

American Museum Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK 24, N.Y.

NUMBER 1730

MAY 11, 1955

The Blister Beetle Genus *Linsleya* (Coleoptera, Meloidae)

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INTRODUCTION

As in the case of many genera of Meloidae, species of the genus *Linsleya* MacSwain have been defined in the past primarily on the basis of sexual characters of the male. In an attempt to remedy this situation and to place the classification of the genus on a firmer basis, I recently undertook a study of about 1100 specimens of *Linsleya*, representing a good proportion of the material of this genus which has been collected to date. New characters introduced in the present paper have permitted me to make improved definitions of the species of the genus as well as to draw some conclusions as to their phylogenetic relationships. Five species of *Linsleya* are herein recognized, one of which is represented by two distinct races. One of the species and one of the races are described for the first time.

HISTORY AND SYSTEMATIC POSITION OF THE GENUS

In 1873 the species of *Lytta* Fabricius of the United States were divided into three groups by Horn. Three species (*sphaericollis*, *compressicornis*, and *convexa*) comprised Horn's Group III, characterized mainly in possessing a convex pronotum, strongly compressed antennae, and slender, acute hind tibial spurs. Fall (1901) described an additional species in Group III, noting that the group is characterized also by the presence of a lining of dense pubescence on the inner surface of the fore tibiae.

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Recently MacSwain (1951) removed the species of Group III and a species (*suavissima*) which had been erroneously placed in Group II from *Lytta* to form a new genus, *Linsleya*. On the basis of the first instar larva of *convexa* and characters of the activity pattern which he did not discuss, MacSwain assigned *Linsleya* to the tribe Epicautini,¹ stating that its inclusion requires no modification of the larval definition of the tribe. Larval differences between the tribes Epicautini and Lyttini are so great (see Cros, 1940, p. 320) that there can be little doubt as to the validity of the tribal assignment made by MacSwain. MacSwain noted, however, that the inclusion of *Linsleya* does require a modification of the adult definition of the tribe, because the genus lacks the sericeous excavation of the fore femora which has been used as the diagnostic character of other adult Epicautini. It should also be noted that *Linsleya* lacks the excavation of the fore tibiae of other Epicautini but not the sericeous lining.

Apparently there is no morphological character of the adult which will definitely place *Linsleya* as a member of the Epicautini rather than the Lyttini. MacSwain's modification of the definition of the Epicautini, to include "members lacking a sericeous patch on the anterior femora but possessing such a patch on the anterior tibia," is not diagnostic, as a sericeous lining of the fore tibiae is a character which occurs quite commonly in other tribes of Lyttinae. It is worth while to note that the male genitalia of *Linsleya* and the other genera of Epicautini agree in having only a single hook on the ventral side of the median lobe, but again this character is not conclusive evidence of relationship and cannot be used as a definition of the tribe, because a number of unrelated Lyttinae also have only a single hook. In the majority of species of Lyttinae other than members of the tribe Epicautini, however, the median lobe is provided with two ventral hooks.

With the inclusion of *Linsleya* it is necessary to define the tribe Epicautini in the adult stage by a combination of characters. A number of combinations could be used, but it seems most convenient merely to add the diagnostic characters of *Linsleya* to the old definition of the tribe, as follows: fore femora with a sericeous excavation or the antennae com-

¹ Under the provisions of the Copenhagen Decisions on Zoological Nomenclature adopted in 1953, both *Macrobases* LeConte, 1862, and *Apterospastides* Wellman, 1910, appear to have priority over *Epicautini* Denier, 1935, as a family-group name for this particular taxon. Because the former two names have never received wide usage and are based on names of genera now regarded as junior synonyms of *Epicauta* Dejean, it will probably be desirable to request the retention of *Epicautini* under the Plenary Powers of the International Commission on Zoological Nomenclature.

pressed and with subquadrate or transverse intermediate segments, the fore tibiae sericeous on the inner surface, and the hind tibial spurs equally slender and acute. If *Linsleya* is retained in the tribe Epicautini, it will probably be convenient to place it in a separate subtribe.

KEY TO THE GENERA OF EPICAUTINI

1. Fore femora with a sericeous excavation ventrally 2
 Fore femora without a sericeous excavation *Linsleya* MacSwain
- 2(1). Dorsal blade of tarsal claws smooth 3
 Dorsal blade of tarsal claws denticulate 5
- 3(2). Elytra with raised costae; pubescence in part scale-like
 *Pleuropompha* LeConte
 Elytra without raised costae; pubescence not scale-like 4
- 4(3). Mandibles greatly enlarged and vaulted, curving posteriorly; labrum not
 deeply emarginate; hind tibiae of male without an apical comb
 *Psalydolyyta* Péringuey
 Mandibles not as above or labrum deeply, semicircularly emarginate and
 hind tibiae of male with a comb on inner side at apex . *Epicauta* Dejean
- 5(2). Elytral pubescence compound, with intermixed long, erect, black, and
 shorter, recumbent, pale setae; antennal segments I to V shiny, sub-
 glabrous in male *Anomalonychus* Saylor
 Elytral pubescence simple, composed of short, recumbent setae only;
 antennal segments not modified as above in male . *Denierella* Kaszab

DISCUSSION OF SPECIFIC CHARACTERS

It is convenient to discuss some of the specific characters of the genus here, as a number of them are referred to in the discussion of phylogeny that follows.

HEAD: There is an orange spot on the front of the head between the eyes in *suavissima* and *californica* which is completely lacking in *sphaericollis* and *compressicornis*. Occasional individuals of *convexa* have a reddish suffusion in this area, but the suffusion is darker than the true frontal spot and, moreover, lacks definite margins. Nevertheless, it might be mistaken for the frontal spot, and for this reason I have used the presence or absence of the spot in the key only after removing *convexa* from consideration on the basis of other characters.

The intermediate antennal segments are distinctly transverse in both sexes of *compressicornis*. In females of *sphaericollis* and *suavissima* they are somewhat broader than long, while in males of these species and in both sexes of *convexa* and *californica* they are either as long as broad or longer than broad. The antennae of *convexa*, *sphaericollis*, and *californica* are a little flatter on the anterior surface than on the posterior, but the flattening is not noticeable in *suavissima*. In *compressicornis* the anterior surface of the antennae is concave in the male and strongly

flattened in the female. Length of antennal segments has been measured as the distance from base to extreme apex, not necessarily the distance from base to apex on the midline. In some cases, especially in *compressicornis*, midline measurements of length are considerably shorter than those given in the present paper. All measurements have been made on dry specimens. In general, proportions of antennal segments given are those obtained from a single specimen. Small interspecific differences of proportion are not to be considered as necessarily diagnostic, as proportions are subject to considerable variation, chiefly as the result of differences in the degree of contraction or extension of the antennae in different specimens. However, where proportional differences are relatively great, even after the observed range of variation has been taken into consideration, as between *compressicornis* and the other species or between races of *compressicornis*, they do offer useful characters.

PRONOTUM: The pronotum of *suavissima* is rather quadrate in outline. In *convexa* and *californica* it is subcampanuliform; in *compressicornis* it is globose. Variation within *sphaericollis* almost completely encompasses the conditions in *convexa*, *californica*, and *compressicornis*. Because of the shape of the pronotum, specimens of *convexa* and *californica* have a greater superficial resemblance to specimens of *Epicauta* than do those of other species of *Linsleya*.

ELYTRA: All species of *Linsleya* have finely punctate elytra. The elytra of *suavissima* are nearly smooth, while those of the other species are scabrous. In *compressicornis* and *convexa* the scabrous markings form a rather regular network, thereby producing well-marked pits in which the punctures are located. The elytra of *californica* and *sphaericollis* are similar to those of the two species just mentioned, but the scabrous markings are less regular and do not delimit such well-marked pits. As a result, the elytral punctures are somewhat less conspicuous than in *compressicornis* and *convexa*.

LEGS: The fore femora of *convexa* are each armed with a spinose tubercle near the base in the male sex. Both fore tibial spurs are normally absent in the male of this species, a modification occurring, as far as I know, in only one other North American meloid, *Epicauta alastor* Skinner. The posterior fore tibial spur is absent in the male of *suavissima*, while in males of *sphaericollis*, *compressicornis*, and *californica* and in females of all species two spurs are present on each of the fore tibiae.

The tarsal pads offer excellent characters. With the exception of males of *californica* and *sphaericollis*, in which the tarsal pad pattern is identical, species can be separated in both sexes on the basis of the tarsal pads alone. Tarsal pads, as here defined, consist of erect, pale pubescence on

the ventral surface of the tarsal segments, situated between two ventrolateral rows of black setae which may be called the ventral fringes. When best developed the pads are dense and cushion-like, without indication of a division. In some cases the pads may be parted or, more commonly, distinctly divided by a glabrous area on the midline of the segments. Frequently a pad may be absent on one or more segments, in which case the area between the ventral fringes may be glabrous, sparsely set with black setae, or densely black-pubescent.

