A REVISION OF THE GENUS *LEBIA* LATREILLE IN AMERICA NORTH OF MEXICO (COLEOPTERA, CARABIDAE)

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Within the genus Lebia *in America north of Mexico four subgenera and 47 species are recognized as valid. The genus is defined in a broad sense to include several New World groups recognized as distinct genera by some workers. This concept of* Lebia *is supported with morphological and limited biological evidence. It is also shown that in this sense* Lebia *encompasses many exotic groups recognized as distinct genera at the present time.*

A key to the subgenera and species is given. Each subgenus and species is described and synonyms are listed. The distribution of each species is presented by locality records and for those species with extensive ranges distribution maps are given. Structures important in identification, especially the endophallic armature of the male genitalia, are illustrated.

The subgenus Loxopeza *includes eight species of which three,* deceptrix, subdola, *and* subgrandis, *are described as new. Five names are reduced to synonymy.*

The subgenus Polycheloma *is described as new. The name of its single species,* lecontei, *is a replacement for an invalid homonym.*

The subgenus Lebia *includes 37 species of which four,* nigricapitata, abdita, insulata, *and* perpallida *are described as new. Forty-nine species group names are relegated to synonymy.*

Phylogenetic relationships are postulated for these subgenera and species.

The genus *Lebia* is a group of ground beetles almost world wide in distribution, comprising several hundred species. The species are usually colorful and range from about 2.5 to 14 mm in length. Although the majority of species occur in the tropical regions a large number occur in temperate areas. Very few extend into the far north. The adults are predaceous and the larvae, as far as is known, are parasitoids on the immature stages of chrysomelid beetles. However, even though they may be beneficial, nothing is known about the biology of the vast majority of the species.

This study deals with the taxonomy of the adults of *Lebia* occurring in America north of Mexico. The concept of this group of species as constituting a single genus is upheld, thus agreeing with most North American students of *Lebia* but opposing the view of many workers in other parts of the world. The various populations of North American *Lebia* are reevaluated in the light of the currently accepted concept of species as outlined by Simpson (1961). Forty-seven species are recognized, seven of which are described as new. This compares with 94 species listed from the area under study by Csiki (1932) in Coleopterorum Catalogus. These 47 species are arranged in four subgenera, one of which is new. A phylogeny of the species within these subgenera is presented.

HISTORICAL SUMMARY

The concept of the genus *Lebia* has undergone considerable modification since its description by Latreille in 1802. Although segregates from *Lebia* were recognized at an early date (*Lamprias* Bonelli 1809, *Echimuthus* Leach 1815 (= *Lamprias*) these were almost completely ignored in the nomenclature of North American *Lebia*. A few American *Lebia* were placed by Motschoulsky under the generic names *Lamprias* and *Lia*. It was not until Chaudoir (1870-71) produced his Monographie des Lebiides that the classification of our species was seriously changed. Of the many genera into which *Lebia* was split by Chaudoir, four (*Lebia* Latreille, *Loxopeza* Chaudoir, *Aphelogenia* Chaudoir and *Dianchomena* Chaudoir) were recognized as occurring in America north of Mexico. Later, *Lamprias*, as understood by Chaudoir, was added to this list when Horn (1882) recognized *Lebia divisa* as a member of that group. Previously Chaudoir (1870-71) and Horn (1872) were uncertain of the generic affinities of *divisa*. *Metabola* Chaudoir was found to occur here also when Bates described *Metabola vivida* from Sonora and Arizona. Horn (1872) recognized Chaudoir's genera as valid but later (1882) thought it best to regard them as subgenera. Since then the opinion of Horn has been followed by some workers while others have recognized some of the segregates of Chaudoir as being generically valid. Thus Casey (1920) recognized *Lebia*, *Loxopeza*, and *Dianchomena* but not *Aphelogenia*; Bradley (1930) recognized *Lebia* and *Dianchomena* and not the others.

The first two species of *Lebia* in America north of Mexico to be described were *vittatus* Fabricius 1776 and *bivittatus* Fabricius 1798, both under the generic name *Carabus*. Say (1825) described four species of *Lebia* although one of these (*ornata*) was known to Melsheimer under the name *quadrinotatus*, a *nomen nudum*. Following Say North American species of *Lebia* were described by many workers, most notably by Dejean, LeConte, Chaudoir, Horn, Bates, and Casey. All the known species of *Lebia* in the United States east of the Rocky Mountains were listed by LeConte (1848). He recognized 23 species. In 1872, the year after Chaudoir had finished his monograph of the known species of the world, Horn gave a revision of the American species. Horn's key was the last dealing with all the known American species. Although most species recognized in this study were described from the area north of Mexico, a number of species with predominantly southern distributions were originally described from Mexico by Chevrolat or Bates. In the twentieth century the taxonomy of *Lebia* was seriously complicated when T. L. Casey described many new species, most of which have turned out to be synonyms, and recognized as distinct many forms previously regarded as having no taxonomic validity. The last species to be described in our area was *Malaena* Hatch, 1953.

BIOLOGY

Information is available on the life cycle and immature stages of very few species of *Lebia*. Silvestri (1904) described the life cycle of

Lebia scapularis Fourcroy in Europe and Chaboussou (1939) that of the North American *Lebia grandis* Hentz. Lindroth (1954) described larvae of the European *Lebia chlorocephala* Hoffman. These three species in their larval stages attack the pupating larvae and pupae of chrysomelid beetles. Possibly this is a habit of all species of *Lebia*. Accompanying this mode of feeding there has been a striking hypermetamorphosis developed. The following brief account of the life cycle is based upon that of *grandis* with differences from the other two species noted where these are known.

Eggs are laid singly in the soil and, being covered with a sticky secretion of the accessory glands, are camouflaged by the particles of dirt sticking to them. The soil must be moist as the eggs are quite susceptible to desiccation. At 250 C the eggs hatch in 11 to 12 days. Chaboussou found that in one case two pairs of *grandis* produced 2600 larvae even though one of the females died prematurely.

When the larvae hatch out they look like typical carabid larvae about 3 to 4 mm long in *grandis*, with well developed legs, mouth parts, and body sclerites. In both *grandis* and *chlorocephala* the tergal sclerites are entire while in *scapularis* they are divided. This first active stage then seeks out in the soil the pupating larvae and pupae of its host (for *grandis* - *Leptinotarsa decemlineata*, for *chlorocephala* - *Chrysolina varians* and for *scapularis* - *Galerucella luteola*). After feeding on the host chrysomelid the first instar larva becomes greatly distended and has only weak powers of locomotion. In nature it would thus probably feed only on a single larva or pupa although in laboratory studies Lindroth was able to feed the larva of *chlorocephala* as many as four host larvae or pupae. In *grandis* and *chlorocephala* the first instar then molts to the second instar. In *scapularis* the first instar larva before molting spins a cocoon from silk secreted by the malpighian tubules. The second instar larva differs in appearance from the first in that the appendages are all reduced and the body sclerites are lacking. The second instar larva does not feed. It molts to fourth pupal stage in *grandis* and *chlorocephala*, but in *scapularis* the second instar larva molts into a form termed the "prepupa" by Silvestri. This "prepupa" has the pupal characteristics but an abdomen of 10 segments. The "prepupa" then molts to the true pupa. In *grandis* development from eclosion to emergence of the adult requires 15 to 20 days at 25 C.

The adult beetles are nocturnal and predaceous. Adults of *scapularis* pass the winter at the base of plants and in the spring seek out and feed upon the eggs and larvae of their host chrysomelid. After becoming sexually mature they lay their eggs. Adults from this first generation emerge in mid July and from these a second generation develops, the adults of which hibernate.

In addition to *grandis* several other species of North American *Lebia* as adults have been found to feed on chrysomelids although nothing is known about the larvae. Cushman and Isely (1916) found that in confinement individuals of *Lebia fuscata* (called *ornata* by them) would readily attack callow adults and pupae of the cherry leaf beetle *Galerucella cavicollis* (LeC). Isely (1920) found that adults of *L. viridis* fed upon eggs, larvae and pupae of the grape vine flea beetles *Altica chalybea* Ill. and *A. woodsi* Isely. Also, Isely found that adult *L. ornata* "fed upon pupae and prepupae of the flea beetles in confinement".

TAXONOMIC CHARACTERS OF ADULTS

Color

Color and especially color pattern are very important in the identification and classification of the species of *Lebia* and are used both to unite species into major groups and to separate some of the closely related species. There are three groups of colors found in *Lebia*: pale colors (usually some shade of yellow or orange), metallic colors (usually blue or green), and dark colors (usually black or brownish). The intermediate condition between dark and pale is termed infuscated. In the descriptions color is described by these terms (pale, dark, infuscated, or metallic) with the actual color often noted in parentheses as well. By using this scheme of nomenclature it is not necessary to describe the variation within a color group. Metallic colors are readily recognized as being such and dark and pale colors, in any one species, are usually quite distinct.

External Morphology

In *Lebia* there are few external morphological characters of much use for taxonomic purposes. Usually those available are difficult to interpret and are often applicable to only a few species. However, these are used in the identification of the species whenever possible.

In the descriptions the term "mouth parts" refers not only to the mandibles, maxillae, and the labium but also to the labrum and to the gula. The epilobes of the mentum are triangular flaps on the mesal side of the lateral lobes of the mentum (fig. 1). They are said to be present or absent. However, Horn (1881, 1882) pointed out that the epilobes are actually always present and when stated to be absent are really just reduced. The epilobes, along with the tooth on the mentum, were used more extensively in previous treatments of *Lebia* than they are here. These structures are usually difficult to see and are mentioned only when necessary.

The neck region behind the eyes is usually moderately constricted in *Lebia* (fig. 2). However, in three species it is very strongly constricted (fig. 3) and there is a strong sulcus across the neck in front of the occipital suture.

In previous works on *Lebia* the shape of the pronotum was described in detail, but this is not done here. The differences between species are usually slight, the variation within a species is often extensive, and better characters are available elsewhere for identification. Illustrations of the pronotum are presented only for those species in which the pronotum is not the typical transverse shape (fig. 6).

The wings of *Lebia* (fig. 13) show several useful characters which in a few species allow reliable identifications to be made of either sex where otherwise only males could be identified by an examination of the endophallic armature. To examine the wings the beetle was relaxed in near boiling water, the left elytron was then raised, and the left wing broken off at the base with a fine pair of forceps. This wing was first studied in water and then flattened out and glued on a card to be pinned beneath the specimen. It could subsequently be studied on the card.

The veins are named (fig. 13) according to the system of Balfour-Browne (1943). This system is preferred to that of Forbes (1922) because in respect to the cubital and anal veins (which are of taxonomic importance in *Lebia*) it is in better agreement with the homologies based upon the axillary sclerites as outlined by Snodgrass (1935). According to Snodgrass the first anal vein (called postcubitus) in winged insects is usually more closely associated with the base of the cubitus than with the third axillary sclerite and the rest of the anals but in Neuroptera, Mecoptera and Trichoptera it is grouped with the other anal veins. As the Coleoptera are related to the Neuroptera probably the first anal vein in beetles is also associated with the third axillary sclerite. On this assumption the first anal vein in the Coleoptera is the vein which Forbes called $2A_3$. Forbes' 1A plus the branches $2A_1$ and $2A_2$ are considered here as branches of Cu_2.

The apical pinch of the elytron is a narrow flattened area along the suture at the apex. This pinch is usually well developed (fig. 10) but in two species, *bivittata* and *bilineata*, it is much reduced.

The basal ridge of the elytron is an extension of the lateral ridge of the elytral disc across the base. If complete it extends across the grooves on either side of the scutellum (here termed the parascutellar grooves); if incomplete it ends at the brow of the groove. Some specimens of species in which the basal ridge is typically complete lack it but the opposite is never true as far as I know.

The lateral lobes of the abdominal sterna are shallow lateral extensions of the posterior margins of the sterna, best developed on the fourth and fifth segments. The central part of the posterior margin, flanked by the lateral lobes, is referred to as the central trough (figs. 11, 12).

Male Genitalia

Both the endophallic armature and the apex of the median lobe afford taxonomic characters for the recognition of the species of *Lebia*. In most species recognized in this study the armature of the endophallus is distinctive. The shape of the apex of the median lobe is of diagnostic value in a few species. Most species can be identified by external characters alone but, in a few, reliable identification can be made only from the male genitalia.

For the study of the endophallus the genitalia were removed from a male beetle. The genitalia were then cleared in a hot 10% solution of potassium hydroxide for about one minute. For small specimens 30 to 40 seconds was often enough while for large specimens a couple of minutes were required. After treatment with the KOH the genital structures were washed in water. The endophallus could usually be everted by squeezing the median lobe beginning at the base and progressing towards the apex. It was usually necessary to complete the eversion by inserting a hooked minuten needle into the endophallus to catch the tip and pull it out. In specimens stored in alcohol before mounting the endophallus could not be everted (it usually tore). This could be remedied by boiling the cleared genitalia in a soapy solution for 10 to 15 minutes, after which eversion could be accomplished in the usual way. The genital structures

were stored in glycerine in a microvial, or glued on a small card, on the pin beneath the beetle from which they were extracted.

Measurements

In a few instances measurements are useful for specific identification of species or for the analysis of intraspecific variation. Because total length could not be measured satisfactorily and conveniently relative size has been indicated by length of the elytra as measured from the base of the humeral area to the apex. The range in length was obtained from all specimens available while the mean elytral length for each species was calculated from measurements made on a sample of 20 to 30 specimens (when available). This sample included the largest and smallest specimens. To avoid bias as much as possible specimens to be measured were not picked individually but rather were picked in groups (usually two or three rows of specimens in a unit tray). Width of the pronotum was measured at the widest point and length was measured along the midline. All measurements were made with a ruled eyepiece in a stereoscopic microscope to the nearest half unit. At 25_X, used for measurements under 4.8 mm, one unit is 0.04 mm; at 12_X, used for measurements over 4.8 mm, one unit is 0.08 mm.

Illustrations and Maps

The drawings were made with the aid of an ocular grid in a stereoscopic microscope. In the illustrations of the endophallus little importance should be placed on indications of wrinkles, bulges and folds in the endophallus except in a few cases which are noted in the descriptions. For each species the everted endophallus has been drawn in the most appropriate of four views to show the armature. These have been termed apical, abapical, left and right views according to the position of the apex of the median lobe when the median lobe is towards the top of the drawing and the endophallus towards the bottom. In an apical view the apex of the median lobe is in front of the endophallus (fig. 66); in an abapical view, the opposite, the apex is hidden behind the endophallus (fig. 67). In a left view the apex is to the left of the drawing and in a right view the apex is to the right (figs. 64, 65). Using this nomenclature the endophallus of a dissected specimen can be oriented with the drawings. For the species of the subgenus *Loxopeza* where the endophallic armature is very complex the endophallus has been drawn as if slit down the abapical side and spread out. This allows for ready comparisons between species. For the same purpose the groups of spines have been numbered as in fig. 50. In all the other species the endophallus was drawn whole in one or more of the four positions listed above. The simpler armature of these does not require any nomenclatural system for the various groups of spines.

Distribution maps are given for all species except those with very restricted ranges. On the maps dots are not placed for all records available (all records are listed separately) but rather only enough to show the limits of distribution as I know them and to fill out the range. Dots represent counties or more restricted localities; stars are used when only a state locality is available on the label.

In the lists of localities given for each species counties, if not given, have been added where possible except for localities in Canada where counties are not consistently used. In addition, no counties have been given for non-restricted localities which are in two or more counties (mountain ranges, large lakes, national parks) unless this information is given on the label.

Recognition of Males and Females

As the male genitalia play an integral part in the identification of at least some of the species of *Lebia*, it is important to be able to distinguish between male and female specimens. Several characters facilitate this. Males of all species have a preapical notch on the inner side of the mesotibia (fig. 16), have a double row of papillate hairs on the underside of the first three protarsal segments (fig. 18), and lack the pair of inwardly placed setae on the apical abdominal sternum (fig. 11). Females lack both the preapical notch on the mesotibiae and the papillate hairs on the underside of the protarsi, but have a pair of more inwardly set setae on the apical abdominal sternum (fig. 12). In addition, males of the subgenus *Loxopeza* have the first three protarsal segments obliquely dilated mesad (fig. 17) while in the females these segments are normal. In most males the circumgenital ring protrudes from the end of the abdomen.

Of the three characters applying to the whole genus the presence or absence of the preapical notch on the mesotibia is the easiest to use as the apex of the mesotibia is usually visible in pinned specimens. The undersurfaces of the protarsi are often folded close to the body and cannot be seen without relaxing the specimen. The long setae on the last abdominal sternum may be broken off leaving only small foveae. The arrangement is then more difficult to discern. There is some variation in the number of setae but this variation occurs only in the row common to both male and female and the seta which indicates a female is always present in this sex.

Synonymy

Several points in the specific synonymies need to be clarified. Subgenera where used by an author are indicated in parentheses. If an author made no distinction between varieties and subspecies then varietal names are listed as being subspecific. Otherwise they are not listed at all. Type localities have been determined from the descriptions only and may be more restricted on the label of the type specimen. Names of journals are abbreviated according to the World List of Scientific Periodicals, third edition.

Criteria for Species and Subspecies

Following the currently accepted definition, species are "groups of actually or potentially interbreeding natural populations, which are reproductively isolated from other such groups" (Simpson 1961). In museum specimens the evidence on which reproductive isolation is judged is necessarily based on morphological and geographical characters. Two forms were regarded as specifically distinct if they overlapped geographically and did not intergrade in the area of overlap in at least one mor-

phological character. Sympatric forms differing only in color were considered conspecific. Sympatric forms which differed slightly in morphology (and usually in color) but which tended to intergrade could be either distinct species or polymorphic variants. In these cases the reasons for the decision made are given in the discussion under the species concerned.

Allopatric forms were regarded as conspecific if there were intermediate forms in the intermediate geographical area or if the geographically nearest specimens approached each other in their distinguishing characters. Allopatric forms not covered by the above statement were regarded as specifically distinct if they differed in morphological or color characters to the same extent as or more than other good species did; or conspecific if they did not.

No subspecies have been recognized in this study. Intraspecific variation is described and where possible clines are pointed out.

TAXONOMY

Genus *Lebia* Latreille

Description

Small to medium sized beetles. Color various and varied.

Head. Prognathous, slightly drooping; eyes usually prominent. Labrum more or less truncate, with six setae across anterior margin. Clypeus with a single seta on each side. Frons with or without sculpture; with two supraorbital setae above each eye. Mandibles moderately prominent and with a distinct scrobe; labium with postmentum divided into a mentum and a submentum; mentum with or without epilobes and a tooth; ligula with paraglossae short and usually not extending beyond glossae; palpi cylindrical, pointed or truncate apically, penultimate segment of labial palpus usually bisetose. Antennae usually with segments one to three and basal third of segment four glabrous; extending back to basal third or fourth of elytra. Neck usually moderately constricted, sometimes strongly so, rarely rather stout.

Prothorax. Pronotum usually distinctly transverse in shape and always with a basal lobe; lateral margins usually widened basally, occasionally narrow throughout, with a seta just anterior to middle and at basal corner; disc with variable sculpture.

Pterothorax. Wings fully developed; oblongum cell often reduced; second branch of cubitus not forked. Metepimeron narrow.

Elytra. Apex obliquely truncate and usually slightly sinuate. Disc usually somewhat flattened, with nine striae (usually distinct) and a scutellar stria; intervals flat to strongly convex, third interval with two dorsal punctures next to third stria; ninth interval with a series of umbilicate punctures, with one puncture at the outer apical corner set inward and forming a jog in the series; base of disc with a strong groove on each side of the scutellum; basal ridge complete or incomplete; apical pinch usually large and well developed, rarely small.

Legs. Protibiae with or without an upper spur. Mesotibiae of males with a preapical notch on inner side, rarely more than one. Fourth

tarsal segment of hind tarsus emarginate or bilobed. Tarsal claws always pectinate.

Abdomen. Venter with segments bearing shallow lateral lobes along posterior margins. Pygidium with a mid-longitudinal keel.

Male genitalia. Parameres small, right smaller than left. Median lobe with shape of apex various. Endophallus usually armed.

Discussion

Since its recognition the genus *Lebia* has undergone extensive modification, first by the splitting off of the more distinctive groups into separate genera and then by the absorption of some of these genera back again as subgenera. Chaudoir (1870-71) recognized on a world basis 22 genera (most of which had their species originally described as *Lebia*) as belonging to his group Lebiides and additional genera have since been described. At the present time there is no generally accepted definition of *Lebia*. While this taxon certainly does not include all the genera which have been placed near it, it does seem to include many of them. For the North American species the following seven characters, when taken as a group, are regarded as being diagnostic and separate *Lebia* clearly from the other lebiine genera in our fauna.

1. Pronotum lobed at base (fig. 5-9)
2. One umbilical puncture at outer apical corner of elytra set in, thus forming a jog in the series (fig. 10)
3. Elytra "pinched" along the suture at the apex (fig. 10)
4. Pygidium (seventh abdominal tergum) with a weak midlongitudinal carina
5. Abdominal sterna with shallow lateral lobes (figs. 11, 12)
6. Vein Cu_2 not forked (fig. 13)
7. Males with a preapical notch on inside of mesotibiae (fig. 16)

In addition all species are probably parasitoids of chrysomelid leaf beetles.

