pubescence. Head pointed at the middle of the occiput. Elytra somewhat inflated; hind wings fully developed. Male: fore and middle tibiae with some long, black, woolly pubescence, the fore tibiae flattened and the middle tibiae swollen, slightly bowed and grooved along the inner edge; segment 1 of fore tarsi contorted, with an inward projection at the apex.

Desert of southeastern California, north to St. George, Utah; San Felipe, northeastern Baja California, 35 mi. W. of Sonoyta and Puerto Peñasco, Sonora, Mexico; and Arizona: YUMA Co.: Yuma, Roll, Wellton. MARICOPA Co.: Gila Bend. Apr. (4), May (1), June (1), Sept. (2). Adults have been recorded twice as feeding on *Coldenia palmeri* and once on *Phacelia crenulata*. Dr. D. M. Tuttle has observed this species at Yuma, and has noted that the adults run rapidly over the ground from about 10:00 a.m. to 3:00 p.m., seeking cover at other times. The species has a peculiar habit of spreading the elytra and hind wings, exposing red intersegmental membranes on the abdomen.

Genus Megetra LeConte

Revision: Selander, 1965

All three species assigned to this genus range into Arizona, but none is ever very abundant here. The adults are sluggish insects, with the abdomen of most individuals greatly swollen.

Megetra cancellata (Brandt and Erichson)

17-30 mm; black, the head dull rufous across occiput, the disc of the elytra with an extensive pattern of raised yellow reticulations that is not concentrated toward the edge as it is in the following two species; intersegmental membranes of abdomen yellow to orange in life. Elytra flattened on disc, which is separated from sides by a distinct lateral ridge. Mexico from southern part of central plateau northward along the eastern cordillera to the state of Nuevo Leon and, on west, to southern Chihuahua, with an apparently isolated population from West Texas to southeastern Arizona (Selander, 1965): COCHISE Co.: Portal, San Simon, Bowie. GRAHAM Co.: Ft. Grant. STA. CRUZ Co.: Washington Mts. Sept. (1), Oct. (1), Nov. (1). Very few specimens are known from Arizona. Selander records *Sphaeralcea* as the preferred food plant in the state of Durango, Mexico.

Megetra vittata (LeConte)

12-24 mm; similar to *cancellata* but generally smaller and with the yellow elytral reticulations concentrated in a line along the sides of the disc. The abdomen tends to be less flattened also. West Texas to northern

Arizona (Selander, 1965): at intermediate elevations, almost entirely north of Mogollon Rim: APACHE Co.: Canyon de Chelly, Lupton, Window Rock, Ft. Defiance. NAVAJO Co.: Kayenta, Kearns (Keams?) Cn. COCONINO Co.: 5-20 mi. N. Flagstaff, 6-7000′, and 15 m. E. YAVAPAI Co.: Dewey, Prescott, Chino V., Granite Mt., Verde V. July (1), Aug. (2). Selander records *Amaranthus* as a food plant.

Megetra punctata Selander Fig. 63

11-18 mm; resembling *vittata* rather closely but differing from both other species in that the elytra are almost evenly swollen, with little or no indication of a ridge, deeply and sometimes confluently punctured rather than coarsely reticulate, and with the yellow marking consisting of a sharply defined line on each elytron, made reticulate by the black punctures. Southern Chihuahua and southwestern Coahuila, Mexico to southwestern New Mexico and southeastern Arizona (Selander, 1965): COCHISE Co.: "Chiricahua Mts.," Portal, Paradise, Douglas, Hereford, Elfrida, McNeal, Pearce. Selander cites Ulke, 1875, for Camp Apache and Gila River. We have one feeding record, on a prostrate pigweed (*Amaranthus*), and Selander lists *Boerhaavia* and *Kallstroemia*. July (3), Aug. (2), Sept. (1).

Genus Cysteodemus LeConte

Both known species of *Cysteodemus* have been collected in Arizona, *armatus* commonly. They are flightless and bizarre, with inflated elytra that are fused along the suture. *C. wislizeni* looks more like a Christmas ornament than an insect when it is seen on its food plant.

Cysteodemus armatus LeConte Fig. 64

7-16 mm; entirely opaque black, usually with a faint bluish, greenish or purplish cast and often with some white to yellowish white incrustation, particularly on the elytral reticulations. Pronotum with a pair of strong lateral spines. Elytra usually somewhat flattened on disc, varying in the degree of inflation even in the same series; raised reticulations irregular, varying from coarse to quite fine.

Deserts of southern California, north to extreme southern Nevada, south to Puerto Peñasco, Sonora, Mexico, and east into Arizona at lower elevations: YUMA Co.: Yuma and 19 mi. E., Wellton, Tinajas Altas, Mohawk, Dateland, Aztec, Ehrenberg, Alamo Crossing, Parker. MOHAVE Co.: Bullhead City, Topock. MARICOPA Co.: Gila Bend. PINAL Co.: Sacaton. Mar. (3), Apr. (12). Most often seen walking on the ground, quite rapidly during the warm part of the day. Taken once feeding on *Coldenia;* La Rivers (1938) records *Langloisia* and *Gilia* as food plants in southern Nevada. La Rivers found the eggs at the end of a burrow presumably excavated by the female. MacSwain (1956) reports finding a fourth-instar larva, with shed skins of earlier instars, in the cell of an unidentified *Osmia* bee. This is the only larval association known in the tribe.

Cysteodemus wislizeni LeConte

10-15 mm; shiny, dark metallic blue or purplish, the elytra almost spherical, more brilliantly colored, with dense, deep, coarse punctures that are partly confluent. Pronotum with short lateral spines. States of Durango (Champion, 1892) and Coahuila (Vaurie, 1950), Mexico to West

Texas and as far north in the Rio Grande valley as Albuquerque, New Mexico. Sometimes abundant in West Texas. We have a single record from Arizona: PIMA CO.: Sta. Rita foothills in the Sta. Rita Range Res., Oct. 1928, collected by F. H. Parker. The usual food plant in West Texas seems to be *Solanum elaeagnifolium*. Selander (194b) found specimens in Chihuahua on species of *Aster*, *Tidestromia*, and *Kallstroemia*.

Tribe Epicautini

This tribe is an extensive one, occurring on all the continents except Australia, but is conspicuously absent from islands, only Madagascar, Taiwan, Ceylon and the islands to the west of Wallace's Line in the East Indies having a few representatives. For the species in which the immature stages are known, the larvae feed on grasshopper eggs and the first instar larvae run over the surface of the ground in search of the egg pods.

Most of the tribe can be distinguished, as adults, by the presence of an excavation beyond the middle of the flexor surface of the fore femora, this excavation being lined with dense silky pubescense, strongly in contrast with the rest of the pubescence of the femora. Recently (1951a) MacSwain has removed part of the old genus *Lytta* to a new genus *Linsleya*, and placed it in the Epicautini. This genus lacks the silky patch on the fore femora but has silky pubescence along the flexor surface of the fore tibiae, as do the rest of the members of the tribe. His reasons for including the genus are based on the form of the first instar larva and the behavior pattern of the adult.

Since one species has been reared from grasshopper eggs (see Selander, 1964), the association seems logical. Some other genera not placed in this tribe have silky pubescence on the flexor surface of the fore tibiae, such as some species of Eupomphini and *Pyrota* in our fauna. So the definition of the tribe Epicautini becomes cumbersome. The genus *Linsleya* can just be added, as suggested by Selander (1955a), and characterized by the combination of the presence of silky pubescence on the fore tibiae, compressed antennae with quadrate or transverse intermediate segments, and equally slender and acute tibial spurs.

Most species of Epicautini are clothed with rather conspicuous appressed pubescence and most other meloids in our fauna are either glabrous or have sparse or shaggy pubescence. Aside from the three genera included here, three others are currently recognized: *Anomalonychus* in South America, *Psalydolytta* in Africa and southern Asia, and *Denierella* in southeast Asia. All three are closely related to *Epicauta* and have the silky patch on the front femur.

Genus Linsleya MacSwain

Revision: Selander, 1955a

This genus has already been discussed under the tribe Epicautini. MacSwain (1951a) considers it to be the most primitive genus in the tribe. Selander recognizes five species and one subspecies, all of which occur in North America north of Mexico, with two known also from northern Mexico. Only *L. suavissima* is known from Arizona, but two other species should also occur here. Selander has established two subgenera: *Linsleya*, s. str., in which the male has ony one or no spur on the fore tibiae, and *Linsleyina* Selander, in which the male fore tibiae have two spurs.

Linsleya (Linsleya) convexa (LeConte)

5.5-14 mm; black, the body sometimes with a very faint bluish tinge and the elytra dark metallic blue or greenish blue, scabropunctate. Male: base of front femora with a large ventral spinose tubercle; front tibiae without spurs; segment 1 of fore tarsi dorsoventrally thickened, weakly distorted, segment 2 slightly swollen. Central Chihuahua, Mexico to West Texas and New Mexico (Selander, 1955a). Selander lists four specimens taken 23 mi. W. of Lordsburg, New Mexico, 19 Aug. 1953, a locality so close to Arizona that the species must occur in the state, at least in the region to the east of the Chiricahua Mts.

Linsleya (Linsleya) suavissima (Wellman) Fig. 65

18-22 mm; shiny black, with some erect black pubescence on head, pronotum and underside. Male: antennae slightly longer and noticeably thicker than in female; fore tibiae with one spur. Central Durango, Mexico and Arizona: at intermediate elevations in southeast, northwest to near Williams: COCHISE Co.: Douglas, McNeal, Willcox, Pinery Cn.-Chiricahua Mts., Huachuca Mts.: Reef and 8 mi. S. Fry. STA. CRUZ. Co.: Lochiel, Sonoita, Patagonia, 15 mi. S.E. of Ruby. PIMA Co.: Sta. Rita Range Res., Madera Cn.-Sta. Rita Mts. COCONINO Co.: Aubrey Valley, W. of Williams. Aug. (1), Sept. (16), Oct. (4), Dec. (1). Records partly from Selander, 1955a. Food plants of adults unknown.

Linsleya (Linsleyina) sphaericollis (Say)

7.5-12 mm; slender; brassy green, the appendages black or legs with a metallic luster; glabrous above, sparsely pubescent below. Male: front tibiae with two spurs, as in female. Southern British Columbia to southwestern Manitoba, Canada, south over most of California and through Rocky Mts. to northern New Mexico (Selander, 1955a). Selander records the species from Allen Canyon, San Juan Co., Utah, a locality so close to Arizona that the species must be found within our borders. The same author records *Symphoricarpos* as a food plant of the adult in Utah. The species has been reared from grasshopper eggs in Canada (see Selander, 1964b).

Genus Epicauta Dejean

Revision: Werner, 1945, Bul. Mus. Comp. Zool. 95: 421-517, pl. 1-7. Additions: Werner, 1949a, 1949b, 1954a, 1954b, 1955.

This is the largest and most complex genus of the tribe Epicautini and the one that accounts for the wide distribution of the tribe described previously. Many fairly well defined species groups are included in it, these tending to be limited in their distribution to one geographic region. There seems to be greater uniformity in the Old World than in the New World species, those in Africa and Eurasia falling into a few groups that are widespread there but not represented in the Western Hemisphere.

The species found in Arizona belong mainly to groups that are highly developed in the southwestern United States and Mexico, but a few belong to groups that have their distribution centered in the northeastern United States and Canada. The genus can be divided into the nominate subgenus,

Epicauta, and the subgenus *Gnathospasta*, on the basis of the presence of a small comb on the inside of the apex of the hind tibiae of the male in the latter.

Subgenus Epicauta

This subgenus includes all of the species of the genus in the Old World, most from South America, and many from North America. It can be divided into a number of species groups.

Group 1

Antennae tapered gradually to the apex, with segment 2 short; male with two spurs on the anterior tibiae, as in the female. This group is most like the members of the genus that occur in the Old World. *E. corvina, jimenezi* and *pennsylvanica* are closely related and represent a subgroup probably strictly North American. *E. brunnea* is most closely related to *E. cinerea* (Forster) and related species in North and South America. Each of the other species included here stands alone in a subgroup, except for *ruidosana*, which appears to be very closely related to *E. cinctipennis* (Chevrolat) of Mexico.

Epicauta corvina (LeConte) Fig. 66

19-26 mm; black, feebly shiny; pubescence moderately dense and black. Posterior tibial spurs spiniform. Southern part of central plateau of Mexico, through central and western Texas to the Great Plains, north to South Dakota; state of Sinaloa, Mexico (Escuinapa, in University of Arizona collection); west into Arizona: at intermediate elevations in southeast and at somewhat higher elevations from the White Mts. to Prescott. COCHISE Co.: Douglas, Elfrida and 5 mi. N., Pearce and 7 mi. E., Willcox, Pinery Cn.-Chiricahua Mts., "Chiricahua Mts.," and "Huachuca Mts." GRAHAM Co.: Stockton Pass-Pinaleño Mts. STA. CRUZ Co.: Canelo, Lochiel, Patagonia, Sonoita and 5 mi. N. PIMA Co.: "Sta. Rita Mts." PINAL Co.: Sta. Catalina Mts.: Pepper Sauce Cn. and N. slope. APACHE Co.: "White Mts.," Whiteriver, Springerville. COCONINO Co.: Flagstaff.. YAVAPAI Co.: Prescott, Granite Dell, Dewey, Williamson Valley. June (1), Jul. (7), Aug. (18), Sept. (10), Oct. (4). Often abundant. *Solanum elaeagnifolium* seems to be the preferred food plant in the Sulphur Springs Valley; also recorded on *Kallstroemia* and *Tribulus* blossoms, *Amaranthus*, alfalfa and cabbage.

Epicauta jimenezi Dugès Werner, 1954a

14-20 mm; opaque, black, the elytra dark reddish brown but with short black pubescence that darkens them. Posterior tibial spurs spiniform. Southwestern Mexico, in the states of Jalisco, Nayarit and Durango, with an apparently isolated population in Arizona: STA. CRUZ Co.: Patagonia, W. slope Patagonia Mts., Atascosa Mts. PIMA Co.: Continental. Jul. (4), Aug. (3), Oct. (1). About a dozen adults were collected at Patagonia in Aug. 1958, by C. W. O'Brien and others. The only specimens seen feeding were devouring the white blossoms of *Clematis*. Arizona specimens have darker elytra than those from Mexico, and resemble *E. corvina* rather closely.

Epicauta pennsylvanica (De Geer)

8-12 mm; black, moderately shiny. Outer spur of posterior tibiae broader than inner, somewhat spoon-shaped. Abundant from Maine to Florida, and west to Montana and eastern Texas, with western extensions as far as Duchesne, Utah and Arizona: at intermediate elevations from the White Mts. to Yavapai Co.: APACHE Co.: Springerville, St. Johns, 2 mi. W. of Eagar. GILA Co.: Sierra Ancha Mts. YAVAPAI Co.: Williamson Valley. July (4), Aug. (1), Sept. (2). Recorded as on "yellow sage-like flowers," ragweed and alfalfa in Arizona. Abundant on *Solidago* blossoms in the eastern U. S. The larvae have been associated with the egg pods of *Melanoplus sanguinipes*, *femurrubrum* and *differentialis* (see MacSwain, 1956).

Epicauta albolineata (Dugès) Fig. 67

7-10 mm; black but surface obscured by dense brownish grey and black pubescence in the following pattern: head and pronotum grey, usually with a pair of longitudinally oval black spots on each, narrowly separated at midline; elytra black to dark grey, with two grey lines extending back from each humerus, joined basally and apically on each elytron, a narrower and incomplete line between the outer humeral line and the suture; the suture and side margins also grey. Underside and part of legs grey. Male: antennal segments 3-6 somewhat thickened; front tibiae slightly curved, flattened behind, and with a tuft of pale setae on the back side of the base. British Honduras to southern Mexico (Champion, 1892) and Arizona: at intermediate elevations in southeast: COCHISE Co.: 32 mi. S.E. of Willcox. GRAHAM Co.: Ash Creek Flat-San Carlos Indian Res. (N. J. Nerney). APACHE Co.: "White Mts." PIMA Co.: Sta. Rita Mts., 5-8000′, "Baboquivari Mts." July (4). Mr. George Bradt took the series from near Willcox on the young stems of a grass, *Aristida*. In general, Central American specimens have the elytral markings reduced, with the inner humeral line often absent and the grey coloring paler. They do not appear to differ structurally.

Epicauta brunnea Werner

10-18 mm; brown with luteous elytra, to dark brown; the pubescence dense enough to affect the color, from luteous to grayish brown; underside and legs similar or the legs slightly darker; antennae black. Male: intermediate antennal segments slightly thickened; segment 1 of the fore tarsi broadened and densely padded beneath.

West Texas to Arizona. Also taken at Salaices, Chihuahua, Mexico at 5200′ by George Bradt. Arizona: at intermediate and lower elevations in southeast: COCHISE Co.: Portal, Douglas, "Huachuca Mts." STA. CRUZ Co.: Nogales. PIMA Co.: Tucson and 10 to 20 mi. E., 5 mi. W. of Amado, Brown Cn.-Baboquivari Mts., Sta. Cruz Village-Comobabi Mts.-Papago Indian Res. PINAL Co.: Superior, Superstition Mts. MARICOPA Co.: Cañon Lake. GILA Co.: Globe, San Carlos, Capitan Mt. NAVAJO Co.: Whiteriver. July (1), Aug. (11), Sept. (5), Oct. (1). Not abundant but most frequently taken at light.

Epicauta ruidosana Fall Fig. 68

9-13 mm; opaque black; pubescence black except as follows: dense and white (occasionally almost yellow) on midline of head and pronotum,

and narrowly on suture and margins of elytra. Pubescence pale but sparser on back of head, underside, most of front legs, and in a narrow line along the posterior edge of the middle and hind femora and trochanters. West Texas (Chisos and Davis Mts.), New Mexico (Ruidoso in the Sierra Blanca), and Arizona: at higher elevations: COCHISE Co.: Chiricahua Mts.: Ida's Peak 7-8000′ and 9000′, Barfoot Park-8600′, Rustler Park-8700′. GILA Co.: Sierra Ancha Mts. APACHE Co.: Greer, Bog Creek-nr. McNary. NAVAJO Co.: Snowflake. COCONINO Co.: Oak Creek Cn. June (3), July (8), Aug. (2), Sept. (1). Taken several times in the Chiricahuas feeding on *Lupinus* in large numbers. but in very limited areas. Also recorded from "weeds" at Bog Creek. *Epicauta cinctipennis* (Chevrolat), which ranges from the highlands of southern Mexico north in the eastern cordillera, is very similar, differing mainly in the color of the pubescence on the legs. *E. ruidosana* could be an isolated geographic race of that species.

Epicauta balli Werner

7-9 mm; black, with rufous legs, palpi and first antennal segment; pubescence dense and obscuring surface, tannish grey, narrowly black at base of elytra. Mandibles elongate and slender, extending well beyond end of labrum. Galeae of maxillae peculiarly modified, stout and subtriangular, with a deep external groove and with a dense mat of erect setae medially. Known only from Arizona: STA. CRUZ Co.: Sycamore Cn.-nr. Ruby, Nogales, Patagonia Mts., Patagonia, Duquesne, Canelo Hills. PIMA Co.: Brown Cn.-Baboquivari Mts., Sta. Rita Range Res., Sabino Cn.-Sta. Catalina Mts., "Mt. Lemmon." COCHISE Co.: "Huachuca Mts." Aug. (5), Sept. (1), Once taken in numbers by sweeping grass and *Calliandra* on the Sta. Rita Range Res.; specimens taken also feeding on pollen of *Bouteloua curtipendula*, which is probably the normal food plant.

Epicauta oregona Horn

7-12 mm; black, with moderately dense, short, cinereous pubescence that largely obscures the surface except in numerous small glabrous spots, which are especially noticeable on the elytra. Antennae black, with cinereous pubescence on basal segments, subensiform in male, slender in female. British Columbia, Canada, to Oregon, east of the Cascades, east to western S. Dakota, and south along Rockies and in Utah to Arizona: APACHE Co.: Phelps Bot. Area-nr. Greer-9500′, McNary, McNary-Springerville summit, Alpine. "NAVAJO Co." COCONINO Co.: Flagstaff, Schultz Pass-San Francisco Mts., Williams. July (2), Sept. (1). Recorded as taken on *Iris*, *Lupinus*, "vetch," cabbage and alfalfa.

Group 2

Antennae tapered to apex but with segment 2 elongate; front tibiae of male with two spurs. Our two species are not closely related to each other. *E. segmenta* represents a subgroup that centers in the Great Plains and probably extends onto the central plateau of Mexico; *immaculata* (Say) is the only other species in the subgroup. *E. tenuilineata* is in a subgroup characteristic of the Sonoran region, including southern Baja California, the other species, *E. languida* (Horn) and *E. excors* (Fall) being confined to the latter region.

Epicauta segmenta (Say) Fig. 69

12-20 mm; black, the pubescence black in general but white as follows: usually the hind margin of the pronotum; on a line along the anterior edge of the hind coxae; and often along the margins of the abdominal sterna, on the front and middle coxae, and in markings on the underside of the thorax. The ventral markings are usually faint in Arizona specimens.

Mexico (Escuinapa, Sinaloa; Villa Lerdo, Durango; through central and eastern Chihuahua — Vaurie, 1950), through West Texas to the Great Plains, north to South Dakota; west through New Mexico (Tucumcari and Hope) to Arizona: at intermediate elevations in southeast to Grand Canyon. COCHISE Co.: San Bernardino Ranch, Chiricahua Mts.: Far Away Ranch and Pinery Cn.-5000′, Dos Cabezas, Elfrida, Gleeson, Palmerlee-Huachuca Mts., Tombstone and 10 mi. S. STA. CRUZ Co.: San Rafael, Lochiel, W. sl. Patagonia Mts., Nogales, "Atascosa Mts.," E. and 10 mi. N. of Sonoita. PIMA Co.: "Sta. Rita Mts.," Sta. Rita Range Res., Tucson, Tucson Mts., Brown Cn.-Baboquivari Mts. GRAHAM Co.: Pinaleño Mts.: Stockton Pass and Noon Creek. GILA Co.: Globe, Hayden, San Carlos, Payson. APACHE Co.: Fish Creek-White Mts. NAVAJO Co.: Whiteriver. YAVAPAI Co.: Prescott, Peeples Valley, Cleator, Turkey Creek. COCONINO Co.: Grand Canyon. July (16), Aug. (19), Sept. (4), Oct. (1), Nov. (1). Common on *Solanum elaeagnifolium* in Cochise Co., sometimes consuming all the leaves; recorded on *Datura* at Grand Canyon. The larvae have been associated with eggs of *Melanoplus sanguinipes*, *differentialis*, and *bivittatus* (see MacSwain, 1956). A wingless form with inflated elytra is known from West Texas to the Great Plains, but is unknown from Arizona and Mexico.

Epicauta tenuilineata (Horn) Fig. 70

8-14 mm; tan, with sparse cinereous pubescence that produces a greyish cast, the pubescense denser on four narrow, slightly raised lines on each elytron. Elytra with a small blackish spot near scutellum and at humeri. Male: antennal segments 1 and 2 slender and shiny, with segment 2 ca. 1¼ times as long as 1, flattened and straight.

Known from Sonora (Puerto Libertad, Hermosillo, Guaymas and Cd. Obregon) and southern Baja California, Mexico; Deep Cn., Riverside Co., California; and Arizona: at low to intermediate elevations: YUMA Co.: Ehrenberg, Roll. MARICOPA Co.: Gila Bend and 35 mi. E., Gillespie Dam, Wickenburg, Phoenix, Tempe. PIMA Co.: 15 mi. S. E. of Ajo, Organ Pipe Cactus Nat. Mon., Brown Cn.-Baboquivari Mts., Tucson Mts., Tucson, Sabino Cn.-Sta. Catalina Mts., Rincon Mts. at 7500′. PINAL Co.: W. of Casa Grande, Eloy, Superior. GILA Co.: Apache Jct., Globe, Cutter, Roosevelt L., San Carlos. GRAHAM Co.: Safford. May (3), June (3), July (10), Aug. (19), Sept. (2), Nov. (1). Sometimes fairly abundant at light, but we have no feeding records.

Group 3

With the characteristics of Group 2, but male with segment 1 of antennae greatly enlarged, curved and excavated externally toward the apex; segment 2 also somewhat enlarged but not otherwise modified. The group centers in the region from the Great Plains to northern Mexico.

