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ADDITIONS TO *EPICAUTA*, WITH NEW SYNONYMY AND A CHANGE OF NAMES (COLEOPTERA: MELOIDÆ)¹

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The numerous specimens of *Epicauta* which have been made available to the author in the past two years have included several new species from the United States and Lower California as well as specimens which indicate that some of the former conclusions regarding our species were erroneous. The most important changes are included in this paper. The author owes a debt of gratitude to the curators of almost all the major museums in North America for their generosity and especially to Mr. Frank H. Parker and Mr. G. P. Mackenzie, who have been most free with specimens from their private collections and with information of real value in understanding the limits of some of our species.

The arrangement followed is that of my former paper on the genus, and changes that will have to be made in the key to species and in descriptions will be noted in their proper places under the species concerned.

Epicauta tenebrosa sp. n.

Epicauta pedalis, Horn, 1873, Proc. Am. Phil. Soc. **13**: 99 (in part). Werner, 1945, Bull. M. C. Z. **45**: 440 (in part).

Arizona specimens which have been assigned to *Epicauta pedalis* Lec. should be referred to this species. The

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California Academy series of *pedalis* from Lower California, the type locality, shows that there is a constant difference between the Lower California and Arizona specimens. From *pedalis*, *tenebrosa* can be distinguished in either sex by the lack of a pale sutural margin on the elytra and by its smaller size. The males have much more slender antennæ and have the tip of the ædeagus of a different shape. (Fig. 1.)

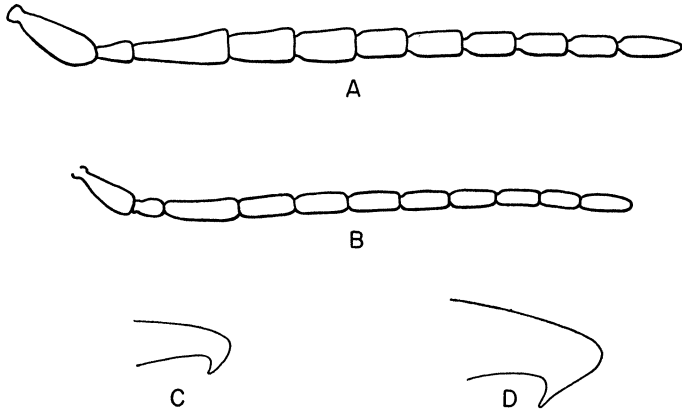


Fig. 1. A. Antenna of *Epicauta pedalis* Lec., male. B. Antenna of *Epicauta tenebrosa* sp. n., male. C. Tip of ædeagus of *Epicauta pedalis*, male. D. Tip of ædeagus of *Epicauta tenebrosa*, male.

Length: 8 to 10 mm. Black, moderately densely clothed with decumbent pubescence, which is tan on the elytra, paler on the head and pronotum and cinereous on the underside. Legs pale brown. Head subquadrate, with moderately dense and deep punctures, distinctly microreticulate on the intervals. Suture very distinctly impressed. Antennal calluses small, denuded, shiny. Eyes prominent, transverse, slightly wider than in *pedalis*. Antennæ in both sexes quite slender, tapering, reaching almost to the middle of the elytra, two and four-fifths times as long as an anterior tibia. First segment slightly thickened, reaching halfway across the eye; second short, three-sevenths as long as the first; third slightly longer than first; fourth four-fifths as long as third; succeeding segments decreasing slightly in length and width. The

third and following segments are just perceptibly flattened, especially in the male.

Pronotum as broad as long, subquadrate, with the sides parallel for the basal three-fourths, then converging at a forty-five degree angle, with the anterior angles rounded. Surface like that of head. Midline distinctly impressed and narrowly denuded. Basal impressed line distinct but not denuded. Elytra with a narrow denuded zone across the base, where normally covered by the base of the pronotum. Tips of femora and tibiae and all of tarsi, except for a few hairs at the base of the basal segments, with dark brown pubescence. Anterior tibiae of male with a single stout, slightly incurved spur. Posterior tibial spurs slightly broadened and flattened, the outer broader and longer.

Holotype: ♂, Tucson, *Arizona* VII-30 (Fall Coll. M.C.Z. No. 28221)

Allotype: ♀, topotypical, VIII-1 (Fall Coll.)