Included with *Lebia* s.s. in this study, either as subgenera or synonyms, are the following groups: *Aphelogenia* Chaudoir, *Dianchomena* Chaudoir, *Lamprias* Bonelli, *Loxopeza* Chaudoir, and *Metabola* Chaudoir.

Of the many exotic groups placed near *Lebia* , *Lia* Eschscholtz and *Lachnolebia* Maindron have been seen and found to possess all seven of the characters set down for *Lebia*. In addition G. E. Ball has kindly checked examples in several European museums of most genera near *Lebia* for the above characters except the fifth and sixth. The following groups possess all five: *Cymatographa* Chaudoir, *Ectomomesa* Chaudoir, *Grammica* Chaudoir, *Helcosopha* Chaudoir, *Hemicycla* Chaudoir, *Lebidema* Motschoulsky, *Metalebia* Jeannel, *Nematopeza* Chaudoir, *Orthobasis* Chaudoir, *Poecilostola* Chaudoir, *Poecilothais* Maindron and *Promecochila* Chaudoir. Four groups, *Lebistinida* Peringuey, *Rhopalostyla* Chaudoir, *Scythropa* Chaudoir and *Stephana* Chaudoir, possess the first four of the above characters but as the specimens available were females the seventh character could not be checked. In the species checked of *Pachylebia* Jeannel, *Lebistina* Motschoulsky and *Diacoptodera* Alluaud the first four characters were present but males lacked the preapical notch in the mesotibiae. I have seen one specimen of *Lebistina* (a male) which had a series of very shallow preapical notches on the

mesotibia. The loss (or reduction) of this character in these groups is probably secondary. In the examples of *Liopeza* Chaudoir and *Lionedya* Chaudoir the abdomen could not be seen to check the pygidial keel but otherwise they were like *Lebia* as far as could be checked. All of the above groups are probably *Lebia* as here defined. *Arsinoe* Castelnau, *Dromiotes* Jeannel, *Lebiomorpha* Muller, *Paralebia* Peringuey and *Scalidion* Schmidt-Goebel are probably not *Lebia*. *Aristolebia* Bates, *Daer* A.Semenov and Znojko and *Metabele* Peringuey were not seen.

Key to the subgenera and species of *Lebia* in America north of Mexico

1 Upper protibial spur present 2
Upper protibial spur absent ..... subgenus *LEBIA* 11

2(1) Frons and pronotum with many coarse setiferous punctures; elytral disc metallic with the basal third pale ..... subgenus *LAMPRIAS divisa* LeC., p. 165
Frons and pronotum without coarse setiferous punctures; elytral disc either entirely metallic or entirely pale 3

3(2) Elytral disc entirely pale; proepisternum with longitudinal wrinkles..... subgenus *POLYCHELOMA lecontei* new name, p. 164
Elytral disc entirely metallic; proepisternum smooth ..... subgenus *LOXOPEZA* 4

4(3) Frons dark (usually black) 5
Frons pale 6

5(4) Palpi and antennae pale; distribution - eastern half of United States and adjacent Canada (fig. 126) .....*tricolor* Say, p. 156
Palpi and usually antennal segments 4 to 11 dark; distribution - western half of United States and adjacent Canada except west coast (fig. 141) ..... *atriceps* LeC., p. 155

6(4) Palpi and usually antennal segments 4 to 11 dark; distribution - eastern two thirds of United States and adjacent Canada (fig. 117) ..... *atriventris* Say, p. 153
Palpi and antennae pale; distribution - eastern United States and adjacent Canada, in the southwest to Arizona 7

7 (6) Elytral intervals strongly convex; elytral disc a dull green, sometimes almost black; distribution - southeastern Arizona.. .....*pimalis* (Csy.), p. 159
Elytral intervals at most moderately convex; elytral coloration variable 8

8(7) Anal margin of wing just distad of vein $3A_2$ with sclerotized patch strongly arched (fig. 14); armature of male endophallus as in figs. 57, 58; distribution - eastern United States and in south to Arizona 9
Anal margin of wing with sclerotized patch weakly arched (fig. 15); armature of male endophallus as in figs. 54, 55; distribution - western Texas to Arizona 10

9(8) Distribution - eastern United States and adjacent Canada, in the south possibly as far west as Davis Mountains, Texas; Texas specimens with the third group on the endophallus large (fig. 58) ..... *grandis* Hentz, p. 161
Distribution - western Texas to Arizona; third group of spines

on the endophallus small (fig. 57) ..... *subgrandis*, n. sp., p. 160

10(8) Length of elytra 3.80 to 4.68 mm..... *subdola* n. sp., p. 157
Length of elytra 6.13 to 7.33 mm..... *deceptrix* n. sp., p. 158

11(1) Elytral disc metallic with pale fasciae 12
Elytral disc entirely metallic, entirely dark, or dark with pale markings 13

12(11) Frons with coarse punctures and short erect hairs (best seen in lateral view); third antennal segment distinctly hairy ..... *pulchella* Dej. (in part), p. 167
Frons without coarse punctures and short erect hairs; third antennal segment with only a few scattered short hairs in addition to the long distal hairs..... *bitaeniata* Chev., p. 171

13(11) Elytral disc metallic (either blue or green) and pronotum pale 14
Elytral disc dark, dark with pale markings or metallic but when metallic, pronotum is dark 21

14(13) Pronotal margins narrow throughout (fig. 8) neck strongly constricted ..... *abdominalis* Chd., p. 198
Pronotal margins widened basally; neck not strongly constricted 15

15(14) Head metallic (blue or green); femora dark distally ..... *viridipennis* Dej., p. 170
Head dark or pale but not metallic; femora entirely dark or pale 16

16(15) Basal ridge of elytra incomplete; distribution - Florida ..... *lecta* Horn, p. 213
Basal ridge of elytra usually complete; distribution - not in Florida 17

17(16) Pterothoracic sclerites dark like abdomen; head dark (usually black, reddish black in Montana, Alberta, and Saskatchewan specimens) ..... *cyanipennis* Dej. (in part), p. 176
Pterothoracic sclerites pale (except sometimes metepisternum), contrasting with color of abdomen; head pale 18

18(17) Fourth segment of hind tarsus bilobed; distribution - southeastern Texas or northeastern United States and adjacent Canada (fig. 138) 19
Fourth segment of hind tarsus emarginate; distribution - southwestern Texas to southern California 20

19(18) Distribution - southeastern Texas; armature of male endophallus as in figs. 66, 67 ..... *rufopleura* Schfr., p. 172
Distribution - northeastern United States and adjacent Canada; armature of male endophallus as in fig. 71. *pleuritica* LeC., p. 173

20(18) Metepisternum usually pale, occasionally dark; elytral intervals usually moderately convex; microsculpture of frons usually distinct ..... *tuckeri* (Csy.), p. 174
Metepisternum infuscated; elytral intervals flat or weakly convex; microsculpture of frons lacking or indistinct ..... *arizonica* Schfr., p. 175

21(13) Head, pronotal disc and entire elytral disc either dark or metallic 22

Elytral disc usually maculate, if entirely dark then pronotum pale 27

22(21) Pronotum bicolored, lateral margins pale and disc dark ..... *marginicollis* Dej., p. 180

Pronotum entirely dark, at most with tinges of red at sides..... 23

23(22) Frons with strong punctation and short erect hairs (the latter best seen in lateral view); third antennal segment distinctly hairy ..... *pulchella* Dej. (in part), p. 167

Frontal punctation usually not strong and never with short erect hairs; third antennal segment with only a few scattered short hairs in addition to the long distal hairs 24

24(23) Lateral lobes of penultimate abdominal sternum each wider than the central trough (fig. 12); third antennal segment usually pale; basal ridge of elytra incomplete; elytral disc usually dark, or if metallic, then legs pale ..... *pumila* Dej., p. 215

Lateral lobes of penultimate abdominal sternum each equal to or narrower than the central trough (fig. 11); if elytral disc dark then basal ridge is usually complete and third segment is dark; legs never pale 25

25(24) Frons and pronotum dark, elytral disc metallic; frons with fine punctures but no fine striations; basal ridge of elytra usually complete; distribution - southern British Columbia, Alberta, and Saskatchewan to New Mexico, Arizona, and southern California (fig. 129) ..... *cyanipennis* Dej. (in part), p. 176

Not as above in color or if frons and pronotum black and elytra metallic, then frons with fine striations (especially at sides) and basal ridge of elytra incomplete 26

26(25) Frons and pronotum usually shiny black, sometimes with a metallic green tinge, elytra metallic; basal ridge of elytra incomplete; distribution - southern British Columbia to southern California; endophallus with armature as in figs. 76, 77 ..... *perita* Csy., p. 182

Frons and pronotum concolorous with the elytral disc, either metallic or black; basal ridge usually complete; distribution - transcontinental; endophallus with armature as in figs. 72, 73. ..... *viridis* Say, p. 177

27(21) Lateral pronotal margins narrow throughout; head dark (usually black) 28

Lateral pronotal margins widened basally; color of head various 29

28(27) Abdomen entirely pale; epipleuron dark and each elytron with two pale vittae ..... *bivittata* (Fab.), p. 195

Basal half of abdomen dark, apical half pale; epipleuron dark or pale; each elytron usually with only one pale vitta, sometimes two when epipleuron pale ..... *bilineata* Mots., p. 197

29(27) Neck strongly constricted; head pale (vertex sometimes slightly infuscated); frons striated at least on lateral thirds 30

Neck not strongly constricted; head color and frontal sculpture variable 31

30(29) Frons completely striated; elytra with a common sutural vitta and two lateral spots; distribution - southern Arizona .... *miranda* (Horn), p. 188
Frons striated on lateral thirds only; elytra with a common sutural vitta and two lateral vittae; distribution - eastern United States and adjacent Canada (fig. 131) ..... *solea* Hentz, p. 187

31(29) Femora dark at least distally 32
Femora entirely pale 35

32(31) Elytra with a dark sutural vitta and a lateral spot on posterior half of elytra (sometimes joined to dark sutural vitta) .... *histrionica* Bates, p. 192
Elytra with a dark sutural vitta and a dark lateral vitta, rarely entire elytral disc (except apex and lateral margins) dark 33

33(32) Common sutural vitta furcate basally, rarely entire elytral disc (except apex and lateral margins) dark and furcation obscured; basal ridge of elytra usually complete ..... *vittata* (Fab.), p. 189
Common sutural vitta not furcate basally, elytra not entirely dark except apex and lateral margins; basal ridge of elytra incomplete 34

34(33) Head black; distribution - Arizona .... *nigricapitata* n. sp., p. 194
Head pale; distribution - eastern United States and adjacent Canada ..... *pectita* Horn, p. 193

35(31) Frons dark (usually black) and distinctly striated except a triangular area above clypeus; abdomen pale 36
Not with above combination of characters 37

36(35) Pronotum distinctly striate (like frons) on anterior lateral regions; apical pale marking on elytra interrupted by a fine dark edging along suture ..... *analis* Dej., p. 184
Pronotum rugose on anterior lateral regions; apical pale marking on elytra uninterrupted by a dark edging along suture .... *scalpta* Bates, p. 186

37(35) Head with fine deep punctures on frons; typical elytral pattern as in fig. 42; pronotal disc dark, margins pale .... *lobulata* LeC., p. 207
Head without fine deep punctures on frons; elytral pattern not as above; coloration of pronotum variable 38

38(37) Elytral pattern as in fig. 37 (note dark apex of elytra) or posterior part of frons and vertex rugose-striate; mentum without a tooth 39
Elytral pattern not as above and frons and vertex not rugose-striate; mentum usually with a tooth, lacking only in *insulata* 40

39(38) Abdomen entirely dark; frons usually only rugose on lateral thirds ..... *guttula* LeC., p. 199
Abdomen dark at sides, pale medially; frons usually entirely rugose-striate ..... *abdita* n. sp., p. 201

40(38) Basal ridge of elytra usually complete; pale apical spot of elytra shaped as in figs. 38-41 or apex of elytra entirely dark; distribution - Arizona 41

Basal ridge of elytra incomplete; elytra with pale apical spot shaped as in figs. 43-48 or absent; distribution - eastern half of United States and adjacent Canada 45

41(40) Apex of elytra dark, pale marking usually restricted to humeral area, sometimes extending three fourths of the elytra but never much onto the mesal half; abdomen dark ... *scapula* Horn, p. 183
Apex of elytra always pale, basal pale markings extending well over onto the mesal half of the elytra; abdomen pale 42

42(41) Pale basal marking of elytra shaped as in fig. 38; distribution - southeastern Texas; mentum without a tooth ..... *insulata* n. sp., p. 202
Pale basal marking of elytra shaped as in figs. 39-41; distribution - not in southeastern Texas; mentum with a tooth 43

43(42) Distribution - western Texas to Arizona 44
Distribution - not in above area (fig. 127) .. *fuscata* Dej., p. 203

44(43) Elytral disc with at least a lateral dark spot, usually a complete vitta (fig. 40); frons with a deep groove next to eyes ..... *subrugosa* Chd., p. 205
Elytral disc without a lateral dark spot (fig. 41); frons without a deep groove next to eyes ..... *perpallida* n. sp., p. 206

45(40) Elytra vaulted and patterned as in fig. 48; distribution - southeastern Texas; head pale ..... *bumeliae* Schfr., p. 213
Elytra flattened and not patterned as above; distribution - Texas and eastern United States; head dark (reddish brown) in Texas. 46

46(45) Elytral disc entirely dark except for lateral margin; frons equally dark; wing with a triangular remnant of oblongum cell; abdomen pale, darkening apically ..... *collaris* Dej., p. 214
Color of elytral disc not as above or if so then wing without a triangular remnant of oblongum cell and abdomen pale throughout 47

47(46) Elytral pattern as in fig. 47 (note shape of basal pale spot, that basal dark marking is always present and that this marking joins or approaches the middle dark fascia which extends forward along the side of the elytral disc); endophallic armature of male as in fig. 111 ..... *calliope* Bates, p. 212
Elytral pattern as in figs. 43-46 or entirely dark except lateral margin; endophallic armature of male as in figs. 108-110 48

48(47) Distribution - eastern Texas; endophallic armature as in figs. 109-110; elytral disc (fig. 46) with dark circum-scutellar spot usually not extending over to shoulder, when it does it usually gradually becomes paler and is not divided by pale basal spot.. ..... *esurialis* Csy., p. 211
Distribution - eastern United States (including eastern Texas) and adjacent Canada; endophallic armature as in fig. 108; in Texas elytra when largely pale (fig. 44) with a circumscutellar and a humeral spot divided by an arm of the basal pale spot ... . *ornata* Say, p. 208

Subgenus *Loxopeza* Chaudoir

Loxopeza Chaudoir 1870 : 138. Type species - *Lebia grandis* Hentz (here designated).

Description

Characters in common among the species north of Mexico are given in the following subgeneric description and are not repeated in the species descriptions.

Head - Variable in color. Frons punctate-rugose, especially at sides, microsculpture variable. Mentum with a small tooth and epilobes; ligula with paraglossae not extending beyond glossae. Palpi slender, apex more or less pointed; penultimate segment of labial palpi bisetose. Antennae variable in color, with segments one to three and basal third of four more or less glabrous. Neck not strongly constricted.

Prothorax - Entirely pale (in species north of Mexico), lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc rugose and with distinct microsculpture.

Pterothorax - Sterna, pleura, and scutellum pale (in species north of Mexico). Wings with oblongum cell complete.

Elytra - Disc metallic; color of epipleura dark or pale. Disc with striae distinct, convexity of intervals variable; apical pinch well developed; basal ridge complete.

Legs - Largely pale (in species north of Mexico). Protibiae with an upper spur present. Mesotibiae of males with a single preapical notch. Fourth segment of hind tarsus usually emarginate, sometimes bilobed.

Abdomen - Venter and pygidium dark.

Male genitalia - Median lobe stout, apex short and broad (fig. 49). Endophallus strongly armed.

Discussion

Recognition - The diagnostic characters of the subgenus *Loxopeza* are: upper protibial spur present, a complete oblongum cell in the wing, a small tooth and epilobes on the mentum, elytra metallic, the male genitalia with a short broad apex to the median lobe, and the endophallus heavily armed. The upper protibial spur and completely metallic elytra readily distinguish the subgenus *Loxopeza* from the other subgenera of *Lebia* north of Mexico.

Taxonomic status - Previous workers disagreed as to the status and limits of *Loxopeza*, it being regarded as a distinct genus, a distinct subgenus within *Lebia*, or not distinct at all from *Lebia*. Sometimes similarly colored species of *Lebia s.s.* were included within it. The species of *Loxopeza* are clearly members of the genus *Lebia* as defined here. However, as they occupy a primitive and isolated position within *Lebia* they are regarded as forming a distinct subgenus.

1. *Lebia (Loxopeza) atriventris* Say

Lebia atriventris Say 1825 : 13. Type locality - not given. Dejean 1826: 454. LeConte 1848 : 193. LeConte 1863 : 5. Gemminger and Harold 1868 : 136. Blatchley 1910 : 144. Leng 1920 : 65 (*Loxopeza*). Csiki 1932 : 1316 (*Loxopeza*). Blackwelder 1944 : 53.

Loxopeza atriventris; Chaudoir 1870 : 142. Horn 1872 : 131. Bates 1883 : 220. Casey 1920 : 235.

Loxopeza enormis Casey 1920 : 237. Type locality - New York (near the city). NEW SYNONYMY.

Lebia enormis ; Csiki 1932 : 1316 (*Loxopeza*).

Description

Length of elytra - 3.40-5.40 mm; mean (22 specimens) 4.22 mm.

Head - Frons, vertex, clypeus and genae pale; microsculpture on frons usually distinct. Mouth parts pale except dark palpi. Antennae with basal three and a third segments pale, others usually dark or infuscated, becoming paler apically.

Elytra - Disc metallic (usually blue); epipleura dark. Disc with intervals usually very weakly convex, almost flat.

Legs - Entirely pale except for infuscated tarsi. Fourth segment of hind tarsus emarginate.

Male Genitalia - Armature of endophallus as in fig. 51 (note that some of the spines of the fourth group are rounded and not pointed apically, that the sixth group of spines is formed from short broad spines arranged to form a vertical rectangle, and the seventh group is lacking). The endophallic armature in five specimens was examined.

Discussion

Recognition - The only pale headed *Loxopeza* in the range of *atriventris* is *grandis* which is larger, with the elytral intervals more strongly convex, and the palpi pale. Superficially *atriventris* is very similar to *pleuritica* but the latter lacks an upper protibial spur and has the epipleura pale instead of dark.

Variation - *Lebia atriventris* shows only minor variation. The fourth segment of the hind tarsus has been described in the past as being bilobed or strongly emarginate but this does not seem to be the typical condition. Specimens examined all had the fourth segment emarginate. As in *atriceps* antennal segments 4-11 are sometimes pale, the elytral disc is occasionally greenish, and the elytral intervals may be somewhat more strongly convex.

Synonymy - Casey's *Loxopeza enormis*, with its blackish antennae and emarginate fourth tarsal segment, is clearly a synonym of *atriventris*.

Distribution - *Lebia atriventris* occurs in the eastern half of the United States and adjacent Canada (fig. 117). Over 950 specimens were studied from the following localities.

CANADA

MANITOBA - Makinack; Winnipeg. ONTARIO - Belleville; Grand Bend; Hillcrest; Leamington; Normandale; Ottawa; Point Pelee National Park; Port Colborne; Prince Edward Co.; Ridgeway; Rondeau; Simcoe; Strathroy; Toronto; Trenton; Vineland Station. QUEBEC - Ianorale; Montreal; Saint Ailaine. SASKATCHEWAN - Saskatoon.