ABDOMEN: There are some differences in the shape of the sixth visible abdominal sternite of the male, but except for *suavissima*, in which the hind margin is sharply and deeply impressed, differences are not useful in species identification. The fifth visible abdominal sternite of the male is moderately deeply emarginate in *compressicornis*, *sphaericollis*, and *californica*, while in *convexa* and *suavissima* it is only feebly emarginate.

MALE GENITALIA: All species are easily separable on the basis of the male genitalia. The lateral lobes of the tegmen (figs. 3-7) offer the best characters. The apex of the median lobe is practically identical in *californica*, *sphaericollis*, and *compressicornis* (fig. 9).

PHYLOGENY

My conclusions as to the phylogeny of the species of the genus *Linsleya* are summarized in figure 1. The following discussion is an attempt to present the data and reasoning on which this interpretation of phylogeny is based. Small numerals on the tree in figure 1 indicate ancestral forms postulated in the discussion.

MacSwain (1951) regarded the genus *Linsleya* as a primitive member of the tribe Epicautini, and I am inclined to follow him in this conclusion because it appears that *Linsleya* more likely represents an evolutionary line which diverged before the fore femoral and tibial modifications of the other genera of Epicautini were developed than a line which subsequently lost them.

On the basis of a number of characters it appears that two major evolutionary lines have arisen within the genus. The first of these, which I have designated as the subgenus *Linsleyina*, includes the species *sphaericollis*, *compressicornis*, and *californica*. In this subgenus the lateral lobes of the tegmen are not strongly impressed ventrolaterally and are clothed apically with relatively short, fine setae only. The fifth visible abdominal sternite of the male is rather deeply emarginate, and the fore tibiae of the male each have two apical spurs. In the subgenus *Linsleya*, composed of the species *convexa* and *suavissima*, the lateral lobes of the tegmen are strongly impressed and have some long, heavy setae laterally near the

apex in the form of a tuft. Furthermore, the hooks of the median lobe are larger than in the subgenus *Linsleyina*, the fifth visible abdominal sternite of the male is barely emarginate, and the male fore tibiae each have only a single spur or none.

The type of genitalia found in males of the subgenus *Linsleya* seems to

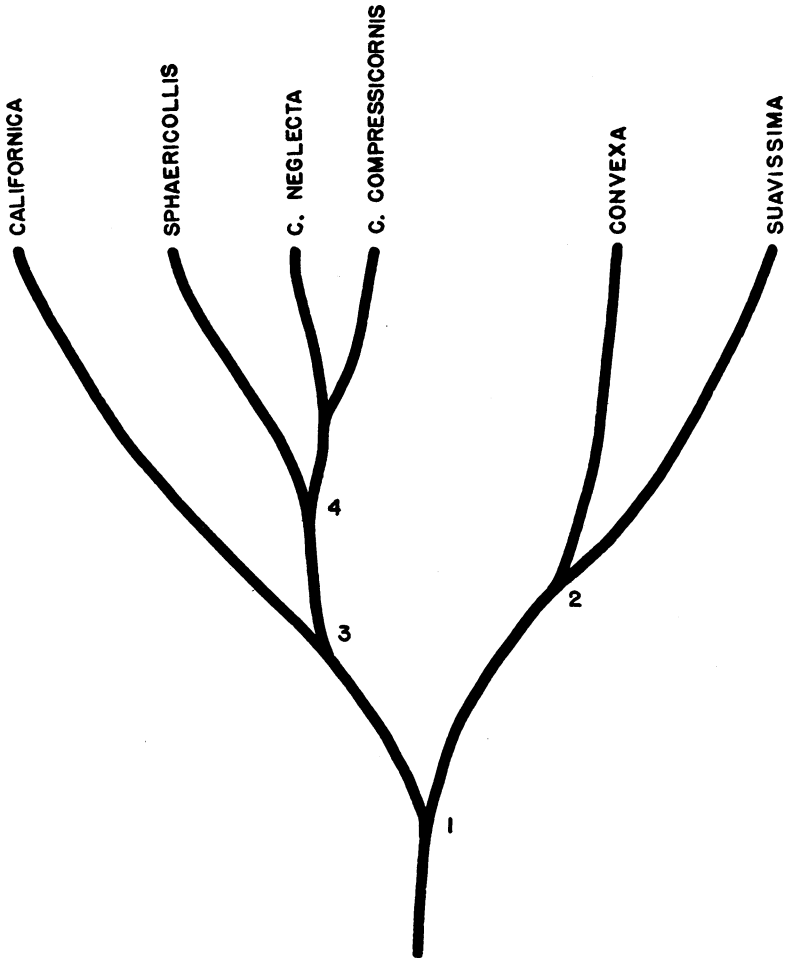


FIG. 1. Phylogenetic tree of the species and subspecies of *Linsleya*.

be more specialized than that of the other subgenus. That is, it seems more reasonable to suppose that the type of genitalia in *Linsleyina* could have given rise to that of *Linsleya* than vice versa. The absence of one or both of the fore tibial spurs in males of *Linsleya* is obviously a special-

ized condition. The status of the depth of the emargination of the fifth visible abdominal sternite of the male is discussed below. Here it may be concluded that the species *suavissima* and *convexa* evolved from a common ancestor (ancestor 2) in which the characters of the subgenus *Linsleya* mentioned above were developed. Because *suavissima* retains one fore tibial spur in the male, it is certain that ancestor 2 retained at least one spur also. There is no reason to suppose that it had more than a single spur, however, as neither of the species of *Linsleya* has two spurs. A similarity between the two species of the subgenus *Linsleya* not mentioned above is the absence of a tarsal pad on the first segment of the hind tarsi of both sexes and the middle tarsi of the female. This condition is not diagnostic of the subgenus, however, as it is duplicated in a member of the subgenus *Linsleyina* (*compressicornis*). It is safe to assume that the pads mentioned were lost in ancestor 2. When other characters are considered, it is clear that the absence of these pads in *compressicornis* and the subgenus *Linsleya* is the result of parallel evolution.

Linsleya convexa developed a number of specializations in its evolution, among which are loss of the remaining fore tibial spur, development of the fore femoral tubercle in the male, and loss of the pad of the second segment of the hind tarsi, the latter specialization associated with a broadening of the first two segments of the hind tarsi. *Linsleya suavissima* developed a number of specializations of a different sort. This species is set apart from others by the relatively deep impression of the sixth visible abdominal sternite of the male, the greater density and length of the pubescence, the nearly quadrate form of the pronotum, and the smooth surface of the elytra. These characters are evidently specializations which *suavissima* gained in its evolution from ancestor 2. As the male genitalia of the subgenus *Linsleya* seem to be of a specialized type and ancestor 2 probably lacked one of the fore tibial spurs in the male as well as the full complement of tarsal pads, it is unlikely that either the *convexa* or *suavissima* line gave rise to any of the other species of the genus.

In the phylogenetic tree ancestor 2 is shown as arising from a common ancestral trunk with the subgenus *Linsleyina*. This conclusion is based primarily on the belief that the deeper emargination of the fifth visible abdominal sternite of the male of *Linsleyina* is specialized with respect to the condition in the subgenus *Linsleya*. Because the emargination is limited to the male sex, it is likely that the shallow emargination in *Linsleya*, which most nearly approaches the entire condition in the female and is therefore the less extreme form of the sexual modification, is

primitive for males of the genus. If this be true, the male sternite in question was only feebly emarginate in the ancestor of the genus (ancestor 1), and the *Linsleya* line diverged before the emargination was deepened in the ancestor of *Linsleyina* (ancestor 3). The presence of the frontal spot in *suavissima* and *californica* must then be explained either as a case of parallel development in the two species or independent loss of the spot on at least two occasions. The latter alternative seems preferable, and it is therefore assumed that the spot is a primitive character originally found in ancestor 1.

The subgenus *Linsleyina* is thought to have evolved from an ancestral species (ancestor 3) which differed in no important respect from ancestor 1, except as regards the deeper emargination of the fifth visible abdominal sternite of the male. Within the subgenus two species groups are herein proposed, i.e., the *californica* group (*californica*) and the *sphaericollis* group (*sphaericollis* and *compressicornis*). The presence of a frontal spot in *californica* presumably indicates that this species evolved as a direct offshoot of ancestor 3, while the absence of the spot in the *sphaericollis* group may be interpreted as evidence that *sphaericollis* and *compressicornis* developed from a common ancestor (ancestor 4) in which the spot had been lost. In *californica* all the tarsal segments are padded in both sexes, the fore and middle tarsi have undivided pads in the male, and all the tarsal pads are complete, except on the first segment of the hind tarsi in the female, where the pad is limited to the apical part of the segment. The tarsal pad pattern is the same in *sphaericollis* and was undoubtedly the same in ancestors 3 and 4. The *californica* line developed a dorsal groove on the lateral lobes of the tegmen, but in other respects it probably changed little from ancestor 3. Similarly, there is no reason to suppose that *sphaericollis* differs in any respect from the form indicated as ancestor 4 and from which *compressicornis* evolved. In the latter species the middle tarsal pads of the male are divided and the pad of the first segment is limited to the apical one-half, the pad of the first segment of the female fore tarsi is shortened, the first segment of the hind tarsi lacks a pad in both sexes, and the antennae are strongly modified. These characters appear to be specializations developed in the evolution of *compressicornis* from ancestor 4. The race *c. compressicornis* is the more derived of the two races of *compressicornis*, as its antennae are more strongly modified than in *c. neglecta*.