Epicauta texana Werner Fig. 71

15-19 mm; black with at least the basal antennal segments rufous; pubescence dense enough to hide surface, luteocinereous to cinereous, but black in a small spot near scutellum and at humeri of elytra, on tips of femora and tibiae, and on most of tarsi. Male: antennae rufous except for last few segments, with segment 1 about as long as the next 4 together, slender, bowed, and with a slight bump on the outer edge at about ⅓ from apex; segment 2 slightly enlarged. Female: antennae normal, with only segments 1 and 2 rufescent. Known only from West Texas and southeastern Arizona: at intermediate elevations: COCHISE Co.: Douglas, McNeal, Elfrida, Pearce, 5 mi. S. E. of Willcox, "Dragoon Mts.," Benson. STA. CRUZ Co.: San Rafael, Lochiel, Canelo, 10 mi. E. Sonoita. Pima Co.: "Sta. Rita Mts." July (6), Aug. (6), Sept. (5). Sometimes abundant, feeding on *Solanum elaeagnifolium.*

Epicauta longicollis (LeConte) Fig. 72

12-21 mm; black, the palpi sometimes rufous; pubescence cinereous to luteocinereous, dense and opaque, concealing surface, or fine and silky so that the surface shows through; black on small spots near scutellum and at humeri on elytra, and on part of legs. Male: antennae black, with segment 1 slender and bowed, as long as the next four segments together. Central and eastern Chihuahua, Mexico (Vaurie, 1950), through West Texas and New Mexico (Faywood and Albuquerque), to Arizona: at intermediate elevations: COCHISE Co.: 5 mi. N. Elfrida, Pearce, Willcox, Benson. GRAHAM Co.: Bonita, Ft. Grant. PIMA Co.: "Sta. Rita Mts.," "Baboquivari Mts." YAVAPAI Co.: Prescott, Chino Valley. COCONINO Co.: Williams, "Kaibab Nat. For." May (2), June (7), July (11), Aug. (1), Sept. (2). Sometimes common on *Solanum elaeagnifolium* in Cochise Co.; recorded twice from mesquite (*Prosopis*).

Epicauta atrivittata (LeConte) Fig. 73

20-28 mm; black; surface obscured by pubescence, which is cinereous with striking black markings, as follows: a pair of large spots on occiput of head, a pair of marks on the pronotum that are sometimes more extensive than the cinereous, two broad stripes on each elytron, joined behind and often more extensive than the cinereous, on the abdomen except for the apices of the segments, and in markings on the legs. Antennae black. Male: segment 1 of antennae enormously enlarged and flattened apically, shiny and bowed, as long as the six following segments together; segment 2 slightly enlarged. Central and southern Chihuahua (Vaurie, 1950; Selander, 1954b) and Tamaulipas (Tlahualilo), Mexico, Texas (Shovel Mts., Burnett Co.; Big Spring, Howard Co.; and from Terrell Co. west), and Arizona: COCHISE Co.: Douglas and McNeal, July and August, 1930, 1933, 1951, collected by W. W. Jones. Douglas, 22 July 1964, Vincent Roth. Willcox, 9 Aug. 1953, George M. Bradt. W. W. Jones records numerous specimens on mesquite near Douglas in 1930, but the species seems to be generally rare in Arizona. It is most often taken at light in West Texas.

Group 4

Antennae tapered, with segment 2 small. Male with a single, curved spur on the fore tibae. *E. bispinosa* forms an exception; the male has two anterior tibial spurs, as in the female. This species appears to be extremely closely related to *maculata* and allied species, *maculata* through *andersoni*. *E. abadona* stands somewhat separate from the rest and apparently has no near relatives. *E. insignis* through *tenebrosa* belong to a subgroup ranging from the southwestern United States to Central America.

Epicauta abadona Skinner Fig. 64

11-17 mm; pale tan and black both in the ground color and the pubescence, the black markings as follows: often a pair of feeble longitudinal stripes on the pronotum; one stripe near the suture on each elytron, another of equal width extending back from the humerus, and a fainter stripe just lateral to the humeral stripe. Male: middle area of head glabrous and smooth; inner spur of middle tibiae stout and curved; and posterior tibial spurs both very much broadened. Sinaloa (Mazatlán, Venedio, Los Mochis), and Sonora (Cd. Obregon, collected by W. Gibson), Mexico and Arizona: at lower elevations in south: MARICOPA Co.: Gillespie Dam, Cashion, Phoenix, Tempe. PINAL Co.: Florence. PIMA Co.: Tucson. STA. CRUZ Co.: Nogales, Patagonia. COCHISE Co.: San Bernardino Ranch. June (4), July (6), Aug. (9), Sept. (5), Nov. (1). Scarce. Most frequently taken at light; we have no feeding records.

Epicauta insignis Horn

6-11 mm; black or dark brown, with paler elytra; pubescence cinereous to tan, almost obscuring surface, denser in a narrow median line on each elytron, forming a line that is from distinct to barely visible. Male: antennae subensiform. Sinaloa (Coyotitlan) and Sonora (Cd. Obregon), Mexico, Texas (Brownsville), New Mexico (Socorro Co.), and Arizona: at intermediate elevations in southeast: COCHISE Co.: Douglas, 5 mi. S. of Bisbee, Willcox, "Chiricahua Mts.," Ft. Huachuca, Palmerlee, "Huachuca Mts." STA. CRUZ Co.: Sonoita and 10 mi. E., Canelo, Duquesne, Patagonia, W. sl. Patagonia Mts., Peña Blanca, Sycamore Cn.-nr. Ruby, Nogales, Amado. PIMA Co.: Sta. Rita Range Res., Sabino Cn.-Sta. Catalina Mts., Brown Cn.-Baboquivari Mts., Badger Well-Papago Indian Res. GILA Co.: Globe. July (12), Aug. (18). Sometimes numerous, feeding on *Salsola, Chenopodium,* and *Amaranthus;* one record on mesquite. This species comes to ultraviolet light at night, but not to white light.

Epicauta nigritarsis (LeConte)

8-12 mm; brown above, the legs paler, most of underside,tips of femora and tibiae, and tarsi, black; pubescence cinereous, dense enough to give a peculiar purplish cast to the color of the upper side, slightly denser in a narrow line on suture and side margins of the elytra; black on a small spot near scutellum and at humeri of elytra. Male antennae slightly flattened. Common from the state of Tamaulipas, Mexico to southern Texas, from the Gulf of Mexico to Terrell Co., apparently less frequent north to Oklahoma and west to New Mexico (Tucumcari and Loving). One specimen has been collected in Arizona: GILA Co.: Sierra Ancha Mts., Sept. 1930, by D. K.

Duncan. The species is most often taken at light in Texas; Dillon (1950) records mesquite as a food plant.

Epicauta tenebrosa Werner

6-11 mm; very dark brown with rufous legs; pubescence paler, affecting color slightly but not obscuring surface, black at very base of elytra. Male antennae slightly thicker and longer. Known only from Arizona: at lower elevations in south: PIMA Co.: Organ Pipe Cactus Nat. Mon., Tucson, Sabino Cn.-Sta. Catalina Mts., Tucson Mts., 5 mi. W. Cortaro. PINAL Co.: Magma. GILA Co.: Cutter. July (10), Aug. (4). Scarce; most frequently taken at light.

Epicauta crassitarsis Maydell

7-11 mm; light to dark brown, the legs paler and the head often darker, the antennae black; pubescence tannish, not obscuring surface, denser in a narrow line down middle of each elytron. Male: middle tarsi, particularly segment 1, inflated and glabrous. Sonora (Navajoa and Cd. Obregon, collected by W. Gibson), Mexico, and Arizona: at lower elevations in south: MARICOPA Co.: Gila Bend, Hassayampa, Palo Verde, Gillespie Dam, Coldwater, Phoenix, Laveen, Tempe. PINAL Co.: Florence, Casa Grande, Stanfield, Oracle, Oracle Jct. PIMA Co.: Baboquivari Mts.: Baboquivari Cn. and Brown Cn., Sta. Rita Range Res., N. side Sta. Rita Mts. STA. CRUZ Co.: Patagonia, 12 mi. E. Nogales, Patagonia Mts. COCONINO Co.: Flagstaff. May (1), June (6), July (10), Aug. (10), Sept. (5). The Flagstaff record seems inconsistent with the rest. Sometimes fairly abundant at light. We have plant records for *Lycium* (2), alfalfa (4), and mesquite (1).

Epicauta maculata (Say) Fig. 75

9-15 mm; black; pubescence cinereous to luteocinereous, obscuring surface except in numerous small spots around tactile setae. The spots are especially noticeable on the elytra, where they are irregularly spaced and slightly irregular in size, but not large enough to be confluent. The elytra are just slightly wider beyond the middle than at base or apex. Male: pad on segment 1 of fore tarsi extending most of length of segment; maxillary palpi much flattened, glabrous beneath, with last segment suborbicular in outline.

Common in the Great Plains, from N. Dakota southward, east to western Iowa and Missouri, rare in the Prairie Region. Ranges west to Rocky Mts., and southwest through West Texas and southeastern New Mexico to Arizona: at intermediate elevations: COCHISE Co.: Pinery Cn.-Chiricahua Mts., Willcox, Cochise, McNeal, Elfrida, Pearce, Palmerlee-Huachuca Mts. STA. CRUZ Co.: Sonoita and 10 mi. E., San Rafael, Lochiel, Nogales. PIMA Co.: 8 mi. N. Sasabe, Brown Cn.-Baboquivari Mts., Tucson. MARICOPA Co.: "Phoenix," Wickenburg. YAVAPAI Co.: 14 mi. N. Wickenburg, at 2900′, Prescott. APACHE Co.: Eagar, 20 mi. W. Springerville. June (1), July (12), Aug. (12), Sept. (1), Oct. (1). The principal food plants in Cochise and Sta. Cruz counties are *Salsola* and *Amaranthus*, on which the species may be quite abundant. There are individual records on *Atriplex canescens*, *Solanum elaeagnifolium*, *Kallstroemia*, "low white herbs," and ragweed.

Epicauta normalis Werner

9-11 mm; almost identical with *maculata*. Arizona specimens average

smaller, but the size is comparable elsewhere in the range. The male differs in having the maxillary palpi not expanded, and in having the pad of segment 1 of the fore tarsi confined to the apical fifth of the segment. Rocky Mts. 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: at intermediate elevations but generally higher than in *maculata*: COCONINO Co.: Flagstaff and 15 mi. N., Mormon Lake, Sunset Peak, Williams. YAVAPAI Co.: Prescott, Kirkland, Chino Valley. APACHE Co.: Vernon, St. Johns, Springerville. COCHISE Co.: W. sl. Chiricahua Mts., Willcox, San Simon, "Huachuca Mts." PIMA Co.: "Sta. Rita Mts." July (2), Aug. (3). Mrs. Vaurie (1950) records this species from several localities in Chihuahua, Mexico. Arizona plant records are for alfalfa (3), *Astragalus humistratus, Chenopodium,* and *Wislizenia.*

Epicauta nogales Werner Fig. 76

7-11 mm; similar to *maculata* but with the black spots on the head and pronotum almost as large as on the elytra, and the elytra slightly flattened and somewhat separated apically. Male: pad on segment 1 of fore tarsi almost as long as segment; maxillary palpi with last segment subtriangular, truncate at apex. Known only from northern Sonora, Mexico (Magadelena, 12 Aug. 1959, W. Nutting and F. Werner) and Arizona: COCHISE Co.: Benson. STA. CRUZ Co.: Nogales, W. sl. Patagonia Mts., 2 mi. E. Lochiel, Patagonia and 7 mi. N. E., 5 mi. N. Sonoita. PIMA Co.: E. sl. Baboquivari Mts., Sta. Rita Range Res., Continental, Tucson, Redington. May (1), July (5), Aug. (3), Sept. (6), Oct. (1). This species is most frequently taken feeding on puncture vine, *Tribulus terrestris,* with two records on alfalfa and one on Swiss chard.

Epicauta bispinosa Werner

9-12 mm; essentially identical with *maculata,* the females indistinguishable. The male has the front legs and palpi unmodified, as in the female. West Texas (Valentine and Sierra Blanca), New Mexico (Lovington), and Arizona: at intermediate elevations in southeast: COCHISE Co.: Pearce, Cochise. STA. CRUZ Co.: 10 mi. E. of Sonoita. July (2), Aug. (4). Apparently scarce in Arizona. The preferred food plants belong to the Solanaceae: *Chamaesaracha coronopus,* and *Solanum elaeagnifolium.* E. Hale reported damage to tomato plants by this species at Lovington, New Mexico, 24 May 1956. Individual samples have been taken on *Amaranthus* and *Sphaeralcea.*

Epicauta phoenix Werner Fig. 77

8-12 mm; similar to *maculata* but spots of almost uniform size on elytra and more distinct on head and pronotum, and with the elytra somewhat inflated beyond the middle. Male: pad on segment 1 of fore tarsi confined to apical fifth; maxillary palpi slightly flatter than in the female and glabrous beneath. Southern California near the Colorado River (Blythe, 12 Sept. 1942, R. P. Allen, in the Calif. Acad. Sci.) and Arizona: at lower elevations in the Gila River system: MARICOPA Co.: Phoenix. GRAHAM Co.: Geronimo. COCHISE Co.: Benson. July (1), Aug. (1), Sept. (1). Once taken in numbers at Geronimo on *Atriplex canescens.*

Epicauta pardalis LeConte Fig. 78

9-14 mm; of general form of *maculata* but slightly more slender and with the glabrous black spots on the elytra large, partially confluent, and often covering most of surface. Male: pad of segment 1 of fore tarsi almost as long as segment; palpi unmodified.

Known from northern Durango to Saltillo, Coahuila and central Chihuahua, Mexico (Vaurie, 1950); West Texas; New Mexico (Silver City, Faywood and Loving), and Arizona: at intermediate elevations from southeast to the Prescott area. COCHISE Co.: Chiricahua Mts.: Pinery Cn., and "Mts.," Elfrida, Pearce, Willcox, Gleeson, Tombstone, Sierra Vista, Bisbee, "Huachuca Mts.," Texas Pass-Dragoon Mts., Benson. GRAHAM Co.: Stockton Pass-Pinaleño Mts., Ft. Grant. STA. CRUZ Co.: Canelo, Elgin, Sonoita, Patagonia, W. sl. Patagonia Mts., Tumacacori, 5 mi. W. Amado. PIMA Co.: Box Cn.-Sta. Rita Mts., Sta. Rita Range Res., Mountain View and 17 mi S., Sahuarita, Tucson, Redington Pass, Brown Cn.-Baboquivari Mts., 60 mi. S. W. Tucson, Arivaca. GILA Co.: Globe, Cutter. YAVAPAI Co.: Prescott, Chino Valley. Apr. (1), May (3), June (10), July (14), Aug. (4). Sometimes extremely abundant on mesquite (*Prosopis*), to the extent that whole trees may be defoliated. Has damaged Chinese elm on several occasions. We have records also from alfalfa (2), potato (2), *Solanum elaeagnifolium*, and *Argemone*.

Epicauta andersoni Werner

9-13 mm; almost identical with *pardalis*, but with the elytral spots tending to be smaller. In some specimens many of the spots are not confluent. Male: both maxillary and labial palpi broad and flat, glabrous beneath. The last segment of the maxillary palpi is subtriangular in outline, and of the labial palpi almost orbicular, with the apex truncate. Known from the state of Chihuahua, Mexico (Vaurie, 1950), West Texas (Childress and Jeff Davis Co.), New Mexico (Gallo Springs), southern Utah (Kanab), and Arizona: at intermediate or higher elevations from White Mts. to northern Coconino Co.: APACHE Co.: Eagar, Springerville, Vernon, "White Mts.," Greer-8600′. NAVAJO Co.: Ft. Apache, Showlow. COCONINO Co.: Flagstaff, Williams, Grand Canyon. YAVAPAI Co.: Prescott and 7 mi. E., Cordes. May (1), June (6), July (4), Aug. (1). A male in the University of Arizona collection labeled Tucson, July 10, 1930, is from so far out of the range as to be extremely doubtful; it may have come from the nearby mountains. Taken once in some numbers feeding on *Clematis;* also recorded on alfalfa (2), potato, cabbage, ragweed, *Sphaeralcea* buds and blossoms, and on *Aster concinnus*.

Group 5 (Caviceps-Group)

This group consists of species that occur as adults late in the season, on blossoms, especially of the Compositae. The first-instar larvae that are known are very dark in color, and are the only ones in the genus that overwinter in this stage (see MacSwain, 1956). Despite the fact that the group is apparently quite homogeneous, it is difficult to define without using a combination of characters. Antennae tapering more gradually than in the previous groups. Pronotum subquadrate, often with short, thick, erect, plush-like pubescence.

Elytra with a small dark spot near scutellum and at humeri in most species, usually with the suture distinctly elevated beyond basal third.

Abdomen with black markings at anterolateral corners of sterna, and mid-ventral and mid-dorsal black markings in many species. Male with middle and hind femora glabrous behind, the glabrous area fringed with long setae. Some species have the eyes and the margins around them modified. The group is entirely North American, ranging from the southwestern U. S. to the southern part of the central plateau of Mexico, and from southern California to the Vizcaino Desert of Baja California; with one isolated species on the Gulf Coast of the U. S.

Epicauta aspera Werner

9-11 mm; black; pubescence dense enough to obscure surface, cinereous to almost rufous, black in a small quadrate spot near scutellum and in a narrow line at humeri on each elytron, and usually in small median spots on some of the abdominal sterna. Pubescence on pronotum normal for genus. Known from Colorado and West Texas, west to Arizona: at intermediate elevations from the White Mts. to the Prescott area: APACHE Co.: Springerville and 5 mi. S., "White Mts." GILA Co.: S. of Carrizo. YAVAPAI Co.: Copper Basin nr. Prescott, Mingus Mountain, Williamson Valley. Sept. (7). Taken on blossoms of Compositae; recorded twice on *Gutierrezia* and once on *Solidago*.

Epicauta wheeleri Horn Fig. 79

7-10 mm; black; pubescence obscuring surface, cinereous to luteo-cinereous on head, elytra and underside, bright rufous to luteous, but always contrasting, on the pronotum; black on a quadrate spot near scutellum and narrow humeral mark on each elytron, and in a median spot on most of the abdominal sterna. Pubescence of pronotum short, erect, and plush-like, the individual setae slightly thickened. Known from southern California (Morongo Valley and Whitewater near Palm Springs; and 5 mi. S. of Big Pine, Inyo Co.), Nevada (Glendale), Utah (St. George), and Arizona: at lower elevations from Yuma to Safford, north to Peach Cprings. YUMA Co.: Yuma. MOHAVE Co.: Peach Springs. MARICOPA Co.: Gila Bend, Phoenix. PINAL Co.: Florence Jct., 10 mi. W. Superior. PIMA Co.: Tucson, E. slope Tucson Mts., Sta. Catalina Mts.: Sabino Cn. and at 3200′ on Hitchcock Highway, Rosemont. GILA Co.: Globe, Cutter. GRAHAM Co.: Bylas, Safford, Aravaipa. Sept. (5), Oct. (20), Nov. (2). Often common on blossoms of Compositae, including *Aplopappus* and *Baccharis*, with one record on *Kallstroemia*.

Epicauta rehni Maydell

8-9 mm; black; pubescence dense, obscuring surface, only the antennae appearing black; luteocinereous to rich luteous, occasionally with a trace of dark markings near scutellum and at humeri of elytra, but with none on the middle of the abdominal sterna. Head nearly normal but eyes slightly reduced, the occiput slightly notched and the frons flattened. Pubescence on head and pronotum nearly normal but directed obliquely. Known only from intermediate elevations in southeastern Arizona: COCHISE Co.: "Chiricahua Mts.," Pearce, Texas Pass-Dragoon Mts. STA. CRUZ Co.: "Atascosa Mts." PIMA Co.: E. of Tucson, Sta. Catalina Mts.: Sabino Cn. and Hitchcock Highway, Mi. 5 (4300′) and Mi. 14 (6600′), Baboquivari Mts.: Schaeffer Cn. and Brown Cn. PINAL Co.: nr. Oracle. Aug. (1), Sept. (13), Oct. (7). Found on blossoms of Compositae with *rileyi*, but much scarcer.

Epicauta caviceps Horn

6-10 mm; black; pubescence moderately dense, not completely obscuring surface, cinereous to luteocinereous, black in a distinct quadrate spot near scutellum and a narrow humeral mark on each elytron; short, erect and plush-like on pronotum, most noticeably so in larger specimens. Head greatly modified, the occiput with a deep, U-shaped cleft, flanked by a pair of anterior tuberosities; eyes large, oblique, smooth, margined by a shiny, glabrous zone, which contains a small pit at the inner margin of the eye. Known from southern California (N. Y. Mts.), extreme southwestern Utah, and Arizona: at lower elevations in south, north into Mohave Co. YUMA Co.: Ehrenberg. MOHAVE Co.: Peach Springs, 11 mi. W. of Pipe Springs. MARICOPA Co.: Gila Bend and 5 mi. W., Phoenix. PINAL Co.: Eloy, Oracle Jct. PIMA Co.: Marana, Tucson and vic., Sta. Catalina Mts.: Sabino Cn. and Hitchcock Hwy. Mi. 5 (4300′); Vail, Sahuarita. COCHISE Co.: Hereford, Bowie. Apr. (1), May (1), Aug. (1), Sept. (6), Oct. (17), Nov. (4). The early-season records may represent overwintering adults. Often abundant on blossoms of Compositae.

Epicauta rileyi Horn

8-11 mm; black; pubescence dense, obscuring surface, luteocinereous to almost rufous, the antennae black; with black marks usually present near scutellum and on humerus of each elytron, and in a spot on middle of part of the abdominal sterna. Pubescence on pronotum short, erect and plush-like, sometimes short and black near the anterior angles. Head much modified, the eyes smooth and oval, with a deep pit in the head near the inner margin of each. Known only from Arizona: at intermediate elevations from southeast to Yavapai Co.: COCHISE Co.: Chiricahua Mts.: Pinery Cn. and "Mts.," Pearce, Texas Pass-Dragoon Mts., 8 mi. E. Douglas, Ft. Huachuca, Reef Mine-Huachuca Mts. GRAHAM Co.: 30 mi. S. Safford. STA. CRUZ Co.: Canelo, 20 mi. E. Sonoita, Nogales and 17 mi. W., Bear V.-nr. Ruby. PIMA Co.: Sta. Rita Mts.: Box Cn., Madera Cn., Rosemont, Greaterville; 22 mi. S. Mountain View; Continental; Sta. Catalina Mts.: Sabino Cn. and Hitchcock Hwy. Mi. 5 (4300′); Tucson; Sta. Cruz R. Valley; Baboquivari Mts.: Baboquivari Cn. and Brown Cn. MARICOPA Co.: "Phoenix." GILA Co.: Hayden Mts.-S.E. of Globe, Sierra Ancha Mts. YAVAPAI Co.: Bloody Basin in S. E. corner. Sept. (12), Oct. (12), Nov. (2). Frequent on blossoms of Compositae.

Epicauta stuarti LeConte Fig. 80

10-11 mm; black; pubescence dense, obscuring surface, luteous with striking black markings as follows: in a band from eye to eye across occiput; in a pair of spots on the pronotum; in two large black markings on each elytron, the first from base to 2/5 from base, narrowly separated at suture from its counterpart, the second starting just behind the middle, almost square in front and rounded behind. Legs with luteous pubescence, the tips of the femora, middle and hind tibiae, and all of tarsi black. Abdomen with median black marks on the terga, a tendency to anterolateral black marks on the sterna, and a variable tendency to median black zones on the sterna. Pubescence on head, base of elytra and tibiae tending to be shaggy, that on head sparse near midline of frons.

This is not the typical form of the species, which is found on the

Great Plains from Wyoming to the panhandle of Texas and Koehler, New Mexico. The typical form is orange and black, without shaggy pubescence, and with extensive black markings on the abdominal sterna, especially in the male. The form described here has been taken in New Mexico (Rodeo, 23 Sept. 1957, B. Benesh) and eastern COCHISE Co., Arizona: road along W. slope of Chiricahua Mts., 25 Sept. 1940, A. H. Caldwell (2 specimens in Parker Coll.; 16 mi. S. E. of Dos Cabezas, 18 Aug. 1950, T. Cohn, P. Boone, M. A. Cazier (one specimen in American Mus. of Nat. Hist.). The species is obviously very rare in Arizona. We have no food plant records. Selander has taken the typical form at Chappell, Nebraska on *Gutierrezia Sarothrae.*

Group 6

Antennae tending to be thickened apically, with the individual segments compact, not tapered at base, so that the antennae are not as noticeably segmented as in the other sections of the genus. Fore tarsi with two spurs in the male. This group is entirely North American. *E. pruinosa* belongs to a distinct subgroup in which the tibial spurs are long and very slender; this subgroup centers in the Northwest, east of the Cascades. The rest of the species listed here belong in another subgroup, centering in the Great Plains and the central plateau of Mexco.