UNITED STATES

ALABAMA - Auburn (Lee Co.); Cheaha State Park (Clay Co.); Mobile (Mobile Co.). CALIFORNIA. CONNECTICUT - Cornwall (Litchfield Co.); Lakeville (Litchfield Co.); Litchfield (Litchfield Co.); Lyme (New London Co.); New Haven (New Haven Co.); Stamford (Fairfield Co.); Stores (Tolland Co.); Suffield (Hartford Co.). DELAWARE - Newark (New Castle Co.). DISTRICT OF COLUMBIA. FLORIDA - Jacksonville (Duval Co.). ILLINOIS - Beverley Hills; Bowmanville; Chicago (Cook Co.); Downers Grove (Du Page Co.); Edgebrook; Eldorado (Saline Co.); Evanston (Cook Co.); Fox Ridge State Park (Coles Co.); Glenview (Cook Co.); Grand Detour; Grand Tower (Jackson Co.); Illinois Beach State Park (Lake Co.); Joliet (Will Co.); Kickapoo State Park (Vermilion Co.); LaGrange (Cook Co.); Lake Zurich (Lake Co.); Lyons (Cook Co.); Macon Co.; Palos Park (Cook Co.); Quincy (Adams Co.); Riverside (Cook Co.); Urbana (Champaign Co.); Utica (LaSalle Co.). INDIANA - Beverley Shores (Porter Co.); Dune Park; Fulton Co.; Gary (Lake Co.); Hammond (Lake Co.); Knox Co.; Lafayette (Tippecanoe Co.); Lagrange Co.; Long Lake; Marion Co.; Mineral Springs; Pine; Posey Co.; Putnam Co.; Tremont;

Vigo Co. IOWA - Ames (Story Co.); Council Bluffs (Pottawattamie Co.); Crawford Co.1 Iowa City (Johnson Co.); Mount Pleasant (Henry Co.); Polk Co.; Sioux City (Woodbury Co.) Waukon (Allamakee Co.). KANSAS - Chanute (Neosho Co.); Kiowa Co.; Lawrence (Douglas Co.); Manhattan (Riley Co.); Mount Hope (Sedgwick Co.); Onaga (Pottawatomie Co.); Rage (Kingman Co.); Saline Co.; Topeka (Shawnee Co.); Wellington (Sumner Co.). KENTUCKY. LOUISIANA - Ruston (Lincoln Co.). MARYLAND - Baltimore (Independent City); College Park (Prince Georges Co.); Forest Glen (*Montgomery Co.*); *Frederick* (*Frederick Co.*); *Hagerstown* (*Washington Co.*); *Marshall Hall* (*Charles Co.*); *Patuxent* Refuge (Prince Georges Co.); Plummers Island; Plum Point (Calvert Co.); Sparrows Point (Baltimore Co.); Suitland (Prince Georges Co.); Travilah. MASSACHUSETTS - Arlington (Middlesex Co.); Boston (Suffolk Co.); Brookline (Norfolk Co.); Cambridge (Middlesex Co.); Chicopee (Hampden Co.); Framingham (Middlesex Co.); Humarock (Plymouth Co.); Lexington (Middlesex Co.); Nahant (Essex Co.); Needham (Norfolk Co.); Revere (Suffolk Co.); Saugus (Essex Co.); Sherborn (Middlesex Co.); Springfield (Hampden Co.). MICHIGAN - Alcona Co.; Ann Arbor (Washtenaw Co.); Beaver Island (Charlevoix Co.); Bloomfield (Oakland Co.); Cheboygan Co.; Cooper Woods (Oakland Co.); Detroit (Wayne Co.); East Lansing (Ingham Co.); E.K. Warren Preserve, Sawyer (Barrien Co.); George Reserve (Livingston Co.); Grand Ledge (Eaton Co.); High Island (Charlevoix Co.); Huron Mountain Club (Marquette Co.); Marquette (Marquette Co.); Marysville (Saint Clair Co.)! Mason (Ingham Co.); Mecosta Co.; Milford (Oakland Co.); Mottawa; Naubinway (Mackinac Co.); Palmer Park (Wayne Co.); Paw Paw Lake (Van Buren Co.); Pigeon (Huron Co.); Port Huron (Saint Clair Co.); Rochester (Oakland Co.); Royal Oak (Oakland Co.); Sanford (Midland Co.); Saugatuck (Allegan Co.); Shiawasse Co.; Silver Lake State Park (Oceana Co.); Southfield (Oakland Co.); South Fox Island (Leelanan Co.); South Haven (Van Buren Co.); Sutton Farm (Lapeer Co.); Three Oaks (Barrien Co.); Whitefish Point (Chippewa Co.). MINNESOTA - Big Stone Co.; Crookston (Polk Co.); Cyrus (Pope Co.); Frontenac (Goodhue Co.); Gray Cloud Island; Hallock (Kittson Co.); Houston Co.; Mille Lacs Co.; Minneapolis (Hennepin Co.); Mississippi Bluff (Houston Co.); Mora (Kanabec Co.); Olmsted Co.; Saint Paul (Ramsey Co.); Saint Peter (Nicollet Co.); Two Harbors (Lake Co.). MISSISSIPPI - Camp Shelby (Forrest Co.). MISSOURI - Branson (Taney Co.); Kansas City (Jackson Co.); Saint Louis (Independent City); Springfield (Greene Co.). MONTANA - Billings (Yellowstone Co.). NEBRASKA - Lincoln (Lancaster Co.); Omaha (Douglas Co.); Saltillo (Lancaster Co.); Waverly (Lancaster Co.). *NEW HAMPSHIRE* - Cornish; Exeter (Rockingham Co.). NEW JERSEY - Arlington (Hudson Co.); Bergenfield (Bergen Co.); Boonton (Morris Co.); Collingswood (Camden Co.); Chester (Morris Co.); Clemton; Durham P.; Emerson (Bergen Co.); Fort Lee (Bergen Co.); Greenwood Lake; Hillsdale (Bergen Co.); Lavallette (Ocean Co.); Manasquan (Monmouth Co.); Morristown (Morris Co.); Newark (Essex Co.); New Brunswick (Middlesex Co.); Phillipsburg (Warren Co.); Point Pleasant (Ocean Co.); Riverton (Burlington Co.); Snake Hille; South Orange (Essex Co.); Westwood (Bergen Co.); Woodbury (Gloucester Co.). NEW YORK - *Bear Mountain; Bronxville (Westchester Co.); Buffalo (Erie Co.); Callicoon (Sullivan Co.); Catskill* (Greene Co.); Chatham (Columbia Co.); Cranberry Lake (Saint Lawrence Co.); Florida (Orange Co.); Goshen (Orange Co.); Ithaca (Tompkins Co.); Kissing L., L.I.; McLean Bogs (Tompkins Co.); New Rochelle (Westchester Co.); New York City; N. Fairhaven; Ocean Beach, Fire Island (Suffolk Co.); Olcott (Niagara Co.); Oswego (Oswego Co.); Peekskill (Westchester Co.); Pike Wyoming Co.); Ringwood Reserve, Dryden (Tompkins Co.); Sea Cliff (Nassau Co.); Wayne Co.; West Point (Orange Co.); W. Hebron; White Lake (Sullivan Co.); Wildwood State Park (Suffolk Co.). NORTH CAROLINA - Black Mountains; Clayton (Johnston Co.); Faison (Duplin Co.); Laurel Springs, Upper Mountain Research Station (Alleghany Co.); Raleigh (Wake Co.). NORTH DAKOTA - Trail Co. OHIO - Ashtabula (Ashtabula Co.); Athens (Athens Co.); Bedford (Cuyahoga Co.); Cincinnati (Hamilton Co.); Columbus (Franklin Co.); Flat Rock Creek, Benton Twp. (Holmes Co.); Georgesville; Grove City; Holmesville (Holmes Co.); Jefferson (Ashtabula Co.); Lockbourne (Franklin Co.); Lucas Co.; Mendon (Mercer Co.); Ottawa (Putnam Co.); Oxford (Butler Co.); Paulding Co.; Put-in-Bay; Rock Creek (Ashtabula Co.); S. Bass Island (Ottawa Co.); Springfield (Clark Co.). OKLAHOMA - Norman (Cleveland Co.). PENNSYLVANIA - Bethlehem (Northampton Co.); Columbia Cross Roads (Bradford Co.); Delaware Water Gap (Monroe Co.); Easton (Northampton Co.); Mt. Airy; Ohiopyle (Fayette Co.); Philadelphia (Philadelphia Co.); Pittsburgh (Allegheny Co.); Tinicum (Bucks Co.); West Chester (Chester Co.). RHODE ISLAND - Block Island (Newport Co.); Warwick (Kent Co.); Watchhill (Washington Co.). SOUTH CAROLINA - Beaufort Co.; Blackville (Barnwell Co.); Clemson (Oconee Co.). TENNESSEE - Elmwood (Smith Co.); Green Brier (Robertson Co.); Knoxville (Knox Co.). TEXAS - Abilene (Taylor Co.); Carthage (Panola Co.); Columbus (Colorado Co.); Dalhart, Rita Blanca Lake (Dallam Co.); Tyler (Smith Co.). VIRGINIA - Blacksburg (Montgomery Co.); Falls Church (Fairfax Co.); Fredericksburg (Spotsylvania Co.); Richmond (Henrico Co.); Warm Springs (Bath Co.). WEST VIRGINIA - Fairmont (Marion Co.); Salem (Harrison Co.); Sistersville (Tyler Co.); White Sulphur Springs (Greenbrier Co.). WISCONSIN - Bayfield (Bayfield Co.); Brodhead (Green Co.); Madison (Dane Co.); Platteville (Grant Co.).

2. *Lebia (Loxopeza) atriceps* LeConte

Lebia atriceps LeConte 1863a : 5. Type locality - Nebraska. Gemminger and Harold 1868 : 136. Leng 1920 : 65 (*Loxopeza*). Csiki 1932 : 1316 (*Loxopeza*). Blackwelder 1944 : 53.

Loxopeza atriceps; Chaudoir 1870 : 143. Horn 1872 : 132. Casey 1920 : 238.

Loxopeza nanulina Casey 1920 : 238. Type locality - Colorado (Boulder Co.). NEW SYNONYMY.

Lebia nanulina; Csiki 1932 : 1317 (*Loxopeza*).

Description.

Length of elytra - 3.67-5.50 mm; mean (25 specimens) 4.49 mm.

Head - Frons, vertex, and genae dark (frons usually black), clypeus pale; microsculpture of frons distinct. Mouth parts pale except dark palpi. Antennae with basal three and a third segments pale, others usually dark or infuscated but becoming paler apically.

Elytra - Disc metallic (usually blue); epipleura dark. Disc with

intervals weakly to moderately convex.

Legs - Trochanters and femora pale; tibiae infuscated; tarsi dark; fourth segment of hind tarsus emarginate.

Male Genitalia - Armature of endophallus as in fig. 52 (note that the sixth group of spines is formed from short spines arranged to form a transverse rectangle or square and that the seventh group is lacking). The endophallic armature in nine specimens was examined.

Discussion

Recognition - North of Mexico there are only two black headed species of the subgenus *Loxopeza*: *atriceps* and *tricolor*. The two are allopatric and differ in the color of their palpi and antennae (dark in *atriceps*, pale in *tricolor*.

Variation - Antennal segments four to eleven are sometimes as pale as the basal segments, the elytral disc is occasionally greenish instead of blue, and the elytral intervals are sometimes moderately convex.

Synonymy - Casey's *Loxopeza nanulina* is here considered a synonym of *atriceps* as it differs only in size and other minor features. It occurs within the range of *atriceps*.

Distribution - *Lebia atriceps* occurs from the Canadian prairies south to Arizona, New Mexico and western Texas (fig. 141). Over 400 specimens were studied from the following localities.

CANADA
ALBERTA - Cypress Hills; Edmonton; Lethbridge; Medicine Hat; Tilley. MANITOBA - Aweme. SASKATCHEWAN - Saskatoon; Swift Current; Val Marie.
UNITED STATES
ARIZONA - Arivaca (Pima Co.); Bar Foot Park, Chiricahua Mountains (Cochise Co.); Brown's Canyon, Baboquivari Mountains (Pima Co.); Calabasas Picnic Grounds, Ruby Road (Santa Cruz Co.); Canelo (Santa Cruz Co.); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.); Dragoon (Cochise Co.); Fairbank (Cochise Co.); Fort Grant (Graham Co.); Fort Huachuca (Cochise Co.); Hereford, Carr Canyon, Huachuca Mountains (Cochise Co.); McNary (Apache Co.); Mormon Lake (Coconino Co.); Nogales (Santa Cruz Co.); Palmerlee (Cochise Co.); Patagonia (Santa Cruz Co.); Patagonia Mountains; Pena Blanca (Santa Cruz Co.); Portal (Cochise Co.); Prescott (Yavapai Co.); Ramsey Canyon, Huachuca Mountains (Cochise Co.); Ruby (Santa Cruz Co.); Santa Rita Mountains; Southwest Research Station, Portal (Cochise Co.); Texas Pass, Dragoon Mountains (Cochise Co.); Turkey Flat, Chiricahua Mountains (Cochise Co.); White Mountains (Gile Co.); Winslow (Navajo Co.). COLORADO - Boulder (Boulder Co.); Cheyenne Mountains Museum (El Paso Co.); Colorado Springs (El Paso Co.); Conejos Co.; Denver (Denver Co.); Fort Collins (Larimer Co.); Pueblo (Pueblo Co.). IDAHO - Caldwell (Canyon Co.); Indian Cove (Owynee Co.); Mountain Home (Elmore Co.). KANSAS. MONTANA - Bozeman (Gallatin Co.); Crow Agency (Big Horn Co.). NEBRASKA - Glen (Sioux Co.); Mitchell (Scotts Bluff Co.). NEVADA - Go Shute Valley (White Pine Co.). NEW MEXICO - Bernalillo (Sandoval Co.); Coolidge (McKinley Co.); Hot Springs, Las Vegas (San Miguel Co.); Jemez Mountains; Mescalero Indian Reservation (Otero Co.). NORTH DAKOTA - Sentinel Butte (Golden Valley Co.). SOUTH DAKOTA - Hot Springs (Fall River Co.). TEXAS - Davis Mountains; Fort Davis (Jeff Davis Co.). UTAH - Farmington (Davis Co.).

3. *Lebia (Loxopeza) tricolor* Say

Lebia tricolor Say 1825 : 11. Type locality - "Pennsylvania ... also on the Missouri". Dejean 1826 : 453. LeConte 1848 : 192. LeConte 1863 : 5. Gemminger and Harold 1868 : 141. Blatchley 1910 : 144. Leng 1920 : 65 (*Loxopeza*). Csiki 1932 : 1317 (*Loxopeza*).
Loxopeza tricolor; Chaudoir 1870 : 140. Horn 1872 : 131. Casey 1920 : 235.

Description

Length of elytra - 3.72-5.76 mm; mean (20 specimens) 4.71 mm.

Head - Frons, vertex and genae dark (frons usually black), clypeus pale; microsculpture of frons usually distinct. Mouth parts pale. Antennae entirely pale.

Elytra - Disc metallic (usually shiny green); epipleura dark. Disc with intervals moderately convex.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Male genitalia - Armature of endophallus as in fig. 43 (note that the first group of spines is very poorly developed, the sixth group is a loose cluster of short broad spines, and that an eighth group is present). The endophallic armature in five specimens was examined.

Discussion

Recognition - See under *atriceps*.

Variation - There appears to be no marked variation in *tricolor*.

Distribution - *Lebia tricolor* occurs in the eastern United States and adjacent Canada (fig. 126). Over 150 specimens were studied from the following localities.

CANADA
ONTARIO - Ottawa; Prince Edward Co.; Roseland; Toronto; Trenton. QUEBEC - Covey Hill; Montreal; Norway Bay; Perkins Mills; Sherbrooke.
UNITED STATES
CONNECTICUT - Canaan (Litchfield Co.); Cornwall (Litchfield Co.); Litchfield (Litchfield Co.). DISTRICT OF COLUMBIA. FLORIDA - Levy Co.; Marion Co.; Tampa (Hillsborough Co.). ILLINOIS - Chicago (Cook Co.). INDIANA - Bartholemew Co.; Gary (Lake Co.). KANSAS. LOUISIANA - Hart; New Iberia (Iberia Co.). MASSACHUSETTS - Arlington (Middlesex Co.); Boston (Suffolk Co.); Brookline (Norfolk Co.); Salisbury (Essex Co.); Springfield (Hampden Co.). MICHIGAN - Cheboygan Co.; Detroit (Wayne Co.); Marquette (Marquette Co.); Washtenaw Co.; Whitefish Point (Chippewa Co.). MINNESOTA - Two Harbors (Lake Co.). NEW HAMPSHIRE - Franconia (Grafton Co.); Mount Washington (Coos Co.); Rumney (Grafton Co.). NEW JERSEY - Arlington (Hudson Co.); Hillsdale (Bergen Co.); Lake Hopatcong; Manasquan (Monmouth Co.); Mountain Lakes (Morris Co.); Woodbury (Gloucester Co.). NEW YORK - Asps Hill, L.I.; Bear Mountain (Rockland Co.); Buffalo (Erie Co.); Catskill Mt., (Ulster Co.); Dryden (Tompkins Co.); Irving (Chautaugua Co.); Ithaca (Tompkins Co.); Kingston (Ulster Co.); Lancaster (Erie Co.); Lyons (Wayne Co.); Mount Whiteface (Essex Co.); New Rochelle (Westchester Co.); New York City; Olcott (Niagara Co.); Phoenicia (Ulster Co.); White Plains (Westchester Co.). NORTH CAROLINA - Lake Junaluska (Haywood Co.). PENNSYLVANIA - Arendtsville (Adams Co.); Milford (Pike Co.); Nanticoke (Luzerne Co.); Philadelphia (Philadelphia Co.); State College (Centre Co.); The Rock. RHODE ISLAND - Warwick (Kent Co.). TEXAS. VIRGINIA - Mount Vernon (Fairfax Co.); Rosslyn (Arlington Co.). WEST VIRGINIA - White Sulphur Springs (Greenbrier Co.). WISCONSIN - Milwaukee (Milwaukee Co.).

4. *Lebia (Loxopeza) subdola* new species

Holotype - A male labelled as follows: Madera Cn. Sta. Rita Mts., Sta. Cruz Co. Ariz. VIII 3.60, 5000' - 5800' G. E. Ball family and R. B. Madge collectors. To be deposited in the Canadian National Collection, Ottawa.

Paratypes are from the following localities.

ARIZONA - Carr Canyon, Huachuca Mountains (Cochise Co.) (one male, California Academy of Sciences); Cave Creek, Chiricahua Mountains (Cochise Co.) (one female, California Academy of Sciences); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.) (three females, personal collection of G.E. Ball, University of Alberta); Chiricahua Mountains (Cochise Co.) (one female, California Academy of Sciences; one female, United States National Museum); Huachuca Mountains (Cochise Co.) (one male California Academy of Sciences); Madera Canyon, Santa Rita Mountains (Santa Cruz Co.) (two females, personal collection of G. E. Ball, University of Alberta; two males and one female, Cornell University); Mount Washington, Nogales (Santa Cruz Co.) (two females, California Academy of Sciences); Palmerlee (Cochise Co.) (one male, Museum of Comparative Zoology); Pinery Canyon, Chiricahua Mountains (Cochise Co.) (one male, American Museum of Natural History; one male, Canadian National Collection); Southwest Research Station, Portal (Cochise Co.) (three males and three females, American Museum of Natural History; one male, Canadian National Collection); Turkey Flat, Chiricahua Mountains (Cochise Co.) (one male, California Academy of Sciences); White Mountains (one male, Museum of Comparative Zoology). TEXAS - Big Bend National Park (Brewster Co.) (two females, personal collection of G. E. Ball, University of Alberta).

Description

Length of elytra - 3.80 - 4.68 mm; mean (22 specimens) 4.21 mm.

Head - Frons, vertex, clypeus and genae pale; microsculpture of frons usually lacking. Mouth parts pale. Antennae entirely pale. Neck not suddenly constricted behind eyes.

Elytra - Disc metallic (usually bright blue); epipleura usually dark. Disc with intervals weakly convex.

Wings - The sclerotized patch just distad of vein $3A_2$ weakly convex (fig. 15).

Legs - Entirely pale. Fourth segment of hind tarsus emarginate.

Male genitalia - Armature of endophallus as in fig. 54 (note that the first group of spines is small and poorly developed, the sixth group is formed of short broad spines in a loose cluster, and the seventh is crescent-shaped and lying between the sixth and first groups). The endophallic armature in seven specimens was examined.

Discussion

Recognition - This small *Loxopeza* is most likely to be confused with small specimens of *subgrandis*. However, the two can usually be distinguished by the lack of microsculpture on the frons of *subdola*. In addition the small sclerotized patch in the anal region of the wing is shaped differently in the two (weakly convex in *subdola*, strongly convex in *subgrandis*, figs. 14, 15).

Variation - In a few specimens the microsculpture of the frons is more or less distinct. Otherwise there appears to be no major variation in *subdola*.

Etymology - The name is derived from the Latin adjective *subdolus* - subtle, deceiving - in reference to it being confused with *Lebia subgrandis*.

Distribution - This species is known only from southern Arizona and western Texas; 29 specimens (type material) were studied.

5. *Lebia (Loxopeza) deceptrix* new species

Holotype - A male labelled as follows: Pena Blanca, Santa Cruz Co. Ariz. 4000' August 11, 1960 at light G. E. Ball family and R. B. Madge. To be deposited in the Canadian National Collection, Ottawa. Paratypes are from the following localities.

ARIZONA - Bear Valley, Tumacacori Mountain (Santa Cruz Co.) (one female, Museum of Comparative Zoology); Canelo (Santa Cruz Co.) (two males and one female, University of Arizona); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.) (two females, personal collection of G. E. Ball, University of Alberta); Madera Canyon, Santa Rita Mountains (Santa Cruz Co.) (three males, personal collection of G. E. Ball); Pena Blanca (Santa Cruz Co.) (four males and six females, personal collection of G. E. Ball); Southwest Research Station, Portal (Cochise Co.) (one female, American Museum of Natural History). TEXAS - Davis Mountains (Jeff Davis Co.) (one male, California Academy of Sciences).