Paratypes: Tucson, *Arizona*: 1♀ VII-21 (Fall Coll.), 1♀ VII-21 (Liebeck Coll.), 6♂♂, 6♀♀ Aug. 1935 Bryant (Parker). Sabino Canyon, Santa Catalina Mts., *Arizona*: 1♀ 7-14-32 E. D. Ball (Parker), 1♂, 1♀ 7-12-32 R. H. Beamer (U. Kansas), 1♂ VII-26-1948 F. Werner & W. Nutting, at light (Werner).

Tenebrosa runs to couplet 63 in my key. It can be distinguished from *pedalis* by the characters mentioned above and from *balli* by the normal mandibles and the presence of a single spur on the anterior tibiae in the male.

Epicauta bispinosa sp. n.

This is the third species to be discovered in the United States belonging to a very closely-knit group, composed of *E. maculata* (Say), *normalis* Werner and *bispinosa* sp. n. These all have the same color, form and markings and the females cannot be distinguished except by association with males. All have numerous denuded spots over the whole body and elytra and have the elytra covering the abdomen almost completely and not conspicuously bulging. The male of *maculata* has the last segment of the labial palpi expanded and suborbicular in outline and the

second segment also expanded, one short, incurved spur on the anterior tibiæ and the first segment of the anterior tarsi padded almost to the base. The male of *normalis* differs from it in having unexpanded palpi and in having the pad confined to the apical third of the first anterior tarsal segment but is like it in having a single anterior tibial spur. The male of *bispinosa* has two slender spurs on the anterior tibiæ as in the females of all three, has unexpanded palpi and the pad of the first anterior tarsal segment as in *maculata*. This combination of characters in the males is exactly like that of the female of any of the three species and it is only by the genitalia that the male can be distinguished from the females at all.

Length: 9 to 12 mm. Black, quite densely clothed with pale olive-cinereous to cinereous pubescence, with scattered denuded spots as in *maculata* (Say). Indistinguishable from *maculata* and *normalis* in shape, proportions and sculpture of head and pronotum. Antennæ almost identical with those of *maculata*, which vary slightly in different sized specimens.

Holotype: ♂ 10 mi. E. of Sonoita, Sta. Cruz Co., Arizona, alt. 4800 ft., in grassland, Aug. 1, 1948. F. Werner, E. & W. Nutting. Feeding on leaves of *Chamæsaracha coronopus* (Dunal) A. Gray. (M.C.Z. No. 28219)

Allotype: ♀ eutopotypical (M.C.Z.)

Paratypes: 62♂♂, 9♀♀ eutopotypical, in U.S.N.M., Chicago Nat. Hist. Mus., U. Kansas., Cal. Acad., collections of F. H. Parker, G. P. Mackenzie and F. Werner.

In an area less than one hundred miles square in southeastern Arizona there occur no less than four distinct, apparently very closely related species in the *maculata* group (*maculata*, *normalis*, *bispinosa* and *nogales*). One would expect that if these species were interfertile a fair number of hybrid forms would occur. There has been no attempt made to cross one with another experimentally but so far no morphological evidence of hybridization has come under observation. It is within the realm of possibility that hybrids do occur, at least among the first three species, since there is no difference in habitus, all varying greatly in the size and number of denuded spots

and in body size so that unusual specimens might be overlooked in the field.

When one examines the distribution of the four species in Arizona, a region well-known for its diversity of habitat and life zones, he gets some clue as to the possible reasons for segregation. *E. maculata*, ranging across the Great Plains and even as far east as Ohio, extends its range westward south of the Rockies onto the Colorado Plateau, just north of the Arizona White Mts., where it is quite abundant, feeding on the leaves of a species of *Amaranthus* and *Salsola*. It also reaches the plateau to the north of the Huachuca Mts., where it is likewise abundant and feeds on the same or similar plants. On this plateau and nearby it is taken occasionally on *Solanum elaeagnifolium*. The specimens on this plant tend toward smaller spots and more luteous pubescence than most populations and may represent a separate race. A series collected by Mr. Parker at Phoenix was feeding on *Kallstræmia*. It does not seem to differ from normal specimens from other parts of the range.

The record of *E. normalis* is not as complete. It is found from the Rockies to the Sierras and seems to range farther north than *maculata*. It has been taken in the Chiricahua and Huachuca Mts. and at Willcox. No food plant records had been kept for these specimens. The Willcox series was mixed with *maculata* but no attempt had been made to segregate by food plant or exact locality. It seems possible that *normalis* usually is found at higher altitudes than its near relatives. Extensive collecting on the plateau in 1948 did not produce any specimens.