Epicauta ferruginea (Say)

6-8 mm; black; pubescence dense, almost obscuring surface, luteocinereous to almost rufous. Outer spur of hind tibiae at least slightly broadened. Great Plains and southern Rockies west to Idaho and Utah, south to eastern Texas and central Chihuahua, Mexico (Vaurie, 1950), and west into Arizona: at intermediate elevation from White Mts. to Williams: APACHE Co.: Springerville and 20 mi. S.W., 2 mi. W. Eagar. NAVAJO Co.: Lakeside. COCONINO Co.: Flagstaff and 15 mi. N., Lake Mary, Mormon Lake, Maine, Williams. July (4), Aug. (5). Recorded once in Arizona on blossoms of thistle (*Cirsium*), and many times in other areas; also in Arizona on the blossoms of another composite with small yellow flowers.

Epicauta fortis Werner

6-8 mm; similar to *ferruginea* but generally stouter, with the antennal segments broader, and with the pubescence cinereous to luteocinereous, usually pale. Guadalupe and Monclova, Coahuila, Mexico (Vaurie, 1950), through West Texas to southern Arizona, Borrego, California, and 20 mi. N. of Mezquital, Baja California. Arizona: intermediate and moderately low elevations of south: COCHISE Co.: San Bernardino Ranch, Douglas, Pinery Cn.-Chiricahua Mts., Pearce and 30 mi. E., Willcox and 8 mi. E., Bowie Jct., Bowie, "Dragoon Mts.," "Huachuca Mts.," Ft. Huachuca. STA. CRUZ Co.: 4 mi. E. Lochiel, Sonoita, Nogales area. PIMA Co.: "Baboquivari Mts.," Sta. Rita Range Res., Tucson. PINAL Co.: Oracle, Eloy, Florence, Apache Jct. MARICOPA Co.: Phoenix, Gila Bend and 25 mi. E. Aug. (7), Sept. (18), Oct. (13), Nov. (3). Occurs on blossoms of various Compositate; two records from morning glory flowers. California specimens have shaggier pubescence than the typical form.

Epicauta callosa LeConte

9-10 mm; black; pubescence dense, obscuring surface, luteocinereous

to rufous, often with the suture of the elytra narrowly paler if rufous. Pronotum with a pair of very small glabrous callosities on the disc. Central Chihuahua, Mexico (Vaurie, 1950), across much of Texas (Dillon, 1952), and north on the Great Plains to South Dakota; west to Las Cruces, New Mexico and Arizona: near the border with Mexico in the southeast: COCHISE Co.: Hereford. STA. CRUZ Co.: Lochiel. Aug. (3). Taken on blossoms of *Xanthocephalum gymnospermoides* at Lochiel. The larvae have been associated with egg pods of *Melanoplus sanguinipes* (see MacSwain, 1956).

Epicauta senilis Werner

9-11 mm; black; pubescence moderately dense, obscuring surface, cinereous, somewhat shaggy; pronotum with a pair of small glabrous callosities on the disc. Known from Sierra Blanca, in West Texas; Luna Co. and White's City, New Mexico; and Arizona: COCHISE Co.: Douglas, "Dragoon Mts.," and 4 mi. W. Willcox. July (1), Aug. (1), Sept. (2). The lot from near Willcox was collected 3 Sept. 1958, in a small patch of alkali sacaton grass (*Sporobolus wrightii*), on the pollen of which the beetles were feeding. Caged specimens continued to feed on the grass blossoms, the females laying viable eggs.

Epicauta emarginata Champion Werner, 1954a

9-11 mm; black; pubescence dense, obscuring surface, cinereous. Labrum cleft, the mandibles slender and extending beyond it. Tibial spurs, especially the inner spur on the front and middle legs, very stout, blunt, slightly curved. Known from San Isidro, Coahuila, Mexico (Champion, 1892), West Texas, southern New Mexico, and Arizona: COCHISE Co.: Douglas, "Dragoon Mts.," and Willcox. July (1), Aug. (1), Sept. (2). Taken 15 mi. W. of Lordsburg, New Mexico in numbers, on a tall grass, probably eating the blossoms.

Epicauta sericans LeConte

7-11 mm; black; pubescence largely obscuring surface, cinereous to luteocinereous, short. Outer spur of hind tibiae sticklike. Antennae with pale pubescence on segments 1 and 2, slightly thickened apically. Great Plains, through central and West Texas to scattered localities on the central plateau and Gulf Coast of Mexico (Vaurie, 1950). The specimens from the central plateau may belong to a different species. Common in the Great Plains and Texas, but also taken as far east as Indiana and Alabama, and as far west as Utah and Arizona. Arizona: at intermediate elevations from the White Mts. to Yavapai Co.: APACHE Co.: Vernon. NAVAJO Co.: Snowflake, Ft. Apache. GILA Co.: 30 mi. N. E. Globe. COCONINO Co.: Flagstaff, Fredonia. YAVAPAI Co.: Seligman. June (5), July (1), Aug. (1). Occurs on blossoms; taken on blossoms of *Aster concinnus* at Ft. Apache.

Epicauta pruinosa (LeConte)

7-13 mm; black; pubescence cinereous, short and sparse but giving the color a greyish cast. Tibial spurs all very slender, longer than in most species. Antennae almost uniform in thickness. British Columbia, Canada and Washington east of the Cascades, east to Alberta, Canada, and Wyoming, south at high elevations in the Rockies to New Mexico and Arizona: at high elevations in the White Mts.: APACHE Co.: Greer-9000′, Paradise

Creek, 11 mi. E. McNary-8200′, Crescent Lake, and "White Mts." July (5), Aug. (1). Taken at Paradise Creek on vetch (*Vicia*).

Subgenus Gnathospasta Horn

This subgenus, which includes all species of *Epicauta* in which the male has a small comb on the inside of the apex of the hind tibiae, is almost entirely North American in its distribution, with only two species ranging into northern South America. The species have recently been segregated into species groups (Werner, 1954b, 1962), most of which are represented in the Arizona fauna.

Tenella-Group

Segment 1 of antennae simple, barely enlarged in male, segment 2 more the ½ as long as 3. Front tibae of male with two spurs, and anterior tarsi simple. This group contains only one species.

Epicauta (Gnathospasta) tenella (LeConte) Fig. 81

8-12 mm; head, pronotum and appendages rufous, elytra black to brown, underside rufous to brownish; pubescence sparse, cinereous, giving a greyish cast to color. Durango (Selander, 1954), Chihuahua (Vaurie, 1950 and Selander, 1954), Sonora (Cd. Obregon, Guaymas and Hermosillo), and southern Baja California, Mexico, north to Hot Springs and Organ, New Mexico and Llano Estacado (type-locality), west to Las Vegas, Nevada and Deep Canyon, Riverside Co., California (collected by E. I. Schlinger). Arizona: at low and intermediate elevations in south: YUMA Co.: Ehrenberg, Roll. MARICOPA Co.: Wickenburg, Gila Bend, Gillespie Dam, Phoenix region, Chandler, Cañon L. PINAL Co.: Stanfield, Casa Grande, Eloy, Florence, Oracle. GILA Co.: Globe, Cutter, Roosevelt L. PIMA Co.: Tucson, Sabino Cn.-Sta. Catalina Mts., Baboquivari Mts.: Baboquivari Cn. and Brown Cn., Arivaca, Sasabe, Organ Pipe Cactus Nat. Mon. STA. CRUZ Co.: Sycamore Cn.-nr. Ruby. COCHISE Co.: Benson, Texas Pass-Dragoon Mts., "Huachuca Mts.," "Chiricahua Mts.," Bowie, San Bernardino Ranch. GRAHAM Co.: Safford. COCONINO Co.: "Flagstaff." May (1), June (1), July (27), Aug. (16), Sept. (4), Oct. (1). This is one of the most abundant species of Meloidae at light in southern Arizona, but we have no food plant records.

Ingrata-Group

Segment 1 of antennae simple, barely enlarged in male, segment 2 about ½ as long as 3. Front tibiae of male with one spur, front tarsi simple. This group contains only one species.

Epicauta (Gnathospasta) ingrata Fall

8-10 mm; black; pubescence moderately dense, partially obscuring surface, cinereous, denser on margins and suture of elytra, and apices of abdominal sterna, black in a small spot near the scutellum and often on a humeral mark on each elytron. Antennae long and slender, longer in male. Known from Colorado Springs, Colorado, and higher elevations in New Mexico and Arizona: from White Mts. to Grand Canyon, and scattered

localities in the mountains to the south: APACHE Co.: "White Mts.," 5 mi. S. McNary, McNary-Springerville summit. NAVAJO Co.: Whiteriver and 4 mi. N. COCONINO Co.: Grand Canyon National Park: North Rim, Swamp Point and Grand View; Williams; Flagstaff; Mormon L. YAVAPAI Co.: Prescott, Jerome. GREENLEE Co.: Coronado Trail-5 mi. S. Rose Peak. GILA Co.: Sierra Ancha Mts., Pioneer Pass-Pinal Mts., Globe. COCHISE Co.: "Huachuca Mts.," "Chiricahua Mts." June (10), July (4), Aug. (1). Taken on young leaves of *Robinia neomexicana* and on *Amorpha* at Pioneer Pass, and on *Vicia pulchella* at Flagstaff.

Alastor-Group

Antennal segment 1 simple, barely enlarged in male, segment 2 less than ½ as long as 3. Male with no, rarely one, spur on the front tibiae, and with segment 1 of the front tarsi short and contorted. This group also contains only a single species.

Epicauta (Gnathospasta) alastor Skinner Fig. 82

9-13 mm; brown, the antennae darker and the legs paler, elytra with a narrow, sharply-defined pale line from mesal side of humerus to near apex, marked both in ground color and denser pubescence; pubescence dusky cinereous, moderately sparse but affecting color somewhat. Antennae of male longer and stouter. The front tibiae of the male almost always lack spurs; one spur has been found in only one specimen.

Los Mochis, Sinaloa, and Cd. Obregon and Hermosillo, Sonora, Mexico; Imperial Co., California; Presidio, Texas; and Arizona: at lower elevations in the south: YUMA Co.: Yuma, Somerton, Ehrenberg. MARICOPA Co.: Theba, Gila Bend, Gillespie Dam, Wickenburg, Tolleson, Phoenix area, Mesa, Cañon L. PINAL Co.: Olberg, Stanfield, Casa Grande, Florence and 10 mi. N., Florence Jct. PIMA Co.: Tucson. GILA Co.: Globe, Cutter, Coolidge Dam. GRAHAM Co.: Safford. COCHISE Co.: Benson, Texas Pass-Dragoon Mts., San Bernardino Ranch. June (8), July (16), Aug. (18), Sept. (7), Oct. (1). Sometimes fairly common at light. We have one record from alfalfa at Theba, and one on mesquite at Cutter, taken on a cloudy day.

Fabricii-Group

Antennal segment 1 simple, enlarged in male, greatly in most species; segment 2 more than half as long as 3 in female, longer than 3 in males of most species. Front tibiae of male with 2 spurs, and front tarsi simple. Comb of hind tibiae of male poorly developed, absent in many specimens. This group centers in the northeastern U. S. and southern Canada; it is the only group in the subgenus in that region. The group contains four species, two of which reach Arizona. (Werner, 1962)

Epicauta (Gnathospasta) fabricii (LeConte)

7-15 mm; black; pubescence cinereous, sometimes luteocinereous, moderately dense and partially obscuring surface, black in a spot near the scutellum and in a humeral mark in most specimens. Antennae black; segment 1 in male slender and flattened, shiny, reaching to vertex of head, straight except for curvature to fit around side of head; segment 2 somewhat flattened, shiny, about as long as segments 3 and 4 together. Abun-

dant from eastern Canada to the Gulf of Mexico, west to the limits of the Great Plains, and in isolated localities to the west. El Paso, Texas; La Jara, in northwestern New Mexico; Duchesne Co., Utah; and Arizona: NAVAJO Co.: Snowflake, Taylor, Show Low, Whiteriver. COCHISE Co.: Douglas (W. W. Jones). June (2), July (2), Aug. (1). Taken on alfalfa and on blossoms of *Amorpha* in Arizona; most records from other areas also on legumes. The larvae have "probably" been associated with the eggs of *Melanoplus bivittatus* and *differentialis* (see MacSwain, 1956).

Epicauta (Gnathospasta) subglabra (Fall)

7-12 mm; black; subopaque and appearing glabrous above, with cinereous to tan pubescence below. Segment 1 of male antennae slender, reaching beyond vertex of head; segment 2 slender and slightly curved, about ⅔ as long as 1 and equal to the following 3 segments together. Alberta to Manitoba, Canada and adjacent states in the U. S., south along the Rocky Mts. to northern New Mexico and Arizona. In the region of the Black Hills this species seems to merge with *E. murina* (LeConte), which differs in having denser, cinereous pubescence on the dorsal side. The two species occur in the same regions in Canada without intergrading; only *subglabra* occurs in Arizona. Arizona: APACHE Co.: Springerville, McNary, McKay's Peak-White Mts., Phelps Bot. Arear near Greer, Alpine. NAVAJO Co.: Pinetop. GILA Co.: Pine. COCONINO Co.: Flagstaff. PIMA Co.: Madera Cn.-Sta. Rita Mts. Apr. (1), June (3), July (7), Aug. (6), Sept. (1). Not rare in the White Mountains, on *Astragalus*. One additional record, labeled Tucson, is probably from the Sta. Catalina or Sta. Rita Mts.

Diversicornis-Group

Antennal segment 1 simple, enlarged in male of most species; segment 2 more than half as long as 3 in female, longer than 3 in male of most species. Male with one spur on the front tibiae and segment 1 of the front tarsi short and contorted. This group contains twelve species, ranging from southwestern U. S. to northern South America. In *E. lauta* the male antennae are barely different from those of the female. The other three species that occur in Arizona have the first two antennal segments enlarged in the male; they are more closely related to each other than they are to the other species in the group (Werner, 1949a).

Epicauta (Gnathospasta) lauta lauta (Horn) Fig. 83

8-15 mm; rufous to tannish, the tips of the femora and all of the tibiae black; pubescence moderately sparse and short, cinereous, giving most specimens a pinkish cast; each elyton with a small black spot near the scutellum and a mark on the humerus. Antennae black, slightly longer in the male and with segments 1 and 2 slightly longer than in the female and shiny. Segment 1 of the front tarsi of the male short and contorted, but not glabrous.

Durango, Chihuahua, and San Pedro de Colonias, Coahuila, Mexico; through West Texas and north along the Rio Grande in New Mexico; and west to Yermo and Amboina, in southern California. Arizona: at lower elevations in south: YUMA Co.: Yuma, Roll, Ehrenberg, 15 mi. S. E. Alamo Crossing. MARICOPA Co.: Gila Bend and 32 mi. E., Gillespie Dam, Wickenburg, Phoenix area, Cavecreek, Cañon L. YAVAPAI Co.: Bloody Basin in

S. E. corner. PINAL Co.: Eloy, Casa Grande, Maricopa, Oracle. PIMA Co.: 15 mi. S. E. Ajo, Organ Pipe Cactus Nat. Mon., "Baboquivari Mts.," Tucson, Tucson Mts., Sabino Cn.-Sta. Catalina Mts., 8 mi. N. Vail, 4 mi. N. Redington. GILA Co.: Globe, Roosevelt L., San Carlos. GRAHAM Co.: Geronimo, Safford. GREENLEE Co.: Clifton. COCHISE Co.: Benson, Gleeson, Cochise Stronghold-Dragoon Mts., Hereford, San Bernardino Ranch. June (3), July (17), Aug. (19), Sept. (6), Nov. (1). Often abundant at light, but we have no food plant records. *E. lauta rossi* Werner, which differs in having the forebody, underside and legs dark, is found in southern Baja California, Mexico.

Epicauta (Gnathospasta) arizonica Werner

8-13 mm; tan or slightly rufous to almost brown, the femora and tibiae of almost the same color; pubescence moderately sparse and short, dusky-cinereous, lightening the color somewhat; each elytron with a small spot next to the scutellum and a humeral mark dark. Antennae black; male with segment 1 elongate and slightly bowed, shiny, segment 2 elongate, about 2/5 as long as 1, shiny, segments 1 and 2 together slightly shorter than 3-11 together. Females resemble *E. lauta* but can be distinguished by the pale legs. Eyes large.

Chihuahua (7 mi. W. Chihuahua City, Salaices, and 6 mi. N.E. Meoqui), Nayarit (San Blas), Sonora (Cd. Obregon, Guaymas, Hermosillo, 8 km. W. Carbo, and Arizpe), and Baja California Sur (nr. Santiago), Mexico; north into Arizona. Specimens from the Meoqui, Chihuahua locality approach *polingi* in color, but are structurally assignable to this species. Arizona: at lower and intermediate elevations, mostly in the south: YUMA Co.: Ehrenberg. MARICOPA Co.: Wickenburg, Gila Bend, Phoenix, Cañon L. YAVAPAI Co.: Cleator, Bloody Basin. PINAL Co.: Superior. GILA Co.: Globe, Roosevelt L., San Carlos, Capitan Mt. NAVAJO Co.: Whiteriver. PIMA Co.: 15 mi. S. E. Ajo, Organ Pipe Cactus Nat. Mon., Kitt Peak-Quinlan Mts., Baboquivari Mts.: Baboquivari Cn. and Brown Cn., near Sasabe, Tucson, Sabino Cn.-Sta. Catalina Mts., Madera Cn.-Sta. Rita Mts., Sta. Rita Range Res. STA. CRUZ Co.: Bear V.-nr. Ruby, Peña Blanca, Nogales, W. sl. Patagonia Mts., Patagonia. COCHISE Co.: Bowie, San Bernardino Ranch. June (1), July (15), Aug. (25), Sept. (8). Sometimes very common at light; taken once on foliage of mesquite at night.

Epicauta (Gnathospasta) polingi Werner

10-16 mm; similar to *arizonica,* differing as follows: color of forebody and underside black or very dark brown, of elytra paler, the elytra not pale-margined; eyes smaller; pubescence dull cinereous to almost luteous; legs rufous with black tips to segments. Male with antennal segments 1 and 2 together equal in length to 3-11 together. Nuevo Leon (Monterrey), Coahuila (Saltillo), Durango (Pedricena and 35 mi. S. El Entronque), Chihuahua (east of Sierra Madre), Mexico (records mostly from Vaurie, 1950 and Selander, 1954); West Texas; New Mexico (Cloudcroft, Alamagordo and Organ); and two records from Arizona: COCHISE Co.: Douglas. PIMA Co.: Sta. Catalina Mts. (reported by Werner, 1945). The species is common at light in West Texas, but there have been no recent collections from Arizona. A sample from 6 mi. N. of Meoqui, Chihuahua, 2 Sept. 1950, collected by Ray F. Smith, contains both *polingi* and *arizonica;* these show no sign of intergradation structurally, but the *arizonica* specimens have typical *polingi* color.

Epicauta (Gnathospasta) liebecki Werner

6-13 mm; similar to *arizonica,* differing as follows: forebody and underside dark, sometimes almost black; elytra brown, with obscurely paler margins; legs rufous with black tips to segments. Antennal segment 1 of male longer, segments 1 and 2 together longer than 3-11 together. Known only from Imuris, Sonora, Mexico and Arizona: at intermediate and lower elevations, from southeast northwestward to Kingman: COCHISE Co.: San Bernardino Ranch, Lowell, Pinery Cn.- Chiricahua Mts., Canelo. GRAHAM Co.: Safford, Aravaipa. STA. CRUZ Co.: Peña Blanca, Bear V.-nr. Ruby. PIMA Co.: Madera Cn.-Sta. Rita Mts., Tucson, Sta. Catalina Mts.: Sabino Cn. and Hitchcock Hwy. Mi. 5 (4300′), 8 mi. N. Vail, "Quinlan Mts.," Ajo. GILA Co.: Christmas, Globe, Cutter. PINAL Co.: Apache Jct. Pinal Pass. MARICOPA Co.: Phoenix, Cavecreek, Wickenburg, Congress Jct. YAVAPAI Co.: Bumblebee, Columbia-on Humbug Creek. MOHAVE Co.: Kingman. May (2), June (18), July (12), Oct. (1). Often fairly abundant at light. Taken several times on mesquite (*Prosopis*), once in great numbers on a single tree in Six-Shooter Canyon near Globe.

Uniforma-Group

Antennal segment 1 with a shallow excavation near the apex on the ventral side, only slightly enlarged in male; segment 2 about half as long as 3. Male with two spurs on the front tibiae and segment 1 of the front tarsi simple. The group now contains ten species, ranging from southwestern U. S. to the southern part of the central plateau of Mexico.

Epicauta (Gnathospasta) uniforma Werner

7-12 mm; black; pubescence tannish-cinereous, rarely cinereous, dense and obscuring surface; elytra without marks at base. Male with antennae slightly longer and stouter, with segment 1 feebly enlarged, the ventral excavation only feebly indicated. Head of normal shape. Zacatecas (Fresnillo) and Durango, Mexico, north to West Texas and Colorado (La Junta and Hoehne), west into Arizona: at intermediate elevations, mostly in southeast: COCHISE Co.: San Bernardino Ranch, Chiricahua, Douglas, Pinery Cn.-Chiricahua Mts., Apache Pass, McNeal, Elfrida, Pearce, Kansas Settlement, Cochise, Bowie Jct., "Dragoon Mts.," Hereford, Fry, Tombstone, Pomerene. STA. CRUZ Co.: Canelo, Sonoita, Patagonia, "Patagonia Mts.," Nogales, Bear V.-nr. Ruby. PIMA Co.: Sta. Rita Range Res., Gardner Wash, Madera Cn.-Sta. Rita Mts., Tucson, Quinlan V.-E. of Baboquivari Mts., "Baboquivari Mts." PINAL Co.: Redrock, Eloy. GILA Co.: Globe. NAVAJO Co.: Ramah-3 mi. N. Joseph City-5000′. July (5), Aug. (17), Sept. (9). Sometimes abundant in Cochise Co. on *Solanum elaeagnifolium.* We have one record from *Datura,* two from *Kallstroemia* blossoms, and one from *Ipomoea leptotoma* blossoms. Related species on the southern part of the central plateau of Mexico seem to prefer *Ipomoea* blossoms.

Epicauta (Gnathospasta) alpina Werner

10-13 mm; black, with paler elytra; pubescence luteous to luteocinereous, dense and obscuring surface. Head narrowly triangular, with the mandibles extending slightly beyond the labrum but of normal form. Male with antennae slightly longer, segment 1 noticeably longer than in the male of *uniforma* and with the excavation more pronounced. West

Texas; Deming, New Mexico; and Arizona: at intermediate elevations in southeast: COCHISE Co.: Douglas, McNeal, Elfrida, Pearce and 30 mi. E., Willcox. GRAHAM Co.: Stockton Pass-Pinaleño Mts. July (3), Aug. (5), Sept. (2). Scarce; usually taken on *Solanum elaeagnifolium*, with single records from *Kallstroemia* and "mallow."

Purpurea-Group

Antennal segment 1 excavated ventrally near apex, greatly elongated, curved and deeply excavated in male; segment 2 more than half as long as 3 in female, longer than 3 in male, curved, flattened and apparently forming a clasping structure with the excavation on segment 1. Male with a single, incurved spur on the front tibiae, and with segment 1 of the front tarsi slightly shortened, broadened and contorted, but not glabrous. Besides the species that range into Arizona, the group contains *E. distorta* (Champion) in Central America.

Epicauta (Gnathospasta) purpurea (Horn) Fig. 84

8-15 mm; black; pubescence black or brownish, producing a purplish sheen, and contrastingly cinereous, as follows: head cinereous with a pair of elongate black dashes; pronotum cinereous with a pair of elongate black dashes that are slightly bowed inward; elytra black with suture, margins, and a sharply defined narrow stripe from base to near apex cinereous; underside and most of legs cinereous but the pubescence not as dense.