While some of the conclusions reached in the preceding discussion seem to be subject to little question, the phylogenetic tree as a whole must be considered as highly tentative, because it is based in large part on the admittedly weak premise regarding the primitive nature of the emargina-

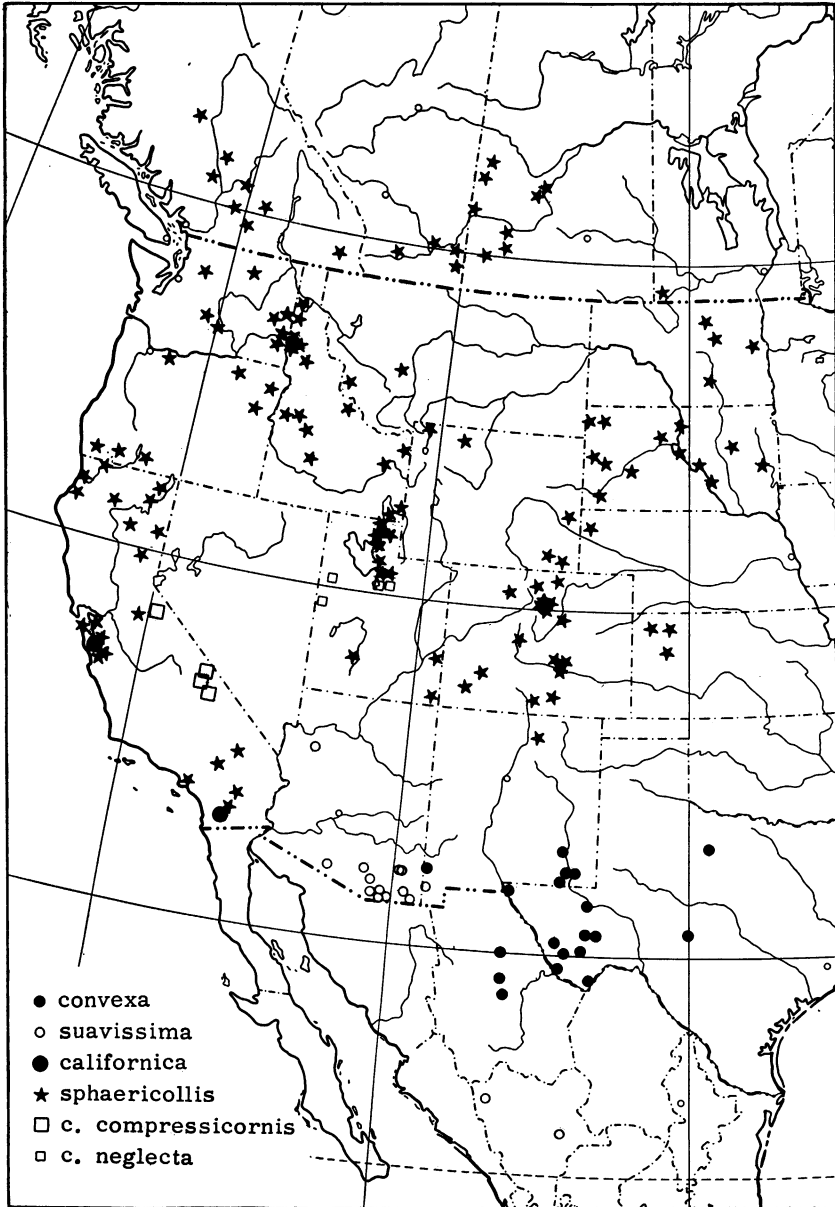


FIG. 2. Distribution of the genus *Linsleya*. Records of specimens examined and records from the literature are included.

tion of the fifth visible abdominal sternite in the male of the subgenus *Linsleya*. An important point to note, however, is the fact that the present tree expresses the degree of morphological similarity of the species more satisfactorily than other arrangements. If comparable rates of evolution in the various species lines are assumed, the actual phylogeny of the genus should correspond to the pattern shown in the tree. Because the tree accounts for the distribution of characters in a logical manner and expresses the degree of morphological similarity, it seems to be the most adequate interpretation of phylogeny that can be made at the present time.

DISTRIBUTION

As shown in figure 2, the genus *Linsleya* is restricted to western North America. It is interesting to note the high degree of allopatry exhibited by the species. Species of the subgenus *Linsleya* are true desert forms, inhabiting the Lower Sonoran desert areas of Arizona, New Mexico, and Texas and adjacent areas in northern Mexico. The host plants of *suavissima* are unknown. *Linsleya convexa* has been collected on species of Solanaceae, Compositae, and Zygophyllaceae. It is probable that all species of the genus feed at least primarily on foliage rather than pollen or other floral parts. The widely distributed *sphaericollis* is primarily a montane species in the southern portion of its range, occurring at lower elevations to the north. It is evidently a readily adaptable species, however, as it appears to have a wide altitudinal range at a given latitude and occurs in a number of life zones and upon a variety of plants. It is also geographically variable. It has been recorded as feeding on species of Oleaceae, Solanaceae, Leguminosae, and Caprifoliaceae (*Symphoricarpos*). The species *compressicornis* is a montane form represented by two races, one found in the Sierra Nevada of California and the other in the Wasatch Mountains and Great Basin ranges of Utah. The Utah race occurs on *Symphoricarpos* and is found in the Transition and Canadian Zones. *Linsleya californica* is a rare species occurring in the southern coastal ranges of California. It has been recorded as feeding on lilac (Oleaceae).

CLASSIFICATION

GENUS *LINSLEYA* MACSWAIN

Linsleya MACSWAIN, 1951, Pan-Pacific Ent., vol. 27, p. 58. SELANDER, 1954, Jour. Kansas Ent. Soc., vol. 27, p. 89.

Metallic green or blue, or black without metallic luster. Pubescence black, not obscuring surface or contributing to general body color. Antennae (figs. 11-12) strongly compressed, rather short, a little longer in

male than in female; segments IV to X more or less subquadrate or transverse, at most only one-third longer than broad. Fore femora lacking ventral sericeous excavation of the other genera of Epicautini. Fore tibiae lacking excavation, with a sericeous lining on inner surface which is differentiated from the rest of the pubescence by density and texture and, in all species except *convexa*, by its pale color; in *convexa* the sericeous lining is black, with a brownish reflection. Male with two, one, or no spurs on each fore tibia. Posterior fore tibial spur at least weakly curved in female. Hind tibial spurs equally slender, acute, the inner spur longer; both spurs flattened on hind surface but not broadened or truncate. Male fore tarsi usually with first to first three segments a little swollen; pads always broadened, dense. Tarsal claws with blades separate, subequal in length, the dorsal blade smooth. Fifth visible abdominal sternite emarginate in male, entire in female; sixth (last) impressed and with a deep, triangular emargination in male, unimpressed and truncate in female. Male genitalia with ninth abdominal sternite normal; tergite consisting of a single lateral sclerite on each side and a transverse, undivided dorsal sclerite; lateral lobes of tegmen (figs. 3-7) with at least some short pubescence, sometimes with a tuft of long setae subapically at sides; median lobe (figs. 8-10) with a single, strongly recurved ventral hook.

TYPE: *Lytta convexa* LeConte. Fixed by original designation.

Members of the genus *Linsleya* may be distinguished from all other Meloidae by the following combination of characters: Antennae strongly compressed, with subquadrate or transverse intermediate segments. Fore femora lacking sericeous excavation but with a sericeous lining on inner surface of fore tibiae. Hind tibial spurs equally slender, acute.