Description

Length of elytra - 6.13 - 7.33 mm; mean (22 specimens) 6.56 mm.

Head - Frons, vertex, clypeus and genae pale; microsculpture of frons usually distinct. Antennae entirely pale.

Elytra - Disc metallic (usually bright blue); epipleura dark. Disc with intervals weakly to moderately convex.

Wings - The sclerotized patch just distad of vein $3A_2$ weakly convex (fig. 15).

Legs - Entirely pale. Fourth segment of hind tarsus emarginate.

Male genitalia - Armature of endophallus as in fig. 55 (note that the first group of spines is small, and that the second, sixth and seventh groups are not separate from each other). The endophallic armature in five specimens was examined.

Discussion

Recognition - *Lebia deceptrix* may be confused with large specimens of *subgrandis* and any specimens of *grandis* from western Texas. From both it can usually be recognized by the smaller, less arched sclerotized patch in the anal region of its wing. Positive identification is best obtained from the endophallic armature of the male.

Variation - In the small series of *deceptrix* available variation in the microsculpture of the frons and the color of the elytral disc was noticed. Usually the microsculpture is present but occasionally it is reduced or lacking as in specimens of *subdola*. The elytral disc is typically bright blue, rarely with a greenish tinge.

Etymology - The name is derived from the Latin noun *deceptrix* - she that deceives - in reference to the similarity of this species to other *Loxopeza*, especially *grandis*.

Distribution - North of Mexico *Lebia deceptrix* is known from southern Arizona and western Texas; 22 specimens (type material) were studied.

6. *Lebia (Loxopeza) pimalis* (Casey)

Loxopeza pimalis Casey 1920 : 237. Type locality - Arizona.
Lebis pimalis ; Csiki 1932 : 1317 (*Loxopeza*).

Description

Length of elytra - 3.80 - 5.40 mm; mean (24 specimens) 4.60 mm.

Head - Frons, vertex, clypeus, and genae pale, microsculpture of frons distinct. Mouth parts pale. Antennae entirely pale.

Elytra - Disc metallic (usually a dull dark green); epipleura varying from dark to pale. Disc with intervals strongly convex.

Legs - Entirely pale. Fourth segment of hind tarsus emarginate.

Male genitalia - Armature of endophallus as in fig. 56 (note that the first group of spines is moderately large, the sixth group consists of only one or two short spines and the seventh group lies in a fold at the side of the first group). The endophallic armature in six specimens was examined.

Discussion

Recognition - *Lebia pimalis* can be distinguished from our other species of the subgenus *Loxopeza* by its very convex elytral intervals. Occasionally there may be difficulty in separating some of the greenish specimens of *subgrandis* in which case it is necessary to check the male genitalia.

Variation - The elytral disc varies in color from the usual dull green to sometimes almost black while the epipleura vary from pale to dark. Most specimens have the epipleura pale or partially so.

Distribution - *Lebia pimalis* is known north of Mexico only in southern Arizona. Over 175 specimens were studied from the following localities.

ARIZONA - Brown's Canyon, Baboquivari Mountains (Pima Co.); Canelo (Santa Cruz Co.); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.); Coyote Mountains; Douglas (Cochise Co.); Dragoon (Cochise Co.); El Mirador Ranch, Sasabe, Baboquivari Mountains (Pima Co.); Fort Grant (Graham Co.); Kits Peak Rincon, Baboquivari Mountains (Pima Co.); Madera Canyon, Santa Rita Mountains (Santa Cruz Co.); Montezuma Pass, Huachuca Mountains (Cochise Co.); Nogales (Santa Cruz Co.); Palmerlee (Cochise Co.); Patagonia Mountains (Santa Cruz Co.); Peña Blanca (Santa Cruz Co.); Ruby (Santa Cruz Co.); Sabino Canyon, Santa Catalina Mountains (Pima Co.); Sierritas; Sonoita (Santa Cruz Co.); Texas Pass, Dragoon Mountains (Cochise Co.); Tombstone (Cochise Co.); Tucson (Pima Co.).

7. *Lebia (Loxopeza) subgrandis* new species

Holotype - A male labelled as follows: Pena Blanca, Santa Cruz Co. Ariz. 4000' August 11, 1960 at light G. E. Ball family and R. B. Madge collectors. To be deposited in the Canadian National Collection, Ottawa.

Paratypes are from the following localities.

ARIZONA - Brown's Canyon, Baboquivari Mountains (Pima Co.) (three males and one female, Museum of Comparative Zoology); Pena Blanca (Santa Cruz Co.) (one male and three females, personal collection of G. E. Ball, University of Alberta); San Bernardino (Cochise Co.) (two males and one female, University of Arizona); Tucson (Pima Co.) (one male and three females, California Academy of Sciences); Tucson Mountains, Desert Museum (Pima Co.) (one male and one female, University of Arizona).

Description

Length of elytra - 4.25 - 6.25 mm; mean (22 specimens) 5.22 mm.

Head - Frons, vertex, clypeus and genae pale; microsculpture of frons distinct. Mouth parts pale. Antennae entirely pale.

Elytra - Disc metallic (blue or green); epipleura varying from dark to pale. Disc with intervals usually moderately convex.

Wings - The sclerotized patch just distad of vein $3A_2$ strongly convex (fig. 14).

Legs - Entirely pale. Fourth segment of hind tarsus emarginate.

Male genitalia - Armature of endophallus as in fig. 57 (note that the first group of spines is moderately large, the third group is small, the sixth group is formed of a dense group of long narrow spines and the seventh group lies in a fold at the side of the first group). The endophallic armature in 11 specimens was examined.

Discussion

Recognition - There are three other species of the subgenus *Loxopeza* with pale heads which are sympatric with *subgrandis* north of Mexico: *pimalis*, *subdola*, and *deceptrix*. In addition, the range of *grandis* may overlap that of *subgrandis* in western Texas. In this area these two can be reliably separated only on the basis of differences in the endophallic armature. Separation of *subgrandis* from the other three species is best done on the basis of the endophallic armature although there are some external characters which can be used. The elytral intervals are not as strongly convex in *subgrandis* as in *pimalis* and the two can usually be separated on the basis of this character. The small sclerotized patch in the anal region of the wing is usually more convex in *subgrandis* than in *deceptrix* and *subdola* and this usually permits recognition. In addition, the microsculpture of the frons is distinct in *subgrandis* and usually lacking in *subdola*.

Variation - In addition to the considerable variation in size the elytral disc varies from blue to green and the epipleura from dark to pale. In a few specimens the elytral intervals are more strongly convex and approach the condition found in *pimalis*.

Relationships - *Lebia subgrandis* is very closely related to *grandis*. The two are largely allopatric but may overlap in western Texas. Because the endophallic armatures are quite distinct where the two at least approach each other in Texas the two forms are regarded as distinct species. The fact that the third group of spines in the endophallic armature

of *grandis* becomes smaller in northern specimens and thus approaches the condition found in *subgrandis* has no bearing on the question as the two are then separated by hundreds of miles.

Etymology - The specific name is derived from the Latin prefix *sub* - a being situated under and hence a being concealed behind something - and *grandis* in reference to it being confused with the closely related *Lebia grandis*.

Distribution - *Lebia subgrandis* occurs from western Texas to southern Arizona. Over 250 specimens were studied from the following localities.

ARIZONA - Arivaipa (Graham Co.); Bear Valley, Tumacacori Mountains (Santa Cruz Co.); Brown's Canyon, Baboquivari Mountains (Pima Co.); Canelo (Santa Cruz Co.); Carr Canyon, Huachuca Mountains (Cochise Co.); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.); Charleston (Cochise Co.); Cochise Stronghold, Dragoon Mountains (Cochise Co.); Cutter (Gila Co.); Fairbank (Cochise Co.); Fort Huachuca (Cochise Co.); Globe (Gila Co.); Kits Peak Rincon, Baboquivari Mountains (Pima Co.); Madera Canyon, Santa Rita Mountains (Santa Cruz Co.); Nogales (Santa Cruz Co.); Oracle (Pinal Co.); Palmerlee (Cochise Co.); Patagonia (Santa Cruz Co.); Patagonia Mountains (Santa Cruz Co.); Pearce (Cochise Co.); Pena Blanca (Santa Cruz Co.); Portal (Cochise Co.); Prescott (Yavapai Co.); Rice; Ruby (Santa Cruz Co.); Sabino Canyon, Santa Catalina Mountains (Pima Co.); San Bernardino (Cochise Co.); Southwest Research Station, Portal (Cochise Co.); Sunnyside Canyon, Huachuca Mountains (Cochise Co.); Texas Pass, Dragoon Mountains (Cochise Co.); Tucson (Pima Co.); Tucson Mountains (Pima Co.). CALIFORNIA. NEW MEXICO - Deming (Luna Co.); Double Adobe Ranch, Animas Mountains (Hidalgo Co.). TEXAS - Alpine (Brewster Co.); Limpia Creek Canyon, Davis Mountains (Jeff Davis Co.).

8. *Lebia (Loxopeza) grandis* Hentz

Lebia grandis Hentz 1830 : 258. Type locality - North Carolina. LeConte 1848 : 192. LeConte 1865 : 5. Gemminger and Harold 1868 : 139. Blatchley 1910 : 144. Leng 1920 : 65 (*Loxopeza*). Csiki 1932 : 1316 (*Loxopeza*). Blackwelder 1944 : 54.

Loxopeza grandis; Chaudoir 1870 : 139. Horn 1872 : 131. Casey 1920 : 235.

Loxopeza majuscula Chaudoir 1870 : 141. Type locality - Texas. NEW SYNONYMY. Horn 1872 : 131. Casey 1920 : 236.

Lebia majuscula; Leng 1920 : 65 (*Loxopeza*). Csiki 1932 : 1317 (*Loxopeza*). Blackwelder 1944 : 54.

Loxopeza grandis rivularis Casey 1920 : 235. Type locality - Texas (Brownsville). NEW SYNONYMY.

Lebia grandis rivularis; Csiki 1932 : 1317 (*Loxopeza*).

Loxopeza magister Casey 1920 : 236. Type locality - Lake Superior (Marquette). NEW SYNONYMY.

Lebia magister; Csiki 1932 : 1317 (*Loxopeza*).

Description

Length of elytra - 4.92 - 7.42 mm; mean (25 specimens) 6.28 mm.

Head - Frons, vertex, clypeus and genae pale; microsculpture of frons usually distinct. Mouth parts pale. Antennae entirely pale.

Elytra - Disc metallic (usually blue); epipleura dark. Disc with intervals moderately convex.

Wings - The sclerotized patch just distad of vein $3A_2$ strongly convex (fig. 14).

Legs - Entirely pale. Fourth segment of hind tarsus variable, bilobed or emarginate.

Male genitalia - Armature of endophallus as in fig. 58 (note that the first group of spines is large, the third group is moderately large, the sixth group is made up of a dense cluster of narrow spines and the seventh lies to the side of the first and in a groove). The endophallic ar-

mature in 15 specimens was examined.

Discussion

Recognition - Over most of its range *grandis* can be confused only with *atriventris* which is smaller, has flatter elytral intervals, and has the palpi dark. As there is the possibility that *grandis* occurs in western Texas, it could be confused with *subgrandis* , *deceptrix* , or possibly *subdola*. The most reliable structure for the identification of these is the endophallic armature of the male genitalia. In addition, *deceptrix* and *subdola* can be recognized by the small size of the sclerotized patch just distad of the apex of vein $3A_2$ (fig. 15). Also, *subdola* is smaller, usually lacks microsculpture on the frons, and the head is gradually constricted behind the eyes to the neck. Females of *subgrandis* cannot be separated from *grandis* .

Variation - In *grandis* variation occurs in the structure of the fourth segment of the hind tarsus and the size of the third group of spines on the endophallus of the male. Northern specimens sometimes have the fourth segment bilobed but usually only more strongly emarginate than in southern specimens. The endophallic spines of the third group are often smaller in the more northern specimens. Typically *grandis* has the elytral disc metallic blue but in many of the southern specimens (especially from Texas) the disc is green.

Synonymy - *Loxopeza majuscula* Chaudoir has been placed here as a synonym although, since no definite locality in Texas was given for the species, it could also be a representative of *subgrandis* , *deceptrix* , or even *subdola*. However, since these latter three occur only in western Texas it is more likely that *majuscula* belongs to the wider ranging (in Texas) *grandis*. Casey's *magister* is based on a character (the roundness of the outer apical corner of the elytra) considered of no value.

Distribution - *Lebia grandis* occurs in the eastern United States and adjacent Canada. In Texas it definitely occurs as far west as Sanderson and possibly farther (fig. 137). The record from the Davis Mountains is based on a female and is thus questionable. Over 1000 specimens were studied from the following localities.

CANADA
ONTARIO - Port Colbouren; Port Hope; Preston; Simcoe; Toronto; Trenton.
UNITED STATES
ALABAMA - Bessemer (Jefferson Co.); Birmingham (Jefferson Co.); Blount Mountains; Oxford (Calhoun Co.); Tuscaloosa (Tuscaloosa Co.). ARKANSAS - Hope (Hempstead Co.); Imboden (Lawrence Co.). CONNECTICUT - Canaan, Cornwall (Litchfield Co.); New Haven (New Haven Co.); Stamford (Fairfield Co.). DELAWARE - Newark (New Castle Co.). DISTRICT OF COLUMBIA. GEORGIA - Atlanta (Fulton Co.); Clarke Co.; Head River (Dade Co.). ILLINOIS - Beverley Hills; Bowmanville; Chicago (Cook Co.); Edgebrook (Cook Co.); Galena (Jo Davies Co.); Glendon Park; La Grange (Cook Co.); LaSalle Co.; Lyons (Cook Co.); Monee (Will Co.); Oakwood (Vermilion Co.); Palos Park (Cook Co.); Riverside (Cook Co.); Urbana (Champaign Co.); Willow Springs (Cook Co.). INDIANA - Brown Co.; Floyd Co.; Gary (Lake Co.); Gibson Co.; Hammond (Lake Co.); Knox Co.; Lagrange Co.; Long Lake; Mineral Springs; Posey Co.; Vigo Co. IOWA - Corydon (Wayne Co.); Fort Madison (Lee Co.); Herrold (Polk Co.); Iowa City (Johnson Co.); Mount Pleasant (Henry Co.); Sioux City (Woodbury Co.); Wauponsie State Park (Fremont Co.). KANSAS - Ellsworth Co.; Garden City (Finney Co.); Gove Co.; Hays (Ellis Co.); Kiowa Co.; Lawrence (Douglas Co.); Logan Co.; Manhattan (Riley Co.); McPherson (McPherson Co.); Meade Co.; Mount Hope (Sedgwick Co.); Nickerson (Reno Co.); Onago (Pottawatomie Co.); Russel Co.; Scott Co.; Topeka (Shawnee Co.); Wellington (Sumner Co.). KENTUCKY - Lexington (Fayette Co.). MARYLAND - Baltimore (Independent City); Catonsville (Baltimore Co.); Crisfield (Somerset Co.); Forest Glen (Montgomery Co.); Hagerstown (Washington Co.); Sparrows Point (Baltimore Co.). MASSACHUSETTS - Amherst (Hampshire Co.); Arlington (Middlesex Co.); Boston (Suffolk Co.); Brookline (Norfolk Co.); Framingham (Middlesex Co.); Lawrence (Essex Co.); Marion (Plymouth Co.); Melrose Highlands (Middlesex Co.); Milton (Norfolk Co.); Mount Toby; Northfield (Franklin Co.); Sherborn (Middlesex Co.); Wellesley (Norfolk Co.). MICHIGAN - Ann Arbor (Washtenaw Co.); Detroit (Wayne Co.); East Lansing (Ingham Co.); E. K. Warren Preserve (Barrien Co.); Grand Ledge (Eaton Co.); Oakland Co.; Palmer Woods (Wayne Co.); Pentwater (Oceana Co.); Port Huron (Saint Clair Co.); Saugatuck (Allegan Co.); Southfield (Oakland Co.). MINNESOTA - Dakota (Winona Co.); Hennepin Co.; Ramsey Co.; Saint Anthony Park; Saint Peter (Nicollet Co.). MISSOURI - Charleston (Mississippi Co.); Kimswick (Jefferson Co.); Saint Joseph (Buchanan Co.); Saint Louis (Independent City); Willard (Greene Co.); Williams-

ville (Wayne Co.). NEBRASKA - Lincoln (Lancaster Co.); Omaha (Douglas Co.). NEW JERSEY - Anglesea; Atco (Camden Co.); Atlantic City (Atlantic Co.); Boonton (Morris Co.); Bridgeboro (Burlington Co.); Chester (Morris Co.); Cumberland Co.; Dayton (Middlesex Co.); Elizabeth (Union Co.); Fort Lee (Bergen Co.); Hackensack (Bergen Co.); Lakehurst (Ocean Co.); Long Beach (Monmouth Co.); Manahawkin (Ocean Co.); Manasquan (Monmouth Co.); Montclair (Essex Co.); Newark (Essex Co.); New Brunswick (Middlesex Co.); Nutley (Essex Co.); Orange (Essex Co.); Passaic Junction; Paterson (Passaic Co.); Point Pleasant (Ocean Co.); Rahway (Union Co.); Ramsey (Bergen Co.); Riverton (Burlington Co.); Snake Hill; South Orange (Essex Co.); Westville (Gloucester Co.). NEW YORK - Albany (Albany Co.); Ashokan (Ulster Co.); Bear Mountain (Rockland Co.); Buffalo (Erie Co.); Centereach; Cold Spring Harbor (Suffolk Co.); Hamburg (Erie Co.); Ithaca (Tompkins Co.); Long Beach (Nassau Co.); McLean Bogs (Tompkins Co.); New York City; North Collins (Erie Co.); Ocean Beach, Fire Island (Suffolk Co.); Olcott (Niagara Co.); Onondaga Co.; Orient (Suffolk Co.); Ossining (Westchester Co.); Peekskill (Westchester Co.); Pike (Wyoming Co.); Richmond, L.I.; Roslyn (Nassau Co.); Smithtown (Suffolk Co.); South Huntington (Suffolk Co.); Tuxedo Park (Orange Co.); Wappingers Falls (Dutchess Co.); West Nyack (Rockland Co.); West Point (Orange Co.). NORTH CAROLINA - Asheville (Buncome Co.); Black Mountain (Buncombe Co.); Black Mountains; Clayton (Johnston Co.); Columbus Co.; Elizabeth City (Pasquotank Co.); Faison (Duplin Co.); Henderson (Vance Co.); Hot Springs (Madison Co.); Lake Junaluska (Haywood Co.); Marion (McDowell Co.); Mills River; Overhills (Harnett Co.); Oxford (Granville Co.); Raleigh (Wake Co.); Sunburst. OHIO - Berea (Cuyahoga Co.); Cedar Point (Erie Co.); Champaign Co.; Cincinnati (Hamilton Co.); Columbus (Franklin Co.); Conneaut (Ashtabula Co.); Dayton (Montgomery Co.); Holmesville (Holmes Co.); Hudson (Summit Co.); Lockbourne (Franklin Co.); Lucas Co.; Marion (Marion Co.); Newark (Licking Co.). OKLAHOMA - Durant (Bryan Co.); Grady Co.; Kenton (Cimarron Co.); Lawton (Comanche Co.); Mangum (Greer Co.); Tulsa (Tulsa Co.); Waynoka (Woods Co.); Woodward (Woodward Co.). PENNSYLVANIA - Abington (Montgomery Co.); Allentown (Lehigh Co.); Ashbourne; Bethlehem (Northampton Co.); Camp Hill (Cumberland Co.); Collingdale (Delaware Co.); Delaware Water Gap (Monroe Co.); Easton (Northampton Co.); Fairview (Erie Co.); Grove City (Mercer Co.); Harrisburg (Dauphin Co.); Homebrook; Hummelstown (Dauphin Co.); Lebanon (Lebanon Co.); Lehigh Gap; Mount Moriah; Philadelphia (Philadelphia Co.); Trevose (Bucks Co.); Vella Novo (Montgomery Co.); Wall (Allegheny Co.); Wyoming (Luzerne Co.). RHODE ISLAND - Providence (Providence Co.); Warwick (Kent Co.); Watch Hill (Washington Co.). SOUTH CAROLINA - Beaufort Co.; Blackville (Barnwell Co.); Camden (Kershaw Co.); Clemson (Oconee Co.). SOUTH DAKOTA - Volga (Brookings Co.). TENNESSEE - Dyer Co.; Knoxville (Knox Co.); Nashville (Davidson Co.). TEXAS - Abilene (Taylor Co.); Austin (Travis Co.); Brazos River; Brownsville (Cameron Co.); Burnet (Burnet Co.); Calvert (Robertson Co.); College Station (Brazos Co.); Cypress Mill (Blanco Co.); Dallas (Dallas Co.); Del Rio (Val Verde Co.); Edinburg (Hidalgo Co.); Fedor; Fort Davis (Jeff Davis Co.); Kingsville (Kleberg Co.); McKinney (Collin Co.); Mission (Hidalgo Co.); New Braunfels (Comal Co.); Sabinal (Uvalde Co.); Sabine Pass (Jefferson Co.); Salado (Bell Co.); Sanderson (Terrell Co.); Seguin (Guadalupe Co.); Tyler (Smith Co.); Victoria (Victoria Co.); Wharton (Wharton Co.); Wichita Falls (Wichita Co.). VIRGINIA - Arlington (Arlington Co.); Blacksburg (Montgomery Co.); Cape Charles (Northampton Co.); Falls Church (Fairfax Co.); Nelson Co.; Richmond (Henrico Co.). WISCONSIN - Baraboo (Sauk Co.); Cranmoor.