Durango (Ventanas and Palos Colorados-nr. Durango City) and Sonora (8 mi. W. Coyote), Mexico, and Arizona: at intermediate elevations in southeast: COCHISE Co.: "Chiricahua Mts." GRAHAM Co.: Noon Creek-Pinaleño Mts. STA. CRUZ Co.: W. sl. Patagonia Mts., Peña Blanca. PIMA Co.: Sta. Rita Range Res., Sabino Cn.-Sta. Catalina Mts., "Sta. Catalina Mts.," "Baboquivari Mts." GILA Co.: Capitan Mt., Mescal Mts., Six-Shooter Cn.-Pinal Mts., Pine. June (3), July (7), Aug. (3), Sept. (2). Generally rare. Taken in fair numbers on the ground among the leaves at one location on the west slope of the Patagonia Mts., a few individuals there and at Noon Creek, Pinaleño Mts. taken feeding on seedlings of *Desmdium neomexicanum*. One specimen taken in Six-Shooter Canyon was on a morning glory.

Epicauta (Gnathospasta) maculifera (Maydell) Fig. 85

8-11 mm; brown to piceous, the legs rufous; pubescence moderately dense, cinereous, largely obscuring surface except in numerous small glabrous spots around the tactile setae, particularly noticeable on the elytra. Antennae of male with some cinereous pubescence on segments 1 and 2. Known only from Arizona: at lower elevations in the south-central portion: PIMA Co.: Tucson, Sabino Cn.-Sta. Catalina Mts., 15 mi. S. E. Ajo. PINAL Co.: Florence. MARICOPA Co.: Phoenix area, Gillespie Dam. June (3), July (7), Aug. (7), Sept. (2). Scarce; all the specimens with collection records were taken at light.

Virgulata-Group

Antennal segment 1 excavated ventrally near apex, elongate, curved and deeply excavated in male; segments 2 and 3 both shortened in both sexes, with 2 about half as long as 3. Male with a single curved spur on

the front tibiae, and with segment 1 of the front tarsi slightly shortened and flattened but not glabrous. All three species in the group range into Arizona.

Epicauta (Gnathospasta) virgulata (LeConte) Werner, 1949b

8-12 mm; brown to piceous, the legs rufous with black tips to the segments; pubescence cinereous to brownish, moderately sparse but affecting color, denser narrowly on suture, margins and a narrow stripe on each elytron from inner edge of humerus to near apex; black or brown in a small spot near the scutellum and a mark on the humerus of each elytron. Hind trochanters with the posterior margin almost straight, without a tuft of setae in the male. Male with segment 1 of the antennae reaching hind margin of head. Southern Baja California, Sinaloa (Los Mochis), and Sonora (Cd. Obregon, Navajoa and Hermosillo), Mexico; Palm Springs, California; and into Arizona: at lower elevations in south: YUMA Co.: Ehrenberg, 15 mi. S. E. Alamo Crossing. MARICOPA Co.: Gila Bend and 32 mi. E., Gillespie Dam, Wickenburg, Cavecreek, Avondale, Phoenix area. PINAL Co.: Florence and 20 mi. S., Maricopa. PIMA Co.: 15 mi. S. E. Ajo, Organ Pipe Cactus Nat. Mon., Tucson. GILA Co.: Globe, San Carlos. June (1), July (2), Aug. (11), Sept. (3). Sometimes fairly common at light; taken once at Cavecreek on palo verde.

Epicauta (Gnathospasta) hirsutipubescens (Maydell) Fig. 86

7-12 mm; very similar to *virgulata*, differing as follows: hind trochanters semicircular behind, with a tuft of setae in the male; segment 1 of antennae of male reaching only to hind margin of eye; 2 short but 3 not as markedly shortened. Coahuila (southern, east to Saltillo), Durango (Pedricena), Chihuahua (central, Vaurie, 1950), and Sonora (Cd. Obregon and Hermosillo), Mexico; north into West Texas, southern New Mexico and Arizona: at intermediate elevations, mostly in southeast: GRAHAM Co.: Marijilda Cn.- Pinaleño Mts. COCHISE Co.: San Bernardino Ranch, Gleeson, Pearce, Cochise Stronghold-Dragoon Mts., Ft. Huachuca, Benson. STA. CRUZ Co.: E. of Sonoita, Patagonia, Nogales region, Calabasas Cn., Peña Blanca, Sycamore Cn.-nr. Ruby. PIMA Co.: Sta. Rita Range Res., Sabino Cn.-Sta. Catalina Mts., Tucson, Tucson Mts., Arivaca, Baboquivari Mts.: Brown Cn. and Baboquivari Cn., Badger, Organ Pipe Cactus Nat. Mon. GILA Co.: San Carlos, Cutter, Globe, Six-Shooter Cn.-Pinal Mts. MARICOPA Co.: Wickenburg. July (23), Aug. (15), Sept. (1). Moderately common at light. Taken once on coralbean at Ruby; Dillon (1952) mentions it as attacking *Acacia vernicosa* in Texas.

Epicauta (Gnathospasta) linearis (LeConte)

9-10 mm; black, the elytra and legs brownish; pubescence brownish-cinereous, moderately dense and largely obscuring surface; some specimens with obscure dark marks next to scutellum and at humeri on elytra. Male with antennae almost as in *virgulata* but with segment 1 not quite reaching vertex; and with the middle femora glabrous behind, fringed above with long setae. Durango (35 mi. S. El Entronque — Selander, 1954b, and Pedricena — Vaurie, 1950), and Chihuahua (6 mi. N. E. Meoqui, collected by R. F. Smith), Mexico; Texas (S. E. Hidalgo Co. and Presidio — Dillon, 1952; Palo Duro State Park, Randall Co., 26 Aug. 1940, C. E. Mickel); Llano Estacado (type-locality); New Mexico (White Sands Nat.

Mon.); and Arizona: COCHISE Co.: San Bernardino Ranch (3 specimens July and Aug., at light). This seems to be an extremely rare species in the United States.

Ochrea-Group

Antennal segment 1 weakly excavated ventrally near apex, enlarged and thickened in male; segment 2 shorter than 3, at most slightly enlarged in male. Male with a single curved spur on the front tibiae, and with segment 1 of the front tarsi short, contorted and largely glabrous. All three species of the group range into Arizona.

Epicauta (Gnathospasta) ochrea (LeConte)

8-15 mm; rufous to dark brown, the elytra rich luteous; pubescence dull luteous, moderately sparse but affecting color. Antennae noticeably moniliform beyond segment 1 in both sexes, the intermediate segments thickened in the male. Segment 1 reaches the hind margin of the eye in the male, and is very heavy at the apex. Front tibiae of male with a tuft of setae externally at the base, otherwise mostly glabrous. Guanajuato City, Guanajuato, Mexico; West Texas; St. George, Utah; and Arizona: at intermediate elevations from southeast northwestward to Grand Canyon. COCHISE Co.: Wood Cn.-Bisbee, Douglas, "Chiricahua Mts.," Pearce, Cochise Stronghold-Dragoon Mts., Gleeson, Tombstone, Palmerlee-Huachuca Mts. STA. CRUZ Co.: Canelo, W. sl. Patagonia Mts., Patagonia, Calabasas Cn., Peña Blanca, Sycamore Cn.-nr. Ruby. PIMA Co.: Sta. Rita Range Res., "Sta. Rita Mts.," Sta. Catalina Mts.: Hitchcock Hwy. Mi. 5 (4300′). GILA Co.: Pinal Mts. NAVAJO Co.: Carrizo, Whiteriver. APACHE Co.: Springerville. COCONINO Co.: Cameron, Grand Canyon. June (7), July (14). Adults closely associated with yucca, where they can be found in the leaf axils during the day. A great swarm was once seen on yucca flowers at night, feeding and mating on one plant (Werner, 1954a). Sometimes taken at ultraviolet light, but not at white light.

Epicauta (Gnathospasta) gissleri (Horn)

7-10 mm; black; pubescence cinereous, sparse but giving the color a greyish cast, denser narrowly along suture and margins of elytra, and on underside and legs. Elytra sometimes with an obscure black spot near scutellum and a humeral mark. Head normal, subquadrate, the mandibles not extending beyond the labrum. Male: midline of abdominal sterna with sparser pubescence, therefore blackish; antennal segment 1 elongate, stout, reaching half-way between eye and vertex, shiny; segment 2 slightly enlarged, also shiny; front tibiae glabrous behind, with an indication of the basal tuft of setae found in *ochrea;* segment 1 of front tarsi rufous and partly glabrous; middle femora flattened and glabrous on surface facing tibia, fringed above with long cinereous setae, slightly bowed. West Texas (The Basin, Big Bend Nat. Park, 30 May 1961, K. Roever); Grant Co., New Mexico; and Arizona: at higher elevations: GILA Co.: Sierra Ancha Mts. and Pinal Mts. NAVAJO Co.: Carrizo. COCONINO Co.: Williams. May (2), June (2). Some of the specimens were taken on blossoms of yucca.

Epicauta (Gnathospasta) parkeri Werner

9-11 mm; similar to *gissleri* but with the antennae more slender, usually with an obscure line of denser pubescence down the middle of each elytron, and with the head narrowly triangular, the mandibles almost straight and meeting well beyond the excised labrum. Male: antennal segment 1 much more slender than in *gissleri* and reaching past the eye only slightly, the middle femora not modified, and the middle of the abdominal sterna only very feebly darkened. Colorado (Manitou and above Manitou Springs); New Mexico (Manzano and Santa Fe); and Arizona: at higher elevations: APACHE Co.: Greer, Eagar. COCONINO Co.: Flagstaff, San Francisco Peaks. GILA Co.: Sierra Ancha Mts., Pinal Mts. PIMA Co.: Sta. Catalina Mts.: Bear Wallow (8000′) and above Summerhaven (8400′), Madera Cn.-Sta. Rita Mts., "Baboquivari Mts." COCHISE Co.: Bisbee. June (6), July (2). One specimen was taken on blossoms on *Gutierrezia* and one by "sweeping" meadow at Greer; specimens from near Manitou Springs, Colorado, were beaten from pine by G. H. Nelson.

Genus Pleuropompha LeConte

Revision: Werner, 1943

This genus is very closely related to *Epicauta*, subgenus *Epicauta*, and MacSwain (1956) states that the first instar larva of *P. tricostata* is more similar to some species of *Epicauta* than those species are to others in their own genus. The adults are distinguished from the *Epicauta* species in our fauna by the presence of strong ridges on the elytra, a tendency for part of the setae, at least, to be scale-like, and by the enlargement of segments 3-5 of the antennae of the male. Only two species are known, both ranging into Arizona.

Pleuropompha costata (LeConte) Fig. 87

7-16 mm; slender; black or with the elytra brown; elytra with the suture, side margins and four ridges on each sharply elevated. Pubescence scale-like, cinereous, almost white, dense enough to obscure surface except on a narrow midline and sometimes in one or two pairs of very small spots on the disc of the pronotum, which are glabrous; sparser between the ridges on the elytra and missing just next to the ridges, which are therefore set off by the darker ground color. Male with antennal segments 3-5, and to a lesser extent 2, elongate, slender, and shiny above.

South-central Durango and Chihuahua, Mexico (Vaurie, 1950); into West Texas, New Mexico and Arizona: intermediate and lower elevations in the south: COCHISE Co.: San Bernardino Ranch, Douglas, Hereford, Elfrida, Pearce, Bowie, 17 mi. N. W. Fry. STA. CRUZ Co.: Lochiel, W. sl. Patagonia Mts., Nogales, Sonoita and 10 mi. N. PIMA Co.: Greaterville, Sta. Rita Range Res., Tucson. GRAHAM Co.: Geronimo. GILA Co.: Cutter. PINAL Co.: Casa Grande, Maricopa, Stanfield. MARICOPA Co.: Tolleson, Gillespie Dam, Gila Bend. YUMA Co.: Roll, Yuma. July (10), Aug. (16), Oct. (1). Populations from intermediate elevations are all black. Great numbers of individuals have been seen feeding on *Datura*, with lesser numbers on *Solanum elaeagnifolium*. The species is not seen at light in these areas. Populations from lower elevations along the Gila River system tend to have the elytra, and to some extent the whole body, paler. The species

does come to light in these areas, and we have no record of any food plant association. It is possible that these populations are primarily nocturnal.

Pleuropompha tricostata Werner Fig. 88

6-12 mm; moderately slender; black; pubescence appressed, slightly scale-like, luteocinereous, occasionally almost cinereous, dense and obscuring surface, and uniform except for a very narrow glabrous midline on head and pronotum. Suture, side margins and three, instead of four, ridges on each elytron strongly elevated. Male with antennal segments 2-5 shiny and somewhat elongate, but not as extremely as in *costata*. Southeastern Coahuila and Chihuahua, Mexico (Vaurie, 1950), into West Texas and Arizona: at intermediate elevations in southeast: Cochise Co.: McNeal, Elfrida, Pearce, Cochise, San Simon, 7 mi. N. Fry, Benson. July (6), Aug. (2). Frequent on the blossoms of *Solanum elaeagnifolium;* confined, they eat only the blossoms. An occasional specimen has been taken on *Datura*. A specimen from Valerio Trujano, Oaxaca, Mexico, 28 July 1937, R. L. Mead, in the Parker collection, extends the known range southward a considerable distance.

Tribe Pyrotini

This tribe, which is confined to the Western Hemisphere, consists of the large genus *Pyrota* in both North and South America, and probably includes several smaller South American genera. MacSwain (1956) established it to preserve the homogeneity of the other tribes he recognized in the subfamily Lyttinae as a result of his studies of the first instar larvae.

The members of the genus *Pyrota* differ from other Lyttinae in the form of the antennae, which are offset beginning with segment 2, and in the form of the last segment of the maxillary palpi of the male of most species. This segment is expanded asymmetrically and has an extensive membranous "sensory area" on the ventral side. Some of the species have dense, silky pubescence along the inside of the anterior tibiae, as in the Epicautini and some Eupomphini.

Genus Pyrota Dejean

Several of the species of *Pyrota* are abundant and conspicuous insects; it is remarkable that the larval host is not known for any of them. Selander and Mathieu (1964) have succeeded in rearing three species on a mixture of honey bee-gathered pollen and honey, or on pollen and water, with or without the addition of one or more honey bee larvae. So it seems likely that the larvae live in the nests of solitary bees. A likely host for such a large and abundant species as *Pyrota akhurstiana* is difficult to imagine, but the same problem exists for some of the larger species of *Lytta*, which almost certainly live as bee parasites.

The genus is currently being studied by R. B. Selander. It has previously been revised by Denier, but Denier's paper is not readily available in the U. S. and treats the North American species only briefly. There has been much misidentification of specimens in collections, particularly in the group of species with spots and bands on the elytra. Only records we could personally verify have been included in the lists of localities.

Pyrota akhurstiana Horn Fig. 89

14-20 mm; shiny; black, marked with brick red as follows: in a complete border around each elytron, in obscure markings on head, on midline and sides of pronotum, and some markings on underside; upperside essentially glabrous, underside of thorax with fairly sparse pubescence. Male: segment 3 of antennae angularly produced ventrally near base; last segment of maxillary palpi flattened and pyriform; and last 3 segments of front tarsi slightly expanded anteriorly.

Southern Chihuahua (Vaurie, 1950), Sinaloa (Los Mochis), and Sonora (Cd. Obregon, Navajoa and Hermosillo), Mexico, north to El Paso, Texas (Dillon, 1952), southern New Mexico and Arizona: at intermediate and lower elevations in southeast. COCHISE Co.: San Bernardino Ranch, Douglas, Elfrida, Gleeson, Cochise Stronghold-Dragoon Mts., Bowie Jct., San Simon, Palmerlee-Huachuca Mts., Benson. GRAHAM Co.: Safford, Thatcher, Geronimo. STA. CRUZ Co.: Patagonia. PIMA Co.: "Sta. Rita Mts.," Continental, Twin Buttes, "Baboquivari Mts.," Tucson area, Tucson Mts., Sabino Cn.-Sta. Catalina Mts., Marana. PINAL Co.: Oracle, Oracle Jct., Florence, Olberg, Casa Grande, Stanfield. MARICOPA Co.: Chandler, Phoenix, Gillespie Dam, Gila Bend. GILA Co.: Globe, Cutter, San Carlos, Payson. June (1), July (19), Aug. (8), Sept. (2). Common at light. Large swarms are sometimes seen in small areas during the daytime. One such group on two mesquite trees at Bowie Jct., with many mating pairs, apparently had no feeding individuals, because there was no leaf damage.

Pyrota obliquefascia Schaeffer Fig. 90

11-18 mm; shiny, the elytra opaque because of dense punctures; black, with a yellow pattern as follows: head yellow with a zone behind each eye, a spot on the occiput and a small spot on the frontoclypeal suture black; pronotum black, the midline, expanded in front, yellow; elytra black, completely though narrowly margined with yellow and usually with an oblique yellow band from side margin to suture just before middle. Underside black, the bases of the legs yellowish. Male: segment 3 of antennae flattened and angled ventrally at base; last segment of maxillary palpi enlarged and flattened, narrowly pyriform; front legs not modified. Known only from Arizona: STA. CRUZ Co.: Patagonia, W. sl. Patagonia Mts., Nogales, Calabasas Cn., Peña Blanca, Sycamore Cn.-nr. Ruby. PIMA Co.: Sta. Rita Mts.: Box Cn. and Madera Cn.; W. of Greaterville; Brown Cn.-Baboquivari Mts.; Kitt Peak (4050′)-Quinlan Mts. July (4), Aug. (13). This is a scarce species, taken mostly at light. The specimen from Box Cn. was on *Acacia millefolia* during the daytime.

Pyrota palpalis Champion Fig. 91

10-15 mm; shiny and with only small and inconspicuous punctures above; head, prothorax, and much of underside and legs pale rufous, elytra typically whitish yellow, darker in greasy specimens; marked with black as shown in the figure. Some specimens have an additional pair of small black spots on the pronotum, visible only from the side. The basal black band on the elytra is sometimes divided into two elongate spots. Antennae except for segment 1, tips of femora and tibiae, and all of the tarsi black. The underside is sometimes all pale, or there may be lateral black markings on thorax and abdomen. Antennal segments 3-10 slighty expanded toward apex, particularly in the male, so that the antennae appear somewhat dis-

jointed. Male: last segment of maxillary palpi expanded laterally at base; last segment of front tarsi slightly asymmetrical. Durango and southern Coahuila, Mexico, north to northcenrtal New Mexico and westcentral Utah, west to southern California, with an extension southward into Sonora, Mexico (Selander, 1964a). Arizona: mostly at lower elevations in south: COCHISE Co.: San Bernardino Ranch, Bisbee, Texas Pass-Dragoon Mts. PIMA Co.: Tucson, Ajo. PINAL Co.: Maricopa, Stanfield, Casa Grande. GILA Co.: Globe, Roosevelt L. MARICOPA Co.: Phoenix, Cashion, Gillespie Dam, Gila Bend, Theba, Wickenburg. YUMA Co.: Roll, Wellton, Ehrenberg, Alamo Crossing. YAVAPAI Co.: Cottonwood, Ashfork. COCONINO Co.: Williams. July (2), Aug. (18), Sept. (6). Sometimes abundant at light in Arizona. Selander (1964a) records it as having been collected on the blossoms of eight genera of Compositae, but we have no record of its occurrence on blossoms here. Selander and Mathieu (1964) have reared this species from egg to adult using the stored pollen of honey bees, honey or water, and honey bee larvae. Selander (1964a) describes its courtship pattern in detail.

Pyrota concinna Casey

11-18 mm; similar to *palpalis* but elytra yellow, not whitish yellow, and subopaque because of fine microreticulation. The basal black band on the elytra tends to be longer and is more frequently divided into two elongate spots on each elytron. Underside usually with extensive black markings, particularly in female, which often has the black markings crossing the midline on some of the abdominal sterna. Zacatecas through Chihuahua, Mexico and south Texas north to southern Montana, east to Arkansas, west to southern Nevada and south into northeastern Sonora, Mexico (Selander, 1964a). Arizona: at intermediate elevations: COCHISE Co.: 7 mi. E. Pearce, W. side Willcox Playa, Willcox. STA. CRUZ Co.: Lochiel, Sonoita. APACHE Co.: Ganado. NAVAJO Co.: Holbrook, Joseph City. COCONINO Co.: Painted Desert. Aug. (7), Sept. (4). Most frequently taken on blossoms of yellow-flowered Compositae. Selander (1964a) describes the courtship pattern.

Pyrota terrestris Selander

6.5-15 mm; basal band on elytra divided into two spots on each elytron, median band elongate and tending to connect with the lateral basal spot and with the lateral portion of an apical lunule that reaches the apex of the elytron. Male: maxillary palpi not modified. Northeastern Durango, Mexico and Arizona: COCHISE Co.: no precise locality. Food plants in Durango *Chamaesaracha*, *Physalis*, and an unidentified mallow, the first seeming to be preferred (from Selander, 1963).

Pyrota fasciata Selander

10-16 mm; moderately shiny but elytra subopaque; forebody and underside pale rufous, elytra only slightly paler; marked with black as follows: a pair of small discal spots on pronotum; an oval spot next to scutellum, an elongate spot at humerus, a short postmedian band widely separated from suture and side margins and sometimes separated into two spots, and an apical lunule that does not quite reach the apex but often reaches the side margin, on each elytron; markings on thoracic pleurites and abdominal sterna; tips of femora, tips and other edge of tibiae, and all of tarsi. Nuevo Leon, Mexico and north to central Texas, west to West

Texas and New Mexico (from Selander, 1963). One specimen recorded from 15 mi. W. of Lordsburg, New Mexico, 30 Aug. 1948. The species should range into Arizona, at least in the area east of the Chiricahua Mts. It is most often recorded as taken at light.

Pyrota postica LeConte

15-18 mm; shiny; yellow or brownish yellow, with black markings as follows: head sometimes with a pair of small spots; pronotum with a pair of spots on disc and another visible from side; each elytron with a spot near scutellum, a small spot on humerus, and a large quadrate marking beginning at or just behind middle and nearly reaching margin and suture; extensive markings on underside; tips of femora and tibiae and all of tarsi. Male: antennal segments 4-10 flattened, broader near apex, the antenna appearing disjointed; last segment of maxillary palpi expanded; last segment of front tarsi slightly eccentric. Coahuila and northern Chihuahua, Mexico; southern to western Texas and into Arizona (Selander, 1964a): COCHISE Co.: Bowie, "Huachuca Mts." GRAHAM Co.: Safford. July (3), Aug. (1). Selander (1964a) list species of Zygophyllaceae as food plants. F. Werner and W. Nutting took a series at Laredo, Texas feeding on mesquite.

Pyrota plagiata (Haag-Rutenburg) Werner, 1954c

12-18 mm; generally like *postica* but differing as follows: median mark on elytra elongate-oval, not quadrate; intervals on the elytra between the faint costulae slightly convex (flat in *postica*). Durango and Chihuahua, Mexico; and Arizona: COCHISE Co.: Cochise (14 July 1915, A. L. Passhall, on alfalfa), Kansas Settlement (28 July 1955, G. Butler and F. Werner, on alfalfa), mouth of Pinery Cn.-Chiricahua Mts. (series, Aug. 1958, collected by University of California summer class in entomology on a few plants of a yellow-flowered composite). This species has not previously been reported from the United States.

Pyrota trochanterica werneri Selander Selander, 1957

7-17 mm; moderately shiny; yellow, with black markings as follows: head sometimes with a pair of small spots on frons; pronotum with a pair of oval spots on disc and usually another pair visible from side; each elytron with a small to medium spot next to scutellum but not reaching suture, and an extensive marking starting at humerus and reaching almost to apex, the outer edge running nearly parallel to the side margin and the inner edge curving around the scutellar spot, then approaching the suture and running parallel to it but not touching it; underside black or with some yellow on edges of sclerites; antennae; palpi; tips and often most of posterior side and upper edges of femora, tips of tibiae, and all of tarsi. Male: antennal segments 3-10 slightly thicker than in female; last segment of maxillary palpi expanded; front tarsi slightly expanded but not eccentric.

Sonora (Guaymas and Hermosillo) and Arizona: at lower elevations in south: PIMA Co.: Organ Pipe Cactus Nat. Mon.-headquarters area; Tucson Mts.-Arizona-Sonora Desert Museum; Tucson. MARICOPA Co.: Phoenix. GRAHAM Co.: Thatcher. Aug. (7), Sept. (2), Oct. (1). Arizona specimens are regarded as atypical by Selander. Subspecies *trochanterica* Horn is found in the southern part of Baja California, Mexico. Most specimens of both subspecies have been taken at light.