TABLE OF SUBGENERA AND SPECIES GROUPS OF *Linsleya*

1. Male fore tibiae each with one or no spurs; male fifth visible abdominal sternite feebly emarginate; lateral lobes of tegmen deeply, concavely impressed lateroventrally and with a tuft of long setae subapically (figs. 6-7); median lobe with relatively large hooks (figs. 8, 10)
 (*convexa, suavissima*) *Linsleya* MacSwain
- Male fore tibiae each with two spurs; male fifth visible abdominal sternite moderately deeply emarginate; lateral lobes of tegmen not deeply impressed lateroventrally and lacking tuft of long setae subapically (figs. 3-5); median lobe with relatively small hooks (fig. 9) . *Linsleyina*, new subgenus
 (Type: *Lytta sphaericollis* Say. Fixed by present designation.)
2. Front of head between eyes with an orange spot; lateral lobes of tegmen grooved dorsally and with evenly distributed setae
 (*californica*) *californica* group
- Front of head between eyes lacking an orange spot; lateral lobes of tegmen not grooved dorsally and with setae confined largely to dorsal surface. . (*sphaericollis, compressicornis*) *sphaericollis* group

KEY TO THE SPECIES OF THE GENUS *Linsleya*

1. Last visible abdominal sternite with a triangular emargination (males) 2
 Last visible abdominal sternite truncate (females) 7
- 2(1). Fore femora each with a large spinose tubercle ventrally at base . *convexa*
 Fore femora without tubercle 3
- 3(2). Fore tibiae each with a single spur *suavissima*
 Fore tibiae each with two spurs 4
- 4(3). Intermediate antennal segments transverse, one-half or more broader than long (fig. 12); middle tarsi with pads divided on midline; first segment of hind tarsi without pad 5
 Intermediate antennal segments as long as or longer than broad; middle tarsi with pads undivided; first segment of hind tarsi with divided pad 6
- 5(4). Antennal segments V to VIII more than twice as broad as long; color green *compressicornis compressicornis*
 Antennal segments V to VIII less than two-thirds broader than long (fig. 12); color blue *compressicornis neglecta*
- 6(4). Front of head between eyes with an elongate orange spot . . *californica*
 Front of head between eyes without an orange spot . . . *sphaericollis*
- 7(1). First segment of middle tarsi with pale pubescence (pad) ventrally . 8
 First segment of middle tarsi entirely black-pubescent, without pad . 9
- 8(7). Front of head between eyes with an elongate orange spot . . *californica*
 Front of head between eyes without an orange spot . . . *sphaericollis*
- 9(7). Entirely black; hind tarsal pads undivided *suavissima*
 At least elytra metallic blue or green; hind tarsal pads divided on midline 10
- 10(9). Body black; second segment of hind tarsi entirely black-pubescent, without pad; intermediate antennal segments longer than broad *convexa*
 Body metallic blue or green; second segment of hind tarsi with some pale pubescence (divided pad) ventrally; intermediate antennal segments broader than long 11
- 11(10). Antennal segments VI to IX one-half or more broader than long; color green *compressicornis compressicornis*
 Antennal segments VI to IX one-third or less broader than long; color blue *compressicornis neglecta*

Linsleya (*Linsleyina*) *californica*, new species

Entirely black, or head, pronotum, and under surface metallic green or blue and elytra dark purple. Antennae and mouth parts black or piceous. Legs entirely black or femora and tibiae with metallic blue or green luster. Length, 9–13 mm.

Upper surface for the most part sparsely pubescent, the setae a little longer and more conspicuous than in *compressicornis*, *convexa*, and *sphaericollis* but much shorter than in *suavissima*; occiput and antero-lateral surface of pronotum with long, moderately dense pubescence.

Head coarsely and moderately densely to sparsely punctate. Front of head between eyes with an elongate orange spot on midline, in a few specimens rather small but always distinct and sharply defined. Antennae a little flatter on anterior surface than on posterior. Pronotum as long as or barely longer than broad, subcampanuliform, not globose; sides straight or slightly sinuate, parallel for basal three-fourths, then strongly convergent; midline finely, distinctly impressed, smooth, the impression usually extending the full length of the pronotum; surface microreticulate, with coarse punctures scattered on middle of disk, becoming denser at sides and apex. Elytra scabrous; punctures not set in well-defined pits. Thoracic sternum rather densely punctate and clothed with long pubescence. Abdominal sternum with moderately long pubescence, arising from punctures which are for the most part separated by a distance as great as or greater than half of the length of a single seta.

MALE: Antennal segments III and X about two-fifths, IV to IX one-tenth to one-third, longer than broad; VII to XI progressively narrower (table 1). Fore tibiae each with two spurs. Fore tarsi not perceptibly swollen; pads broadened, dense, cushion-like, undivided. Middle tarsal pads similar to those of fore tarsi but a little narrower and usually finely parted (but not divided) on midline. Hind tarsal pads divided on midline. Fifth visible abdominal sternite moderately deeply emarginate. Lateral lobes of tegmen (fig. 5) distinctly curved and bluntly rounded at apex in lateral view, deeply grooved on dorsal surface, sparsely and evenly clothed with short setae on distal half. Median lobe as in figure 9, similar to that of *compressicornis* and *sphaericollis*.

FEMALE: Antennal segment III one-third longer than broad; IV to IX as long as to one-fifth longer than broad; VI to XI subequal in breadth (table 1). Fore and middle tarsal pads dense, cushion-like but not so large as in male; middle tarsal pads sometimes divided on midline. Hind tarsi as in male, except that pad of first segment is limited to apical one-third or less.

This species most closely resembles *sphaericollis*. It is easily distinguished from all other species of the genus except *suavissima* by the presence of a definite orange spot on the front of the head. The spot is always narrowly elongate in the present species, while in *suavissima* it is broad and diamond-shaped. The pubescence throughout is somewhat more noticeable in *californica* than in all species except *suavissima* but not nearly so conspicuous as in the latter. The distinctly impressed midline of the pronotum is a rather distinctive feature of *californica*. In *sphaericollis* and *compressicornis* the midline is not impressed, and, while in some specimens of *suavissima* and *convexa* it is impressed for a

part of its length, the impression is never so well marked and is seldom so complete in these species as in *californica*. The tarsal pad pattern is like that of *sphaericollis*. Males of *californica* and *sphaericollis* differ from others in having a pad on the first segment of the hind tarsi. Females of these two species are unique in having a pad on the first segment of the middle and hind tarsi, the latter pad being limited to the apex of the segment.

According to the label, one of the specimens from Santa Ysabel, California, was found feeding on lilac. The species was collected at Santa Ysabel in 1935 and again in 1937, but it apparently has not turned up at San Jose, California, since it was first collected there in 1881. The present description is drawn from a long series of specimens received for study from the United States National Museum.

DISTRIBUTION: California. (See fig. 2.)

COLLECTION DATES: June 28 to October 13.

TYPE MATERIAL: Holotype male and allotype female from San Jose, California, October 13, 1881. Paratypes have been designated as follows: four males and nine females, eutopotypical; 11 males and 15 females, Santa Ysabel, 3000 feet, San Diego County, California, June 28, 1937 (Whittier no. 16); one male, Santa Ysabel, 3000 feet, "June 30? 37" (Mrs. J. Helhjer, Whittier no. 16), stripping lilacs; and one male and one female, Santa Ysabel, August 23, 1935, "thru B. Boyden." Three of the eutopotypical paratypes have an additional notation, "from Mrs. A. S. Bugh [?]." Holotype, allotype, and many of the paratypes returned to the United States National Museum. Additional paratypes will be distributed among the collections of the American Museum of Natural History, F. G. Werner, W. R. Enns, and R. B. Selander.

Linsleya (Linsleyina) sphaericollis (Say)

Lytta sphaericollis SAY, 1824, Jour. Acad. Nat. Sci. Philadelphia, vol. 3, p. 299; 1824, American entomology, vol. 1, p. 7 (redescription). HORN, 1872, in Rept. U. S. Geol. Surv. 1871, 1872, p. 390 (distribution). PUTNAM, 1876, Proc. Davenport Acad. Sci., vol. 1, p. 181 (record). CARRUTH, 1931, Ent. News, vol. 42, p. 54 (records). KNOWLTON, 1939, Utah Agr. Exp. Sta. Mimeo. Ser. 200 (Tech.), pt. 3, p. 5 (records). KNOWLTON AND TAYLOR, 1952, Utah Agr. Exp. Sta. Mimeo. Ser. 389, pp. 15, 31 (records).

Cantharis chalybea LECONTE, 1851, Ann. Lyc. Nat. Hist. New York, vol. 5, p. 160; 1853, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, p. 335 (redescription).

Cantharis sphaericollis, LECONTE, 1853, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, p. 336 (note). HORN, 1873, in Rept. U. S. Geol. Surv. 1872, 1873, p. 717 (record); 1873, Proc. Amer. Phil. Soc., vol. 13, p. 114 (redescription). LECONTE, 1879, Bull. U. S. Geol. Surv., vol. 5, p. 506 (record). FALL, 1901, Trans. Amer. Ent. Soc., vol. 27, pp. 294, 299 (variation; in key). GIBSON, 1911, 42d Ann. Rept. Ent. Soc. Ontario, p. 5 (records).

Cantharis chalybeata GEMMINGER, 1870, Coleopt. Hefte, vol. 6, p. 124. New name for *Cantharis chalybea* LeConte, not Erichson, 1843, Arch. Naturgesch., vol. 9, p. 258.

Cantharis compressicornis, LECONTE, 1878, Bull. U. S. Geol. Surv., vol. 4, p. 469 (record). FALL, 1901, Occas. Papers California Acad. Sci., vol. 8, p. 185 (record). Misidentifications.

Cantharis infidelis FALL, 1901, Trans. Amer. Ent. Soc., vol. 27, p. 303. New synonymy.

Lytta stygica, ESSIG, 1926, Insects of western North America, p. 390 (fig. 267, not text). Misidentification.

Lytta viridena [sic], TANNER AND HAYWARD, 1934, Proc. Utah Acad. Sci., Arts and Lett., vol. 11, p. 218 (record). Misidentification.