Subgenus *Polycheloma* new subgenus

Type species - *Lebia testacea* LeConte (= *Lebia lecontei* Madge)

Description

Head - Mentum without epilobes, with a tooth; ligula with paraglossae extending slightly beyond glossae; neck rather stout (fig. 4).

Legs - Protibia with an upper spur. Mesotibiae of males with several preapical notches.

Other features of this subgenus as it occurs north of Mexico are given in the description of *Lebia lecontei*.

Discussion

Recognition - This subgenus can be distinguished from the other subgenera occurring north of Mexico by the following characteristics: upper protibial spur present; and elytra entirely pale.

Notes - Although *Lebia lecontei* is subgenerically distinct from the other subgenera of *Lebia* occurring north of Mexico, possibly it belongs to one of the Neotropical genera described by Chaudoir, especially *Poecilostola*. However, most of the characters used here to distinguish *Polycheloma* were not used by Chaudoir in the description of *Poecilostola* so it is difficult to compare the two. Until such time as the species of *Poecilostola* can be studied the name proposed here will serve for the subgeneric placement of *Lebia lecontei*.

Etymology - The name is derived from the Greek πολυς - many, χηλωμα - notch - in reference to the several preapical notches found on the mesotibiae of the males. The name is neuter.

9. *Lebia (Polycheloma) lecontei* new name

Loxopeza testacea LeConte (not Dejean 1831) 1880 : 164. Type locality - Texas.

Lebia testacea; Leng 1920 : 65 (*Loxopeza*). Csiki 1932 : 1317 (*Loxopeza*). Blackwelder 1944 : 56.

Description

Length of elytra - 3.80 - 4.56 mm; mean (14 specimens) 4.26 mm.

Head - Frons, vertex, clypeus and genae pale (usually reddish brown); frons with fine, rather indistinct microsculpture, scattered fine punctures, and fine wrinkles. Mouth parts pale; mentum with a tooth. Antennae entirely pale.

Prothorax - Entirely pale (usually reddish brown), lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and confused wrinkles. Episternum with horizontal wrinkles at the center.

Pterothorax - Sterna, pleura and scutellum pale.

Elytra - Entirely pale (usually reddish brown) sometimes slightly infuscated apically; epipleura pale. Elytral disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Wings - Oblongum cell absent.

Legs - Entirely pale. Fourth segment of hind tarsus emarginate.

Abdomen - Venter and pygidium pale (usually reddish brown).

Male genitalia - Endophallus unarmed; apex of median lobe tapered to a broad point. The endophallic armature in two specimens was examined.

Discussion

Recognition - This is our only more or less entirely pale species in which the upper protibial spur is present.

Variation - In the few males seen of this species the number of preapical notches on the mesotibiae varies from 2 to 3, even in the same individual.

Synonymy - This species was originally described by LeConte as *Loxopeza testacea*. However, this name is a secondary junior homonym of *Lebia testacea* Dejean and must be replaced. *Lebia testacea* Dejean is now generally placed in the genus *Lia* which I consider a subgenus of *Lebia*.

Etymology - The replacement name proposed here is in honor of the original describer, Dr. John L. LeConte.

Distribution - Although 14 specimens of this species were available for study only one had a definite locality. This was 2.5 m east of Nickle Creek Stn., Culberson Co.; Texas. All the others were from Texas with no specific locality.

Subgenus *Lamprias* Bonelli

Lamprias Bonelli 1809. Type species - *Carabus cyanocephalus* Linnaeus 1758, designated by Curtis 1829.

Echimuthus Leach 1815 : 81.

Omalomorpha Motschoulsky 1845 : 42.

Homalops Motschoulsky 1850 : 42.

Lebida Motschoulsky 1862 : 51.

Description

Head - Variable in color. Frons with variable sculpture, often strongly punctured, with short erect setae. Mentum with a tooth with a distinct sulcus across its base, epilobes present; ligula with paraglossae not extending beyond glossae. Palpi usually stout with the apex truncate; labial palpi with penultimate segment usually bisetose. Antennae variable in color; basal three and a third segments often hairy. Neck not strongly constricted.

Prothorax - Entirely pale (in species seen in this study). Pronotum variable in shape, lateral margins widened basally; disc with variable sculpture, often with strong punctures and short erect setae.

Pterothorax - Sterna, pleura and scutellum variable in color.

Elytra - Disc usually entirely metallic, sometimes bicolored; epipleura variable in color. Disc with striae indistinct and broken into punctures; intervals flat; apical pinch well developed; basal ridge usually complete.

Wings - Oblongum cell variable in extent of completeness.

Legs - Color variable. Protibia with upper spur present. Mesotibia of males with a single preapical notch. Fourth segment of hind tarsus usually emarginate.

Abdomen - Venter and pygidium variable in color.

Male genitalia - Median lobe with apex usually tapered to a broad point. Endophallus (in species seen) armed with longitudinal rows of fine spines.

Discussion

Recognition - The diagnostic characters of the subgenus *Lamprias* are an upper protibial spur, epilobes on the mentum, a tooth on the mentum with a distinct sulcus across its base, and (in species seen) strong punctures and short erect setae on the frons, pronotum, and elytral disc. In the area under study the subgenus *Lamprias* can be recognized by the presence of an upper protibial spur and by the strongly punctured frons and pronotum.

Taxonomic status - The subgenus *Lamprias* is clearly a member of the genus *Lebia* as defined here. As far as is known it is distinct from other groups within *Lebia* and is regarded as a valid subgenus.

Lebia (Lamprias) divisa LeConte

Lebia concinna LeConte (not Brulle 1938) 1848 : 192. Type locality - Lake Superior.

Lebia divisa LeConte 1850 : 203. LeConte 1863 : 5. Gemminger and Harold 1868 : 138. Horn 1872 : 141. Blatchley 1910 : 145. Leng 1920 : 65 (*Lebia*). Csiki 1932 : 1314 (*Lamprias*).

Description

Length of elytra - 3.60 - 5.08 mm; mean (22 specimens) 4.52 mm.

Head - Frons, vertex, clypeus, and genae pale; frons lacking microsculpture, with strong setiferous punctures. Mouth parts pale

except infuscated palpi; mentum with a tooth. Antennae entirely pale, first segment lightest. Neck not strongly constricted.

Prothorax - Entirely pale. Pronotum shaped as in fig. 5, lateral margins equal throughout; disc lacking microsculpture, with strong setiferous punctures.

Pterothorax - Sterna, pleura and scutellum pale.

Elytra - Disc metallic with a pale basal marking (fig. 19); epipleura pale on basal half, dark on distal half. Disc with striae composed of a series of strong punctures, intervals flat, with scattered punctures, and with short erect setae at least at the base; apical pinch well developed; basal ridge variable, complete or incomplete.

Legs - Pale, tibiae darker distally, tarsi dark. Fourth segment of hind tarsus strongly emarginate or weakly bilobed.

Abdomen - Venter and pygidium dark.

Male genitalia - Armature of endophallus as in figs. 59, 60; median lobe with apex shaped as in fig. 61. The endophallic armature in five specimens was examined.

Discussion

Recognition - This is the only species of our fauna with an upper protibial spur and bicolored elytra. It is also the only species with short erect setae on the frons, pronotum and base of the elytra.

Variation - In most specimens of *Lebia divisa* the elytra bear short setae only at the base. However, in specimens from Illinois and Kansas there are setae over the entire elytral disc although more numerous at the base. These specimens also have the tibiae more strongly infuscated. These variants are considered to belong to a single species because one of the Illinois specimens shows a definite reduction in the number of hairs on the elytra. The specimen does not appear to be rubbed. In addition some of the specimens which typically lack setae except at the base, show a few very poorly developed setae scattered over the disc. The two forms, which are allopatric, have the same endophallic armature. There is little doubt but that specimens from intermediate areas will show that the two forms completely intergrade.

Distribution - This species occurs over the central part of the continent (fig. 120); 67 specimens were studied from the following localities.

CANADA
ALBERTA - Bow Slope; Cassils; Edmonton; Medicine Hat. MANITOBA - Brandon. SASKATCHEWAN - Saskatoon.
UNITED STATES
COLORADO. IDAHO - Lawyers Canyon (Lewis Co.). ILLINOIS. KANSAS. MINNESOTA - Garrison (Crow Wing Co.).

Subgenus *Lebia* Latreille

Lebia Latreille 1802 : 85. Type species - *Carabus haemorrhoidalis* Fabricius 1792 (= *Buprestis marginatus* Geoffrey 1785 = *Lebia marginata*); designated by Andrewes 1935.

Metabola Chaudoir 1870 : 160. Type species - *Metabola rufopyga* Chaudoir, type by monotypy.

Aphelogenia Chaudoir 1871 : 25. Type species - *Carabus vittatus* Fabricius; here designated.

Dianchomena Chaudoir 1871 : 45. Type species - *Lebia scapularis* Dejean (=

Lebis solea Hentz); here designated.

The members of the subgenus *Lebia* are extremely varied. Characters mentioned in the generic description as being variable are also variable in *Lebia s.s.* except for the following. Mentum always without epilobes; ligula with paraglossae short and not extending beyond glossae. Penultimate segment of labial palpus bisetose. Wings with oblongum cell reduced to a triangular remnant or entirely absent. Protibiae without an upper spur. Mesotibiae with a single preapical notch. Median lobe of male genitalia with apex always long, broad or narrow.

Discussion

Recognition - The most diagnostic feature of the subgenus *Lebia* is the lack of the upper protibial spur. Other features which are found throughout the subgenus *Lebia* can also be found in other subgenera.

Synonymy - Chaudoir's genera *Metabola*, *Aphelogenia*, and *Dianchomena* are regarded as synonyms of *Lebia*. At least one and probably both species of *Metabola* are variants of *Lebia pulchella*. *Aphelogenia*, characterized by lack of a tooth on the mentum and the apex of the median lobe narrow, is clearly connected with the rest of *Lebia* through *Lebia analis* and *scalpta*. *Dianchomena* includes several species which are basically members of *Aphelogenia*, i. e. they lack the tooth on the mentum and the apex of the median lobe is narrow. Chaudoir segregated them from *Aphelogenia* because of their strongly constricted necks but this character is clearly a specialization which has arisen twice within *Aphelogenia*.

11. *Lebia (Lebia) pulchella* Dejean

Lebia pulchella Dejean 1826 : 457. Type locality - "Amerique septentrionale". LeConte 1848 : 194. LeConte 1863 : 5. Gemminger and Harold 1868 : 140. Chaudoir 1870 : 172. Horn 1872 : 133. Blatchley 1910 : 145. Casey 1920 : 253. Leng 1920 : 65 (*Lebia*). Csiki 1932 : 1330 (*Lebia*).

Lia pulchella; Motschoulsky 1864 : 228.

Metabola vivida Bates 1884 : 298. Type locality - Arizona; Mexico, northern Sonora. NEW SYNONYMY.

Lebia vivida; Horn 1885 : 132. Leng 1920 : 65 (*Lebia*). Csiki 1932 : 1318 (*Metabola*). Blackwelder 1944 : 56.

Lebia tahoensis Casey 1920 : 252. Type locality - California (Lake Tahoe). NEW SYNONYMY. Csiki 1932 : 1331 (*Lebia*).

Description

Length of elytra - 2.56 - 4.24 mm; mean (23 specimens) 3.63 mm.

Head - Frons and vertex metallic blue or green, clypeus and genae dark; frons and vertex strongly punctured and with short erect hairs. Mouth parts largely dark, posterior part of gula pale; mentum toothed. Antennae with basal three segments variable in color, others dark; third distinctly hairy. Neck not strongly constricted.

Prothorax - Usually entirely pale, variable in shape (see Table 1). Lateral margins widened basally; disc with distinct microsculpture but variable rugosity.

Pterothorax - Sterna, pleura and scutellum usually pale, dark if

elytral disc is entirely metallic.

Elytra - Disc metallic with pale markings (figs. 20, 21) or entirely metallic blue; epipleura usually pale with a dark basal spot, entirely dark when elytral disc is entirely metallic. Disc with striae weak and broken into spots; intervals flat; elytral pinch well developed; basal ridge incomplete.

Legs - Variable in color but tarsi always dark. Fourth tarsal segment strongly emarginate.

Abdomen - Venter usually pale, dark when elytra are completely metallic; pygidium usually pale with two dark apical spots, entirely dark if elytra are completely metallic.

Male genitalia - Armature of endophallus as in figs. 62, 63 (note that the spines in the row below the apex are larger than in *viridipennis* and that the small patch of spines is directly beneath the right hand end of the row above it); apex of median lobe tapered to a broad point. The endophallic armature in five specimens was examined.

Discussion

Recognition - This is the only species of the subgenus *Lebia* north of Mexico with short erect pubescence on the frons. The frons is usually distinctly punctate, and over most of the range of *pulchella* the elytral pattern of pale fasciae on a metallic background is distinctive.

Variation - *Lebia pulchella* is one of the more variable species of *Lebia*. The color of the beetle as a whole, the shape of the pronotum, and the sculpture of the pronotum vary geographically. In the eastern United States and adjacent Canada west to Minnesota, Kansas, and Texas occurs a form colored as follows: head dark with frons metallic; prothorax and pterothorax entirely pale; elytra (fig. 20) with a wide prebasal pale fascia and an apical pale fascia; the legs entirely pale except the tarsi; the abdomen entirely pale. In addition the pronotum is very smooth and longer (see Table 1). The pale apical fascia of the elytra is rarely absent in this form.

TABLE 1. Variation in ratio of 100 X pronotal length/pronotal width in *Lebia pulchella*.

Population	No. in sample	Range	Mean
eastern	20	70.80-79.25	75.75
northern prairie	16	66.67-73.33	70.40
Wyoming to New Mexico	6	69.49-73.68	72.06
Arizona	9	70.37-75.00	72.79
California	5	68.38-71.15	69.60

In southern Alberta, Saskatchewan and in North Dakota there occurs a form similar to the above but the pale fascia at the apex of the elytra is absent and the anterior margin of the dark posterior half is not so jagged. The femora are dark tipped, and the pronotum is somewhat

more rugose and more transverse. South of this area in Wyoming, Colorado and New Mexico, is a form similar to the above but the basal dark marking on the elytra is reduced (fig. 21); the femora are dark on the distal half, and the pronotum is somewhat more rugose, especially in New Mexico. In Arizona, specimens are like the above but the pronotum is strongly punctato-rugose. Finally, in interior California and at least part of Nevada occurs an entirely dark form, the elytra, pronotum, and front of the head being a dark blue. The pronotum is moderately rugose and the most transverse of all the known forms.

Interpretation of the variation described above is somewhat uncertain at the present time. It would seem that the shape of the pronotum varies clinally on an east-west axis (Table 1). Also, the three central populations from Arizona and New Mexico north to Alberta and Saskatchewan may show clinal variation in a north-south pattern in pronotal rugosity and perhaps femoral coloration. However, the limited number of western specimens available prohibits any conclusive statement on this point.

The five forms described above are here considered conspecific because they all possess an identical endophallic armature, a strongly punctured frons with short erect hairs, and a distinctly hairy third antennal segment. In addition they replace each other geographically. It is expected that intermediates between the various color forms will be found when the distribution is more completely known.

Subspecific names have not been applied here because of the limited number of specimens of the western forms and the resultant uncertainty of the type of variation involved, whether clinal or subspecific. The nominate form is the eastern one. The name *vivida* was applied to the Arizona form with the strongly rugose pronotum and the name *tahoensis* to the entirely dark form in California.

Distribution - This species occurs over most of the United States and adjacent Canada (fig. 123). Over 200 specimens were studied from the following localities.

CANADA

ALBERTA - Edmonton; Gull Lake; Happy Valley; Medicine Hat. ONTARIO - Campden. SASKATCHEWAN - Swift Current.

UNITED STATES

ALABAMA - Tuscaloosa (Tuscaloosa Co.). ARIZONA - Canille (Santa Cruz Co.); Lake Mary (Coconino Co.); Phoenix (Maricopa Co.); Prescott (Yavapai Co.); Santa Catalina Mountains; Tucson (Pima Co.). ARKANSAS - Hope (Hempstead Co.). CALIFORNIA - Cayton (Shasta Co.); Marin Co.; Sequoia National Park; Sugar Pine (Madera Co.). COLORADO - Horsefly Pk. (Ouray Co.); Utah Creek (Costilla Co.). CONNECTICUT - Stamford (Fairfield Co.). DISTRICT OF COLUMBIA. FLORIDA - Archbold Biological Station (Highlands Co.); Dunedin (Pinellas Co.); Gainesville (Alachua Co.); Homestead (Dade Co.); Jacksonville (Duval Co.); Lake Placid (Highlands Co.); Lake Luey; Osceola Co.; Tarpon Springs (Pinellas Co.); Welake (Putnam Co.); Winter Park (Orange Co.). GEORGIA - Clarke Co. ILLINOIS - Saint Clair Co.; Willow Springs (Cook Co.). KANSAS - Manhattan (Riley Co.); Topeka (Shawnee Co.); Wallace Co. MARYLAND - Baltimore (Independent City); Chesapeake Beach (Calvert Co.); Nanjemoy (Charles Co.); Plum Point (Calvert Co.). MASSACHUSETTS - Arlington (Middlesex Co.); Brookline (Norfolk Co.); Dover (Norfolk Co.); Martha's Vineyard (Dukes Co.); Needham (Norfolk Co.). MICHIGAN - Detroit (Wayne Co.); Mecatawa (Ottawa Co.). MINNESOTA - Olmsted Co. MISSISSIPPI - Oxford (Lafayette Co.). MISSOURI - Kansas City (Jackson Co.). NEBRASKA - Lincoln (Lancaster Co.). NEVADA. NEW HAMPSHIRE - Mount Surprise, Intervale (Carroll Co.). NEW JERSEY - Anglesea; Atlantic City (Atlantic Co.); Great Notch (Passaic Co.); Hopatcong (Sussex Co.); Manasquan (Monmouth Co.); Ocean City (Cape May Co.); Orange (Essex Co.); Orange Mountains; Point Pleasant (Ocean Co.); Sea Isle City (Cape May Co.); Seaside Heights (Ocean Co.); Woodbury (Gloucester Co.); Woodside. NEW MEXICO - Jemez Mountains; Mescalero Reservation; Porvenir. NEW YORK - Bellport (Suffolk Co.); Cooks Falls (Delaware Co.); Fire Island; Long Beach (Nassau Co.); New York City; Peekskill (Westchester Co.); Smith Town Bay (Suffolk Co.); Yaphank (Suffolk Co.). NORTH CAROLINA - Clayton (Johnston Co.); Columbus Co.; Oxford (Granville); Raleigh (Wake Co.). NORTH DAKOTA - Bismarck (Burleigh Co.). PENNSYLVANIA - Philadelphia (Philadelphia Co.); State College (Centre Co.); Wilkes Barre (Luzerne Co.). RHODE ISLAND - Cranston (Providence Co.); Warwick (Kent Co.). SOUTH CAROLINA - Blackville (Barnwell Co.); Clemson (Oconee Co.); Meredith. TENNESSEE - Greeneville (Green Co.); Knoxville (Knox Co.). TEXAS - Brownsville (Cameron Co.); Carrizo Springs (Dimmit Co.); Corsicana (Navarro Co.); Kingsville (Kleberg Co.); Plano (Collins Co.); Victoria (Victoria Co.). VIRGINIA - Alexandria (Independent City); Black Pond (Fairfax Co.); Falls Church (Fairfax Co.); Mount Vernon (Fairfax Co.); Saint Elmo; Springhill. WEST VIRGINIA. WYOMING - Laramie (Albany Co.).

12. *Lebia (Lebia) viridipennis* Dejean

Lebia viridipennis Dejean 1826 : 452. Type locality - "Amerique septentrionale". LeConte 1848 : 193. LeConte 1863 : 5. Gemminger and Harold 1868 : 141. Chaudoir 1870 : 194. Horn 1872 : 135. Blatchley 1910 : 146. Casey 1920 : 250. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1331 (*Lebia*).

Lebia borea Hentz 1930 : 256. Type locality - Massachusetts.

Lebia abrupta Casey 1920 : 250. Type locality - Indiana. NEW SYNONYMY. Csiki 1932 : 1328 (*Lebia*).

Lebia viridipennis frontalis Casey 1920 : 251. Type locality - Iowa (Keokuk). NEW SYNONYMY. Csiki 1932 : 1331 (*Lebia*).