E. nogales has turned up only in or near the Santa Cruz river valley and it is quite evident that it must have a more extended range in the adjacent part of Mexico. The other species have not been taken in this valley.

The occurrence of the fourth species, *E. bispinosa*, on the plateau north of the Huachuca Mts. in an area where *E. maculata* also occurs abundantly, would be quite inexplicable were it not for some observations made at the time it was taken. Both species were abundant at a roadside stop 10 miles east of Sonoita. *Maculata* was feeding

on *Amaranthus* and *Salsola*, in considerable numbers. Under these plants were scattered patches of *Chamaesarracha*, a low solanaceous plant, which had *bispinosa* feeding on them. The species, as mentioned before, differ only in the male secondary sexual characters and several specimens were collected from both hosts before the differences were discovered. Then careful collecting by host plant revealed that out of 87 *maculata* and 63 *bispinosa* males not a single one was on the wrong plant. It can be safely surmised that the females show the same selection.

The question of expressing the known relationships in the taxonomy of the group is one to which the author has given considerable thought and which he has discussed with his colleagues in some detail. Dr. George Horn would probably have left at least the three very similar species as one, readily identifiable, species. This approach is particularly attractive to one who attempts to determine numerous museum specimens but is becoming increasingly indefensible as we attempt to apply the taxonomist's results to problems in the field.

Assuming that we attach names to all three forms, we still have at least two possible techniques, each with some merit. Using the extreme similarity of the three as a criterion, we can place them all in one species, with the typical and two other subspecies, with supposed geographical replacement. This view would be strengthened if *bispinosa* were found to have a wide range in northern Mexico and *maculata* not. It serves to point out the extremely great similarity of the three. It is weakened by the lack of evidence that the three hybridize where they meet, as in southeastern Arizona. We expect subspecies to be populations which have differentiated slightly behind barriers but which have not gone so far in differentiation that they cannot interbreed wherever they come together geographically.

The alternative method, and the one which the present author favors, is to call each a species. From the available evidence we have three geographically isolated species which show no tendency to interbreed. Where the ranges of *maculata* and *normalis* meet, along the front of

the Rockies, an altitudinal segregation acts and the same mechanism may act in Arizona where the ranges overlap. Where *maculata* and *bispinosa* overlap, or where one has differentiated from the other as the case may be, strict adherence to host plant specificity serves to segregate the two in the adult stage and present a barrier to interbreeding.

Present-day conditions in Arizona are exceedingly favorable for study of host specificity of *Epicauta*. A good proportion of the land is heavily grazed, the only comparatively untouched parts of many areas being along the main roads where the vegetation is protected by fences. Any adults of the herb-feeding species that emerge congregate on the roadside plants. A fairly high percentage of the individuals in the area must assemble here. Being parasitic and living in an area of uncertain rainfall, the number of individuals varies greatly from year to year. When a patch is found which supports blister beetles it usually has several species within a small area. Under such conditions one would expect any possible hybridization to occur. When none does occur, it is certainly an indication that there is some barrier, be it intersterility, micro-ecological isolation on host plants or even psychological.

Therefore the author maintains that the occurrence of *maculata* and *bispinosa* side by side on different food plants is a clear indication that they are distinct populations and since no intergrades have been found to indicate hybridization, prefers to treat them as species. At the same time, he feels certain that as more becomes known about both, this food plant isolation will be found not to be the primary factor in keeping the two separate.

Epicauta cinerea (Forst.)

Meloe cinereus Forster, 1771, Cat. Animals N. Am.: 62.

Lytta fissilabris LeConte, 1850, Agassiz Lake Superior
4: 232; 1853, Proc. Acad. Nat. Sci. Phila. 6: 339. (new synonymy)

Epicauta fissilabris, Horn, 1873, Proc. Am. Phil. Soc.
13: 102. Werner, 1945, Bull. M.C.Z. 45: 456.

LeConte described *fissilabris* from Lake Superior and Hudson's Bay Territory and since the time of its description very few specimens have been taken. These, however, show that there is a close relationship between it and *cinerea*. The author was unable to distinguish between the two species at the time he wrote his revision of the genus, except on the basis of color. Subsequent specimens indicate from their distribution that *fissilabris* is a marginal form of *cinerea*. It has been taken at Aweme, Manitoba; Tokio, North Dakota; Hope, Arkansas and Smithville and Stillwater, Oklahoma. These localities coincide fairly well with the northern and western limits of *cinerea*. The Arkansas and Oklahoma specimens were taken in company with normal *cinerea*.