Linsleya sphaericollis, SELANDER, 1954, Jour. Kansas Ent. Soc., vol. 27, p. 89 (note).

Brassy green through metallic blue to (rarely) black. Antennae and mouth parts black. Legs entirely black or femora and tibiae with metallic luster. Length, 7.5–12 mm.

Upper surface subglabrous. Head and pronotum coarsely to finely, sparsely punctate. Front of head between eyes lacking an orange spot. Antennae a little flatter on anterior surface than on posterior. Pronotum globose to subcampanuliform; midline not impressed. Elytra scabrous; punctures not set in well-defined pits. Under surface sparsely pubescent, the pubescence on abdomen arising from punctures which are for the most part separated by a distance obviously greater than half of the length of a single seta.

MALE: Antennal segment III about two-fifths longer than broad; IV to X as long as or barely longer than broad, subequal in breadth (table 1). Fore tibiae each with two spurs. Fore tarsi with first segment a little swollen; pads broadened, dense, cushion-like, undivided. Middle tarsal pads similar to those of fore tarsi but narrower and sometimes finely divided on midline on fourth and fifth segments. Hind tarsal pads divided on midline. Fifth visible abdominal sternite moderately deeply emarginate. Genitalia (fig. 3) similar to those of *compressicornis*, differing mainly in the less slender lateral lobes of the tegmen, which are nearly straight in lateral view.

FEMALE: Antennal segment III one-half longer than broad; IV to X as broad as to about one-tenth broader than long, becoming progressively slightly broader (table 1). Fore and middle tarsal pads not so well developed as in male. All tarsal pads divided on midline, the fore tarsal pads finely so. Pad of first segment of hind tarsi limited to apical one-fourth to one-half.

This species most closely resembles *compressicornis*, from which it

differs conspicuously in having more or less subquadrate intermediate antennal segments and by tarsal pad characters. Darker specimens superficially resemble *californica* but are easily distinguished by the complete absence of an orange frontal spot on the head, among other characters.

Linsleya sphaericollis is the most common, widely distributed, and variable species of the genus. Variation is geographical and seems to take the form of a cline extending from the western coast of the United States to Idaho and Saskatchewan. At one extreme, in California and south-western Oregon, the color is commonly dark blue or black and the pronotum is relatively flat. Black populations seem to be centered around northern California. I have examined black series from San Francisco, Mt. Hamilton, Calaveras County, and Humboldt County, California, and from Josephine County, Oregon. Other California specimens vary from dark blue to green, with blue specimens predominating. Northward through western Oregon and Washington to British Columbia blue is still the predominant color, but green specimens occur more frequently and the pronotum is, on the average, more globose in form, all intermediate steps between extreme California populations and typical *sphaericollis* being found in different specimens in regard to pronotal shape. In eastern Washington and Oregon the shape of the pronotum remains variable, while the color is much more commonly green, grading finally in Idaho to typical *sphaericollis*, in which the pronotum is strongly globose and series are, with rare exceptions, uniformly green in color. Specimens from Alberta and Saskatchewan are typical as regards pronotal shape but usually blue in color. Specimens from Colorado tend to be blue also, but elsewhere in the range of the species the color is almost always green.

Fall (1901) separated West Coast populations of *sphaericollis* as a separate species under the name *infidelis*. Considering the pattern of variation, as described in the preceding paragraph, I have been unable to find a sharp break that could be used to delimit racial boundaries within *sphaericollis*, and I consider *infidelis* as a strict synonym of *sphaericollis*. With more precise methods of study and additional material it may be possible, at some future date, to recognize the West Coast populations as racially distinct from interior *sphaericollis*. It should be noted that in this event *chalybeata*, described from Oregon, will have priority over *infidelis* as the racial name.

LeConte recorded *compressicornis* from Alma, 10,000 feet, Colorado. Two specimens of *sphaericollis* in the collection of the University of Kansas bear this label with the date August 13-14, 1877. These specimens are undoubtedly from the LeConte series, and they form the basis

for regarding his record as a misidentification. Fall's record of *compresicornis* from Los Angeles, California, is surely a misidentification of *sphaericollis* also. I have examined specimens of the latter collected in Los Angeles by Coquillett which were probably seen by Fall. Tanner and Hayward's record of *Lytta viridana* from Utah is based on four specimens of *sphaericollis* now in the collection of the Brigham Young University.

Among material examined are specimens collected on *Lupinus*, *Melilotus*, lilac, honeysuckle, potato, and *Symphoricarpos*. On several occasions over a period of six years I have observed feeding of *sphaericollis* adults on *Symphoricarpos tetonensis* at Kimballs Junction, 7000 feet, in the mountains east of Salt Lake City, Utah. *Symphoricarpos*, or snowberry, is an abundant shrub in this area, but the beetles are extremely gregarious and have been found in any one year only on two or three shrubs growing in close proximity to one another. Although the precise location of the feeding aggregation may shift from year to year, the total area involved has not been more than one acre. The beetles are unusually wary and drop from the plants at the slightest disturbance. They feed on the leaves and cause considerable damage to infested plants. In 1949 a specimen was taken on a flowerhead of *Helianthella uniflora*, but its occurrence there was probably accidental. Attempts to obtain larvae have been unsuccessful.

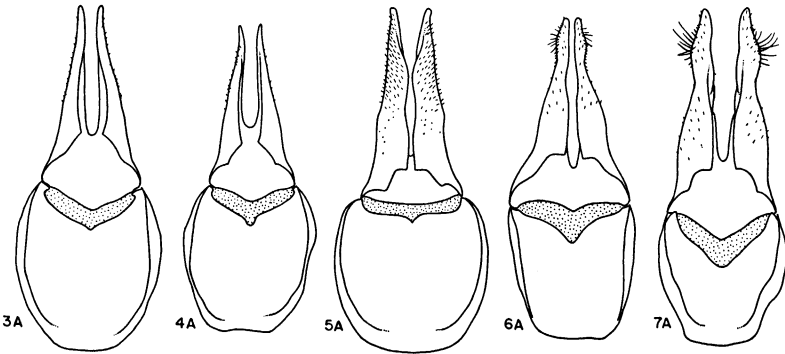
DISTRIBUTION: British Columbia and Manitoba to southern California and northern New Mexico. (See fig. 2.)

COLLECTION DATES: March 17 to September 10. Most of the records are in June, July, or August.

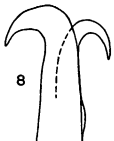
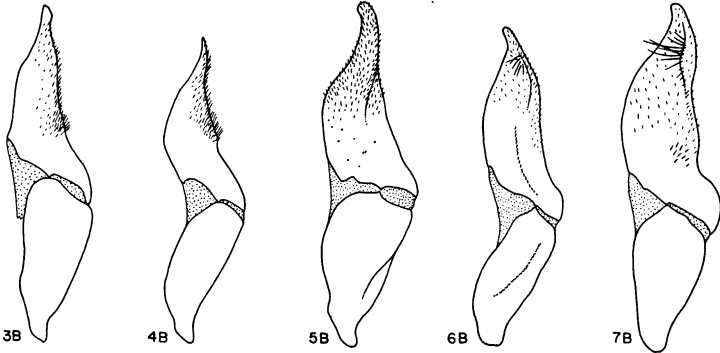
RECORDS: *Alberta*: Lethbridge, 11; Medicine Hat, 12; Ross Creek, Medicine Hat, one; Scandia, one; Victoria (not located), one. *British Columbia*: Chilcotin [River], five; Clinton, 12; Cranbrook, one; Kamloops, two; Lac de Bois, Kamloops, two; Lillooet, four; Midday Valley, Merritt, 36; Peachland, 20; Vernon, three. *California*: Adin, four; Alameda County, two; Blair's Ranch, Redwood Creek, Humboldt County, two; Blacksburg (not located), one; Borrego [Springs], one; Buck Creek, Modoc County, three; Coffee Creek, Trinity County, one; Grenes, 3000 feet, Calaveras County (not precisely located), two; hills back of Oakland, one; Indio, one; Isabel Creek, Santa Clara County, one; Kane Springs (not located), one; Klamath, one; Lassen County, eight; Los Angeles, four; Mt. Hamilton, two; 4 miles west of Quincy, *Melilotus*, two; San Bernardino County, one; San Francisco, five; Siskiyou National Forest, one; Shasta County, four (two with "Ls. Angls." labels also); Sierra Nevada (not mapped), one; Victorville, one. *Colo-*