Lebia rhodeana Casey 1920 : 251. Type locality - Rhode Island (Boston Neck). NEW SYNONYMY. Csiki 1932 : 1330 (*Lebia*).

Description

Length of elytra - 2.80 - 4.12 mm; mean (22 specimens) 3.69 mm.

Head - Frons and vertex metallic (usually green), clypeus and genae dark; frons with distinct microsculpture, with fine punctures and slightly wrinkled by the eyes. Mouth parts mostly dark but mentum and ligula rather pale; mentum with a tooth. Antennae with segments one and two pale, three to eleven dark but apical ones somewhat paler. Neck not strongly constricted.

Prothorax - Entirely pale. Pronotum transverse in shape, lateral margins widened basally; disc with very fine wrinkles, almost smooth.

Pterothorax - Sterna, pleura and scutellum pale.

Elytra - Disc entirely metallic (usually green); epipleura dark. Disc with striae very weak and breaking up into separate punctures, intervals flat; apical pinch well developed; basal ridge incomplete.

Legs - Coxae and trochanters pale; femora pale on the basal two thirds, dark distally; tibiae pale medially, darkened at ends; tarsi dark. Fourth segment of the hind tarsus bilobed.

Abdomen - Venter and pygidium pale.

Armature of male endophallus - As in figs. 64, 65 (note that the spines in the row below the apex are smaller than in *pulchella* and that the small patch of spines is not directly beneath the right hand end of the row of spines above it); apex of median lobe tapered to a broad point. The endophallic armature in five specimens was examined.

Discussion

Recognition - *Lebia viridipennis* is similar in appearance to *abdominalis*, both having the elytra and frons metallic and the pronotum pale. However, in *viridipennis* the pronotal margins are widened basally and the femora are dark on the apical third.

Variation - There seems to be no significant variation in *viridipennis*. The metallic coloration is sometimes blue instead of green. The head may then appear to be black.

Synonymy - Casey's *Lebia abrupta*, *Lebia rhodeana*, and subspecies *Lebia viridipennis frontalis* are here considered synonyms of *viridipennis*. Both *abrupta* and *frontalis* are based on the shape of the pronotum which is generally of little value in *Lebia*. *L. rhodeana* is apparently the blue form in which the

metallic blue of the frons is very dark and appears black.

Distribution - *Lebia viridipennis* occurs in the eastern United States and probably adjacent Canada (fig. 122). Over 325 specimens were studied from the following localities.

UNITED STATES
ALABAMA - Coleta; Mobile (Mobile Co.). CONNECTICUT - Cornwall (Litchfield Co.); New Haven (New Haven Co.). *DISTRICT OF COLUMBIA. FLORIDA - Capron; Cedar Keys (Levy Co.); De Funiak Springs (Walton Co.); Dunedin* (Pinellas Co.); Enterprise (Volusia Co.); Freeport (Walton Co.); Gainesville (Alachua Co.); Homestead (Dade Co.); Kissimmee (Osceola Co.); Jacksonville (Duval Co.); La Belle (Henry Co.); Lake Letta (Highlands Co.); Lake Placid (Highlands Co.); Royal Palm State Park (Dade Co.); Sarasota (Sarasota Co.); Sebastion (Indian River Co.); Sebring (Highlands Co.); Tarpon Springs (Walton Co.). GEORGIA - Clarke Co.; Newton (Baker Co.). ILLINOIS - Argo (Cook Co.); Downers Grove (Du Page Co.); Glen Ellyn (Du Page Co.); Kickapoo State Park (Vermilion Co.); Lyons (Cook Co.); Macon Co.; Olive Branch (Alexander Co.); Palos Park (Cook Co.); Riverside (Cook Co.); Urbana (Champaign Co.); Utica (La Salle Co.); Willow Springs (Cook Co.). INDIANA - Crawford Co.; Elkhart (Elkhart Co.); Gary (Lake Co.); Hanover (Jefferson Co.); Judson Co.; Knox Co.; Kosciusko Co.; Lafayette (Tippecanoe Co.); Marion Co.; Perry Co.; Posey Co.; Vigo Co. IOWA - Iowa City (Johnson Co.). KANSAS - Douglas Co.; Franklin Co.; Kansas City (Wyandotte Co.); Onaga (Pottawatomie Co.); Riley Co.; Topeka (Shawnee Co.). MARYLAND - Great Falls (Montgomery Co.); Plummers Island; Talbot Co. MASSACHUSETTS - Andover (Essex Co.); Brookline (Norfolk Co.); Marion (Plymouth Co.); Sherborn (Middlesex Co.); Stoneham (Middlesex Co.); Wareham (Plymouth Co.); Wellesley (Norfolk Co.); Weston (Middlesex Co.). MICHIGAN - Detroit (Wayne Co.); East Lansing (Ingham Co.). MINNESOTA - Minneapolis (Hennepin Co.). MISSISSIPPI - Lucedale (George Co.). MISSOURI - Kansas City (Jackson Co.); Saint Charles (Saint Charles Co.); Saint Louis (Independent City); Webster Groves (Saint Louis Co.). NEBRASKA - Omaha (Douglas Co.). NEW JERSEY - Anglesea; Atlantic City (Atlantic Co.); Boonton (Morris Co.); Cape May (Cape May Co.); Clementon (Camden Co.); Iona (Gloucester Co.); Lahaway; Lakehurst (Ocean Co.); Lakewood (Ocean Co.); Mountain View (Passaic Co.); Orange (Essex Co.); Phillipsburg (Warren Co.); Snake Hill; Surf City (Ocean Co.); Westville (Gloucester Co.); Woodbury (Gloucester Co.). NEW YORK - Bear Mountain (Rockland Co.); New York City; Orient (Suffolk Co.); Peekskill (Westchester Co.); Tarrytown (Westchester Co.); Wyandanch (Suffolk Co.). NORTH CAROLINA - Belhaven (Beaufort Co.); Black Mountains; Columbus Co. OHIO - Cincinnati (Hamilton Co.); Cleveland (Cuyahoga Co.); Oxford (Butler Co.); Summit Co. OKLAHOMA - Le Flore Co. PENNSYLVANIA - Allegheny Co.; Ashbourne; Ashley (Luzerne Co.); Broomall (Delaware Co.); Canadensis (Monroe Co.); Conshohocken (Montgomery Co.); Delaware Water Gap (Monroe Co.); Easton (Northampton Co.); Grove City (Mercer Co.); Hazleton (Luzerne Co.); Hummelstown (Dauphin Co.); Kermet Square (Chester Co.); Lackawaxen (Pike Co.); Lenhartsville (Berks Co.); Martinsburg (Blair Co.); Ohiopyle (Fayette Co.); Philadelphia (Philadelphia Co.); Pymatuning; State College (Centre Co.). RHODE ISLAND - Warwick (Kent Co.). SOUTH CAROLINA - Clemson (Oconee Co.); Meredith. TENNESSEE. TEXAS - Brownsville (Cameron Co.); Cypress Mills (Blanco Co.). VIRGINIA - Alexandria Co.; Black Pond (Fairfax Co.); Great Falls (Fairfax Co.); Springhill. WEST VIRGINIA - Harpers Ferry (Jefferson Co.).

13. *Lebia (Lebia) bitaeniata* Chevrolat

Lebia bitaeniata Chevrolat 1834 : 2nd fascicle. Type locality - Orixaba (Mexico). Gemminger and Harold 1868 : 137. Chaudoir 1870 : 208. Bates 1883 : 228. Schaeffer 1910 : 397. Leng 1920 : 65. (*Lebia*). Csiki 1932 : 1332 (*Lebia*). Blackwelder 1944 : 53.

Lebia bicincta Laporte 1834 : 47. Type locality - "Orizaba, au Mexique". Gemminger and Harold 1868 : 136.

Lia femorata Motschoulsky 1864 : 228. Type locality - "Am[erique] centr [ale]".

Lebia callizona Bates 1878 : 607. Type locality - unknown. Bates 1883 : 228.

Lebia bitaeniata callizona; Schaeffer 1910 : 397. Leng 1920 : 65.

Description

Length of elytra - 3.36 - 3.84 mm; mean (18 specimens) 3.61 mm.

Head - Frons, clypeus, vertex, and genae metallic or pale; frons with distinct but fine microsculpture, punctate-rugose at sides. Mouth parts pale except for dark palpi and usually dark labrum and mandibles; mentum with a tooth. Antennae with segment one pale, two and three variable, four to eleven dark. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct, but fine microsculpture and with very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc metallic with pale fasciae (fig. 22); epipleura pale except for dark section adjacent to metallic basal marking of disc. Disc

with striae distinct but broken, intervals flat; apical pinch well developed; basal ridge incomplete.

Legs - Coxae and trochanters pale, femora pale on basal third, dark or metallic distally; tibiae and tarsi dark. Fourth segment of hind tarsus bilobed.

Abdomen - Venter mostly or entirely pale, sometimes with a large dark apical marking on last segment. Pygidium dark.

Male genitalia - Armature of endophallus as in figs. 68, 69; apex of median lobe long and slender (fig. 70). The endophallic armature in three specimens was examined.

Discussion

Recognition - The only other species occurring north of Mexico with the elytral disc metallic with pale fasciae is *pulchella*. In southern Texas where the ranges of the two overlap the femora of *bitaeniata* are largely dark while in *pulchella* they are entirely pale. In addition, the elytral patterns are quite distinct (figs. 20, 21, 22) as well as the sculpture and vestiture of the frons.

Variation - This species varies considerably in color. The head varies from pale to metallic and similarly the large dark spot on the apical abdominal sternum may be present or absent. The elytral pattern, at least north of Mexico, is however, quite constant.

Synonymy - As was pointed out by Schaeffer (1910) *bitaeniata*, *callizona* and intermediates occur in the same population. Thus these two forms cannot be regarded even as subspecifically distinct. It is uncertain whether *bitaeniata* is conspecific with *bifasciata* Dejean from South America. The endophallic armatures of the two are slightly different but these differences may be bridged in the intermediate geographic area.

Distribution - North of Mexico *bitaeniata* is known only from southeastern Texas; 17 specimens were studied from the following localities: Brownsville (Cameron Co.); Victoria (Victoria Co.).

14. *Lebia (Lebia) rufopleura* Schaeffer

Lebia rufopleura Schaeffer 1910 : 398. Type locality - Brownsville, Texas. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1330 (*Lebia*).

Description

Length of elytra - 4.12 - 4.48 mm; mean (7 specimens) 4.33 mm.

Head - Frons, clypeus, vertex, and genae pale; frons with distinct microsculpture, with a few wrinkles by eyes. Mouth parts entirely pale; mentum with a distinct tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum transverse in shape, lateral margins widened basally; disc with fine transverse wrinkles.

Pterothorax - Sterna, pleura and scutellum pale.

Elytra - Disc metallic (green-blue or green); epipleura entirely pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge of elytra usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus weakly bi-

lobed.

Abdomen - Venter and pygidium dark.

Male genitalia- Armature of endophallus as in figs. 66, 67; apex of median lobe tapered to a broad point. The endophallic armature in five specimens was examined.

Discussion

Recognition- This is the only member of the subgenus *Lebia* with metallic green or blue elytra and a pale pronotum and head found in southeastern Texas. Although very similar externally to *tuckeri* and especially *pleuritica* the endophallic armature of *rufopleura* is very distinctive.

Variation - No significant variation was noticed in the small series of specimens available for study.

Distribution - *Lebia rufopleura* is known only from southeastern Texas. Eight specimens were studied from the following localities: Brownsville (Cameron Co.); Victoria (Victoria Co.).

15. *Lebia (Lebia) pleuritica* LeConte

Lebia pleuritica LeConte 1848 : 193. Type locality -"...ad Lacum Superiorem...". LeConte 1868 : 5. Gemminger and Harold 1868 : 140. Horn 1872 : 135. Blatchley 1910 : 146. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1330 (*Lebia*). Blackwelder 1944 : 55.
Loxopeza pleuritica; Chaudoir 1871 : 84.

Description

Lebia pleuritica is almost identical to *rufopleura* and is thus not redescribed here. It differs in the following points. Length of elytra - 4.28-5.40 mm; mean (27 specimens) 4.83 mm. Elytral disc with intervals weakly to moderately convex. Male genitalia with armature of endophallus as in fig. 71. The endophallic armature in five specimens was examined.

Discussion

Recognition - In the northeastern quadrant of the United States and adjacent Canada this is the only species of *Lebia s.s.* with metallic green elytra and a pale head and pronotum. However, unless specimens are examined carefully for the subgeneric characters or the pale color of the epipleura is noted they may be mistaken for *Lebia (Loxopeza) atriventris*.

Variation - The number of spines in the armature is variable. Typically there are five or six spines but there may be additional small ones.

Relationships - *Lebia pleuritica* and the following two species, *tuckeri* and *arizonica*, have very similar but rather variable genitalia. On the basis of this structure they could be regarded as a single species. However, *pleuritica* has the fourth segment of the hind tarsus weakly bilobed (not emarginate as in the other two) and as far as is known there is a geographical gap separating *pleuritica* from the others. On these two features *pleuritica* is regarded as a distinct species and the endophallic armature is considered of little value within this group.

Distribution - *Lebia pleuritica* occurs in the northeastern quadrant of

the United States and adjacent Canada (fig. 138). Over 100 specimens were studied from the following localities.

CANADA
ONTARIO - Manotick; Marmora.
UNITED STATES
ILLINOIS - Cook Co.; Galesburg (Knox Co.). IOWA - Ames (Story Co.); Iowa City (Johnson Co.). KANSAS - Lawrence (Douglas Co.); Onaga (Pottawatomie Co.); Riley Co.; Tonganoxie (Leavenworth Co.). MASSACHUSETTS - Mount Hermon (Franklin Co.). MICHIGAN - Birmingham (Oakland Co.); Marquette (Marquette Co.); Rochester (Oakland Co.). MINNESOTA - Saint Paul (Ramsey Co.). NEW JERSEY - Palisades; Snake Hill. NEW YORK - Bronxville (Westchester Co.); Cold Spring Harbor (Suffolk Co.); Ithaca (Tompkins Co.); Long Beach (Nassau Co.); Massapegua (Nassau Co.); New Rochelle (Westchester Co.); New York City; Orient (Suffolk Co.); White Plains (Westchester Co.). PENNSYLVANIA - Easton (Northampton Co.); State College (Centre Co.); Wall (Allegheny Co.). SOUTH DAKOTA - Brookings (Brookings Co.). WISCONSIN - Platteville (Grant Co.).

16. *Lebia (Lebia) tuckeri* (Casey)

Loxopeza tuckeri Casey 1920 : 237. Type locality - Arizona (Tucson).
Lebia tuckeri; Csiki 1932 : 1317 (*Lebia*).

Description

Lebia tuckeri is very similar to *rufopleura* and an entire description need not be given here. It differs in the following ways. Length of elytra - 2.96-5.08 mm; mean (25 specimens) 3.99 mm. Elytral disc with intervals weakly to moderately convex. Fourth segment of hind tarsus emarginate and not bilobed. Male genitalia with armature of endophallus similar to that of *pleuritica* (fig. 71) or somewhat more reduced. The endophallic armature in 16 specimens was examined.

Discussion

Recognition - Of the species of the subgenus *Lebia* occurring in the southwestern United States from western Texas to southern California only two, *tuckeri* and *arizonica*, have metallic green elytra and a pale head and pronotum. In *tuckeri* the metepisternum is usually pale, in *arizonica* it is dark. However, care must be taken in distinguishing the two by this character since the metepisternum in *tuckeri* may appear dark when the underlying tissue has pulled away from the sclerite. Also, the dark coloration of the metepisternum may be weakly developed in *arizonica*.

Variation - In addition to the considerable variation in length, the elytral intervals in *tuckeri* vary from moderately to weakly convex. The endophallic armature varies from several spines as in *pleuritica* to no spines. Typically there seem to be a few present.

Relationships - The *pleuritica* - like species of *Lebia* in the southwestern United States have presented a difficult problem. In the course of this work they were at first considered to be a hybrid population between *pleuritica* with endophallic armature consisting of a short row of spines and a theoretical Mexican form which was smaller and had the endophallus unarmed. When it was realized that *pleuritica* was both morphologically and geographically distinct and that the endophallic armature in this group is of little value the southwestern populations were reexamined. These were found to be divisible into two parts, the most diagnostic feature being whether the metepisternum was pale or dark. The form with the dark metepisternum also had the elytral intervals generally flatter, never became as large as the pale form, lacked distinct micro-

sculpture on the frons, and appeared not to get into California. The pale form with the stronger elytral intervals appears to be Casey's *tuckeri* while the form with the dark metepisternum and the flatter elytral intervals fits best Schaeffer's *arizonica*.

Because the two forms are sympatric in Arizona they must be considered either as distinct species or completely synonymous, but not subspecies. The first choice is here considered the correct one because the dark metepisternum and the rather flat elytral intervals seem to indicate that *arizonica* is closer to the allopatric *cyanipennis* than to the present species. Since the characters separating these two species are weak, experimental work needs to be carried out in order to confirm or reject these conclusions.

Distribution - *Lebia tuckeri* occurs from western Texas to southern California. Over 200 specimens were studied from the following localities.

ARIZONA - Alamo Canyon, Santa Catalina Mountains; Baboquivari Canyon, Baboquivari Mountains (Pima Co.); Brown's Canyon, Baboquivari Mountains (Pima Co.); Carr Canyon, Huachuca Mountains (Cochise Co.); Catalina Springs; Cave Creek Ranch, Chiricahua Mountains (Cochise Co.); Cochise Stronghold, Dragoon Mountains (Cochise Co.); Coyote Mountains; Desert Museum, Tuscon Mountains (Pima Co.); Gila Bend Mountains; Globe (Gila Co.); Kits Peak Rincon, Baboquivari Mountains (Pima Co.); Madera Canyon, Santa Rita Mountains (Santa Cruz Co.); Nogales (Santa Cruz Co.); Oracle (Pinal Co.); Organ Pipe National Monument (Pima Co.); Palmerlee (Cochise Co.); Patagonia (Santa Cruz Co.); Patagonia Mountains (Santa Cruz Co.); Pena Blanca (Santa Cruz Co.); Pinal Mountains; Portal (Cochise Co.); Prescott (Yavapai Co.); Sabino Canyon, Santa Catalina Mountains (Pima Co.); San Bernardino Ranch (Cochise Co.); Tanque Verde (Pima Co.); Texas Pass, Dragoon Mountains (Cochise Co.); Tucson (Pima Co.). CALIFORNIA - Argus Mountains (Inyo Co.); Berrego V. (San Diego Co.); Borego State Park (San Diego Co.); Chino Canyon (? San Bernardino Co.); Palm Springs (Riverside Co.); San Bernardino (San Bernardino Co.). COLORADO - Grand Junction (Mesa Co.). NEW MEXICO - Las Cruces Las Vegas Hot Springs. TEXAS - Fort Davis (Jeff Davis Co.).

17. *Lebia (Lebia) arizonica* Schaeffer

Lebia arizonica Schaeffer 1910 : 398. Type locality - Huachuca Mts., Arizona. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1328 (*Lebia*).

Description

Lebia arizonica is very similar to *rufopleura*, differing in the following points. Length of elytra - 2.84 - 4.08 mm; mean (26 specimens) 3.64 mm. Frons with microsculpture lacking or indistinct. Metepisternum infuscated. Elytral intervals flat or weakly convex. Fourth segment of hind tarsus emarginate. Endophallus of male genitalia usually unarmed. The endophallic armature in five specimens was examined.

Discussion

Recognition - See under *tuckeri*.

Variation - There appears to be no important variation in *arizonica*.

Relationship - See under *tuckeri*.

Distribution - *Lebia arizonica* occurs from western Texas to southern Arizona. Over 125 specimens were studied from the following localities.

ARIZONA - Baboquivari Canyon, Baboquivari Mountains (Pima Co.); Bisbee (Cochise Co.); Brown's Canyon, Baboquivari Mountains (Pima Co.); Carr Canyon, Huachuca Mountains (Cochise Co.); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.); Cochise Stronghold, Dragoon Mountains (Cochise Co.); Dry Canyon, Sands Ranch, Whetstone Mountains (Cochise Co.); Fort Huachuca (Cochise Co.); Globe (Gila Co.); Madera Canyon, Santa Rita Mountains (Santa Cruz Co.); Nogales (Santa Cruz Co.); Noon Creek, Graham Mountains (Graham Co.); Oak Creek Canyon (Coconino Co.); Oracle (Pinal Co.); Palmerlee (Cochise Co.); Patagonia (Santa Cruz Co.); Pinal Mountains (Gila Co.); Portal (Cochise Co.); Sabino Canyon, Santa Catalina Mountains (Pima Co.); Southwest Research Station, Portal (Cochise Co.); Sunnyside Canyon, Huachuca Mountains (Cochise Co.); Texas Pass, Dragoon Mountains (Cochise Co.). NEW MEXICO - Double Adobe Ranch, Animas Mountains (Hidalgo Co.); Silver City (Grant Co.). TEXAS - Alpine (Brewster Co.).