***Epicauta pestifera* nomen novum**

Epicauta marginata auct., nec Fabricius (in part).

Epicauta cinerea auct., nec Forster (in part).

Epicauta solani Werner, 1945, Bull. M.C.Z. 45: 457, nec

Epicauta Koehleri var. *solani* Denier, 1940, Rev. de la Soc. Ent. Argentina 10: 421.

It is hoped that at last our common margined blister beetle has a name that will stick with it.

***Epicauta ficta* sp. n.**

This unicolorous grey species is most closely allied in our fauna to *cinerea* (Forst.), having similar antennæ but broad posterior tibial spurs. It differs from grey specimens of *pestifera* in its short, stout antennæ and from *brunnea* Werner by the broad posterior tibial spurs and unexpanded anterior tarsi in the male. It seems to be most closely related to *Epicauta obesa* from Vera Cruz on the Caribbean coast of Mexico.

Length: 9 to 12 mm. Black, densely clothed with decumbent cinereous to yellowish-cinereous pubescence. Antennæ short but of a form similar to those of *cinerea*.

Head subtriangular. Surface microreticulate, densely and rather deeply punctured. Midline very feebly impressed, usually not visible under low magnification. Antennal calluses small, slightly raised, denuded and

shallowly microreticulate. Eyes rather small, transverse, narrow, barely extending inwardly beyond the antennal sockets. Antennæ short, extending to just beyond the base of the elytra, twice as long as an anterior tibia. In the male the first segment is stout, the heaviest segment, reaching one-third across the eye; second slender, seventenths as long as first; third one-sixth longer than first, increasing gradually in thickness toward the apex where it is one and six-tenths times as wide as at the base. First two segments and base of third with cinereous pubescence. Fourth segment three-fifths as long as third; fifth and sixth equal to fourth in length, the apices of the third, fourth and fifth equal in thickness, wider than their bases. The length decreases gradually from the sixth to the tenth, which is five-sixths as long as the sixth. The sixth to the tenth are individually almost uniform in thickness. Last segment one and one-half times as long as tenth. The proportions are the same in the female except that the first and intermediate segments are not enlarged. Pronotum subquadrate, slightly longer than broad. Midline not impressed or denuded.

Elytra narrowly denuded and with a little black pubescence at the base where covered by the base of the pronotum. Outer margin of anterior tibiæ and top of anterior tarsi of male slightly denuded, the first tarsal segment slightly thickened. Posterior tibial spurs broadened, the outer slightly the broader and longer. In some of the males there is a small spot of black pubescence on the hind margin of the abdominal sternites and a mid-dorsal black line on the pygidium. This character is present in *obesa* and several other species in southern Mexico.

Holotype: ♂ Broken Bow, McCurtain Co., *Oklahoma* Aug. 27, 1931 M. L. Costner (M.C.Z. No. 28223).

Allotype: ♀ Smithville, Payne Co., Okl. Aug. 24, 1931 W. D. Davis (M.C.Z.).

Paratypes: *Oklahoma*: 3♂♂ eutopotypical; 3♂♂ Broken Bow Aug. 29, 1931 M. L. Costner; 1♀ Broken Bow Aug. 26, 1931 W. D. Davis; 1♂, 3♀♀ Smithville Aug. 24, 1931 W. D. Davis; 2♂♂ Idabel July 27, 1931 A. O. Elrod; 1♀ Stillwater Sept. 3, 1931 E. Hixon; 1♂ Stillwater Sept. 14,

1930 E. Hixon; 1♀ Stillwater Sept. 15, 1930 E. Hixon; 1♂ Stillwater Oct. 1, 1930 V. Laird; 1♀ Jay Jul. 5, 1931 M. L. Costner.

Paratypes deposited in the collections of the U.S.N.M., Cornell U., U. of Oklahoma and F. Werner.

Males with midventral spots on the abdominal sternites run to couplet 37 in the key but can be separated by the absence of scutellar and humeral spots on the elytra. The rest key to *solani* (*pestifera*) and can be separated by the short, heavy antennæ.

Epicauta senilis sp. n.

The combination of shaggy grey pubescence and pair of denuded callosities on the pronotum distinguish this species from all others in our fauna. Champion's *candidata* from Mexico has similar characters but has the outer posterior tibial spurs spoonshaped.