rado: No precise data, eight; [on *Symphoricarpos* (Putnam, 1876)]¹; Alma, 10,000 feet, two; Boulder, seven; Cheyenne Cañon, three; Cheyenne Mountain, 6900 feet (not located), seven; Colorado Springs, 6000–7000 feet, three; Denver, four; Eldorado Springs, four; Estes Park, one; Fort Collins, one; [(Fort) Garland, 8000 feet (LeConte, 1879)]; Gold Hill, one; La Veta, four; Lump Gulch, near Gilpine, one; Manitou [Springs], 6400 feet, four; Nederland, one; Ouray, 9000 feet, three; Rabbit Ear Pass, five; Rico, 14. *Idaho*: Couer d'Alene, honeysuckle, six; Dixie, 51; Donnelly, one; Geneva, two; Granite, *Lupinus*, one; Idaho Falls, 4708 feet, eight; Lakefork, one; Moscow, 2560 feet, 12; Moscow Mountain (7 miles northeast of Moscow), 20; No Business Lookout (± 10 miles west of Donnelly), one; Orofino, 1016 feet, three; Paris, 5966 feet, potato, five; Potlatch, one; Salmon, 3955 feet, one; [Teton Basin (Horn, 1873)]. *Kansas*: Decatur County, one; Gove County, 2500 feet, four; Rawlins County, two. *Manitoba*: Melita, four. *Montana*: No precise data, five; Helena, one; Sleeping Child Canyon, Ravalli County, eight. *Nebraska*: Sioux County, four. *New Mexico*: Taos, two. *North Dakota*: Knox, seven; Northwood, one; Tappen, two; Tokio, one. *Oregon*: Baker, 3400 feet, one; Hood River, 14; Josephine County, 10; Klamath Falls, 37, feeding on Tartarian honeysuckle, 10; Medford, lilac, five; Pendleton, nine; Summit Prairie, on *Symphoricarpos* (not located), 25; Wallowa Lake, one. *Saskatchewan*: Attons Lake, Cut Knife, three; Gull Lake, one; Marengo, one; Pike Lake, one; Roadene, three; Rutland, six; Saskatoon, five; Swift Current, 25. *South Dakota*: [Brookings, Buffalo, Camp Cook, Chamberlain, Grass Rope, Hot Springs, Mobridge, Philip, Whitewood (Carruth, 1931)]; Mossman, one; Piedmont, three; Pierre, three; Redfield, one. *Utah*: No precise data, 24; Allen Canyon, San Juan County, one; Amalga, Cache County, one; Brigham Canyon, 23; [Farmington (Knowlton and Taylor, 1952)]; Kimballs Junction, 7000 feet, *Symphoricarpos tetonensis*, 78; Logan, nine; Logan Canyon, one; Panguitch, one; Parleys Canyon, Salt Lake County, one; Warner Ranger Station, La Sal Mountains, 9000 feet, four; Wellsville, two. *Washington*: No precise locality, seven (four on lilac); Okanogan County, one; Pullman, seven; Soda Springs, two; Spokane, eight; Tieton, one; Waukon, one; Wawawai, one; Yakima, three. *Wyoming*: No precise data, one; Cottonwood Creek (ambiguous; not mapped), one; Laramie County, two; 40 miles northeast of Laramie, four; Lusk, one; Powell, injuring honeysuckle, four; Yellowstone National Park, Gardiner Entrance, one. *State unknown*: Yancies, one.

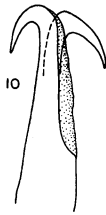
¹ Literature records not duplicated by records of specimens examined are placed in brackets.



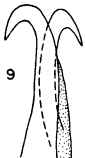
SPHAERICOLLIS COMPRESSICORNIS CALIFORNICA CONVEXA SUAVISIMA



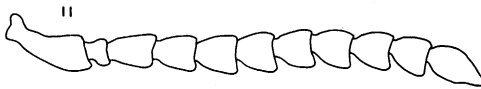
SUAVISIMA



CONVEXA



CALIFORNICA



SUAVISIMA



C. NEGLECTA

FIGS. 3-7. Ventral (A) and lateral (B) views of the tegmen of the species of *Linsleya*.

FIGS. 8-10. Lateral views of the median lobe of three species of *Linsleya*.

FIGS. 11-12. Male antennae of two species of *Linsleya*.

TYPE LOCALITIES: Of *sphaericollis*, "Missouri and Arkansa." Type probably lost. Neotype male, Boulder, Colorado, July 2, 1949 (L. D. Beamer); a typical, brassy green specimen in the collection of the University of Kansas. Of *chalybeata*, Oregon. Type presumably in Horn collection, Academy of Natural Sciences of Philadelphia. Of *infidelis*, Pacific Coast region, from Washington to San Francisco, California. Two cotypes of *infidelis* in the United States National Museum are from San Francisco. A lectotype should be designated from specimens in the Fall collection, Museum of Comparative Zoölogy.

Linsleya (Linsleyina) compressicornis (Horn)

Metallic blue or green. Antennae and mouth parts black. Legs entirely black or femora and tibiae with metallic blue or green luster. Length, 9–11 mm.

Upper surface subglabrous. Head and pronotum coarsely, sparsely punctate. Front of head between eyes lacking an orange spot. Antennae concave (males) or flat (females) on anterior surface, more strongly compressed than in other species. Pronotum globose; midline not impressed. Elytra scabro-punctate, as in *convexa*, the punctures set in rather well-defined pits. Under surface sparsely pubescent, the pubescence on abdomen arising from punctures which are for the most part separated by a distance as great as or greater than the length of a single seta.

MALE: Intermediate antennal segments broadened, transverse, the middle segments more strongly transverse than the rest; VI to IX one-half or more broader than long; VI broadest, VI to XI progressively narrower. Fore tibiae each with two spurs. Fore tarsi with first segment a little swollen; pads broadened, dense, cushion-like, those of fourth and fifth segments usually divided on midline, the rest undivided. Middle tarsal pads divided, similar to those of hind tarsi; pad of first segment limited to apical one-half. First segment of hind tarsi lacking pad, with a few black setae between ventral fringes. Fifth visible abdominal sternite moderately deeply emarginate. Lateral lobes of tegmen (fig. 4) slender, acuminate, apically curved in lateral view, sparsely pubescent dorsally for distal half. Median lobe similar to that of *californica* and *sphaericollis*.

FEMALE: Intermediate antennal segments less strongly compressed and less transverse than in male, but with at least some of the segments one-fourth or more broader than long; VI to X subequal in breadth, XI narrower. Fore tarsal pads much more weakly developed than in male, the first segment with pale pubescence (pad) only at apex. Middle

and hind tarsal pads divided, similar to those of male; first segment of each lacking pad, with a few black setae between ventral fringes.

This species could be confused only with *sphaericollis*, from which it is most easily distinguished by the broadened, transverse intermediate antennal segments, the divided middle tarsal pads, and the genitalia in the male, and by the absence of a pad on the first segment of the middle and hind tarsi in the female.

Samples of *compressicornis* from California prove to be 100 per cent separable from samples collected in Utah. Since the two populations are allopatric, it is impossible to establish definitely whether or not they are conspecific. From a morphological standpoint, however, it is doubtful that they are specifically distinct, and they are therefore treated as races.

Previously published records of *compressicornis* from Colorado and from Los Angeles, California, are based on misidentifications of *sphaericollis*.

Linsleya compressicornis compressicornis (Horn)

Lytta compressicornis HORN, 1870, Trans. Amer. Ent. Soc., vol. 3, p. 91.

Cantharis compressicornis, HORN, 1873, Proc. Amer. Phil. Soc., vol. 13, p. 115 (redescription). FALL, 1901, Trans. Amer. Ent. Soc., vol. 27, pp. 295, 300 (discussion; in key).

Metallic green. Antennae very strongly broadened in both sexes. Male antennae with segments V to VIII more than twice as broad as long; III about one-tenth, IV four-fifths, V and VI one and two-fifths, VII one and two-thirds, VIII one and one-tenth, IX about nine-tenths, and X about three-fourths, broader than long. Female antennae with segments VI to IX one-half or more broader than long; III nearly one-third longer than broad; IV one-tenth, V one-third, VI to VIII one-half, IX two-thirds, and X one-third, broader than long. (See table 1.)

See discussion of *c. neglecta*.

According to Horn (1870), the types of *compressicornis* were collected on, "a plant resembling our Canada thistle but with yellow leaves." I know of no other host plant record for the present race.

DISTRIBUTION: Sierra Nevada of California. (See fig. 2.)

COLLECTION DATES: June to July 20.

RECORDS: *California*: Big Pine, June, two; [Owens Valley (Horn, 1870)]; Sonora Pass, 9000–10,000 feet, July 3, 11, 16, and 20, 1951 (J. W. MacSwain and R. W. Wagner), 37; White Mountains, Inyo County, July 2, 1928 (J. W. Tilden), four.

TYPE LOCALITY: Owens Valley, California. Type presumably in Horn collection, Academy of Natural Sciences of Philadelphia.

Linsleya compressicornis neglecta, new subspecies

Lytta compressicornis, KNOWLTON, 1939, Utah Agr. Exp. Sta. Mimeo. Ser. 200 (Tech.), pt. 3, p. 5 (record).

Metallic blue. Antennae less strongly broadened than in *c. compressicornis*. Male antennae (fig. 12) with segments V to VIII less than two-thirds broader than long; III one-fourth longer than broad; IV one-fifth, V to VIII two-fifths to nearly two-thirds, IX one-half, and X about one-third, broader than long. Female antennae with segments VI to IX one-third or less broader than long; III one-third longer than broad; IV and V quadrate; VI to VIII one-fourth, IX one-third, and X about one-fifth, broader than long. (See table 1.)