Pyrota bilineata Horn Fig. 92

6-10 mm; shiny, the elytra slightly opaque; rufous yellow, the elytra paler yellow; marked with black as shown in the figure. The pronotum usually has a pair of black spots; the underside is rufous-yellow with some black markings; and the legs are mostly rufous yellow, with the tips of the femora and tibiae and the tarsi black. Male: antennae slightly longer and stouter than in female; last segment of maxillary palpi very slightly expanded. Great Plains in Colorado and Nebraska to West Texas and northern Durango, Mexico, west through New Mexico and Arizona to southwestern Utah (Selander, 1964a). Arizona: at intermediate elevations: COCHISE Co.: Douglas, Webb, McNeal, Elfrida, 7 mi. S. Pearce, Willcox, Ramsey Cn.-Huachuca Mts. STA. CRUZ Co.: Sta. Cruz R. valley. APACHE Co.: 6 mi. S. Wide Ruin (6000′). NAVAJO Co.: Holbrook, Joseph City. COCONINO Co.: Fredonia. July (2), Aug. (6), Sept. (3). Often abundant on blossoms of Compositae in Cochise Co.

Tribe Lyttini

As restricted by MacSwain, this tribe contains only the genus *Lytta* in our fauna. It is more highly developed in the Old World, especially in the Mediterranean region. The characteristics of the tribe consist largely of the absence of the distinctive features of the other tribes. There is no silky pubescence along the inner edge of the front tibiae; the antennae are not angled between segments 2 and 3; and the last segment of the maxillary palpi does not have a ventral sensory area.

Genus Lytta Fabricius

Revision: Selander, 1960

Most of the species of *Lytta* in the Arizona fauna are brightly and distinctively colored and easily recognized. The few species known from here have been placed in three subgenera by Selander; an extract of his key to subgenera is given below. Several species have been reared from the nests of bees and it is probable that all the species are associated with these insects.

Key to Subgenera (adapted from Selander, 1960)

1. Intermediate antennal segments of male thickened, segments 4 and 5 at least as wide as apical segments, or at least with 4 wider than 5. Hind trochanters of male not spined or angulate. 2

Intermediate antennal segments of male not thickened or, if they are, hind trochanters angulate or spined. Antennae of male usually longer than those of female. .....(*Poreospasta*)

2. At least segments 4 and 5 of male antennae conspicuously and asymmetrically distorted. .....(*Adicolytta*)

Intermediate antennal segments of male somewhat compressed and usually flattened on inner side but not asymmetrically produced. .....(*Paralytta*)

Subgenus Adicolytta Selander

Lytta (Adicolytta) mutilata (Horn) Fig. 93

13-25 mm; forebody shiny, elytra subopaque because of fine granulation; head and pronotum dull red, rest of insect black. Male: antennal segments 4 and 5 modified, usually rufescent, 4 flattened and broadened, 5 with a conspicuous dorsal apical projection. Northeastern Durango and east-central Coahuila, Mexico, north to West Texas and west to southern California and northern Baja California, Mexico (Selander, 1960). Arizona: at intermediate and lower elevations in south: COCHISE Co.: Douglas, Elfrida, 20 mi. S. Pearce, Willcox. GRAHAM Co.: Thatcher. STA. CRUZ Co.: Nogales, Patagonia, Tumacacori Mission. PIMA Co.: Tucson, Marana, Postvale. PINAL Co.: Oracle Jct., Redrock. GILA Co.: Globe. MARICOPA Co.: Phoenix, Litchfield Park. July (2), Aug. (5), Sept. (2), Oct. (1). Sometimes abundant very locally, feeding on dodder (*Cuscuta*) parasitic on low-growing *Euphorbia* and puncture vine (*Tribulus*). Also taken occasionally feeding on petals of *Kallstroemia grandiflora.*

Subgenus Paralytta Selander

Lytta (Paralytta) magister Horn Fig. 94

20-32 mm; forebody shiny, elytra conspicuously reticulated; head, pronotum and legs except for tarsi and tips of femora and tibiae orange, the rest of the insect black. Male: segments 4-7 of the antennae conspicuously thickened, the whole antenna longer than in the female. Southeastern California to extreme southwestern Utah, east into Arizona at lower elevations. Arizona: YUMA Co.: Yuma, Tinajas Altas, Wellton, Tacna, Ehrenberg, Quartzite. MARICOPA Co.: Gila Bend, Scottsdale, Phoenix, Tempe. PINAL Co.: Florence Jct., Oracle. GILA Co.: Globe, Winkelman. PIMA Co.: Organ Pipe Cactus Nat. Mon. (headquarters and Dripping Springs), Silverbell, Rillito, Tucson area. MOHAVE Co.: 8 mi. S. Hoover Dam (Selander, 1960). STA. CRUZ Co.: Patagonia. COCONINO Co.: Bright Angel in Grand Canyon (Selander, 1960). March (2), Apr. (12), May (4), June (2). Has been encountered in large assemblages on the ground on several occasions. We have records of collections made on yucca, *Plantago*, and a low, white-flowered composite, but none of these is likely to be the preferred food plant. The big swarms seem to be mating swarms; no feeding has been observed in them. Selander (1958) reports a population on the Pinacate lava cap, 35 mi. W. of Sonoyta, Sonora, Mexico, in which the usually orange areas are from dark brown to black.

Lytta (Paralytta) vulnerata (LeConte)

12-20 mm; forebody shiny, the elytra with at least feebly raised reticulations; head except between eyes, and pronotum except for a pair of spots at middle of anterior margin, orange; rest of insect black. Selander's "interior race," equivalent to *L. vulnerata cooperi* LeConte of older lists, ranges from British Columbia, Canada south to the east of the Cascades and Sierras to southern Nevada and Utah, east to eastern Utah. Selander (1960) lists specimens from St. George, Utah and Las Vegas, Nevada, the latter as intermediate to some extent with the "California race." He also lists one specimen with an Arizona state label. His

Utah records are for the period from August to October. The species should occur in extreme northern Arizona.

Lytta (Paralytta) deserticola Horn

18-25 mm; forebody shiny, elytra subopaque and with fine raised reticulations; head, pronotum and femora except for base and tip reddish orange, the pronotum often with 4 black spots in a line across the disc, the middle pair sometimes extending forward to the margin; rest of insect black. Southern Sonora to southwestern New Mexico, Arizona and southwestern Utah (Selander, 1960). Arizona: at intermediate and higher elevations from southeast to the north rim of the Grand Canyon. COCHISE Co.: San Bernardino Ranch, Douglas, Bisbee, "Chiricahua Mts.," 5 mi. W. Portal. STA. CRUZ. Co.: Nogales. PIMA Co.: "Sta. Rita Mts." GRAHAM Co.: Mt. Graham (9000′), Thatcher. APACHE Co.: McNary. YAVAPAI Co.: Yarnell, Skull Valley (W. of Prescott), S. of Ft. Whipple. COCONINO Co.: Flagstaff and 15 mi. N., North Rim Campground-Grand Canyon National Park, Grand Canyon. July to September. (Records partly from Selander, 1960.) No food plants are known for this species, which is quite scarce.

Lytta (Paralytta) arizonica Selander

13-20 mm; subopaque, the elytra with fine raised reticulations; pronotum yellow-orange, the frontal area of the head and the very base of the elytra sometimes with some obscure orange; rest of insect black. Known only from the type locality, Arizona: MOHAVE Co.: Littlefield (13 specimens collected 20 Apr. 1930, by W. J. Gertsch). Maehler's (1939) record of *cribrata* from Tuba City may have been based on a specimen of this species.

Lytta (Paralytta) agrestis (Fall)

13-17 mm; forebody shiny, elytra with raised reticulations that are coarser than in *deserticola* and *arizonica* but finer than in *magister;* head, pronotum and very base of elytra reddish orange; rest of insect black. Known only from Arizona: COCONINO Co.: Tuba City and 20 mi. E., Painted Desert. Very rare. The few known specimens were collected in July and August, and there is no record of food plant. "Painted Desert" localities could be in several counties in northern Arizona; there is no way of knowing the exact location of the one listed.

Lytta (Paralytta) fulvipennis LeConte

11-26 mm; forebody shiny, densely punctured, elytra dull, finely scabrous; a spot on front of head and all of elytra rufous, rest of insect black; pubescence black, erect and fairly conspicuous on forebody and underside, pale and inconspicuous on elytra. Male: intermediate antennal segments flattened, somewhat thicker than in female but not thicker than the terminal segments. Southern Texas to southwestern Nebraska and west to Arizona: COCHISE Co.: Cave Creek Cn.-E. slope Chiricahua Mts. July. (Selander, 1960) It has apparently been taken only once in Arizona, but is fairly common in parts of Texas, where it has been recorded on "Mexican poppy."

Lytta (Paralytta) melaena LeConte

14-22 mm; slender; shiny, the elytra finely scabrous; black except for a small orange spot on front of head. Labrum emarginate; mandibles strongly curved; pads well developed on front and middle tarsi, weak or absent on hind tarsi; and tarsal claws strongly curved, the lower blade as long as the upper. Southern Baja California, Mexico, southern California, and Arizona. YUMA Co.: Roll (1 specimen, 14 Apr. 1955, G. Butler and F. Werner, on blossoms of *Verbesina.*) The larvae have been associated with the nest of a *Diadasia* bee in California.

Lytta (Paralytta) puberula LeConte

7-10 mm; shiny; moderately densely punctured; black; pubescence sparse but obvious, short, erect and cinereous. Male: intermediate antennal segments slightly thickened. Extreme southwestern Colorado, south-central New Mexico, and Arizona: APACHE Co.: McNary. NAVAJO Co.: Show Low. YAVAPAI Co.: Prescott, Ft. Whipple. COCONINO Co.: Oak Creek Cn.-6000′, Fort Valley, Flagstaff and 15 mi. N., Williams, Winona, Grand Canyon. MOHAVE Co.: Peach Springs. July (3), Aug. (7). Frequent. Taken on primrose and at light at McNary. Selander (1960) lists specimens taken on *Campanula* in New Mexico.

Lytta (Paralytta) biguttata LeConte Fig. 95

7-13 mm; shiny, shallowly punctured; pubescence short, fine, erect and inconspicuous; head and underside rufous yellow to black, pronotum rufous yellow, often with a pair of black spots, elytra paler yellow, each elytron often with an elongate brown or black spot toward apex; tibiae sometimes yellow; tarsi black. Antennae mainly black. Male: antennal segments 4-6 thickened, sometimes rufous, in which case segment 1 is rufous also. Great Plains from Montana and South Dakota south to the state of Mexico, Mexico on the central plateau, west in the U. S. to Arizona and southwestern Utah. Selander (1960) lists all the Arizona populations under his "pale race." Arizona: at intermediate elevations: COCHISE Co.: San Bernardino Ranch, Douglas, Chiricahua Mts.: Pinery Canyon and Onion Saddle, 7 mi. E. Pearce, Willcox, Hereford, Benson. STA. CRUZ Co.: Lochiel, Patagonia Mts., Nogales. PIMA Co.: "Sta. Rita Mts." GRAHAM Co.: Stockton Pass-Pinaleño Mts., Gila Valley. APACHE Co.: Springerville, "White Mts." NAVAJO Co.: Carrizo, 10 mi. S. W. Kayenta. GILA Co.: San Carlos, Globe, base of Pinal Mts., Sierra Ancha Mts., COCONINO Co.: Oak Creek Cn., Winona, Mormon L., Williams. YAVAPAI Co.: Cornville, Rimrock, Yarnell, Prescott, Ft. Whipple, Seligman. MOHAVE Co.: Peach Springs-Hualpai Indian Res. Aug. (15), Sept. (6). Frequent on blossoms, especially of yellow-flowered Compositae.

Subgenus Poreospasta Horn

Lytta (Poreospasta) nuttalli Say

11-22 mm; shiny, the elytra finely rugulose and subopaque; metallic green with bronze or purplish reflections, the elytra metallic purple or with purplish reflections over most of surface; antennae black. Male: last visible abdominal sternum deeply and acutely cleft, the next to last triangularly excavated; hind trochanters with a short, erect spine. Northern Great Plains in Canada and the U.S., extending south down the Sierra

Nevada to southern California and down the Rocky Mts. to northern New Mexico and Arizona: APACHE Co.: Phelps Botanical Area-nr. Greer (9500'), Greer Lakes, McNary-Springerville summit, Paradise Creek-White Mts. COCONINO Co.: Kaibab Nat. For. July (5), Aug. (1). Sometimes abundant on blossoms of *Iris missouriensis* in the White Mts. The species has been recorded as eating several genera of Leguminosae in the U. S. and Canada (see Selander, 1960).

Lytta (Poreospasta) viridana LeConte

10-17 mm; shiny, the elytra finely rugulose and subopaque; metallic green to blue, the forebody often with bronze reflections and the whole insect sometimes bronze; antennae black. Male: intermediate antennal segments with moderately dense, erect, curved setae on anterior side; abdominal sterna almost as in *nuttalli;* hind trochanters without a spine but sometimes with a feeble angulation at middle of hind margin. Northern Great Plains, south along the Rocky Mts. Arizona: COCONINO Co.: San Francisco Mts. (2 Jul. 1947, reported by K. W. Radford, 1959, Coleop. Bul. 13:35). Selander (1960) lists Leguminosae as the food plants.

Lytta (Poreospasta) navajo Werner

16-23 mm; subopaque, the elytra finely reticulate, with two feeble costulae on each; deep blue-black except for a small orange spot on front of head. Male: one specimen from Holbrook has the hind trochanters slightly angulate. Known only from Arizona: COCONINO Co.: 22 mi. N. Cameron (19 May 1949, H. Epson, feeding on *Astragalus*); Flagstaff (20 May-20 June 1961, V. Narrakol in N.A.U. collection). NAVAJO Co.: Holbrook (1 June 1941, A. Duke), Second Mesa (18 Apr. 1960, E. Polingrowma).

Lytta (Poreospasta) stygica (LeConte)

8-11 mm; forebody slightly opaque, with scattered moderately deep punctures, elytra finely rugulose; metallic blue, the elytra sometimes greenish; head, pronotum, base of elytra and underside with some erect dark setae. Male: antennae elongate, submoniliform, with the intermediate segments almost oval. Pacific Coast from Washington to southern California, inland to southern Idaho in the north. The Arizona population seems to be isolated geographically, but Selander (1960) could not find consistent morphological differences between it and some populations in southern California. Arizona: PIMA Co.: Tucson (7 lots), Cortaro. GILA Co.: Globe, San Carlos. APACHE Co.: "White Mts." (Selander, 1960). All the Tucson lots have been collected in March and April, on *Lesquerella gordoni, Encelia farinosa, Sphaeralcea,* iris, California poppy, African daisy, apple and cherry. The species apparently feeds only on the petals.

Lytta (Poreospasta) auriculata Horn

6-16 mm; head and pronotum shiny, elytra finely granulose and subopaque; vertex of head reddish, the rest of the body black, the elytra often with a greenish or bluish cast; body lightly clothed with short pubescence. Male: antennae slender, much longer than in female. Central to southern California, east into Arizona. One specimen from San Felipe, Texas, 18 Feb. 1953, H. B. Dietrich, apparently is the most eastern collection to

date. Arizona: mostly at lower elevations in south: YUMA Co.: Wellton, Dateland, Aztec, Ehrenberg. MOHAVE Co.: Oatman, Wickieup, Cane Springs, Peach Springs. COCONINO Co.: Fredonia. MARICOPA Co.: Sentinel, Gila Bend, Phoenix. PIMA Co.: Covered Wells, Sells, Cortaro, Tucson area, Sabino Cn.-Sta. Catalina Mts. PINAL Co.: Oracle Jct., Picacho, Florence and 10 mi. S., Superior. GILA Co.: Globe, Roosevelt L. COCHISE Co.: Rustler Park-Chiricahua Mts. (8700′, 19 June 1960, K. Roever.) Feb. (1), Mar. (6), Apr. (9), May (2), June (2). Sometimes taken quite abundantly on blossoms of *Sphaeralcea* and occasionally on *Argemone*.

Subfamily Meloinae

The subfamily Meloinae, as it is presently defined, contains only the genus *Meloe*. The position of several genera with similar characteristics is in doubt, and probably will remain so until the larvae are studied. None of these genera is a part of the North American fauna.

Genus Meloe Linnaeus

MacSwain, 1956

The genus *Meloe* is widespread but developed mainly in the Northern Hemisphere. Most of the subgenera and species are found in the Mediterranean region of Europe and North Africa, with some groups extending much farther and a few groups being restricted to other parts of the World. All known species are parasitic on bees, the first instar larvae attaching themselves to adult bees to gain access to the nest.

The subgenus *Meloe*, in which the male has two intermediate antennal segments contorted, is Holarctic, extending even into tundra regions in the Arctic. Several species are known from North Africa and one or two from Mexico and Central America. This subgenus is very rare in Arizona. The few specimens available have been identified with species of the eastern U. S., perhaps unsatisfactorily. The subgenus *Treiodous* Dugès, in which the antennae are similar in the sexes, contains only one species, *M. laevis*.

Meloe (Meloe) impressus Kirby

Arizona specimens 9-11 mm to tip of elytra, about twice this if abdomen extended. Head and pronotum microreticulate, more deeply in the Gila and Apache Co. specimens, without punctures except in the Apache Co. specimen, which has some deep punctures. General color black or partly deep chocolate brown, feebly shiny. Arizona: APACHE Co.: Phelps Mt.-nr. Greer (9000′, 23 Jul. 1953, L. A. Carruth). GILA Co.: Globe (1 Oct. 1935, F. H. Parker). PIMA Co.: Tucson (Nov. 1935, 27 Dec. 1937, 28 Jan. 1943, 13 Apr. 1958). We have no record of food plants in Arizona.

Meloe (Meloe) niger Kirby

With the characteristics given in the key to species. The single Arizona specimen assigned to this species was taken at NAVAJO Co.: Holbrook (Mar. 1943, C. D. Libert, in Parker Coll.) It is a very small male, 5 mm long to tip of elytra. The black color has a faint purplish cast.

Meloe (Treiodous) laevis Leach Fig. 96

10-14 mm to tip of elytra, as much as 30 mm total; black, without bluish reflections; moderately shiny. The abdominal sclerites are rather small and become completely isolated from each other when the abdomen is distended. Costa Rica, through coastal Vera Cruz and the central plateau of Mexico (but not in the lowlands of the West Coast — Vaurie, 1950), north into Arizona, New Mexico and Colorado (VanDyke, 1928). Also known from the Tres Marias Islands off the west coast of Mexico and from the larger islands of the West Indies. Arizona: scattered localities at intermediate elevations: STA. CRUZ Co.: Calabasas Cn. (28 Jul. 1948, F. Werner & W. Nutting); Lochiel (30 Jul. 1948, Werner & Nutting). COCHISE Co.: Douglas. GILA Co.: Globe. NAVAJO Co.: Show Low (24 Jul. 1956, G. Butler & P. Gerhardt). APACHE Co.: "White Mts.," Vernon.

Subfamily Tetraonycinae

This group is difficult to place with assurance in the family. The adults are very similar to some Lyttinae, so similar in fact that some South American species are difficult to assign to one group or the other. Kaszab (1959) associates *Tetraonyx* with his tribe Lyttini, which is somewhat differently constituted from MacSwain's tribe of the same name. But the first instar larvae are so different from those of other Meloidae that Bφving and Craighead established a separate family, Tetraonycidae, for *Tetraonyx*, the only genus they had available for study. MacSwain's recognition of the group as a subfamily is also based largely on the form of the larva.

Genus Tetraonyx Latreille

Unusually broad and stocky beetles, with the prothorax rather sharply margined at the sides. Antennae short, thickened toward apex, the segments somewhat moniliform. Male with the segments of the front tarsi somewhat bilobed, and with the inner angle of segment 1 produced in our species. Some eighty species are known, all from the New World and mostly from the Neotropical region. These are remarkably uniform in structure but varied in color. MacSwain (1956) presumes that the larvae of our species are associated with the nests of anthophorine bees. The most abundant bee visitors to *Sphaeralcea*, the food plant of the adults of *Tetraonyx fulvus*, are species of *Diadasia*.

Tetraonyx femoralis Dugès

10-12 mm; broad, the disc of the pronotum more than twice as broad as long; subopaque because of dense and fine punctures above; rufous above except black on head back to hind margin of eyes, black on underside and appendages except rufous on all but tips of the front femora and in a broad median band on the other femora; pubescence short, erect and moderately dense but fine, matching the ground color above and below. Abundant in Michoacan and Jalisco, Mexico. Vaurie (1950) cites a specimen from the state of Durango. Champion records it from various localities on the southern part of the central plateau of Mexico and northern Sonora. Horn (1885) has previously recorded it from Arizona, without precise locality, and his record has been copied by Champion and Leng. Arizona: STA. CRUZ Co.: Patagonia Mts., 29 Jul. 1941, F. H. Parker,

2 specimens in the Parker collection). The species was fairly abundant on the blossoms of *Anisacanthus thurberi* 6 mi. N. W. of Cananea, Sonora (6000′), 15 Aug. 1959. Champion (1892) regarded this species as a variety of *Tetraonyx frontalis* Chevrolat because he took both at Jalapa and Mexico City. The latter is almost entirely allopatric with *femoralis* and the presence of the two together in southern Mexico is fairly good evidence that they are reproductively isolated, particularly since there was no indication of integradation of characters. The main point of difference is that the legs are entirely black in *frontalis.*

Tetraonyx fulvus LeConte Fig. 97

8-13 mm; moderately shiny but with fairly dense small punctures; rufous above except for the mandibles and eyes, black on underside and antennae, the femora and tibiae rufous tipped with black and the tarsi black; pubescence short, erect and moderately dense, matching the ground color. Guanajuato, Mexico (Champion, 1892) to West Texas, New Mexico and Arizona: at intermediate elevations: Cochise Co.: San Bernardino Ranch, Hereford, McNeal, Elfrida, Kansas Settlement, Bowie, San Simon. Sta. Cruz Co.: Sonoita. Pima Co.: Tucson. Apache Co.: Springerville, Vernon, Chambers, St. Johns. Coconino Co.: Winona, Williams. Yavapai Co.: Cottonwood, Mingus Mountain, Prescott. July (7), Aug. (5), Sept. (1), Oct. (1). Sometimes common on blossoms of *Sphaeralcea.* MacSwain (1956) observed oviposition on this plant at St. Johns. Some populations on the central plateau of Mexico differ in the density of the punctures or in having some dark markings on the elytra.

Subfamily Nemognathinae

The presence of two rows of fine teeth along the ventral side of the upper division of the tarsal claws distinguishes most of the members of this subfamily from all other Meloidae in our fauna.. The highly specialized genus *Hornia* has the tarsal claws simple, even the ventral division being poorly developed. It is placed in this subfamily on the form and habits of the larvae. The tarsal claws of the more normal Nemognathinae have a ventral division that arises from the outside of the base of the upper, as it does in the rest of the family except for the tribe Eupomphini of the subfamily Lyttinae.

One other group, recognized as subfamily Horiinae by MacSwain (1956), has similar tarsal claws. The members of this subfamily are large insects, probably all parasitic on carpenter bees (*Xylocopa*), at least insofar as the New World species are concerned. One species of Horiinae has been reported from Arizona, but it is extremely doubtful that it really was collected here. Enns (1958) reports that he found two specimens of *Cissites maculata* (Swederus) labeled "Yuma, Arizona, V-21" in the Klages Collection of the Carnegie Museum in Pittsburg. These specimens could have provided the basis for LeConte and Horn's listing of *Horia maculata* for southwestern Arizona in 1883.

Champion (1892) changed the identification to his *Horia auriculata* because the known range of the latter species seemed more likely to be expandable to include Arizona. Both species are now assigned to the genus *Cissites.* The nearest locality Enns could authenticate for *Cissites maculata* was in the state of Morelos, Mexico. The main chance that the Yuma labels are correct lies in the possibility that logs shipped to Yuma

from tropical America in the days when the Colorado was filled with water and Yuma was a seaport of sorts, carried *Xylocopa* nests and the parasitic beetles with them. At any rate, no specimens have been collected in Arizona, or the United States, since then.

The adults of the Nemognathinae are usually found on blossoms, where they feed on nectar and pollen. Some genera have the galeae of the maxillae elongated to form a sucking organ. The eggs are usually laid on or near the flowers, the first instar larvae attaching themselves to bees to gain entrance to the nest and their coming food supply. Members of the genera *Tricrania* and *Hornia* do not feed or visit blossoms during the adult stage. They remain near or in the nest of the host bee; the first instar larvae must depend on the bees that leave the host nest to distribute them.