Length: 9 mm. Head broadly triangular, quite densely and moderately deeply punctured, with the intervals quite densely punctulate. Median impressed line distinct down to the level of the eyes, bordered by a narrow denuded area. Antennal calluses small, low. Eyes large, narrow, excavated next to the antennæ. Antennæ slender, twice as long as an anterior tibia. First segment slender, reaching three-fourths across the eye; second half as long as first; third just shorter than the first. The basal three segments with some short cinereous pubescence behind. Fourth and following segments two-thirds as long as third, gradually decreasing in thickness. Pronotum quadrate, conspicuously bulging on the disc. Median impressed line distinct, supplemented by a narrow denuded area. Basal impressed line distinct. With a pair of smooth, denuded callosities just before the middle, as in *callosa*. Surface similar to that of head. The pubescence on the pronotum is directed irregularly, giving a ragged appearance. Elytra black next to the scutellum and across the base where normally covered by the base of the pronotum. Anterior legs of male not modified. Anterior tibial spurs of both sexes rather stout, spiniform,

somewhat incurved. Posterior tibial spurs slender, the outer sticklike, the inner spiniform.

Holotype: ♂ Luna Co., *New Mexico*, 4000 ft. July 25, 1939, Rehn and Rehn (Acad. Nat. Sci. Phila.)

Allotype: ♀ Douglas, Arizona, July 23, 1929 W. W. Jones (Parker)

Paratypes: 1♂ Dragoon Mts., Arizona IX-10-47 D. J. & J. N. Knull (Ohio State); 1♂ Sierra Blanca, El Paso Co., Texas, Sep. 13-14, 1912 (USNM).

This species runs to *callosa* LeConte in my key but is distinguished by the long, shaggy pubescence of the prothorax and back of the head and heavy anterior tibial spurs. It goes to group BB in the table but does not seem to be very closely related to any known species.

Epicauta afoveata sp. n.

Length: 7 to 9 mm. Black, sparsely clothed with pale cinereous pubescence. Elytra with inconspicuous scutellar and humeral black spot. A member of the *caviceps*

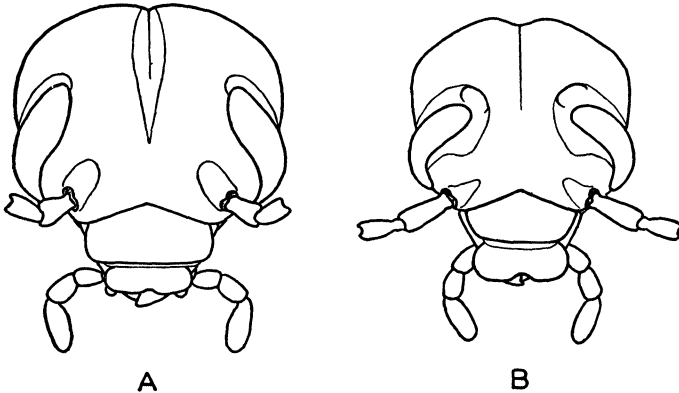


Fig. 2. A. Head of *Epicauta afoveata* sp. n. B. Head of *Epicauta impressifrons* V.D.

group, apparently most closely related to *impressifrons* Van Dyke, which it resembles in general appearance, differing mainly in the lack of occipital callosities, lack of a pit at the inner border of the eyes and by certain secondary sexual characters in the male. (Fig. 2.)

Head subtriangular, without occipital callosities or deeply impressed hind margin. Surface shiny, feebly microreticulate, moderately densely and deeply punctured except near the midline on the occiput, on the antennal calluses and on a narrow zone behind the eyes. Midline distinctly impressed to just below the upper level of the eyes. A narrow zone in the middle of the head often glabrous and without punctures, as in Fig. 2A. Antennal calluses small but denuded. Eyes oblique, narrow, rounded at the inner margin, bordered behind by a narrow, smooth, denuded zone one-fourth their greatest width. There is no trace of a pit at the inner edge of this denuded zone. Clypeus and labrum sculptured like rest of head. Antennæ almost uniform in thickness, reaching the basal third of the elytra, two and one-half times as long as an anterior tibia. First segment reaching one-third across the eye, moderately slender but nevertheless the thickest segment. There is often some cinereous pubescence on the dorsal and posterior surfaces. Second segment two-sevenths as long as first, moderately slender; third slender, a little more than twice as long as second; fourth three-fourths as long as third; the rest decreasing slightly in length and thickness.