The two races of *compressicornis* appear to differ constantly in the degree of broadening of the antennal segments. Color differences have been constant in specimens examined, but they should be used with caution, as it is not unlikely that color will be found variable within either or both of the populations when more material is available. The color is apparently a structural phenomenon. In a liquid medium, specimens of *c. neglecta*, which are normally blue, appear green. Two specimens, one of them the holotype of the present race, relaxed in boiling methyl alcohol retained the green color after drying. It seems probable that the normal coloration was altered by fats or some other substance leached from the body by the alcohol and deposited on the integument. Specimens immersed for a few minutes in unheated alcohol returned to their original blue color when dry.

Specimens from the type locality are labeled as collected on a species of *Symphoricarpos* which is not known to occur in the Wasatch Mountains. It will be interesting to discover the host of *c. neglecta* in the latter area. A number of species of *Symphoricarpos* occur in the Wasatch range, including at least one, *S. tetonensis*, which supports another species of *Linsleya*. Because I did not decide to name the Utah race of *compressicornis* until after borrowed material had been returned, only six specimens have been designated as types.

DISTRIBUTION: Wasatch Mountains and Great Basin ranges of Utah. (See fig. 2.) Knowlton's record from Trout Creek is assigned to this race on the basis of range. It is presumed that *c. neglecta* may be found to intergrade with *c. compressicornis* in Nevada. Specimens from that state are lacking at the present time.

COLLECTION DATES: June 18 to August 10.

TYPE MATERIAL: Holotype male and allotype female from Whiskey Springs Canyon, Granite Mountain, Tooele County, Utah, June 18, 1954, *Symphoricarpos longiflorus* (E. D. Vest). Two males and two

females, designated as paratypes, are eutopotypical. Holotype and allotype in the collection of the Illinois Natural History Survey. Paratypes will be deposited in the collections of the American Museum of Natural History and R. B. Selander.

ADDITIONAL RECORDS: *Utah*: Eutopotypical, 12; North Fork, Provo Canyon (V. M. Tanner), three, August 10, [?] (T. Spalding), five; Provo, July 10, 1912 (T. Spalding), one, July 31, 1908 (T. Spalding), one; [Trout Creek (Knowlton, 1939)]. I have also examined two female specimens without locality labels in the University of Utah collection.

Linsleya (Linsleya) convexa (LeConte)

Lytta convexa LECONTE, 1853, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, p. 336. DILLON, 1952, Amer. Midland Nat., vol. 48, p. 353 (redescription).

Cantharis convexa, HORN, 1873, Proc. Amer. Phil. Soc., vol. 13, p. 115 (redescription). FALL, 1901, Trans. Amer. Ent. Soc., vol. 27, p. 300 (in key).

Linsleya convexa, SELANDER, 1954, Jour. Kansas Ent. Soc., vol. 27, p. 89 (records).

Black; elytra dark metallic blue or greenish blue. Body sometimes with a very faint bluish tinge in certain light. Length, 5.5–14 mm.

Upper surface subglabrous. Head and pronotum coarsely, sparsely punctate. Front of head occasionally with a dark red suffusion between eyes but never with a sharply defined orange spot. Antennae a little flatter on anterior surface than on posterior. Pronotum subcampanuliform, relatively flat, not at all globose; midline not impressed or faintly impressed at middle. Elytra scabro-punctate, as in *compressicornis*. Under surface sparsely pubescent, the pubescence on abdomen arising from punctures which are for the most part separated by a distance as great as or greater than the length of a single seta.

MALE: Antennal segment III two-thirds, IV to VIII about one-fifth, and IX and X one-third, longer than broad; IV to X subequal in breadth (table 1). Fore femora each with a large spinose tubercle ventrally at base. Fore tibiae lacking spurs. Fore tarsi with first segment a little swollen, thickened dorsoventrally, weakly distorted; second segment a little swollen also; pads broadened, dense, cushion-like, undivided. Middle tarsal pads dense, undivided but narrower than fore tarsal pads. First two segments of hind tarsi broadened, the ventral surface yellow-brown, flat, and entirely glabrous between ventral fringes; remaining segments normal, with divided pads. Fifth visible abdominal sternite feebly emarginate. Lateral lobes of tegmen (fig. 6) not so deeply impressed as in *suavissima* and with shorter setae laterally near apex; distal half with some short, scattered setae. Median lobe as in figure 10.

FEMALE: Antennal segment III four-fifths longer than broad; IV

TABLE 1
 PROPORTIONS OF ANTENNAL SEGMENTS (TO A TOTAL ANTENNAL LENGTH OF 1000 UNITS) OF THE
 SPECIES AND SUBSPECIES OF *Linsleya*

	<i>sphaericollis</i>		<i>californica</i>		<i>c. compressicornis</i>		<i>c. neglecta</i>		<i>comexa</i>		<i>suavissima</i>	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
I	152/75	191/84	155/71	186/74	176/88	183/97	187/80	179/75	151/58	154/67	181/73	188/77
II	54/54	67/67	39/52	48/56	55/60	65/65	62/58	66/57	50/43	49/45	44/49	58/56
III	89/75	101/67	84/58	81/60	88/99	97/75	107/84	94/71	94/58	107/58	88/68	92/72
IV	75/75	79/79	77/65	81/69	77/137	75/86	89/107	75/75	79/65	80/71	83/73	77/72
V	80/80	79/84	77/71	81/74	66/159	75/97	80/116	80/85	79/65	80/80	86/78	75/82
VI	80/80	79/89	84/71	81/77	77/187	75/118	76/124	75/94	79/68	76/80	78/78	72/89
VII	80/80	79/89	84/71	81/77	66/176	70/108	71/116	75/94	79/65	80/76	78/73	77/82
VIII	85/80	89/101	84/65	81/81	82/176	75/113	71/116	75/94	86/65	80/80	83/73	75/87
IX	80/80	89/89	90/68	81/81	77/143	65/108	71/107	71/94	86/65	89/76	83/73	77/85
X	85/80	89/98	90/65	81/81	82/143	81/108	80/107	75/90	86/65	89/80	78/73	77/87
XI	138/71	169/89	135/58	121/81	154/110	140/91	107/89	132/80	130/61	116/71	117/64	130/77

*Numerators represent length, denominators breadth. For further explanation, see Werner (1953).

to X as long as to nearly one-fifth longer than broad; IV to IX subequal in breadth (table 1). Fore and middle tarsal pads undivided but not nearly so well developed as in male; first segment of each lacking pad, entirely black-pubescent on ventral surface. First and second segments of hind tarsi not so strongly modified as in male, the ventral surface black and with some scattered black setae between ventral fringes; remaining segments as in male.

This species is easily recognized by its color. The male is further distinguished by the spinose projection on the fore femora and, normally, by the absence of the fore tibial spurs, and the female by the absence of pale pubescence on the ventral surface of the first segment of the fore and middle tarsi and the first and second segments of the hind tarsi.

Two of four males of *convexa* from Pecos, Texas, are anomalous in having a rather small, but distinct, posterior spur on the left fore tibia. All other males examined lack the fore tibial spurs completely. The significance of the occurrence of a spur in two of the males is unknown. If the spur represents a vestigial condition, then it may possibly be of phylogenetic importance. In a preceding section of this paper it was postulated that the common ancestor of *convexa* and *suavissima* had lost the posterior fore tibial spur, as it is this spur which is absent in *suavissima*. The present anomaly might suggest, however, that the last spur lost in the evolution of *convexa* was the posterior one, in which case it must be concluded that the loss of spurs in *convexa* and *suavissima* took place independently. However, there seems to be no particular reason to believe that the vestigial occurrence of one of a pair of structures necessarily indicates the order of their loss in the evolutionary history of a species. Furthermore, because the female of *convexa* retains both spurs intact, there is a very good possibility that the presence of a spur in the two males in question is the result of a developmental anomaly associated with sex determination and is therefore of no significance phylogenetically. Whatever the true significance of the anomaly, there would seem to be no reason to change the phylogenetic tree proposed above.

In Chihuahua I found *convexa* feeding on an unidentified plant or running over the ground among mesquite (*Prosopis*) bushes in much the same manner as some of the eupomphine meloids. Near Valentine, Texas, specimens were collected on *Baileya* and *Solanum* growing together at roadside. These and other host plant records are listed below.

Fall's (1901) record of *convexa* from Colorado is highly questionable. A remark made in the same paper (p. 295) would indicate that Fall had not seen specimens of the species, and I have been unable to find a basis for his record in the literature.

DISTRIBUTION: Chihuahua and southern New Mexico to central Texas. (See fig. 2.)

COLLECTION DATES: June 5 to October 17.