18. *Lebia (Lebia) cyanipennis* Dejean

Lebia cyanipennis Dejean 1831 : 385. Type locality - "Californie". LeConte 1863 : 5. Gemminger and Harold 1868 : 138. Chaudoir 1870 : 174. Horn 1872 : 133. Casey 1920 : 251. Leng 1920 : 65 (*Lebia*). Csiki 1932 : 1329 (*Lebia*).

Lamprias cyanipennis; Motschoulsky 1850 : 42.

Lebia ruficollis LeConte 1849 : 178. Type locality - San Diego. LeConte 1863 : 5. Gemminger and Harold 1869 : 140. Chaudoir 1870 : 175. Horn 1872 : 134. Leng 1920 : 65 (*Lebia*). Csiki 1932 : 1330 (*Lebia*).

Lebia montana Horn 1885 : 131. Type locality - Montana. NEW SYNONYMY. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1330 (*Lebia*).

Lebia barbarae Casey 1920 : 242. Type locality - California (Sta. Barbara). NEW SYNONYMY. Csiki 1932 : 1328 (*Lebia*).

Lebia melaena Hatch 1953 : 152. Type locality - southern B.C., southeast Washington, western Oregon. NEW SYNONYMY.

Description

Length of elytra - 3.00 - 4.44 mm; mean (21 specimens) 3.85 mm.

Head - Frons, vertex, clypeus, and genae dark (frons usually black); frons with indistinct microsculpture, scattered fine punctures and fine wrinkles. Mouth parts variable in color, pale or infuscated; mentum with a tooth. Antennae with segments one to three variable in color, dark or pale, others dark. Neck not strongly constricted.

Prothorax - Varying from entirely pale (except intercoxal process) to entirely dark. Pronotum transverse in shape, lateral margins widened basally; disc with indistinct microsculpture and transverse wrinkles.

Pterothorax - Sterna, pleura and scutellum dark.

Elytra - Disc metallic; epipleura infuscated. Disc with striae distinct, intervals flat; apical pinch well developed; basal ridge usually complete.

Legs - Entirely dark (reddish brown). Fourth segment of hind tarsus emarginate.

Abdomen - Venter and pygidium dark.

Male genitalia - Endophallus unarmed; apex of median lobe tapered to a broad point. The endophallic armature in five specimens was examined.

Discussion

Recognition - The only species resembling the dark form of this species (metallic elytra, the rest dark) is *perita*. These two can readily be separated by the basal ridge of the elytra, complete in *cyanipennis* and incomplete in *perita*. There is no species north of Mexico similar to the light form (metallic elytra, pale prothorax and the rest dark).

Variation - There are two color forms in *cyanipennis*, a dark form with the prothorax dark like the frons, and a light form with the prothorax pale. Intermediate specimens with a reddish black pronotum connect the two. In most specimens from Montana, Alberta, and Saskatchewan, which always seem to be the pale form, the frons is reddish brown instead of the usual black. A few specimens have the frons almost as dark

as normal. The basal three segments of the antennae also vary in color from pale to dark.

Synonymy - As recognized by several earlier workers *Lebia ruficollis* is only a color variant of *cyanipennis*. I have seen paratypes of *L. montana* and this name applies to that section of the species with the somewhat paler frons. The type of *Lebia melaena* Hatch seems to be a typical specimen of the dark form of *cyanipennis*. It was described under the erroneous belief that in *cyanipennis* the basal segments of the antennae were always dark. The type of *Lebia barbarae* Casey has been examined by G. E. Ball and is also a specimen of the present species.

Distribution - *Lebia cyanipennis* occurs from southern British Columbia, Alberta, and Saskatchewan south to New Mexico, Arizona, and California (fig. 129). Over 300 specimens were studied from the following localities.

CANADA
ALBERTA - Medicine Hat. BRITISH COLUMBIA - Creston; Salmon Arm; Vernon. SASKATCHEWAN - Eastland; Val Marie.
UNITED STATES
ARIZONA - Ganado (Apache Co.); Tuba City (Coconino Co.). CALIFORNIA - Alma (Santa Clara Co.); Azusa (Los Angeles Co.); Camp Greely (Fresno Co.); Carmel (Monterey Co.); Carmen; Cloverdale (Sonoma Co.); Colton (San Bernardino Co.); Crystal Lakes (San Mateo Co.); Half Moon Bay (San Mateo Co.); Kaweah (Tulare Co.); La Honda (San Mateo Co.); Lake Co.; La Mesa (San Diego Co.); Los Angeles (Los Angeles Co.); Los Gatos (Santa Clara Co.); Marin Co.; Mokelumne Hill (Calaveras Co.); Orange Co.; Palm Springs (Riverside Co.); Palo Alto (Santa Clara Co.); Paraiso Springs (Monterey Co.); Pasadena (Los Angeles Co.); Patterson (Stanislaus Co.); Pine Flats Camp; Pomona (Los Angeles Co.); Poso Creek (Kern Co.); Poway (San Diego Co.); Redondo; San Antonio Valley (Santa Clara Co.); San Benito Co.; San Bernardino (San Bernardino Co.); San Diego (San Diego Co.); San Francisco (San Francisco Co.); San Juan Hot Springs; San Mateo (San Mateo Co.); Santa Cruz Mountains; Santa Monica (Los Angeles Co.); Santa Paula (Ventura Co.); Saticoy (Ventura Co.); Sequoia National Park; Sierra National Forest (Madera Co.); Soboba Springs (Riverside Co.); Tanbark Flat (Los Angeles Co.); Tassajara (Monterey Co.); Tejon Canyon (Kern Co.); Tulare Co.; Tuolumne Co.; Walker Pass (Kern Co.); Whittier (Los Angeles Co.). COLORADO - Cortez (Montezuma Co.); Durango (La Plata Co.). IDAHO - Moscow (Latah Co.). MONTANA. NEW MEXICO - Jemez Mountains; Las Vegas Hot Springs. OREGON - Klamath Co.; Siskiyou (Jackson Co.). TEXAS. UTAH - Provo (Utah Co.); Stockton (Tooele Co.). WYOMING - Yellowstone National Park.

19. *Lebia (Lebia) viridis* Say

Lebia viridis Say 1825 : 14. Type locality - not given. LeConte 1848 : 195. LeConte 1863 : 5. Gemminger and Harold 1868 : 141. Chaudoir 1870 : 192. Horn 1872 : 134. Bates 1883 : 223. Blatchley 1910 : 146. Casey 1920 : 246. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1331 (*Lebia*). Blackwelder 1944 : 56.

Lebia viridis Dejean 1825 : 271. Type locality - "Amerique septentrionale".

Lebia smaragdula Dejean 1831 : 387. Type locality - "Amerique septentrionale". LeConte 1848 : 195. LeConte 1863 : 5. Gemminger and Harold 1868 : 140. Casey 1920 : 247.

Lebia viridis smaragdula; Chaudoir 1870 : 192. Horn 1872 : 134. Bates 1883 : 223.

Lamprias cyanellus Motschoulsky 1850 : 42. Type locality - not given.

Lebia cyanella; LeConte 1863 : 5. Gemminger and Harold 1868 : 138.

Lebia cyanea (in part - incorrect synonymy with *smaragdula*; *cyanella*); Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1329.

Lebia moesta LeConte 1850 : 203. Type locality - Michipicotin. LeConte 1863 : 5. Gemminger and Harold 1868 : 139.

Lebia viridis moesta; Chaudoir 1870 : 192. Horn 1872 : 134. Bates 1883 : 223. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1331 (*Lebia*).

Lebia viridis subopaca Schaeffer 1910 : 397. Type locality - Huachuca Mts., Arizona. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1331 (*Lebia*).

Lebia cynica Casey 1920 : 241. Type locality - Rhode Island (Boston Neck).

NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Lebia truckeensis Casey 1920 : 241. Type locality - Nevada (Reno). NEW SYNONYMY. Csiki 1932 : 1331 (*Lebia*).

Lebia castigata Casey 1920 : 242. Type locality - California (Placer Co.). NEW SYNONYMY. Csiki 1932 : 1328 (*Lebia*).

Lebia adolescens Casey 1920 : 242. Type locality - Rhode Island (Boston Neck). NEW SYNONYMY. Csiki 1932 : 1328 (*Lebia*).

Lebia evoluta Casey 1920 : 243. Type locality - New Mexico (Las Vegas). NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Lebia histrica Casey 1920 : 243. Type locality - Rhode Island (Boston Neck). NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Lebia bracata Casey 1920 : 243. Type locality - "Probably from Indiana". NEW SYNONYMY. Csiki 1932 : 1328 (*Lebia*).

Lebia magica Casey 1920 : 244. Type locality - Missouri (St. Louis). NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Lebia incitata Casey 1920 : 244. Type locality - California (Hoopa Valley, Humboldt Co.). NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Lebia subaffinis Casey 1920 : 244. Type locality - New Mexico (Fort Wingate). NEW SYNONYMY. Csiki 1932 : 1331 (*Lebia*).

Lebia vermiculina Casey 1920 : 245. Type locality - Rhode Island (Boston Neck). NEW SYNONYMY. Csiki 1932 : 1331 (*Lebia*).

Lebia prominens Casey 1920 : 245. Type locality - "Probably taken in Indiana". NEW SYNONYMY. Csiki 1932 : 1330 (*Lebia*).

Lebia planifera Casey 1920 : 246. Type locality - Arizona (Tucson). NEW SYNONYMY. Csiki 1932 : 1330 (*Lebia*).

Lebia cobaltina Casey 1920 : 246. Type locality - Mexico (Colonia Garcia, Ziena Madre Mts., Chihuahua). NEW SYNONYMY. Csiki 1932 : 1333 (*Lebia*).

Lebia papago Casey 1920 : 247. Type locality - Arizona (Tucson). NEW SYNONYMY. Csiki 1932 : 1330 (*Lebia*).

Lebia papago trajecta Casey 1920 : 247. Type locality - Arizona. NEW SYNONYMY. Csiki 1932 : 1330 (*Lebia*).

Lebia duluthiana Casey 1920 : 247. Type locality - Minnesota (Duluth). NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Description

Length of elytra - Shiny metallic form: 2.00 - 3.96 mm; mean (21 specimens) 3.00 mm. Dark form: 2.00-3.16 mm; mean (20 specimens) 2.53 mm. Dull blue form: 2.84-3.76 mm; mean (20 specimens) 3.47 mm.

Head - Frons and vertex metallic or dark when elytral disc dark, clypeus and genae dark; frons with fine striae by eyes, occasionally at center, microsculpture variable. Mouthparts dark or infuscated; mentum with a tooth. Antennae entirely dark, segments 1-3 usually with a slight metallic tinge in specimens with metallic elytral disc. Neck not strongly constricted. Eyes usually prominent, a few specimens small and flattened.

Prothorax - Entirely dark or metallic. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture, with fine transverse wrinkles.

Pterothorax - Sterna, pleura, and scutellum usually dark with traces of metallic coloration, sometimes entirely dark.

Elytra - Disc dark or metallic; epipleura dark or infuscated. Disc with striae distinct, sometimes slightly broken; intervals flat or slightly convex; apical pinch well developed; basal ridge usually complete, sometimes incomplete.

Legs - Entirely dark, sometimes slightly metallic.

Abdomen - Venter dark, sometimes slightly metallic. Pygidium dark.

Male genitalia - Armature of endophallus as in figs. 72, 73 (note lateral position of the sclerotized lobe); apex of median lobe tapered to a broad point. The endophallic armature in 24 specimens was examined.

Discussion

Recognition - *Lebia viridis* may be confused with *pumila* or *perita*. Non-metallic forms of *viridis* appear very similar to dark specimens of *pumila* but the two can be readily separated by the width of the lateral lobes of the fifth abdominal sternum (wider than the central trough in *pumila*, equal to or narrower in *viridis*), by the basal ridge of the elytra (incomplete in *pumila*, usually complete in *viridis*), and by the color of the third antennal segment (usually pale in *pumila*, dark in *viridis*). From *perita*, *Lebia viridis* can be separated by its usually complete basal ridge and the metallic color of the head and pronotum (usually shiny black, sometimes slightly metallic in *perita*). In addition males can be separated by the structure of the endophallic armature.

Variation - Most specimens of *viridis* are shiny metallic above (some shade of blue or green), less so underneath with small specimens often lacking any metallic coloration on the underparts. Across the northern United States and adjacent Canada and southward in the cordilleran region occurs a form with the elytral disc, head, and pronotum dark with slight aeneous reflections. The eyes of eastern specimens of this dark form are small and flattened but in the western cordilleran region the eyes are more prominent as in the shiny metallic form. In the southwestern United States occurs a dull blue form in which the frons and pronotum are more strongly sculptured.

Relationships - As noted above there are basically three forms, a shiny metallic form, a dark form, and a dull blue form. The endophallic armature of these forms is the same and the distribution of the shiny metallic form completely overlaps that of the other two.

The three forms are here regarded as conspecific and the names applied to these (*moesta* to the dark form and *subopaca* to the dull blue form) are synonymized under *viridis*. Until field work is done on this complex a final solution probably cannot be obtained. One possible explanation is that these are polymorphic variants adapted to mimic various species of the probable host genus *Altica*. For example the dull blue form may be mimicking the dull blue *Altica obliterata* LeConte which occurs in the southwestern United States.

Synonymy - The types of the numerous Casey names included in synonymy here were examined by G. E. Ball. Most of them do not occur within the range of *perita* with which *viridis* is most likely to be confused.

Distribution - *Lebia viridis* occurs throughout the United States. In Canada its exact distribution is unknown but specimens have been collected as far north as the Yukon Territory (fig. 139). Over 3,300 specimens were studied. It does not seem necessary to list the numerous United States localities from which *viridis* has been taken. The Canadian records are as follows.

ALBERTA - Brooks; Calgary; Edmonton; Lethbridge; McMurray; Medicine Hat; Nordegg; Pincher Creek; Slave Lake; Tilley; Turner Valley; Waterton. BRITISH COLUMBIA - Atbara; Creston; Fernie; Gale; Glenemma; Kamloops; Lytton; Mission City; Nanaimo; Oliver; Pender Harbor; Robson; Royal Oak; Salmon Arm; Steelhead; Trinity Valley; Vancouver; Vernon; Victoria; Wynndel. MANITOBA - Aweme; Husavick; Mackinak; Saint Lazare; The Pas. NEW BRUNSWICK - Fundy National Park. NORTHWEST TERRITORIES - Fort Simpson. NOVA SCOTIA - Halifax; Millsville; Truro. ONTARIO - Bells Corners; Brittania; Constance Bay; Dorchester; Frankford; Jarvis Lake; Kingsville; Marmora; Midland; Ottawa; Pelee Island; Prince Edward Co.; Toronto. QUEBEC - Aylmer; Como; Covey Hill; Duparquet; Mont Albert; Mont Jaques Cartier; Perkins Mills; Thunder River. SASKATCHEWAN - Carleton; Cut Knife; Cypress Hills; Kenosee Lake; Pike Lake; Swift Current. YUKON TERRITORY - Rampart House.

20. *Lebia (Lebia) marginicollis* Dejean

Lebia marginicollis Dejean 1825 : 271. Type locality - "Georgie". LeConte 1863 : 5. Gemminger and Harold 1868 : 139. Chaudoir 1870 : 184. Horn 1872 : 134. Bates 1883 : 222. Casey 1920 : 240. Leng 1920 : 65 (*Lebia*). Csiki 1932 : 1329 (*Lebia*). Blackwelder 1944 : 54.

Lebia cyanea Dejean 1831 : 386. Type locality - "L'ile de Cuba". NEW SYNONYMY. Gemminger and Harold 1868 : 137. Schaeffer 1910 : 397. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1329 (*Lebia*). Blackwelder 1944 : 53.

Lebia viridis cyanea; Horn 1872 : 134. Bates 1883 : 223. Chaudoir 1870 : 192.

Lebia affinis Dejean 1871 : 387. Type locality - "Amerique septentrionale". LeConte 1848 : 195. LeConte 1863 : 5. Gemminger and Harold 1868 : 136.

Lebia marginicollis affinis; Chaudoir 1870 : 184. Horn 1872 : 134. Bates 1883 : 222. Leng 1920 : 65. Csiki 1932 : 1329 (*Lebia*).

Lamprias limbicollis Motschoulsky 1859 : 145. Type locality - Canada.

Description

Length of elytra - Eastern specimens from Texas eastward: 2.16-3.28 mm; mean (23 specimens) 2.59 mm. New Mexico specimens: 2.84 - 4.08 mm; mean (6 specimens) 3.52 mm. Arizona specimens : 3.28-4.16 mm; mean (23 specimens) 3.78 mm.

Head - Frons, vertex, clypeus, and genae dark (frons darkest, with a greenish tinge in some specimens); frons striated to a variable extent. Mouth parts infuscated; mentum with a tooth. Antennae with segments one to three infuscated (basal segment palest), four to eleven dark. Neck not strongly constricted.

Prothorax - Entirely dark except pale lateral margins of pronotum. Pronotum transverse in shape, lateral margins widened basally; disc usually with distinct microsculpture and fine wrinkles (best developed when frontal sculpture strong).

Pterothorax - Sterna, pleura, and scutellum dark.

Elytra - Disc metallic; epipleura infuscated. Disc with striae weak, sometimes breaking up into spots; intervals flat; apical pinch well developed; basal ridge incomplete.

Legs - Entirely dark. Fourth segment of hind tarsus strongly emarginate or weakly bilobed.

Abdomen - Venter and pygidium dark.

Male genitalia - Armature of endophallus as in figs. 74, 75 (note the central position of the sclerotized lobe in the right view of the endophallus); apex of median lobe tapered to a broad point. The endophallus armature in three specimens was examined.

Discussion

Recognition - *Lebia marginicollis* is our only *Lebia* with the elytra metallic and the rest of the body dark except for pale pronotal margins.

Variation - Both size and frontal sculpture vary considerably in *marginicollis*. Specimens from Texas and eastward are smaller than those from Arizona and most specimens from New Mexico (see elytral lengths in description). Similarly the frontal sculpture is weaker, sometimes entirely absent, in the eastern specimens while it is well developed in the New Mexico and Arizona populations.

Relationships - The larger, more strongly sculptured western form is here considered conspecific with typical *marginicollis* of the eastern United States. The endophallic armature is the same in both forms, the frontal sculpture of the eastern form varies towards that of the western form, and in New Mexico large, small, and intermediate sizes occur together.

Synonymy - The synonymy given here is probably incomplete. The tropical species *chalcoptera*, *pleurodera*, *striatifrons*, and *cupripennis*, which differ mainly in size and strength of the frontal striations, are probably forms of this species. In fact, *L. cupripennis* is usually placed as a synonym (Leng 1920, Csiki 1932) but as it comes from Chile it seems best to leave it out with the other tropical species.

Both Chaudoir (1868) and Lindroth (1955) studied the type of *Lebia cyanea* and both considered it to be a form similar to *viridis*. But as Schaeffer (1910) points out Dejean's description refers to a species similar to *marginicollis*. The original description mentions the pale basal segment of the antennae, the frons striated between the eyes, and the pale pronotal margins, characters which do not fit *viridis*. Possibly the labels on the original type have become switched to another specimen. I prefer to use the name in the sense of the original description and regard it as a synonym of *marginicollis* as the type locality, Cuba, is so close to Florida where *marginicollis* is common.

Distribution - This species occurs mainly across the southern United States from Florida to Arizona. In the east it ranges northward to Michigan (fig. 125). It may occur in southern Ontario also as the type locality of *limbicollis* is given as Canada. Over 200 specimens were studied from the following localities.

UNITED STATES

ALABAMA - Mobile (Mobile Co.). ARIZONA - Graham Mountains; Oak Creek Canyon (Coconino Co.); Peña Blanca (Santa Cruz Co.); Pine (Gila Co.); Sierra Ancha Mountains; Whiteriver (Navajo Co.). ARKANSAS - Polk Co. FLORIDA - Belleair (Pinellas Co.); Biscayne Bay (Dade Co.); Centreville; Crescent City (Putnam Co.); Crystal River (Citrus Co.); Dunedin (Pinellas Co.); Enterprise (Volusia Co.); Everglades (Collier Co.); Fort Myers (Lee Co.); Gainesville (Alachua Co.); Hillsboro Co.; Jacksonville (Duval Co.); Kissimmee (Osceola Co.); Lakeland (Polk Co.); Lake Okeechobee; Levy Co.; Naples (Collier Co.); Royal Palm State Park (Dade Co.); Saint Augustine (Saint Johns Co.); Sarasota (Sarasota Co.); Sebastian (Indian River Co.); Tampa (Hillsborough Co.); Winter Park (Orange Co.). GEORGIA - Okefenokee Swamp; Rabun Co.; Tifton (Tift Co.). ILLINOIS - Willow Springs (Cook Co.). INDIANA -

Gibson Co.; Marion Co.; Putnam Co. LOUISIANA - Franklin (Saint Mary Co.); Logansport (DeSoto Co.); Tallulah (Madison Co.); Vowell's Mill (Natchitoches Co.); Winnfield (Winn Co.). MICHIGAN - Sawyer Dunes (Barrien Co.). MISSISSIPPI - Lucedale (George Co.). MISSOURI - Roaring River State Park (Barry Co.). NEW MEXICO - Gila Hot Springs; Socorro Co. NORTH CAROLINA - Black Mountains; Faison (Duplin Co.). OKLAHOMA - McAlester (Boone Co.). SOUTH CAROLINA - Camden (Kershaw Co.); Clemson (Oconee Co.). TENNESSEE - Grassy Cove (Cumberland Co.). TEXAS - Brownsville (Cameron Co.); Columbus (Colorado Co.); Cypress Mills (? Blanco Co.); Dallas (Dallas Co.); Denton (Denton Co.); Victoria (Victoria Co.). VIRGINIA - Boykins (Southampton Co.).