MacSwain (1956) recognizes two tribes in this subfamily, Apalini, which is confined to the Old World, and Nemognathini (as Zonitini). He further divides the tribe Nemognathini into the subtribes Zonitides and Nemognathides, both of which are represented in the Arizona fauna.

Tribe Nemognathini

Subtribe Zonitides

The principal distinguishing feature between the two subtribes of Nemognathini is the structure of the male aedeagus. In the Zonitides the median lobe is sclerotized and bears a sclerotized dorsal appendage, derived from the base of the internal sac, as it does in the other subfamilies. In the Nemognathides the median lobe is semimembranous and lacks the dorsal appendange. Both subtribes contain genera in which the galeae are elongated and others in which they are not.

The subtribe Zonitides contains three genera in North America: *Zonitis*, *Pseudozonitis*, and *Gnathium*. *Pseudozonitis* has the galeae short, *Gnathium* has them long, and different subgenera of *Zonitis* have them either short or long. *Zonitis* is nearly cosmopolitan in its distribution, but the other two genera are known only from North America.

Genus Gnathium Kirby

Revision: MacSwain, 1952

Small to very small, slender species, with the galeae produced into an elongate sucking organ and the antennae at least slightly thickened apically; elytra covering abdomen and wings fully developed. The adults have been taken only on the blossoms of Compositae.

Gnathium minimum (Say)

4-6.5 mm. Despite its specific name, this is one of the largest species of the genus. It is the only species in this area that has the pronotum even moderately densely punctured. Most specimens have the elytra brownish along the sides and narrowly brownish along the suture. Alberta, Canada to Louisiana, west to Arizona in the south (MacSwain, 1952). Specimens from the Great Plains, where the species is more abundant, average larger, have the pronotum more densely punctured, and have the elytra more densely pubescent. Samples from Arizona vary somewhat, those from Yuma Co. tending to small and pale, with the pronotum even

less densely punctured than those from the southeastern fourth of the state. Arizona: COCHISE Co.: 20 mi. E. Pearce. PIMA Co.: Tucson, Sabino Cn.-Sta. Catalina Mts., Saguaro National Monument, Sahuarita, Sta. Rita Mts. PINAL Co.: Florence, Sacaton, Coolidge. MARICOPA Co.: Phoenix, Tempe. YUMA Co.: Yuma and 10 mi. E. May (5), June (2), July (3), Aug. (4), Sept. (4), Oct. (3). All specimens for which the host blossom was recorded were on *Helianthus*, including *H. annuus* at Sacaton and *H. niveus* at 10 mi. E. of Yuma.

Gnathium francilloni Kirby

Less than 4 mm long; luteous with the head and elytra brown to black, or entirely luteous. Abundant in southeastern U. S.; ranging from Georgia to Arizona (MacSwain, 1952) and as far north as Wyoming. MacSwain notes that the bicolored form predominates in the northern part of the range, while the pale form is more abundant in the south and the dominant form in Texas. Samples from higher elevations in central Arizona are bicolored; most specimens from the southern counties are pale. Arizona: NAVAJO Co.: Show Low. COCONINO Co.: Oak Creek Cn. (3500′). STA. CRUZ Co.: 12 mi. N. E. Lochiel, W. sl. Patagonia Mts. Aug. (3), Sept. (2). The last two samples were taken on blossoms of *Aplopappus gracilis*.

Gnathium vandykei MacSwain

This species was described from southern Nevada and recorded from the desert region of southern California. MacSwain noted its similarity to the previous species and suggested that it may represent a well-defined race of that species. Arizona: YUMA Co.: Ehrenberg, Tinajas Altas. PINAL Co.: Florence Jct. GILA Co.: Roosevelt L. Mar. (1), Apr. (3), May (1). The specimens from central Arizona differ slightly from the others, but can probably be assigned to this species.

Gnathium caviceps MacSwain

Described from southern California, with one specimen listed from Yuma Co., Arizona. Arizona: YUMA Co.: Yuma Mesa, Aztec, Ehrenberg. All three samples were taken in April, the first on *Palafoxia linearis* by D. M. Tuttle. MacSwain records it from *Geraea canescens* in California.

Gnathium nitidum Horn

Eastern Oregon to Baja California, east to eastern Texas and eastern Mexico (MacSwain, 1952). Our only Arizona records are from the northern and central parts of the state. COCONINO Co.: Cameron. NAVAJO Co.: Holbrook. YAVAPAI Co.: Verde Valley. Aug. (2), Sept. (2), MacSwain lists *Chrysothamnus* as a host blossom.

Gnathium eremicola MacSwain

This species was described from specimens from Imperial Co., California, with others listed from Riverside Co. It should occur in southwestern Arizona, in the fall.

Gnathium obscurum MacSwain

This species was described from Nogales, Arizona, from specimens collected by F. E. Blaisdell, 30 Sept. 1906. Arizona: STA. CRUZ Co.: 10 mi. E. Nogales on road to Lochiel, W. sl. Patagonia Mts. PIMA Co.: mouth of Box Cn.-Sta. Rita Mts. COCHISE Co.: Cochise Stronghold-Dragoon Mts., Willcox. GRAHAM Co.: Stockton Pass-nr. Ft. Grant. GILA Co.: Hayes Mt., San Carlos. Aug. (4), Sept. (5), Oct. (1). The first three samples listed were on *Aplopappus gracilis*, and one sample from Willcox on *Baileya multiradiata*.

Genus Pseudozonitis Dillon

Revision: Enns, 1956

Slender species with unusually long and narrow elytra, the latter with two dark stripes in most species; head elongate-triangular, the eyes greatly enlarged and protuberant, strongly developed on underside of head; the antennae extremely long and slender, with segment 6 at least three times as long as wide; the galeae of the maxillae lobe-shaped, with a brush of setae at the apex; and the spurs of the hind tibiae broad and spatulate. Most of our records are of specimens collected at light, but some species have been taken on blossoms during the day. No other Nemognathinae are very likely to be taken at light. The genus contains about fifteen described species, all North American. MacSwain records the larva of *Pseudozonitis maculicollis* (MacSwain) as probably feeding on the egg and provisions of a species of *Melissodes* bee.

Pseudozonitis martini (Fall)

8-12 mm; subopaque, the head densely punctured, the pronotum moderately densely punctured, broader than long, the elytra densely and finely punctured or rugose-punctuate; black or fuscous, the pronotum rufous, usually with a dark median spot on anterior third; pubescence inconspicuous, fine and suberect, the color matching the surface. Southern California to southern New Mexico. Arizona: MARICOPA Co.: Gila Bend. COCHISE Co.: Ramsey Cn.-Huachuca Mts., "Huachuca Mts.," "Chiricahua Mts.," and "Peloncillo Mts.," the last without county indicated but either in northeastern Cochise Co. or along the border between Graham and Greenlee counties. Mar.-Aug. One specimen was taken on blossoms of *Tamarix* and another flying to *Agave*. Mesquite is also recorded by Enns.

Pseudozonitis arizonica (VanDyke)

10-12 mm; subopaque, forebody moderately coarsely, sparsely and irregularly, elytra more densely and evenly, punctured; pale yellowish to tannish, sometimes with obscure darker stripes near suture and side margins of elytra; darker to black on distal half of mandibles, distal segments of palpi, apical fourth of femora, at least apical half of tibiae and all but extreme base of tarsi. Southern California to New Mexico. Arizona: PINAL Co.: Florence, Superior. PIMA Co.: Tucson, Tucson Mts.: Arizona-Sonora Desert Museum, 8 mi. N. Vail. Jul.-Sept. Rare; most specimens recorded as taken at light.

Pseudozonitis vittipennis (Horn)

8-10 mm; feebly shiny, forebody moderately sparsely punctured, the elytra shallowly rugose-punctate; rich rufous yellow, each elytron with two fuscous stripes, one rather narrow next to suture and the other broader, starting at humerus, the two sometimes confluent apically but not quite reaching apex of elytron; black or fuscous on tips of mandibles, sometimes the palpi, the very tip of the femora, all but the base of the tibiae, and the antennae and tarsi except for a very narrow zone at the base of the segments. Southern Nevada to West Texas. Arizona: COCHISE Co.: San Bernardino Ranch, Willcox. PIMA Co.: Tucson. MARICOPA Co.: Phoenix. GILA Co.: Globe, Cutter. NAVAJO Co.: Holbrook. COCONINO Co.: Fredonia. June-Oct. This species probably is taken mostly on blossoms; it has been recorded twice from blossoms of *Gutierrezia*.

Pseudozonitis vaurieae Enns Fig. 98

10-18 mm; subopaque, the forebody moderately densely, the elytra densely, punctured; yellowish with broad brown vittae on elytra, reaching apex, and pronotum usually with at least front third and a broad median stripe rufous to brown, the base narrowly and the hind angles yellowish; black on tips of mandibles, palpi, tips of femora, at least apical half of tibiae, and on antennae and tarsi except often narrowly at articulation of segments. Occasional specimens have the elytra entirely pale and the other dark areas reduced; others have the elytra all brown. Pubescence inconspicuous, short and suberect, the color matching the surface. Eyes extremely large, separated below by width of gula and on front by a little more than twice this. Guerrero to northern Coahuila, Mexico, southern New Mexico to southern California, and south in Baja California, Mexico to the tip. Arizona: COCHISE Co.: San Bernardino Ranch, San Simon, Portal, Round Valley-Chiricahua Mts., Gleeson, Benson. GRAHAM Co.: Safford. STA. CRUZ Co.: Peña Blanca. PIMA Co.: Tucson, Tucson Mts.: Arizona-Sonora Desert Museum, Kitt Peak-Quinlan Mts. June-Aug. Most often taken at light; specimens have been collected on blossoms of *Larrea* and *Chrysothamnus*.

Pseudozonitis stroudi Enns

7-11 mm; similar to vittate specimens of *vaurieae* but smaller, with somewhat coarser elytral punctures, and the pronotum broader, with a rectangular median reddish spot. West Texas (Presidio), southern New Mexico, and Arizona: COCHISE Co.: San Bernardino Ranch. PIMA Co.: Tucson. MARICOPA Co.: Phoenix. GILA Co.: Globe, base of Pinal Mts., Roosevelt L. YAVAPAI Co.: Cottonwood. July (3), Aug. (7), Sept. (1). Several of the specimens were taken at light.

Pseudozonitis brevis Enns

7-10 mm; similar to vittate specimens of *vaurieae* but smaller; shinier, the punctures sparser on forebody and elytra; the pronotum all yellowish; and the pubescence inconspicuous but moderately long and decumbent, pale even on dark areas. Some specimens have the elytra entirely yellowish and the other dark areas reduced. Elytra comparatively short, about three times as long as wide across base. Southern California, southwestern Utah (St. George), and Arizona: YUMA Co.: Yuma, Ehrenberg. MARICOPA

Co.: Phoenix. PIMA Co.: Tucson, "Sta. Catalina Mts." COCHISE Co.: Benson. GRAHAM Co.: Bylas, Geronimo. June-Aug. Frequent at light at Tucson and recorded as taken at light at some other localities.

Genus Zonitis Fabricius

Revision: Enns, 1956

Elytra entire, the wings present and probably functional. Head elongate-triangular; antennae filiform or submoniliform, not thickened toward apex; galeae in the form of short lobes with an apical brush of setae, or elongated into a short sucking structure. Spurs of hind tibiae usually spatulate. Eyes variable in size, rarely produced beneath head. Adults usually found on blossoms. The known larvae are parasitic in the nests of bees. This genus is almost cosmopolitan as presently defined, but probably contains many discordant elements in the faunas that have not been critically studied.

Subgenus Neozonitis Enns

Galeae of maxillae scarcely modified or produced into a short, broad, lobiform structure. The subgenus is presently defined as containing only North American species. Differences between this subgenus and the genera *Pseudozonitis* and *Rhyphonemognatha*, which have similar galeae, are given in the key to species.

Zonitis (Neozonitis) vermiculata Schaeffer

8-12 mm; shiny, forebody sparsely and finely punctured, elytra sparsely and finely punctured and shallowly wrinkled (vermiculate); forebody, scutellum and underside yellow or orange-yellow, the elytra black, with a feebly metallic blue, purple or bronze cast; black on tips of mandibles, palpi, antennae, tarsi, tibiae and apex of femora. Eyes moderately large, reaching to outer margins of maxillae below; antennae moderately slender, with segment 6 about 2½ times as long as broad. Southern California to southeastern Washington, east to western Colorado. Arizona: COCONINO Co.: House Rock Valley. NAVAJO Co.: Holbrook. Occurs in late summer; has been taken on blossoms of *Isocoma vernonioides* and "yellow *Cleome*."

Zonitis (Neozonitis) interpretis Enns

10 mm; very similar to *vermiculata* but the elytra not vermiculate, fuscous without a metallic sheen; the eyes more protruding, coarsely faceted and extending beyond bases of maxillae below; and the antennae elongate, with segment 6 three times as long as wide. The abdomen is fuscous. West Texas (Chisos Mts.) and Arizona: PIMA Co.: Sabino Cn.-Sta. Catalina Mts. (8 Aug. 1955, F. Werner and G. D. Butler, reported by Enns, 1959). Only a single specimen has been collected in Arizona.

Zonitis (Neozonitis) hesperis Selander

8-8.5 mm; similar to *vermiculata* but elytra brownish and almost smooth, the body shorter and more robust, and the inner row of teeth on the tarsal claws containing 5-8 teeth (13-14 in *vermiculata*). Utah

(Uintah Co.) and southern California (Palm Springs). The species should occur in northwestern Arizona, in late summer.

Zonitis flohri Dugès

11 mm; moderately stout, the pronotum broader than long, with a deeply impressed midline and two deep impressions on each side, one behind the other and just short of half-way between midline and sides; head and pronotum shiny and almost glabrous, the head with scattered deep punctures; the elytra opaque, finely and deeply wrinkled, with three fine and feeble costulae on each elytron; forebody, scutellum, underside and all but apex of femora rich rufous, elytra deep bluish-black; antennae, palpi, apex of mandibles, tips of femora, all of tibiae and all of tarsi except claws piceous black, tarsal claws tan. Scutellum, underside and rufous portion of femora with fine, silky pubescence of a peculiar rich pink color; pubescence on dark areas inconspicuous and dark. Eyes large and coarsely faceted, separated by 0.13 mm on underside and 0.64 on front.

State of Vera Cruz, Mexico (Champion, 1892). Arizona: STA. CRUZ Co.: Sycamore Cn.-nr. Ruby (1 specimen, 2 Aug. 1959, K. Roever, in ultraviolet light trap). This species has not previously been recorded from the United States and would not be expected here from its distribution in Mexico. The Arizona specimen agrees very well with Champion's specimens in the British Museum. Its placement in the subgenus is only tentative.

Zonitis (Neozonitis) atripennis (Say)

6-12 mm; shiny, head and elytra moderately densely, pronotum more sparsely, covered with deep and distinct punctures, the pubescence sparse, short and decumbent, matching surface color; underside more densely and finely punctured and pubescent, especially on abdomen of male. Galeae lobiform. Spurs of hind tibiae concave and broad, the outer broader. Rufous yellow, the elytra yellow, the antennae beyond segment 2, tips of femora and tibiae, most of tarsi and sometimes part of underside brown (ssp. *flavida* LeConte); or similar but with as much as apical fourth of elytra black (ssp. *terminalis* Enns); or elytra and antennae black, tips of femora, all but base of tibiae, all of tarsi and much of underside brown (ssp. *atripennis*). Great Plains to the Sierras, south to southern Baja California, Mexico; *atripennis* the common form in the Great Plains and Rockies, extending to Idaho and Arizona; *flavida* the common form in West Texas, New Mexico, Arizona, Utah and Idaho; and *terminalis* the only form in California and the common one in Nevada, extending in small numbers to Wyoming and New Mexico. Arizona: at intermediate and higher elevations, *flavida* widespread, *terminalis* and *atripennis* almost entirely north of the Mogollon Rim: COCHISE Co.: San Simon (f), Bowie (f), Elfrida (f), Pearce (f), Willcox (f). PIMA Co.: "Sta. Catalina Mts." (f), "Tucson" (1 record, a). GILA Co.: San Carlos (f). YAVAPAI Co.: Skull Valley (f), Prescott (f, a), Seligman (f). COCONINO Co.: Oak Creek Cn. (f), Williams (f), Winona (f), Flagstaff (f, t, a), San Francisco Mts. (f, t, a), Tuba City (f), Fredonia (f). NAVAJO Co.: Holbrook (f, a), Show Low (f). APACHE Co.: McNary (t). June to late September. Adults sometimes relatively abundant, closely associated with blossoms of *Cleome* (recorded from *C. serrulata* in Arizona) and the related *Wislizenia*

refracta. Selander and Bohart (1954) give a detailed account of the bionomics of *flavida* in Utah, listing *Nomia melanderi* as the principal host bee, with *Anthophora* and *Melissodes* possible.

Zonitis (Neozonitis) bilineata Say

6-13 mm; shiny, the elytra slightly opaque; punctures of upperside distinct, moderately sparse on forebody, denser on elytra, where the intervals are slightly wrinkled; underside of thorax sparsely punctured, the abdomen densely and finely punctured and short-pubescent in male, more sparsely in female. Forebody and much of underside rufous yellow, the elytra contrastingly paler, sometimes almost white, with a brown stripe down the middle of each, narrow and not reaching base or apex (sometimes absent) in male, broader in female. Antennae brown to black; legs almost all rufous yellow. Galeae lobiform. Spurs of hind tibiae broadly spoon-shaped, equal. New England to South Carolina, west to Idaho and southern California. Arizona: at higher elevations north of Mogollon Rim: APACHE Co.: "White Mts.," Springerville. COCONINO Co.: Flagstaff. June-Sept. Apparently scarce in Arizona. Recorded elsewhere mainly on *Helianthus*, the female laying her eggs on the underside of the leaves; also recorded on *Vernonia, Cirsium, Solidago, Ambrosia, Asclepias* and *Medicago.* Some specimens from other regions are much darker than described above, with much of the body brown to black and the elytra of the female varying to all black, narrowly margined all around with white.

Subgenus Parazonitis Enns

Galeae somewhat elongated, as in *Nemognatha.* The most important difference between this subgenus and the genus *Nemognatha* is in the form of the aedeagus, as described under the subtribe Zonitides heading. The four species of this subgenus actually known from Arizona differ from all species of *Nemognatha* in this region by having the elytra coarsely punctured. But *Z. vittigera propinqua,* which also may occur here, does not have this difference. All of the species listed have the abdomen of the male more densely, and usually more finely, punctured than the female.

Zonitis (Parazonitis) vittigera propinqua MacSwain

10-18 mm; subopaque, the forebody moderately densely, the elytra densely and finely, punctured; pubescence decumbent, dark but short and fine; rufescent to fulvous, the antennae, apices of femora, and almost all of tibiae and tarsi black. Galeae short, 1¼ times as long as mandibles, black. Spurs of hind tibiae subequal, stout and concave. Missouri and Kansas to western New Mexico (Garfield, Dona Ana Co., on the Rio Grande). Subspecies *vittigera* (LeConte) ranges from the northern Great Plains and Michigan to Florida. Apr.-Aug. Adults recorded from blossoms of *Rudbeckia, Gaillardia, Helianthus, Vernonia,* and *Cacalio.* Should range into extreme southeastern Arizona.

Zonitis (Parazonitis) punctipennis punctipennis (LeConte)

8-14 mm; shiny, the elytra slightly opaque; punctures moderately dense on head, very sparse on pronotum, dense and deep on elytra, the intervals slightly wrinkled; pale yellowish, the elytra of the female with some dark brown to black markings, varying from a moderately narrow

stripe on each to all dark. Antennae beyond base, tarsi, and sometimes part of tibiae, also dark. Galeae slender, usually reaching hind coxae. Kansas and West Texas to southern California, except in the coast region, where ssp. *californica* Enns occurs. Arizona: at intermediate elevations: COCHISE Co.: San Bernardino Ranch, Douglas, Portal, "Chiricahua Mts.," Willcox, Huachuca Mts.: E. of, Carr Cn., Ramsey Cn.; Benson. STA. CRUZ Co.: 4 mi. E. Lochiel. PIMA Co.: "Tucson." MARICOPA Co.: "Phoenix." GILA Co.: Sierra Ancha Mts. YAVAPAI Co.: Prescott, Kirkland. COCONINO Co.: Oak Creek Cn. NAVAJO Co.: Cottonwood Springs. July-Sept. Adults taken frequently on blossoms of *Helianthus*.

Zonitis (Parazonitis) sayi Wickham

8-12 mm; shiny; punctures small and moderately dense on head, particularly on frons, very small and extremely sparse on pronotum, and deep, coarse, sparse and irregularly spaced on elytra; pale yellowish, the antennae, tips of femora and tibiae and all of tarsi brown to black. Galeae relatively long, usually reaching hind coxae. Great Plains from southern Canada to West Texas, east to eastern Minnesota and Kansas, west to Idaho, western Utah and eastern Arizona. Arizona: mostly at higher elevations: COCONINO Co.: Jacob Lake. NAVAJO Co.: Carrizo, Lakeside. APACHE Co.: McNary and 10 mi. W., Springerville. GRAHAM Co.: Hospital Flat-Mt. Graham (9000′). COCHISE Co.: Chiricahua Mts.: Pinery Cn. and "Mts.," "Huachuca Mts." PIMA Co.: "Tucson." May-Sept. Frequent in Arizona. Recorded adult host plants over the range of the species include *Helianthus, Grindelia, Solidago, Aplopappus, Chrysopsis, Engelmannia, Silphium,* and *Sphaeralcea.* Enns (1956) records one larval association with a *Nomia* bee.

Zonitis (Parazonitis) dunniana Casey Fig. 99

7.5-14 mm; shiny; punctures small and moderately dense on head, sparse but about as deep on pronotum, and deep, coarse, sparse and irregularly spaced on the elytra, which have three distinctly raised costae on each. Pale yellow, the elytra somewhat translucent, the antennae beyond segment 1, very tips of femora and tibiae, and part of tarsi, brown. Galeae short and slender, about as long as the somewhat elongated mandibles. West Texas to Arizona: at intermediate elevations in southeast: COCHISE Co.: San Bernardino Ranch, Douglas, Bisbee, McNeal, Elfrida, Pearce and 40 mi. E., Willcox, Portal, Texas Pass-Dragoon Mts., Huachuca Mts.: Ramsey Cn. and Ft. Huachuca, Tombstone. STA. CRUZ Co.: Sonoita. PIMA Co.: Madera Cn.-Sta. Rita Mts., Sta. Rita Range Res., Continental, 5 mi. N. Tucson, Coyote Mts. PINAL Co.: Oracle Jct. and 11 mi. N., Oracle. Aug.-Oct. Frequent in Arizona; recorded on blossoms of *Chrysothamnus, Baileya, Verbesina, Sideranthus,* and *Eriogonum.*

Zonitis (Parazonitis) tarasca (Dugès)

8-10 mm; forebody and underside shiny, smooth, elytra slightly opaque; head with moderately dense small punctures on front, scattered on vertex, pronotum with scattered small punctures, and elytra with moderately dense, deep, larger punctures, the intervals finely microreticulate, and with distinctly elevated costulae; rufous yellow, the antennae, tips of most of tibiae, and all of tarsi brown (ssp. *tarasca*); or elytra, antennae, tips of femora, most of tibiae and all of tarsi dark brown to

black (ssp. *borealis* Enns). The hind tibiae tend to be paler than the others, especially toward base. The metasternum of ssp. *borealis* may be partly brown. Galeae short and slender, about as long as the somewhat elongated mandibles, or shorter in Arizona specimens. Panama to northern Mexico (Coahuila and Durango) and southeastern Arizona (ssp. *tarasca*); southeastern Arizona, and one apparent intergrade from Durango, Mexico (ssp. *borealis* Enns). Arizona: COCHISE Co.: Portal (b), 32 mi. S.E. Willcox (b), Cochise Stronghold-Dragoon Mts. (b), Tombstone and 12 mi. S. (b). STA. CRUZ Co.: Sonoita (t,b), Peña Blanca (t), Ruby (t). July (6), Aug. (2). Collected near Willcox on *Argemone platyceras* by George Bradt, and at Tombstone on *Mortonia scabrella* by Butler and Werner. Apparently quite rare in Arizona.