Pronotum slightly broader than long, with the sides roughly parallel on the basal two-thirds, then converging at a forty-five degree angle. Surface more deeply punctured and microreticulate than that of head. Disc roughened, flattened on the basal two-thirds, with a feeble narrow median smooth area on the basal half. Basal impressed line deep; median suture absent or present only on the middle of the disc. Pubescence of the disc sparse, directed laterally in part and in a pair of small anterior whorls. Elytra with slightly denser pubescence than the head, with scutellar and humeral black spot, inconspicuous because of the sparseness of the pubescence. Pubescence of the underside denser than above, uniformly pale cinereous. Second to sixth abdominal sternites of male broadly denuded, the sixth strongly notched apically. Legs with pale cinereous pubescence except for the tips of the femora, tips of the tibiæ and outer edge of mid-

dle tibiæ and the tarsi, which are black. The first tarsal segments often have a few cinereous hairs dorsally at the base.

Male with two spurs on the anterior tibiæ and with posterior surface of trochanter, femur and tibia of middle and hind legs denuded, slightly flattened, with a dorsal fringe of long cinereous hairs. Posterior tibial spurs slender, sticklike.

Holotype: ♂ Borrego, San Diego Co., California Oct. 8, 1947 G. P. Mackenzie (M.C.Z. No. 28220)

Allotype: ♀ eutopotypical (M.C.Z.)

Paratypes: 11♂♂, 3♀♀ eutopotypical; 2♀♀ topotypical Oct. 28, 1939; 1♂, 1♀ topotypical Oct. 14, 1948. 5♂♂, 6♀♀ San Jacinto Mts., Riverside Co., California Oct. 7, 1947. 1♂ Vallecitos, San Diego Co., California Oct. 28, 1939. All collected by G. P. Mackenzie.

Paratypes are deposited in the collections of the U. S.N.M., Chicago Nat. Hist. Mus., Calif. Acad., G. P. Mackenzie and F. Werner.

Mr. Mackenzie, who kindly loaned this fine series for description, appends the following information on the localities: Borrego (sometimes spelled Borego), several miles south of the town; San Jacinto Mts., about fifteen miles west of Indio on Rt. 74, on the east slope of the mountains; Vallecitos, 20 miles south of Borrego. Elevation of all three places ca. 2500 ft. Vegetation of a desert type.

In my key the male runs to couplet 37, differing from *aspera* and *nigritarsis* by being black with sparse cinereous pubescence and in having the midventral abdominal black markings composed of denuded areas with at most scattered, very short pubescence, rather than of black pubescence which is as dense as on the rest of the abdomen in *aspera*. The female keys to couplet 67, but differs from *ingrata* and *longicollis* in its small size and uniform pubescence. Some females of *impressifrons* also key out here but can be distinguished by head form.

Epicauta impressifrons Van Dyke

1929, Bull. Br. Ent. Soc. 24: 12.

Several samples of *Epicauta* from near the type lo-

cality of *impressifrons* are composed of specimens which seem most closely related to that species but which differ in several characters ordinarily of importance in the group. The variation is continuous enough that all should be included in *impressifrons* but isolated samples often have a distinctly different aspect.

First there is a striking difference in size and more or less correlated with it a difference in pubescence, the larger specimens having it much denser. Also more or less correlated with the denser pubescence is the presence of the midventral, lateral and dorsal black abdominal markings and scutellar and humeral spots characteristic of the *caviceps* group to which *impressifrons* belongs.

One lot of eight specimens from Whitewater has midventral spots in both males and females. Another series of 25, from Morongo Valley, collected by G. P. Mackenzie, has these spots in the male but not in the female even though some are as large as the Whitewater females. This series has sparser pubescence than the Whitewater lot. Other smaller lots from several localities are similar to the Morongo Valley set.

The distribution of the species seems to follow a definite northwest-southeast line, from Cajon Pass in San Bernardino Co. to Fish Springs on the Salton Sea. It has been taken most abundantly in the vicinity of Palm Springs in Riverside Co., at Whitewater, Cabazon, Morongo Valley and Indio, all within twenty miles map distance from Palm Springs, in the Coachella Valley.

Epicauta occipitalis sp. n.

Length: 8 to 11 mm. Black, densely clothed with yellow-cinereous to light rufous pubescence, which is darker above than below. Disc of pronotum with dense short, erect pubescence, not denuded anteriorly as in *diversipubescens* Mayd. Elytra usually with a small black scutellar spot. Denuded spots on the midline of the abdominal sternites in the male. Middle and hind femora of male flattened behind, denuded and with a margin of long hairs above. Head bulging at the occiput, the bulge not split by a deepened midline.