RECORDS: *Chihuahua*: Seven miles north of Chihuahua, July 22, 1952 (R. B. and J. M. Selander), six; 2 miles north of Sueco, July 22, 1952 (R. B. and J. M. Selander), 10; 54 miles south of Sueco, July 22, 1952 (R. B. and J. M. Selander), one. *New Mexico*: Five miles east of Carlsbad, August 14, 1950, *Tribulus terrestris* (J. W. MacSwain), six; 5 miles west of Carlsbad, August 14 and 15, 1950 (J. W. MacSwain), 200; 23 miles west of Lordsburg, August 19, 1953 (R. B. and J. M. Selander), four; Roswell, August, three; White City, June 20, 1948 (M. Cazier), two. *Texas*: Albany, June 8, 1950 (V. M. Potts), one; [El Paso (Dillon, 1952)]; Fort Stockton, June 6, 1937 (R. H. Crandall), five; 25 miles west of Fort Stockton, August 5, 1941 (W. F. Barr), eight; Hot Springs, Big Bend, July 10, 1938 (R. H. Beamer), one; 9 miles east of Junction, 1700 feet, October 1, 1950 (W. J. Gertsch and M. Cazier), one; [Marathon (Dillon, 1952)]; Marfa, 4600–4800 feet, July 3, [?] (Wickham), two, June 5, 1908 (Mitchell and Cushman), one; Pecos, June 19, 1947 (A. T. McClay), nine; Presidio, October 17, 1929 (R. H. Crandall), one, August 17, 1945, on *Viguiera stenoloba* (J. R. Russell), one, October 9, 1944, on *Aplopappus spinulosus* foliage, four, September 27, 1944, with mixed weeds and grass, two, September 9, 1928 (W. L. Owen, Jr.), one; $\frac{1}{4}$ mile south of Valentine, August 18, 1953, *Solanum elaeagnifolium* and *Baileya multiradiata* (R. B. and J. M. Selander), 48.

TYPE LOCALITY: Concerning the source of the type of *convexa*, LeConte (1853) gave the following information: "Mexican Boundary Commission; collected by Mr. Clark, under Col. J. D. Graham." It is likely, although not certain, that the type locality is along the Texas-Mexico border. Type presumably in LeConte collection, Museum of Comparative Zoölogy.

Linsleya (Linsleya) suavissima (Wellman)

Cantharis gentilis HORN, 1883, Trans. Amer. Ent. Soc., vol. 10, p. 311. CHAMPION, 1891–1893, Biologia Centrali-Americana, Coleoptera, vol. 4, pt. 2, pp. 448, 464, pl. 21, fig. 25 (redescription). FALL, 1901, Trans. Amer. Ent. Soc., vol. 27, p. 298 (in key).

Lytta suavissima WELLMAN, 1910, Deutsche Ent. Zeitschr., p. 24. VAURIE, 1950, Amer. Mus. Novitates, no. 1477, p. 45 (synonymy). New name for *Cantharis gentilis* Horn, not *Cantharis flavipes* var. *gentilis* Frivaldsky, 1877, Termesz. Füz., vol. 1, p. 136.

Black, without metallic luster. Length, 18–23 mm.

Head finely, sparsely punctate at center of vertex, moderately densely punctate and clothed with long, semi-erect pubescence elsewhere. Pronotum with a glabrous or very sparsely pubescent area at center of disk; elsewhere moderately densely punctate and clothed with long pubescence. General aspect of head and pronotum hairy. Front of head between eyes with a diamond-shaped orange spot. Antennae not noticeably flatter on anterior surface than on posterior. Pronotum with a shallow fovea on each side at middle; midline not impressed or faintly impressed before middle; disk transversely impressed before middle and at base; sides weakly divergent and nearly straight for basal two-thirds, then strongly convergent. Elytra very finely punctate, nearly smooth, with some long, suberect setae basally and along suture and with scattered short, recumbent setae elsewhere. Thoracic sternum very densely clothed with long pubescence. Abdominal sternum with longer pubescence than in other species, arising from punctures which are separated by a distance less than half of the length of a single seta.

MALE: Antennal segment III from one-fourth to two-fifths longer than broad; IV to X as long as to a little more than one-tenth longer than broad; VI to X equal in breadth (fig. 11; table 1). Fore tibiae each with a single spur, the posterior spur absent. Fore tarsi with first three segments moderately swollen; pads broadened, dense, cushion-like, undivided. Middle tarsal pads similar to those of fore tarsi but narrower. Hind tarsal pads similar to those of middle tarsi but still narrower; first segment lacking pad, with some black setae between ventral fringes. Fifth visible abdominal sternite feebly emarginate; sixth sharply impressed along hind margin. Lateral lobes of tegmen (fig. 7) strongly impressed and with a tuft of long setae laterally near apex; distal half with some short, scattered setae. Median lobe as in figure 8, most similar to that of *convexa*.

FEMALE: Antennal segment III about one-fourth, IV one-tenth, longer than broad; V to X one-tenth to one-fourth broader than long; V to X subequal in breadth (table 1). Fore tibiae with posterior spur more strongly curved than in other species. Fore and middle tarsal pads dense, cushion-like, and undivided but smaller than in male; first segment of middle tarsi lacking pad, with some black setae between ventral fringes. Hind tarsi as in male.

This unusual, large species is easily distinguished from other members of the genus by almost any of the characters mentioned in the preceding description except color. Selander (1954) erred in stating that the male fore tibiae have two spurs. The next-to-last statement in his key to the Mexican species of *Linsleya* should read: "fore tibiae of male each with one spiniform spur."

Nothing is known of the biology of *suavissima* except that it is a desert form with a relatively late seasonal distribution for the adult stage.

Champion's record of a pair of specimens from Canelas, Durango, is the only published notice of the occurrence of *suavissima* in Mexico. Canelas is located in the extreme west central part of the state of Durango. A specimen of *suavissima* in the collection of the Chapingo Laboratory of the Rockefeller Foundation in Mexico from Francisco Madero, Durango, extends the known range of the species nearly 150 miles east-southeastward. A specimen in the British Museum (Natural History) collection is labeled "Truqui, Mexico," but I have been unable to find such a locality. From the distribution of other species of Meloidae similarly labeled, I would surmise that Truqui is in southern Mexico, which means that the specimen in question may represent an even greater extension of the known range of *suavissima*.

DISTRIBUTION: Arizona and southwestern New Mexico southward at least as far as central Durango. (See fig. 2.)

COLLECTION DATES: August 26 to December 7.

RECORDS: *Arizona*: No precise data, 11; Aubry Valley, September 11, 1934 (E. D. Ball), one; Douglas, September, 1930 (W. W. Jones), 15, October 9, 1935 (W. W. Jones), six; 8 miles south of Fry, 4725 feet, August 26, 1950 (T. Cohn, P. Boone, and M. Cazier), two; Huachuca Mountains, September 21, 1936 (R. H. Crandall), one; Lochiel, 4700 feet, September 6, 1950, one; McNeal, 4100 feet, September 13, 1950 (W. Gertsch and M. Cazier), one; Patagonia, September 8, 1949 (J. W. Tilden), one; Pima County, October 9, 1925 (F. T. Bingham), one; 61 Ranch, 4000 feet, 15 miles southeast of Ruby, September 6, 1950 (T. Cohn, P. Boone, and M. Cazier), two; Reef, Cochise County (not located), October 20, 1904, two; Santa Rita Mountains, September 30, 1939 (E. C. Marshall), two, September 27 and 29, 1939 (R. H. Crandall), 16, December 7, 1935 (R. A. Flock), six; Willcox, October 25, 1935 (E. D. Ball), one; 1 mile east of Willcox, 4100 feet, September 8, 1950 (T. Cohn, P. Boone, and M. Cazier), one. *Durango*: [Canelas (Champion, 1891-1893)]; Francisco Madero, September 7, 1951 (J. J. McKelvey), one. *New Mexico*: Rodeo, September 4, 1937, one. *Mexico (state unknown)*: Truqui, Fry collection, 1905-1900, one.

TYPE LOCALITY: Arizona or New Mexico. Type presumably in Horn collection, Academy of Natural Sciences of Philadelphia.

ACKNOWLEDGMENTS

I am indebted to Drs. H. H. Ross and G. F. Edmunds, Jr., for use of the facilities of the Section of Faunistic Surveys, Illinois Natural History

Survey, and the Laboratory of Aquatic Zoology, University of Utah, respectively, during this study. For the loan of material from either their personal collections or collections in their care, or both, I wish to acknowledge gratefully the assistance of Mrs. P. Vaurie, Miss C. M. F. von Hayek, Messrs. R. H. Crandall, W. R. Enns, H. B. Leech, R. R. Lejeune, A. T. McClay, and R. L. Wenzel, and of Drs. W. H. Anderson, D. Barnes, W. F. Barr, E. C. Becker, G. E. Butler, Jr., M. A. Cazier, H. E. Cott, H. Dietrich, L. S. Dillon, W. P. Hayes, P. D. Hurd, Jr., G. F. Knowlton, J. W. MacSwain, C. D. Michener, V. D. Roth, M. W. Sanderson, V. M. Tanner, J. W. Tilden, and G. Wallace.

Finally, I would like to thank Drs. Cott and F. G. Werner for gifts of specimens and Drs. Barr and Becker for aid in locating several place names.

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