Subtribe Nemognathides

In this subtribe the male has the aedeagus semimembranous and lacking a dorsal appendage on the median lobe. The largest genus, *Nemognatha*, has the elytra entire, the wings present, and the galeae elongated into a sucking structure. The other three genera have the galeae short and unmodified. *Rhyphonemognatha* is not otherwise modified; *Tricrania* is probably flightless, remaining near the nest of the larval host; and *Hornia* has both wings and elytra reduced, the adults remaining actually in the nest of the larval host. The tarsal claws of *Hornia* lack the double row of teeth on the upper blade, and have the lower blade much reduced or absent.

Genus Nemognatha Illiger

Revision: Enns, 1956

Species assigned to this genus are found on all the continents except Australia, with the greatest number of species in North America and Africa. The subgenera into which the North American species have been divided are presently defined as being strictly North American.

Subgenus Pronemognatha Enns

North American species in which abdominal sterna 2-5 of the male are not modified; the spurs of the hind tibiae are broadly spatulate, similar and equal; and the galeae are very short.

Nemognatha (Pronemognatha) sparsa LeConte

6-7.5 mm; shiny, the elytra slightly opaque; punctures moderately dense, sparser and coarser on pronotum; head, prothorax, scutellum, front coxae, femora except tips, and abdomen (except base in male) rufous yellow to yellow; elytra, antennae, meso- and metathorax and most of legs fuscous to black; pubescence short and suberect, dark, not very conspicuous. Galeae slender, reaching hind coxae. Spurs of hind tibiae subequal and spatulate. Great Plains from South Dakota to northern New Mexico, west to southwestern Utah and northern Arizona: NAVAJO Co.: Joseph City. COCONINO Co.: Grand Canyon. June-Sept. Recorded from *Grindelia* and other Compositae. Linsley and MacSwain (1952) record oviposition on flower buds of *Grindelia*.

Nemognatha (Pronemognatha) cantharidis MacSwain

7-11 mm; forebody and underside shiny, elytra subopaque; punctures small, moderately dense on head, sparse on pronotum, very dense on elytra; pubescence pale, short, appressed on elytra; head and antennae black, metathorax and legs except front coxae in most specimens dark brown, prothorax, mesopleurites, abdomen, and usually scutellum, front coxae, mesosternum and metepimera rufous yellow, the elytra varying from dull yellow with apical fourth brown to dark brown with suture very narrowly and side margins more broadly pale. Mandibles long; galeae moderately slender, reaching hind coxae. Spurs of hind tibiae subequal, spatulate. Desert region in southern California, northwestern Sonora, Mexico (50 mi. W. Sonoyta) and southern Arizona: YUMA Co.: Yuma, Wellton, Ehrenberg, nr. Sierra Pinta in S.E. GRAHAM Co.: Dublin (10 mi. W. Safford). Feb. 21-Apr. Scarce; recorded from blossoms of *Encelia, Geraea, Helianthus petiolatus* and *Pluchea.* It has been reported to be much more in evidence on blossoms at night or on overcast days than on clear days (Linsley and MacSwain, 1952).

Nemognatha (Pronemognatha) selanderi Enns

5-9 mm; forebody and underside shiny, elytra subopaque; punctures small, moderately dense on head, sparse on pronotum, dense on elytra; pubescence dark, short, subdecumbent on elytra; head, antennae, and elytra almost black, meso- and metathorax and legs dark brown, prothorax, and usually abdomen of female, rufous yellow, scutellum usually dark, sometimes almost yellow. Galeae slender, about as long as mandibles. Spurs of hind tibiae subequal, moderately broad, spatulate. Northern Mexico and from West Texas to eastern Arizona: at intermediate elevations: COCHISE Co.: Douglas, Pearce and 6 mi. N., Cochise Stronghold-Dragoon Mts., Willcox, Ramsey Cn.-Huachuca Mts. STA. CRUZ Co.: Nogales. NAVAJO Co.: Winslow, Joseph City, Snowflake, 5 mi. S. Carizzo. APACHE Co.: Springerville, St. Johns. July (7), Aug. (3). Recorded as collected on alfalfa and *Lepidium* in Arizona, and on blossoms of *Grindelia, Melilotus, Petalostemum, Croton, Baileya, Baccharis, Atriplex* and *Fallugia* elsewhere.

Subgenus Nemognatha Illiger

North American species in which abdominal sterna 4 and 5 of the male are excavated medially, the excavation lined with erect setae; the spurs of the hind tibiae elongate, similar or nearly so; and the galeae moderately to extremely long.

Nemognatha (Nemognatha) bifoveata Enns

6-12 mm; shiny; head and elytra moderately densely, pronotum more sparsely, covered with small punctures; pubescence erect, dark. Head behind eyes and pronotum rufous yellow, elytra black, rest of insect dark brown. Galeae slender, reaching about to hind coxae. Spurs of hind tibiae fairly slender, equal. Male with a deep, elongate-oval excavation lined with erect setae on middle of abdomen, involving sterna 4 and 5. Resembles some specimens of *N. lurida* and *N. piazata bicolor,* differing from both in having the front of the head dark. Kansas and Texas to Utah and possibly southern California. Arizona: 6 specimens labeled

"Ari." in the Otto Lugger collection, University of Minnesota. Apr.-Aug.; recorded almost exclusively from blossoms of *Monarda.*

Nemognatha (Nemognatha) piazata bicolor LeConte

7-13 mm; finely and rather evenly punctured; pubescence suberect, dark, fine; head and pronotum rufous yellow, elytra slightly paler, sometimes with a broad black stripe on each from basal fifth to apex or all black, scutellum pale to black, underside black, occasionally pale in specimens that are pale dorsally. Galeae slender, reaching tip of abdomen. Spurs of hind tibiae subequal, moderately slender. Male with a narrow excavation lined with erect setae on abdominal sterna 4 and 5. Most similar to *N. lurida*, which differs most strikingly in having the outer spur of the hind tibiae very broad. The nominate subspecies occurs in southeastern U. S.; *bicolor* ranges from Minnesota and eastern Texas to Idaho, Utah and Arizona. Arizona: at higher elevations, north of Mogollon Rim: NAVAJO Co.: Snowflake, Show Low. COCONINO Co.: Mormon Lake, 4 mi. N. Grand Canyon Jct. and 4 mi. N. Red Lake (both near Williams.) July (4). Most frequently collected on blossoms of *Cirsium.* The larvae have been associated with the cells of *Anthophora occidentalis* (Porter, 1951).

Subgenus Pauronemognatha Enns

North American species in which the male has a transversely oval punctulate area bearing a tuft of setae, on at least abdominal sternum 4; the spurs of the hind tibiae slender to somewhat flattened, usually with the apices acute; and the galeae from short to long.

Nemognatha (Pauronemognatha) nigripennis LeConte Fig. 100

5-10 mm; slender, the elytra almost parallel-sided; feebly shiny; punctures small, moderately dense, especially on elytra; pubescence erect, black, fine; rufous yellow to rufous, the antennae, tips of femora, all of tibiae and tarsi, and sometimes an apical crescent or all of elytra black. Galeae slender, reaching hind coxae. Spurs of hind tibiae slender and pointed. Mandibles short and evenly curved. Abdominal sterna 4 and 5 of male with tufts of setae. Eastern Colorado to western Oregon, south to West Texas, southern California and northern Baja California, Mexico. Arizona: COCHISE Co.: Portal, "Chiricahua Mts.," Warren, Ramsey Cn.-Huachuca Mts. GRAHAM Co.: Mt. Graham-5000′. STA. CRUZ Co.: W. sl. Patagonia Mts., Peña Blanca, Atascosa Mts., Sycamore Cn.-nr. Ruby. PIMA Co.: Sta. Rita Mts.: 2 mi. W. Helvetia and "Mts." Sta. Catalina Mts.: Hitchcock Hwy., base and Mi. 5 (4300′), Sabino Cn.; "Rincon Mts.," Tucson and 12 mi. E. and 10 mi. N., 13 mi. S. Three Points, Baboquivari Mts., Coyote Mts., Papago Indian Res.: Sta. Cruz Village and Comobabi Mts.; Organ Pipe Cactus Nat. Mon. MARICOPA Co.: Phoenix and 26 mi. N., Theba, Gila Bend. YUMA Co.: Yuma and 45 mi. N. PINAL Co.: Ray, Superior. GILA Co.: Globe, "Pinal Mts.," "Sierra Ancha Mts." APACHE Co.: "White Mts." YAVAPAI Co.: Weaver Mts.-20 mi. N. Wickenburg, Prescott. COCONINO Co.: Oak Creek Cn., Williams, Flagstaff and 8 mi. N., Navajo Mts., N. Rim Grand Canyon: Cape Royal and Swamp Point. Mar. (3), Apr. (17), May (3), July (2), Aug. (10), Sept. (3). Widespread and frequently collected on blossoms. Arizona records are for *Encelia*

farinosa (5), *Baileya multiradiata* (3), *Senecio monoensis*, and *Aplopappus*. Enns (1956) lists many additional genera. Has been reared from the cells of megachilid bees of the genera *Anthidiellum*, *Dianthidium*, *Hoplitis* and *Megachile* (MacSwain, 1956; Enns, 1956). Reared from cells of *Ashmeadiella* sp. from Yuma, Arizona by G. D. Butler (new record).

Nemognatha (Pauronemognatha) capillaris Enns

6-8 mm; shiny; elytra uniformly finely and densely punctured, with long, extremely fine, suberect setae; pale yellowish, the elytra paler and sometimes with a median reddish brown or dark median stripe on each from middle to apex; the antennae beyond segment 2, legs and thoracic sterna also dark. Galeae reaching to just behind hind coxae. Spurs of hind tibiae moderately slender and pointed. Known only from Bluff, Utah, a locality so close to the border that the species must range into northwestern Arizona.

Nemognatha (Pauronemognatha) scutellaris LeConte

5-10 mm; moderately shiny; punctures small, moderately dense and uniform; pubescence black, that on elytra fairly short and subdecumbent; typically yellow to rufous yellow above, the front and sometimes the occipital angles of the head, the scutellum, and usually the suture and apical portion of the side margins of the elytra black to brown; underside and appendages entirely black. Galeae reaching hind coxae. Spurs of hind tibiae slender and subequal. Common from Washington to southern California, rare as far east as Nebraska. Arizona: MOHAVE Co.: Littlefield. GILA Co.: Globe. PIMA Co.: Sabino Cn.-Sta. Catalina Mts., 45 mi. S.W. Tucson. Rare in Arizona. Apparently most frequently taken here in the spring, but Enns lists dates from Feb. to Oct. Has been recorded from blossoms of many plants in several families. The female has an ovipositor and inserts her eggs into the florets. The females of most other species of *Nemognatha* lay masses of eggs on the underside of the bracts or phyllaries. MacSwain (1956) lists larval associations with the megachilid genera *Hoplitis*, *Ashmeadiella*, *Collanthidium* and *Osmia*, and the apid genera *Xylocopa* and *Anthophora*.

Nemognatha (Pauronemognatha) cribraria cribaria LeConte

7-10 mm; shiny; punctures small and moderately dense on head, sparser on pronotum, and sparse on elytra; setae dark, suberect, inconspicuous, short on elytra but moderately long elsewhere; rufous yellow above, typically black on an apical crescent on each elytron, scutellum, head except a large spot on frons in most specimens, appendages, underside of thorax, and basal abdominal sterna of male. Antennal segment 2 very short, ca. ⅓ as long as 3. Galeae slender, reaching hind coxae. Spurs of hind tibiae fairly slender, pointed. Southern New Mexico and western Kansas to Oregon; subspecies *fuscula* Enns in northeastern U. S. Arizona: COCONINO Co.: Walnut Canyon (6400-6700′), 29 July 1950, Cohn, Boone, Cazier — 1 specimen in American Mus. Nat. Hist. Apparently rare over its whole range; recorded from *Chrysothamnus* blossoms, July-Sept.

Subgenus Meganemognatha Enns

North American species in which the male has at least abdominal sterna 4 and 5 subtriangularly or trapezoidally punctulate and pubescent in the middle (tufted in a few); the spurs of the hind tibiae usually dissimilar, often extremely, their apices rounded; and the galeae from moderately to extremely long. This is the largest subgenus in the United States.

Nemognatha (Meganemognatha) lurida LeConte Fig. 101

7-15 mm; shiny; punctures small but well-defined, moderately dense, denser and evenly spaced on elytra; pubescence erect, moderately dense, fine and fairly short. Variation in color extreme. Upperside all rufous yellow to rufous; rufous with only the scutellum black; rufous with scutellum and tips of elytra brown to black, the apical marking extending forward in two narrowing strips on each elytron in some specimens, in which case a sharply defined submedian strip, the suture and the margins are left pale; or scutellum and elytra entirely black. Underside darker rufous in palest specimens, the legs sometimes rufescent; to dark rufescent or black on mesothorax, metathorax and abdomen in dark specimens, the head and prothorax remaining rufous below. Galeae extending to behind the hind coxae. Outer spur of hind tibiae very broad and spatulate, much broader than inner. U. S. from Mississippi River to Pacific Coast, south in Mexico to Durango. Subspecies *lurida* ranges west to Montana, western Colorado and Arizona, intergrating with subspecies *apicalis* LeConte, which ranges to the Pacific Coast. *Lurida* has the anterior angles of the pronotum more abrupt, the pronotal punctures denser, and the pubescence pale or dark; *apicalis* the anterior angles of the pronotum broadly rounded, the pronotal punctures denser, and the pubescence dark. Dark individuals are more frequent in *apicalis* populations.

Arizona: widespread, subspecies *lurida* more frequent at higher elevations, *apicalis* in the southwest: YAVAPAI Co.: Williamson Valley (1), Prescott (a), 12 mi. S. Camp Verde (1). GILA Co.: "Sierra Ancha Mts." (1), Globe (1). GRAHAM Co.: Pima (a), Thatcher (a). COCHISE Co.: Nicksville-E. of Huachuca Mts. (1), Carr Cn.-Huachuca Mts. (1,a), Benson (a). STA. CRUZ Co.: Lochiel (1,a), Patagonia Mts. (1), Nogales (a). PIMA Co.: Tucson (1,a). PINAL Co.: Coolidge (a), Eloy (1). MARICOPA Co.: Phoenix area (1,a), Hassayampa (a), Arlington (a). YUMA Co.: Yuma and 10 mi. E. (a). Apr. (1), May (2), June (2), Jul. (2), Aug. (5), Sept. (6), Oct. (2). Most frequently collected from blossoms of *Helianthus;* recorded from *H. annuus* and *H. niveus* in Arizona. Larvae associated with *Anthophora occidentalis* near Manitou Springs, Colorado (Mickel, 1928) and *Megachile occidentalis* in New Mexico (Linsley and MacSwain, 1952).

Nemognatha (Meganemognatha) lutea lutea LeConte

8-14 mm; resembling pale specimens of *lurida,* yellowish above with scutellum and apex of elytra sometimes dark, the underside variable but usually with at least apex of abdomen pale. Galeae longer than in *lurida,* reaching apex of abdomen, and pubescence shorter, less erect, and pale. The species ranges from western North Dakota, central Nebraska and West Texas to the Pacific Coast; subspecies *lutea* in the eastern portion of

the range, west to western Montana, eastern Nevada and Arizona. Arizona: Coconino Co.: Oak Creek Canyon. Pima Co.: "Sta. Catalina Mts." Mar.-Oct. Apparently very rare in Arizona. Adults usually found on blossoms of *Cirsium.*

Nemognatha (Meganemognatha) pallens LeConte

8-10 mm; resembling pale specimens of *lurida,* yellowish above, the scutellum, thoracic sterna and legs varying to black, the antennae shorter and more slender, and the galeae more slender, barely reaching the hind coxae. Outer spur of hind tibiae very broad. Southern California to near the Colorado River; should occur in western Yuma Co., Arizona. Sept-Oct. Adults recorded from *Isocoma* in California, and the larvae as associated with *Anthocopa* (Linsley and MacSwain, 1952).

Nemognatha (Meganemognatha) nitidula Enns Fig. 102

7-13 mm; moderately shiny, the head moderately densely, the pronotum more sparsely, and the elytra densely punctured; pubescence short and decumbent; rufous yellow, usually with a dark stripe on each elytron as in the figure, but this stripe varying from broad and extending almost to base, to absent; underside of thorax usually all dark, the metasternum almost always as dark as the metepisterna and hind coxae. Galeae reaching to apex of abdomen. Known only from Arizona: at intermediate elevations: Cochise Co.: Elfrida. Sta. Cruz Co.: Patagonia, Patagonia Mts. Pima Co.: Madera Cn.-Sta. Rita Mts., Sta. Rita Range Res., Tucson, Sta. Catalina Mts.: southern foothills, Molino Basin (ca. 4300′); E. slope Coyote Mts., Elkhorn Ranch-E. sl. Baboquivari Mts. Pinal Co.: Oracle Jct., Florence Jct., 5 mi. S. Ray, Superior. Gila Co.: N. of Christmas, Globe, San Carlos, Sierra Ancha Mts., Payson and 12 mi. S. Yavapai Co.: Mingus Mt., 32 mi. S. Prescott. Coconino Co.: Oak Creek Canyon, Ash Fork, Bright Angel Springs-Grand Canyon Nat. Park. Mar. (3), Apr. (17), May (11), June (2), July (1). This is the most abundant species on thistle (*Cirsium*) blossoms; individual records on *Iris* and *Baileya.*

Nemognatha (Meganemognatha) meropa Enns

7-10 mm; resembling *nitidula* but generally smaller, yellowish rather than rufous yellow, with the punctures of the pronotum finer, and the metepisterna and hind coxae usually darker than the metasternum. Galeae long, extending beyond hind coxae and almost reaching apex of abdomen. Known only from Arizona: Mohave Co.: Truxton Valley (N.E. of Kingman, ca. 3500′). Yuma Co.: Yuma. Maricopa Co.: Gila Bend. Pinal Co.: Stanfield. Apr. (3), June (1). The specimens from Gila Bend and Stanfield were collected on *Larrea.* Apparently rare.

Nemognatha (Meganemognatha) macswaini Enns

7-9 mm; resembling *nitidula* but yellowish rather than rufous yellow, the elytra very densely punctulate and more densely pubescent in the male, more shallowly in the female, and with the metepisterna and hind coxae usually darker than the metasternum. Galeae extending beyond hind coxae but not reaching apex of abdomen. Outer spur of hind tibiae markedly wider than inner, slightly flared at apex. Desert regions of

southern and eastern California to El Paso, Texas. Arizona: MOHAVE Co.: Kingman. YUMA Co.: Sentinel, Gila Bend, Congress Jct. PINAL Co.: Florence. PIMA Co.: Tucson, Vail. COCHISE Co.: "Huachuca Mts." Mar.-May. Most collection records are from blossoms of *Larrea*, with at least one on *Encelia*. Apparently rare.

Nemognatha (Meganemognatha) miranda Enns

8-10 mm; moderately shiny; upperside with moderately dense small punctures and erect pubescence; yellowish above, the scutellum sometimes dark, underside from all pale to all dark. Galeae short, extending barely behind hind coxae. Male with tufts of setae on abdominal sterna 4 and 5. Southern California from coast inland, and southern Arizona: PIMA Co.: 5 mi. N.W. Sells, Tucson, Madera Cn.-Sta. Rita Mts. COCHISE Co.: 5 mi. W. Elfrida, Willcox. Aug. (4), Sept. (2). The specimen from Elfrida was taken on blossoms of *Bahia*. Apparently rare.

Nemognatha (Meganemognatha) bridwelli Wellman

8-10 mm; pale tannish yellow, only the antennae, tips of the legs and sometimes the abdomen darker; finely punctulate; entirely covered with long, decumbent, somewhat shaggy, pale pubescence. Galeae reaching to just beyond the hind coxae. Desert region in southern California, extreme northeastern Baja California, Mexico (Tecolote), and southwestern Arizona: YUMA Co.: Yuma; and Blythe, California, across the Colorado River from Ehrenberg. Apr.-June. Recorded from blossoms of *Pluchea*. Very rare.

Genus Rhyphonemognatha Enns

The species in this genus were previously assigned to *Zonitis* on the basis of their short galeae. However, the male aedeagus shows a close relationship of the group to *Nemognatha*. Only one species extends into the United States, but several others are found in Mexico and Central America.

Rhyphonemognatha rufa (LeConte)

7-9 mm; forebody shiny, the elytra subopaque; punctures small but distinct, moderately dense on head, sparse on pronotum, very dense on elytra; entirely bright red, except for black eyes and dark tips to mandibles, or with tips of femora and tibiae, and tarsi, black; pubescence red, short, appressed, moderately dense on elytra. Arizona to southern Texas, northeastward to Iowa and northern Illinois. Champion (1893) records the species from the southern part of the central plateau of Mexico, but mentions that there were extensive black markings on the underside of the specimens he examined. The specimens have not been reexamined. Arizona: at intermediate elevations in southeast: STA. CRUZ Co.: 10 mi. E. Sonoita. PIMA Co.: "Sta. Rita Mts.," Sta. Rita Range Res., Sabino Cn-Sta. Catalina Mts., "Baboquivari Mts." GILA Co.: Sierra Ancha Mts. July and August. Rare in Arizona. Plant hosts have not been recorded here, but in Iowa the adults are found deep in the blossoms of several species of *Physalis*.

Genus Tricrania LeConte

This genus includes only three North American species and is apparently a derivative of *Nemognatha*. The adults are sluggish insects that remain near the nests of the bees they parasitize, early in the spring, and do not visit blossoms. The elytra are long, the head is strongly triangular, and the antennae are moniliform. The galeae are not modified at all and the adults probably do not feed. A single species occurs in Arizona.

Tricrania stansburyi (Haldeman) Fig. 103

8-9 mm; forebody densely and finely, elytra more sparsely and deeply punctured, almost rugulose; pubescence erect and black; black, only the elytra brick red and the head with an obscure tannish mark in the middle of the front. The elytral apices are sometimes dark, but apparently only rarely in Arizona populations. Head almost equilaterally triangular, the mandibles very short. Hind wings of full length. Pacific Coast from British Columbia, Canada to southern California, east to Kansas. Arizona: GILA Co.: Sierra Ancha Mts. (D. K. Duncan). PINAL Co.: Florence Jct. (26 Apr. 1937, F. H. Parker). PIMA Co.: Sabino Cn.-Sta. Catalina Mts. (20 Mar. 1960, C. Sipes), Tucson (4 Apr. 1964, J. Link), 5 mi. N.W. Sells (16 Feb. 1957, W. Nutting, H. Parent, F. Werner), and 1 mi. W. Sells (7 Mar. 1964, J. C. Bequaert and J. Burger). Linsley and MacSwain (1951) have published an account of the bionomics. The adults are usually found on the ground or under logs, etc. They mention seeing males in flight. The eggs are probably laid in masses outside the nest of the host bee, as they are in the eastern *T. sanguinipennis* (Say), the first instar larvae attaching themselves to bees resting near the nest. Has been bred from the cells of bees of the genera *Hoplitis, Osmia, Anthidium,* and *Anthophora.*

Genus Hornia Riley

Revisions: Linsley, 1942; MacSwain, 1958.
Bionomics: Linsley and MacSwain, 1942; MacSwain, 1958.

These are peculiar flightless beetles, which rarely leave the nest of the host bee in the adult stage, apparently mating and laying their eggs in the burrows. Males sometimes leave one burrow to enter another. All the known hosts belong to the apid genus *Anthophora.* The adults have vestigial wings or lack them entirely, and have the elytra reduced to scales that do not even cover the first abdominal tergum. The abdomen is large and sac-like, with variably sclerotized plates on the terga and sterna. The galeae are unmodified and the tarsal claws simple or bearing a variably developed ventral blade. Three species may occur in Arizona, but none has yet been taken in the state as far as we are aware.

Hornia minutipennis minutipennis Riley

This subspecies ranges from the northeastern U. S. to California and has been collected in New Mexico and Utah. MacSwain (1958) has provisionally restricted the subspecies *occidentalis* Linsley to western California. Accounts of the bionomics are given in the references cited under the genus and in Bohart & Selander (1955) and Hocking (1949). These authors discuss earlier observations.

Hornia mexicana neomexicana Cockerell

This subspecies has been collected in Kansas, Oklahoma, Texas, Colorado and New Mexico. It should range into Arizona at intermediate elevations. Its bionomics are discussed by MacSwain (1956), and its relationship to *mexicana* (Dugès) by MacSwain (1958).

Hornia boharti Linsley

This species was described from several localities in southern California, including Blythe, just across the Colorado River from Ehrenberg, Arizona. It is discussed in the references cited under the genus.