Head suboval, widest just behind the eyes, broadly rounded behind, with the posterior margin straight in front view, excavated when seen from above. Seen in side view, the occiput appears bulged. Surface densely punctured except along the narrowly denuded midline. Antennal calluses small, denuded. Median impressed line distinct down to the level of the eyes. Eyes fairly prominent, rather narrow (.47 times as wide as long), transverse. Antennæ reaching to the middle of the elytra in the male, two and two-thirds as long as an anterior tibia, slightly shorter in the female, two and one-half times as long as an anterior tibia, slender, almost uniform in thickness, slightly thicker in the male than in the female. First segment reaching halfway across the eye, the stoutest segment; second .55 times as long as first; third as long as first; fourth and following subequal, three-fourths as long as third. The first three segments have some pale pubescence.

Pronotum broadly campanulate, slightly longer than broad, densely clothed on the disc with short erect pubescence. This pubescence is composed of short, swollen but pointed hairs which are circular in cross-section. *E. wheeleri* Horn has similar discal pubescence, *E. rileyi* and *E. rehni* similar but much more slender. The midline and an oblique area from the anterior angles to the middle somewhat elevated. Elytra with a small scutellar black spot which may be reduced to a few hairs. Abdominal sternites of male with a denuded spot on the midline posteriorly, with only a few short black hairs and setæ present on them. Middle and posterior trochanters, femora and tibiæ of male flattened and broadly denuded behind, fringed above with long pale pubescence. The corresponding edge of the anterior trochanters and femora also denuded but not fringed with long hairs. Anterior tibial spurs of male slightly shortened, the first tarsal segment a little thickened. Posterior tibial spurs slender, sticklike. Tips of femora and tibiæ and all but base of tarsi with black pubescence.

Holotype: ♂ 20 mi. N. of Mesquital, *Lower California*

IX-27-1941 Ross and Bohart (Calif. Acad. No. 6126)

Allotype: ♀ eutopotypical (Calif. Acad.)

Paratypes: 17♂♂, 10♀♀ eutopotypical. 1♂ El Arco, L. Calif. IX-28-1941.

Paratypes have been placed in the M.C.Z. collection (No. 28222), Chicago Nat. Hist. Mus., collections of F. H. Parker, G. P. Mackenzie and F. Werner.

The localities are in the Vizcaino Desert in the southern part of the northern district of Lower California. (See Proc. Calif. Acad. Sci. (4th ser.) 24: 8.)

This species belongs to the *caviceps* group and looks most like *diversipubescentis* Mayd. but differs in its narrower head, bulging occiput and thickened erect hairs on the pronotum. The male keys to couplet 37, *aspera* but differs in the broadly denuded flattened surface of the femora. The female keys to part 2 of couplet 64 (with the addition of "or with a small scutellar spot") and thence to *rehmi* in couplet 75. It differs from *rehmi* in lacking the ridges on the head and from *uniforma* and *alpina* by the dense erect pubescence on the pronotal disc.

Epicauta lauta subsp. *rossi* subsp. nov.

Large series of *Epicauta lauta* from the United States show very little variation in color. One specimen from Lower California, the only representative of the species seen from there, shows a striking deviation from the usual uniform coloration. It has the pubescence the same as in *lauta* but the ground color is black, with the elytra tan. It looks more like the female of *polingi* than *lauta* but is structurally identical with the latter.

Holotype: ♂, 15 mi. S. of San Domingo, *Lower California* October 4, 1941. Ross and Bohart. (Calif. Acad. No. 6127).

Epicauta virgulata (Lec.)

Macrobasis virgulata LeConte, 1866, Smiths. Misc. Coll.

6: no. 167, 2nd ed.: 156.

Epicauta virgulata, Werner, 1945, Bull. M.C.Z. 45: 512 (in part).

A re-examination of material in this species shows that two species are present, *virgulata* being the Lower California species, extending to southwestern Arizona and *hirsutipubescens* (Mayd.) being found from western Texas to southeastern Arizona.