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FIGURES

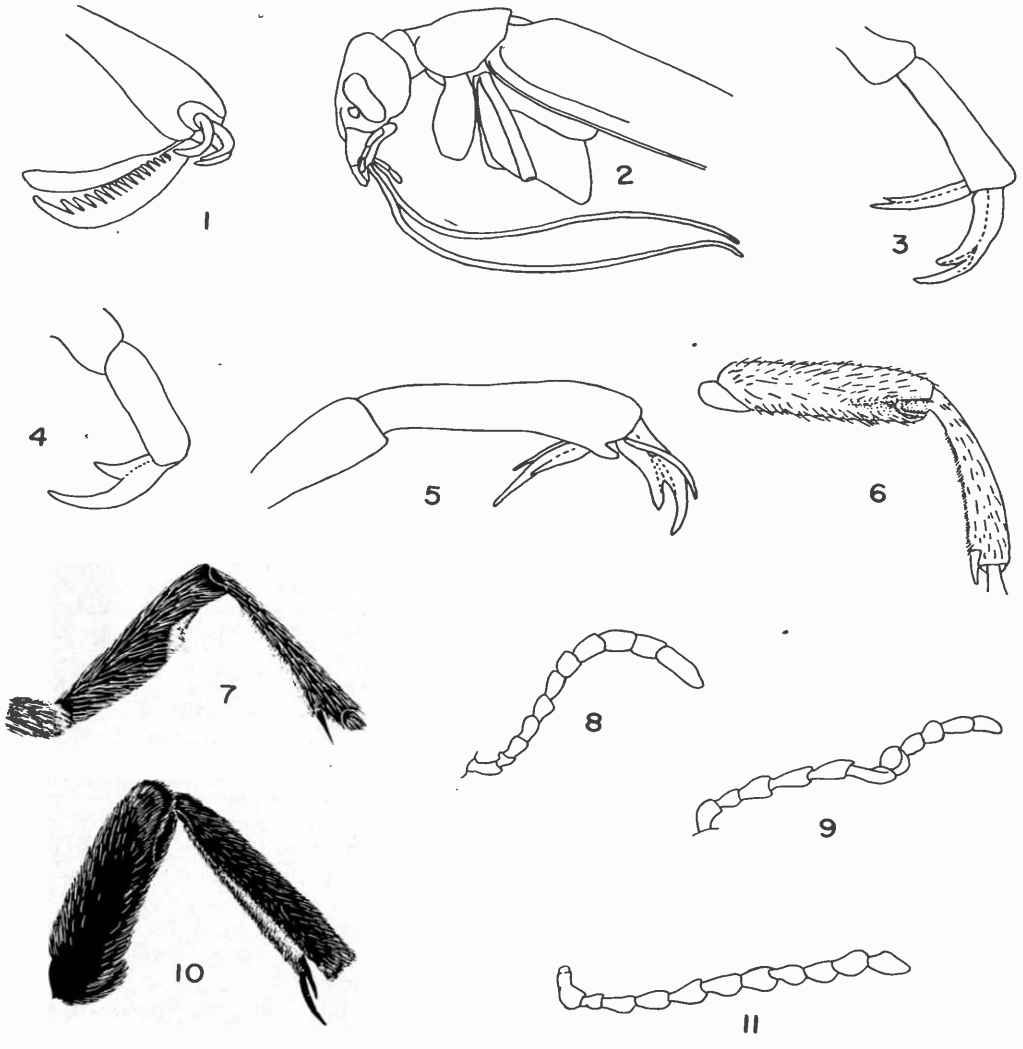


PLATE I — Fig. 1, *Nemognatha lurida,* tarsal claws. Fig. 2, *Nemognatha nitidula,* side view. Fig. 3, *Eupompha fissiceps,* tarsal claws. Fig. 4, *Tegrodera erosa,* tarsal claws. Fig. 5, *Eupompha* (*Spastonyx*) *nemognathoides,* tarsal claws. Fig. 6, *Lytta biguttata,* front leg. Fig. 7, *Epicauta andersoni* ♀, front leg. Fig. 8, *Meloe laevis* ♂, antenna. Fig. 9, *Meloe impressus* ♂, antenna. Fig. 10, *Linsleya suavissima,* front leg. Fig. 11, *Lytta nuttalli* ♂, antenna.

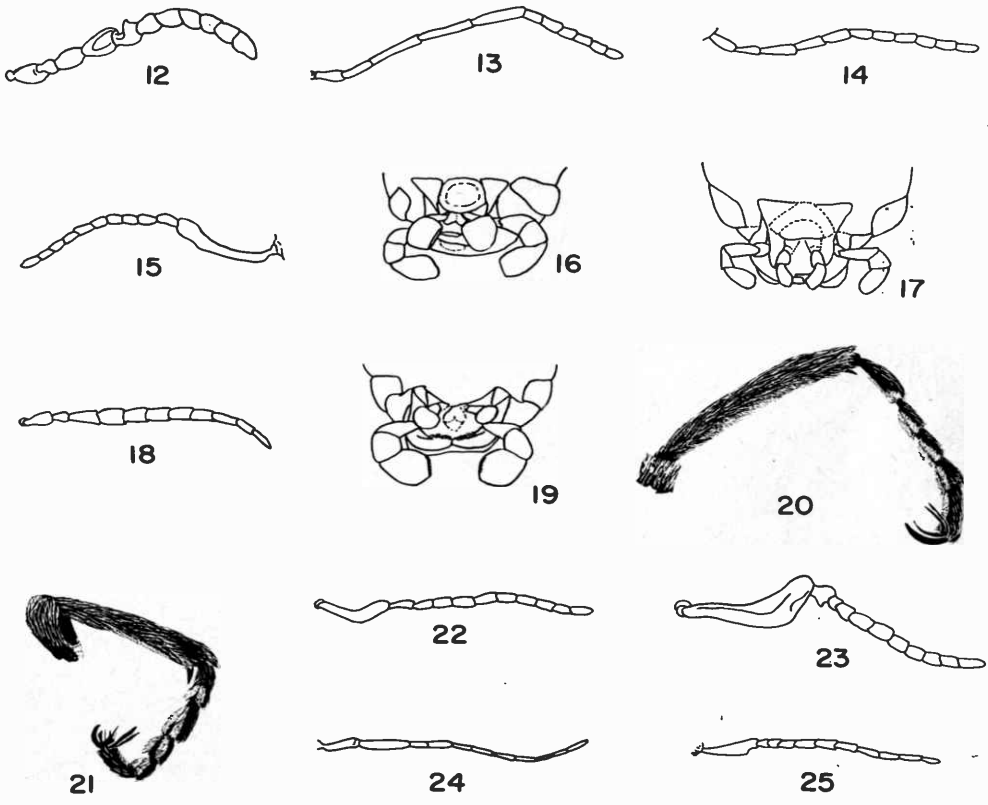


PLATE II — Fig. 12, *Lytta mutilata* ♂, antenna. Fig. 13, *Pleuropompha costata* ♂, antenna. Fig. 14, *Pleuropompha tricostata* ♂, antenna. Fig. 15, *Epicauta maculifera* ♂, antenna. Fig. 16, *Epicauta andersoni* ♂, mouth parts. Fig. 17, *Epicauta pardalis* ♂, mouth parts. Fig. 18, *Epicauta oregona* ♂, antenna. Fig. 19, *Epicauta maculata* ♂, mouth parts. Fig. 20, *Epicauta normalis* ♂, front leg. Fig. 21, *Epicauta phoenix* ♂, front leg. Fig. 22, *Epicauta purpurea* ♂, antenna. Fig. 23, *Epicauta atrivittata* ♂, antenna. Fig. 24, *Epicauta tenuilineata* ♂, antenna. Fig. 25, *Epicauta virgulata* ♂, antenna.

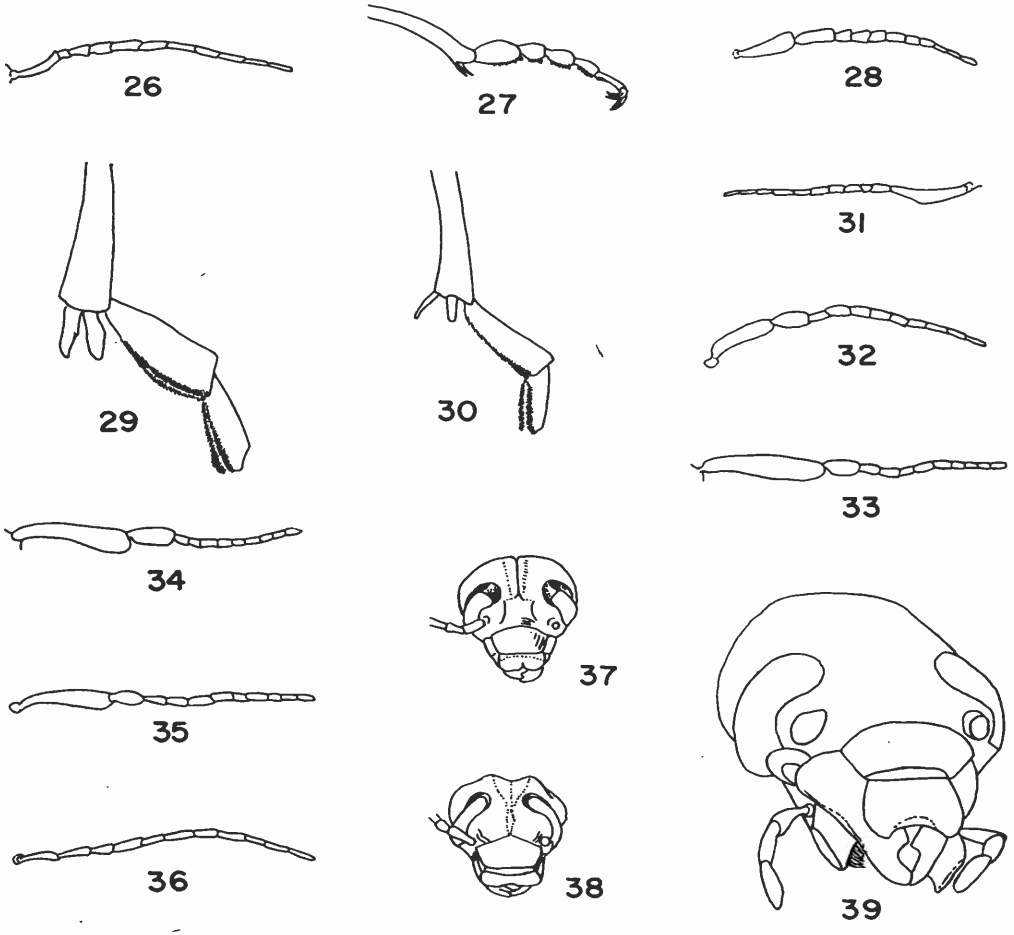
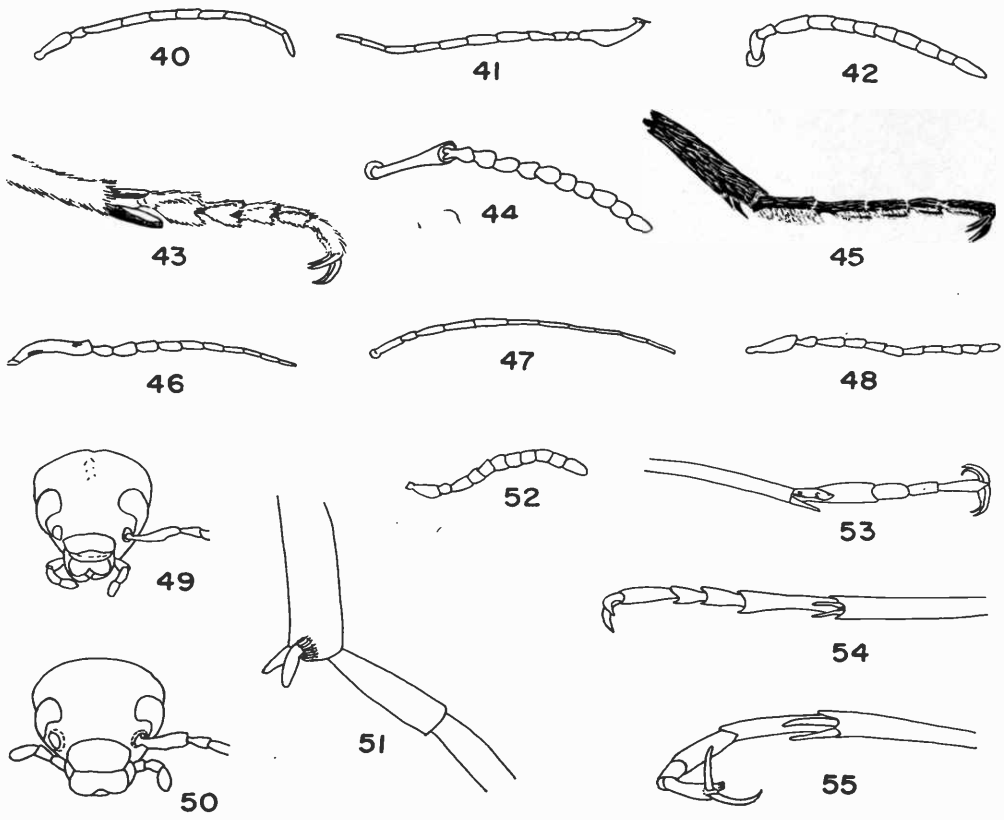


PLATE III — Fig. 26, *Epicauta hirsutipubescens* ♂, antenna. Fig. 27, *Epicauta crassitarsis* ♂, middle tarsus. Fig. 28, *Epicauta subglabra* ♂, antenna. Fig. 29, *Epicauta pennsylvanica*, hind leg. Fig. 30, *Epicauta corvina*, hind leg. Fig. 31, *Epicauta texana* ♂, antenna. Fig. 32, *Epicauta fabricii* ♂, antenna. Fig. 33, *Epicauta polingi* ♂, antenna. Fig. 34, *Epicauta liebecki* ♂, antenna. Fig. 35, *Epicauta arizonica* ♂, antenna. Fig. 36, *Epicauta lauta* ♂, antenna. Fig. 37, *Epicauta rileyi*, head. Fig. 38, *Epicauta caviceps*, head. Fig. 39, *Epicauta balli*, head.



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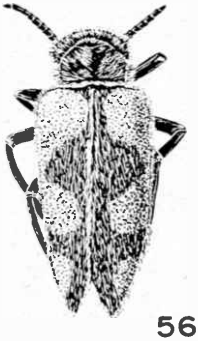

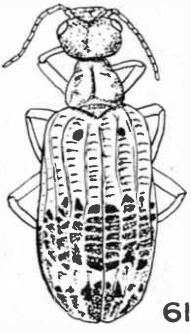

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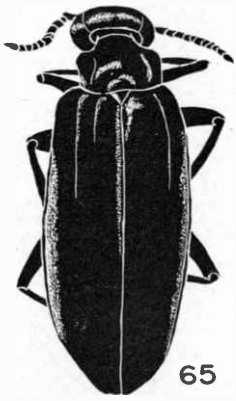

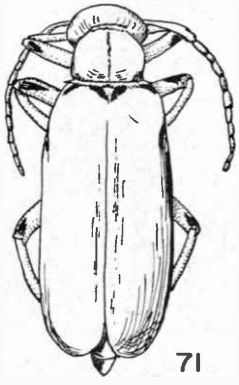

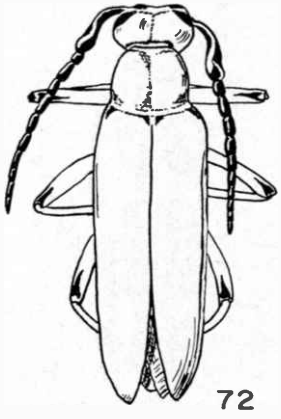

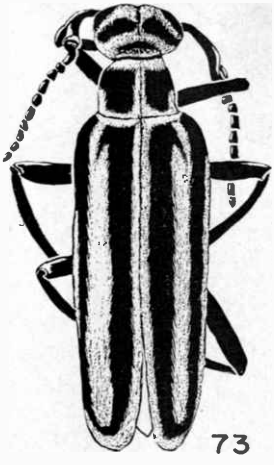

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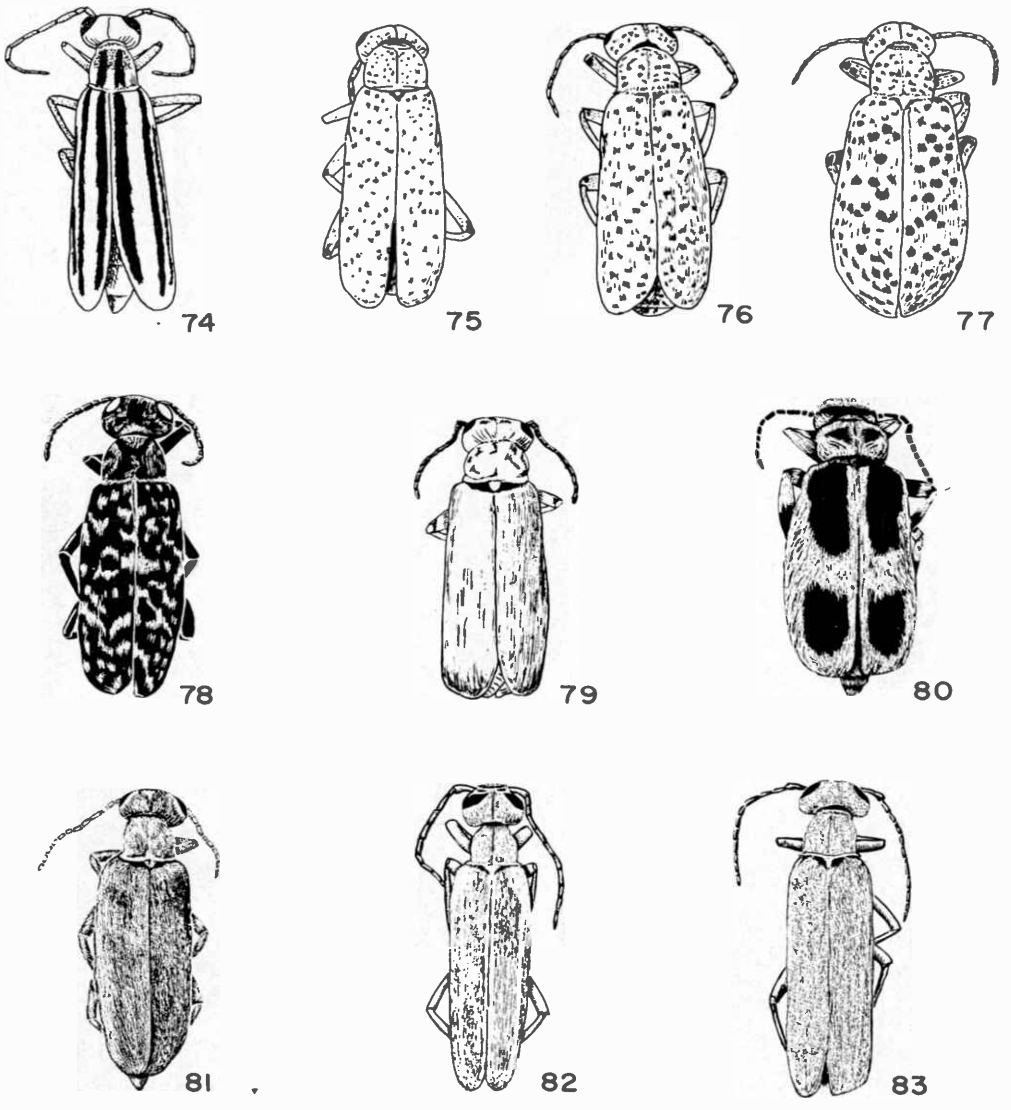

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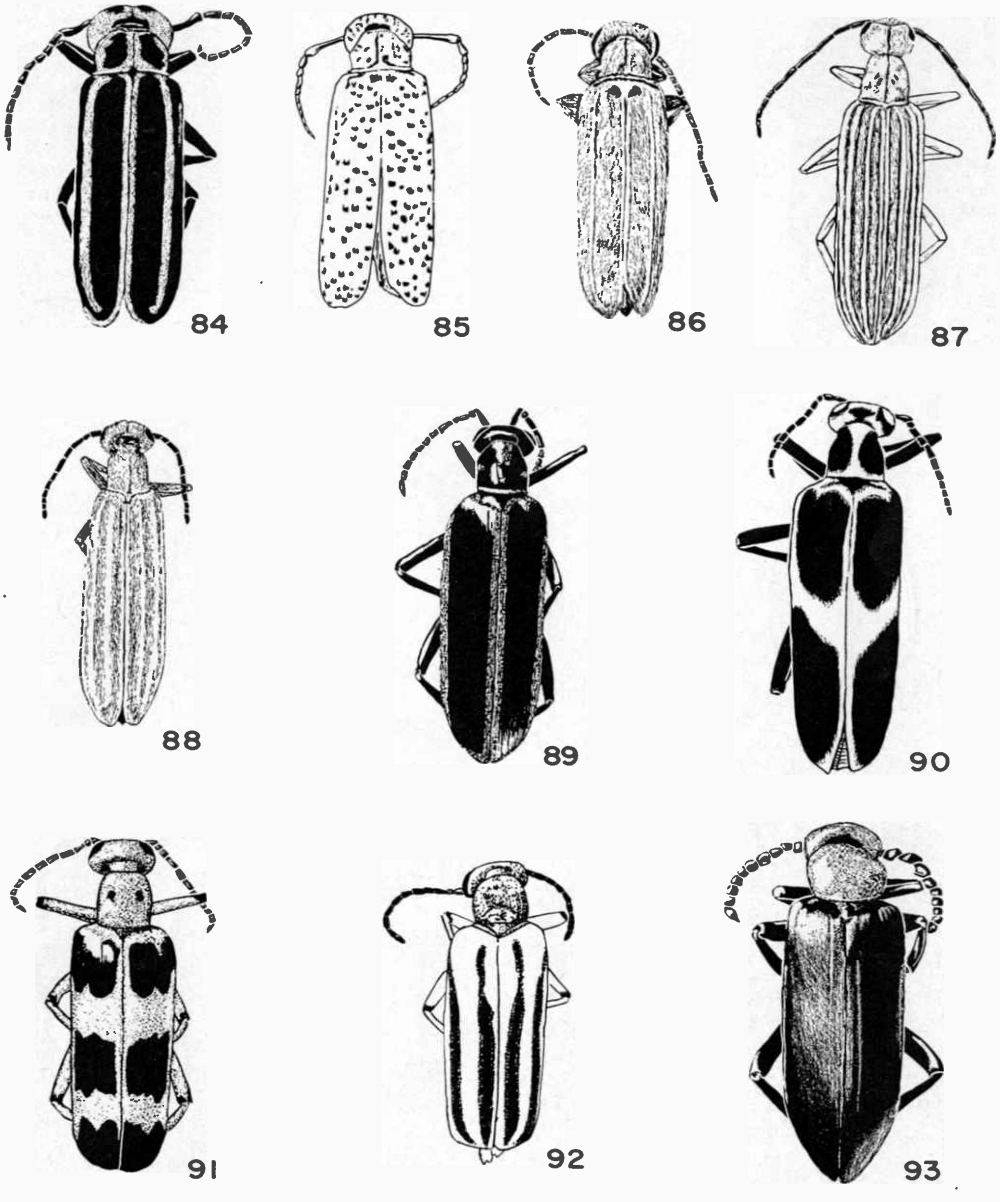

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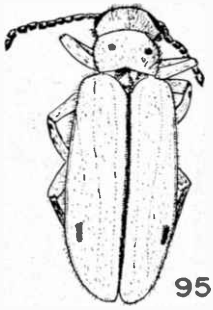

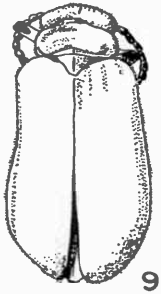

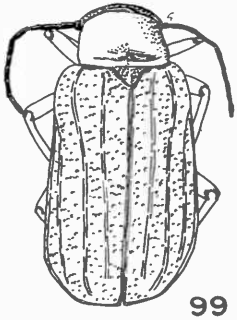

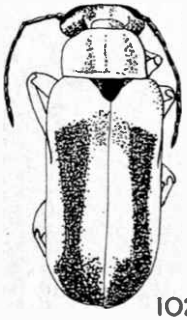

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