The description of *virgulata* in my revision need not be greatly changed except for addition of characters by which it differs from *hirsutipubescens*. The shape of the hind trochanters serve to separate it in both sexes (Fig. 3). In the male the first antennal segment reaches

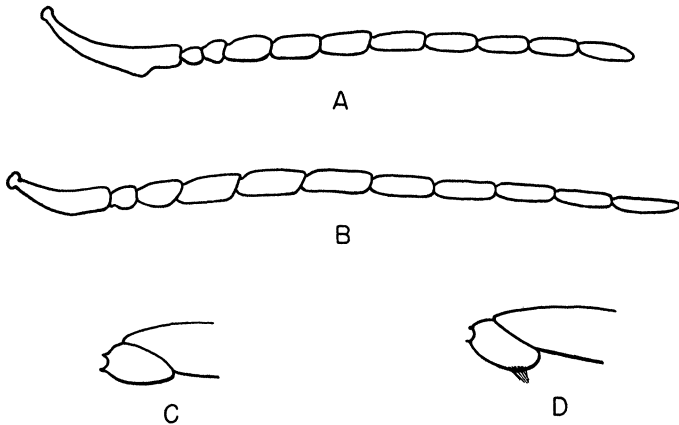


Fig. 3. A. Antenna of *Epicauta virgulata* (Lec.), male. B. Antenna of *Epicauta hirsutipubescens* Mayd., male. C. Metatrochanter of *Epicauta virgulata*, male. D. Metatrochanter of *Epicauta hirsutipubescens*, male.

nearly to the hind margin of the head and is equal to the following four in length. It is deeply excavated externally near the apex. Second segment small, two-thirds as long as third, which is also broader. The second to sixth segments are dorso-ventrally flattened, the ventral surface of the second to fourth smooth and apparently forming a clasping organ, opposing the antennal excavation. Middle femora and trochanters denuded behind, flattened and slightly excavated, margined ventrally with a few long hairs and also dorsally on the trochanters.

Specimens from Lower California have the body col-

or dark brown to black, the legs rufous. The Sinaloa and Arizona specimens have the legs of the same color but the body color paler so that the contrast is not as great. I can find no other differences. There is a slight variation in the width of the antennal segments but it occurs in the Lower California and Arizona specimens alike. The pubescence is composed of hairs which are brown at the base and cinereous apically. The brown zone may be up to two-thirds of the length of the hair or reduced to less than one-third, thus affecting the general color of the insect considerably. Lower California specimens in general have more brown than Arizona specimens.

Localities: Lower California: Comondu; 5 mi. So. of San Miguel, San Domingo; San Quentin; Coyote Cove, Conception Bay; Venancio; Triunfo; 10 mi. S. of Catavina; La Paz; Todos Santos; all in the southern district. Sinaloa: Los Mochis. Arizona: Ehrenburg, Yuma Co.; Cave Creek, Maricopa Co.; Gillespie Dam, Maricopa Co.; Florence, Pinal Co. I am very much indebted to the California Academy for permission to study the Lower California and Sinaloa specimens.

Epicauta hirsutipubescens (Mayd.)

Macrobasis hirsutipubescens Maydell, 1934, Trans. Am. Ent. Soc. **60**: 334.

Epicauta virgulata, Werner, 1945, Bull. M.C.Z. **45**: 512 (in part).

This species can be distinguished from *virgulata* by the shape of the hind trochanters (Fig. 3) and by the shorter first antennal segment and lack of long hairs on the middle femora of male. In the male the first antennal segment reaches the hind margin of the eye and is equal to or slightly shorter than the following three, and is not as deeply excavated as in *virgulata* (Fig. 3). The second to fifth segments are not flattened and expanded. The posterior trochanters of the male have a tuft of hairs on the posterior border as in the figure.

West Texas specimens are usually black, with grey pubescence (as in the type) or with tan pubescence, in

which the individual hairs are unicolorous. The discal stripe on the elytra is not as prominent as in *virgulata* and southeastern Arizona specimens. Arizona specimens, from the southeastern part of the state, have the ground color brown and the pubescence brown at the base and white at the apex, and with the discal stripe very distinct. There seems to be no morphological difference between the two groups and it must be presumed that the range is continuous in northern Chihuahua. Occasional specimens from Arizona have the pubescence very similar to western Texas specimens. The southeastern Arizona specimens tend to be a little stouter and shorter than the Texas series or southwestern Arizona *virgulata*.

Localities: Texas: Lozier Canyon, Terrell Co.; Tornilla Flat, Big Bend Nat. Pk.; Marathon; Culbertson Co.; Ft. Stockton; McNary, Hudspeth Co. New Mexico: Organ, Dona Ana Co.; Hope, Eddy Co.; Hot Springs, Sierra Co. Arizona: Benson; Huachuca Mts.; Sta. Rita Mts; Globe; Badger; Tubac; San Carlos; Tucson; Patagonia; Nogales; Calabasas Canyon, Tumacacori Mts; Arivaca, Pima Co.



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