21. *Lebia (Lebia) perita* Casey

Lebia perita Casey 1920 : 241. Type locality - California (Hoopa Valley, Humboldt Co.). Csiki 1932 : 1330 (*Lebia*).

Description

Length of elytra - 2.56 - 3.72 mm; mean (21 specimens) 3.33 mm.

Head - Frons and vertex dark, often with a slight metallic tinge, clypeus and genae dark; frons with striae, best developed near eyes, shortest and weakest medially. Mouth parts dark except ligula and base of palpi; mentum with a tooth. Antennae dark, basal segments lightest. Neck not strongly constricted.

Prothorax - Entirely dark, sometimes slightly metallic. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and wavy transverse wrinkles.

Pterothorax - Sterna, pleura and scutellum dark.

Elytra - Disc metallic; epipleura dark or infuscated. Disc with striae distinct but poorly developed, intervals flat or weakly convex; apical pinch well developed; basal ridge incomplete.

Legs - Entirely dark. Fourth segment of hind tarsus strongly emarginate.

Abdomen - Venter and pygidium dark.

Male genitalia - Armature of endophallus as in figs. 76, 77; apex of median lobe tapering to a broad point. The endophallic armature in five specimens was examined.

Discussion

Recognition - Within its range *perita* may be confused with *cyanipennis* or *viridis*. However, in specimens of the last two species the basal ridge of the elytra is complete while it is incomplete in *perita*. In *cyanipennis* the frons is not striated as in *perita*, and *viridis* usually has the frons distinctly metallic unless the elytra are also dark.

Variation - No major variation was noted in *perita*.

Synonymy - The name *Lebia cyanella* (Motschoulsky), here regarded as a synonym of *viridis*, may apply to the present species. Motschoulsky does compare it to his *limbicollis* (= *marginicollis*) which is certainly very much like the present species except in the color of its pronotal margins. However, as it is impossible to say without seeing the type I have placed it in *viridis* following Chaudoir (1868) and Horn (1872) rather than use a doubtful name.

Distribution - *Lebia perita* ranges from southern British Columbia to southern California (fig. 140). Over 200 specimens were studied from the following localities.

CANADA
BRITISH COLUMBIA - Creston; Mabel Lake; Nanaimo; Sidney; Sirdar; Victoria; Wyndel.
UNITED STATES
CALIFORNIA - Azusa (Los Angeles Co.); Blocksburg (Humboldt Co.); Butte Creek Canyon, nr. Chico (Butte Co.); Camp Creely (Fresno Co.); Camp Nelson (Tulare Co.); Carrville (Trinity Co.); Colton (San Bernardino Co.); Corralitos (Santa Cruz Co.); Dalzura (San Diego Co.); Davis Creek (Modoc Co.); Dunsmuir (Siskiyou Co.); Forest Home (San Bernardino Co.); Fort Seward (Humboldt Co.); Fort Tejon (Kern Co.); Gilroy Hot Springs (Santa Clara Co.); Guerneville (Sonoma Co.); Hullville (Lake Co.); Kaweah (Tulare Co.); Lagunitas (Marin Co.); La Honda (San Mateo Co.); Lake Tahoe; Laurel Dell (Lake Co.); Miami Ranger Station (Mariposa Co.); Mill Creek Canyon (San Bernardino Co.); Mokelumne Hill (Calaveras Co.); Murphys (Calaveras Co.); Oakland (Alameda Co.); Palm Springs (Riverside Co.); Pasadena (Los Angeles Co.); Riverton (El Dorado Co.); San Mateo (San Mateo Co.); Sequoia National Park; Sequel Creek (Santa Cruz Co.); Sonora (Tuolumne Co.); Sugar Pine (Madera Co.); Trinity National Forest (Trinity Co.); Twin Rocks (Mendocino Co.); Warner Mountains (Lake Co.); Willow Creek (Humboldt Co.). IDAHO - Hayden Lake (Kootenai Co.); Kellogg (Shoshone Co.); Mountain Home (Elmore Co.). OREGON - Baker Creek; Cline Falls State Park (Deschutes Co.); Corvallis (Benton Co.); Dayton (Yamhill Co.); Grants Pass (Josephine Co.); Hubbard (Marion Co.); Marshfield; McMinnville (Yamhill Co.); Portland (Multnomah Co.); Port Orford (Curry Co.); Prospect (Jackson Co.); The Dalles (Wasco Co.); Toll Gate (Umatilla Co.). WASHINGTON - Ariel (Cowlitz Co.); Baring (King Co.); Central Ferry (Whitman Co.); Elk (Spokane Co.); Monroe (Snohomish Co.); Naches (Yakimo Co.); Newman Lake (Spokane Co.); Oakville (Grays Harbor Co.); Olympia (Thurston Co.); Paradise Park, Mount Rainier (Pierce Co.); Pullman (Whitman Co.); Seattle (King Co.); Soda Springs; Toppenish (Yakima Co.); Villa; Walla Walla (Walla Walla Co.).

22. *Lebia (Lebia) scapula* Horn

Lebia scapula Horn 1885 : 132. Type locality - Arizona. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1331 (*Lebia*).

Description

Length of elytra - 2.76 - 3.52 mm; mean (21 specimens) 3.16 mm.

Head - Frons, vertex, clypeus, and genae pale; frons with indistinct microsculpture and fine punctures, sometimes slightly wrinkled at sides. Mouth parts pale except for infuscated palpi; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins broadening basally; disc very finely rugose.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings (typical pattern as in fig. 23); epipleura pale. Disc with striae distinct, intervals weakly to moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale; fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium dark.

Male genitalia - Armature of endophallus as in figs. 78, 79; apex of median lobe tapered to a broad point. The endophallic armature in 5 specimens was examined.

Discussion

Recognition - This is the only species in the southwestern United States with at least the apex and more or less the entire mesal half of each elytron dark.

Variation - The extent of the pale elytral markings varies from entirely absent (except for the lateral margins) to covering the anterior three fourths of the lateral areas of the disc. Usually only a small humeral pale marking is present.

Notes - As *Lebia scapula* occurs in Mexico as well as Arizona (specimens seen from Puebla, Mexico) the Mexican populations may be known under a different and possibly earlier name. The description of *Lebia cymindoides* Bates fits very well and the two may prove to be the same. If

so the name *cymindoides* will have priority. However, until the type of *cymindoides* and possibly other species can be checked I prefer to use the name *scapula*.

Distribution - North of Mexico *scapula* is known only from Arizona and New Mexico. Over 600 specimens were studied from the following localities.

ARIZONA - Badger; Bear Valley, Tumacacori Mountain (Santa Cruz Co.); Brown's Canyon, Baboquivari Mountains (Pima Co.); Canelo (Santa Cruz Co.); Carr Canyon, Huachuca Mountains (Cochise Co.); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.); Chiricahua National Monument, Chiricahua Mountains (Cochise Co.); Cochise Stronghold, Dragoon Mountains (Cochise Co.); Continental (Pima Co.); Douglas (Cochise Co.); Dry Canyon, southeast end of Whetstone Mountains (Cochise Co.); Fort Huachuca (Cochise Co.); Gilman Ranch, Mule Mountains (Cochise Co.); Gleeson; Globe (Gila Co.); Kit's Peak Rincon, Baboquivari Mountains (Pima Co.); Madera Canyon, Santa Rita Mountains (Santa Cruz Co.); Nogales (Santa Cruz Co.); Noon Creek, Graham Mountains (Graham Co.); Oak Creek Canyon (Coconino Co.); Oracle (Pinal Co.); Palmerlee (Cochise Co.); Patagonia (Santa Cruz Co.); Patagonia Mountains (Santa Cruz Co.); Pearce (Cochise Co.); Peña Blanca (Santa Cruz Co.); Pinery Canyon, Chiricahua Mountains (Cochise Co.); Ruby (Santa Cruz Co.); Santa Catalina Mountains; Sedona (Coconino Co.); Sonoita (Santa Cruz Co.); Southwest Research Station, Portal (Cochise Co.); Sunnyside Canyon, Huachuca Mountains (Cochise Co.); Texas Pass, Dragoon Mountains (Cochise Co.); Tucson (Pima Co.); White Mountains (Gila Co.); Yanks Spring, Sycamore Canyon, Tumacacori Mountains (Santa Cruz Co.). NEW MEXICO - Double Adobe Ranch, Animas Mountains (Hidalgo Co.).

23. *Lebia (Lebia) analis* Dejean

Lebia analis Dejean 1825 : 265. Type locality - "Amerique septentrionale". Chaudoir 1870 : 211. Horn 1872 : 136. Blatchley 1910 : 147. Casey 1920 : 254. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1328 (*Lebia*). Blackwelder 1922 : 52.

Lebia ornata (in part, incorrect synonymy with *analis*); LeConte 1848 : 194. LeConte 1863 : 5. Gemminger and Harold 1868 : 140.

Lebia anchora Chevrolat 1835 (fascicle 6 No. 132). Type locality - Orixaba (Mexico). NEW SYNONYMY. Gemminger and Harold 1868 : 136. Chaudoir 1870 : 212. Bates 1883 : 229. Casey 1920 : 253. Csiki 1932 : 1331 (*Lebia*). Blackwelder 1922 : 53.

Lebia bonellii Putzeys 1845 : 391. Type locality - unknown. Gemminger and Harold 1868 : 137.

Lebia appendiculata Chaudoir 1870 : 212. Type locality - "Louisiane". Casey 1920 : 253.

Lebia analis appendiculata; Horn 1872 : 136. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1328 (*Lebia*).

Description

Length of elytra - 2.32 - 4.12 mm; mean (24 specimens) 3.38 mm.

Head - Frons, vertex, clypeus and genae dark (frons usually black); frons striated except for a triangular area above clypeus. Mouth parts more or less pale, except gula, scrobes, and tips of mandibles dark, and labrum and palpi somewhat infuscated; mentum with a tooth. Antennae with segments one to three pale, four to eleven infuscated but becoming pale apically. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins broadening basally; disc with striae regularly arranged on upper lateral areas, becoming confused at center and base.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc varying from entirely dark to extensively pale (fig. 25; intermediate condition, fig. 24); epipleura pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter pale, darker apically. Pygidium infuscated.

Male genitalia- Armature of endophallus as in figs. 80, 81; apex of median lobe tapered to a broad point. The endophallic armature in 5 specimens was examined.

Discussion

Recognition- The dark (usually almost black) striated frons and the pale abdomen combine to distinguish *analis* from all our other *Lebia* except *scalpta*. Where these two overlap in Texas the elytral pattern of *scalpta* is distinctive (fig. 26). In Arizona the elytral patterns of the two are very similar but the pale apical marking is interrupted by a fine black border along the suture in *analis*, uninterrupted in *scalpta*. In addition, the upper lateral regions of the pronotum are definitely striated in *analis*, rugose in *scalpta*.

Variation - The color pattern of the elytra varies considerably in *analis*. Specimens from the eastern half of the United States usually have small humeral and apical pale spots. However, in some specimens the elytral disc is entirely dark while in others, especially those from Texas, it is paler and approaches that of the pale western form found in Arizona. The western form is always very pale and shows little variation.

Synonymy - The name *Lebia anchora* Chevrolat probably applies to the pale western form of *analis* and is here considered a synonym. Although I have not seen the type of *anchora* the color pattern agrees and in the original description Chevrolat mentions the ridges on the pronotum.

Distribution- *Lebia analis* occurs in the eastern United States and in the south as far west as Arizona (fig. 130). Over 850 specimens were studied from the following localities.

UNITED STATES

ALABAMA - Auburn (Lee Co.); Tuscaloosa (Tuscaloosa Co.). ARIZONA - Canelo (Santa Cruz Co.); Madera Canyon, Santa Rita Mountains; Patagonia (Santa Cruz Co.); Peña Blanca (Santa Cruz Co.); Southwest Research Station, Portal (Cochise Co.); Tucson (Pima Co.); Yanks Springs, Pajaritos Mountains (nr. Ruby, Santa Cruz Co.). ARKANSAS - Hope (Hempstead Co.). DISTRICT OF COLUMBIA. FLORIDA - Alachua (Alachua Co.); Gainesville (Alachua Co.); Jacksonville (Duval Co.); Key West (Monroe Co.); Levy-Warburg Lake (Alachua Co.); Marion Co. GEORGIA - Clarke Co.; DeWitt (Mitchell Co.); Kennesaw Mountain (Cobb Co.); Lizella (Bibb Co.); Thomasville (Thomas Co.). ILLINOIS - Boskey Dell; Cahokia (Saint Clair Co.); Chicago (Cook Co.); Fairmount (Vermilion Co.); Fort Sheridan (Lake Co.); Gorham (Jackson Co.); Homer (Champaign Co.); Kickapoo State Park (Vermilion Co.); La Grange (Cook Co.); Olive Branch (Alexander Co.); Ottawa (LaSalle Co.); Palos Park (Cook Co.); Prairie du Rocher (Randolph Co.); Springfield (Sangamon Co.); Urbana (Champaign Co.). INDIANA - Crawford Co.; Knox Co.; Lafayette (Tippecanoe Co.); Posey Co.; Putnam Co.; Starke Co. IOWA - Ames (Story Co.); Sioux City (Woodbury Co.). KANSAS - Kansas City (Wyandotte Co.); Lawrence (Douglas Co.); Manhattan (Riley Co.); Onaga (Pottawatomie Co.); Sedgewick Co.; Topeka (Shawnee Co.). KENTUCKY. LOUISIANA - Alexandria (Rapides Co.); Baton Rouge (East Baton Rouge Co.); Bayou Sara; Camp Plauche; Covington (Saint Tammany Co.); Harahan (Jefferson Co.); Logansport (Desoto Co.); New Iberia (Iberia Co.); New Orleans (Orleans Co.); Opelousas (Saint Landry Co.); Tallulah (Madison Co.); MARYLAND - Baltimore (Independent City); Chesapeake Beach (Calvert Co.); Great Falls (Montgomery Co.); Joyce Lane; Plummers Island. MASSACHUSETTS - Brookline (Norfolk Co.); Lexington (Middlesex Co.); Stoughton (Norfolk Co.). MICHIGAN - Harbert Dunes (Barrien Co.); Oakland Co. MINNESOTA - Olmsted Co.; Saint Peter (Nicollet Co.). MISSISSIPPI - Holly Bluff (Yazoo Co.); Jackson (Hinds Co.); Natchez (Adams Co.). MISSOURI - Cuba (Crawford Co.); Langdon (Atchison Co.); Saint Charles (Saint Charles Co.); Saint Louis (Independent City). NEBRASKA - Omaha (Douglas Co.); Saltillo (Lancaster Co.); Waverley (Lancaster Co.). NEW JERSEY - Chester (Morris Co.); Collingswood (Camden Co.); Cumberland Co.; Newark (Essex Co.); Oradell (Bergen Co.); Orange (Essex Co.); Orange Mountains; Woodbury (Gloucester Co.). NEW YORK - Bear Mountain (Rockland Co.); Bellport (Suffolk Co.); Florida (Orange Co.); New Rochelle (Westchester Co.); Wyandanch (Suffolk Co.). NORTH CAROLINA - Clayton (Johnston Co.); Franklin Co.; Hot Springs (Madison Co.); Lake Junaluska (Haywood Co.); Pikeville (Wayne Co.); Pollocksville (Jones Co.); Raleigh (Wake Co.); Scotland Co.; Simpson Co.; Southern Pines (Moore Co.); Swanquarter (Hyde Co.); Whiteville (Columbus Co.); Willard (Pender Co.). OHIO - Cincinnati (Hamilton Co.); Columbus (Franklin Co.); Holmes Co.; Marietta (Washington Co.); West Alexandria (Preble Co.). OKLAHOMA - Catoosa (Rogers Co.); Tulsa (Tulsa Co.). PENNSYLVANIA - Ashbourne; Avondale (Chester Co.); Castle Rock; Darby (Delaware Co.); Easton (Northampton Co.); Gladwyne (Montgomery Co.); Hummelstown (Douphin Co.); Kennet Square (Chester Co.); Lancaster (Lancaster Co.); Lansdowne (Delaware Co.); Ohiopyle (Fayette Co.); Ole Bull; Philadelphia (Philadelphia Co.); Pottstown (Montgomery Co.); State College (Centre Co.); Tinicum (Delaware Co.); Wilkes Barre (Luzerne Co.); Williamsport (Lycoming Co.). SOUTH CAROLINA - Aiken (Aiken Co.); Camden (Kershaw Co.); Clemson (Oconee Co.); Columbia (Richland Co.); Florence (Florence Co.); Meredith; Summerton (Clarendon Co.). TENNESSEE - Dyer Co.; Elmwood (Smith Co.); Grassy Cove (Cumberland Co.); Knoxville (Knox Co.); TEXAS - Arlington (Tarrant Co.); Beeville (Bee Co.); Brownsville (Cameron Co.); Cypress Mills (? Blanco Co.); Dallas (Dallas Co.); Denton (Denton Co.); Greenville (Hunt Co.); Laredo (Webb Co.);

New Braunfels (Comal Co.); Port Isabel (Cameron Co.); San Diego (Duval Co.); Uvalde (Uvalde Co.); Victoria (Victoria Co.). VERMONT - Burlington (Chittenden Co.). VIRGINIA - Alexandria (Independent City); Arlington (Arlington Co.); Boykins (Southampton Co.); Dismal Swamp; Falls Church (Fairfax Co.); Fredericksburg (Spotsylvania Co.); Great Falls (Fairfax Co.); Nelson Co.; Norfolk (Norfolk Co.); Petersburg (Chesterford Co.); Roanoke River, Route 1; Rosslyn (Arlington Co.). WEST VIRGINIA - Eastern Panhandle; Spruce Knob, Riverton (Pendleton Co.); White Sulphur Springs (Greenbrier Co.).

24. *Lebia (Lebia) scalpta* Bates

Lebia scalpta Bates 1883 : 230. Type locality - Mexico, Jalapa or Yucatan. Csiki 1932 : 1338 (*Lebia*). Blackwelder 1944 : 55.

Description

Length of elytra - 3.52 - 4.40 mm; mean (8 specimens) 4.07 mm.

Head - Frons, vertex, clypeus, and genae dark (frons usually black); frons striated except for a triangular area above clypeus. Mouth parts more or less pale except for infuscated gula; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins broadening basally; disc strongly wrinkled.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings, either patterned as in fig. 26 or lateral vitta reduced and pattern approaching that of *analis* (fig. 25); epipleura pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus strongly emarginate.

Abdomen - Venter pale. Pygidium pale or slightly infuscated.

Male genitalia - Armature of endophallus as in figs. 82, 83; apex of the median lobe tapered to a narrow point. The endophallic armature of two specimens was examined.

Discussion

Recognition - See under *Lebia analis*.

Variation - The four Texas specimens seem identical in color pattern to Bates' illustration of *scalpta*. The five Arizona specimens, however, lack the anterior section of the dark lateral vitta although in four of them the remaining lateral spot extends forward slightly. In the fifth the pattern is like that of the pale form of *analis*.

Relationships - There is no doubt that this is a distinct species from *analis*, differing in color pattern, sculpture of the pronotum, and structure of the male genitalia. I had at first considered the Texas and Arizona samples of *scalpta* as being specifically distinct from each other. Because the lateral elytral marking of some of the Arizona specimens is not completely reduced this view is no longer held. As there were no males in the Texas sample the genitalia of the two geographical groups have not been compared.

Distribution - North of Mexico this species is known from Texas and Arizona. Nine specimens were studied from the following localities.

ARIZONA - Baboquivari Mountains (Pima Co.); Patagonia (Santa Cruz Co.); Peña Blanca (Santa Cruz Co.). TEXAS - Laredo (Webb Co.); Uvalde (Uvalde Co.).

25. *Lebia (Lebia) solea* Hentz

Lebia solea Hentz 1830 : 255. Type locality - Massachusetts. Lutshnik 1922 : 72. Csiki 1932 : 1342 (*Dianchomena*). Blackwelder 1944 : 55.

Lebia scapularis Dejean (not Fourcroy 1785) 1831 : 377. Type locality - "Amerique septentrionale". LeConte 1848 : 194. LeConte 1863 : 5. Gemminger and Harold 1868 : 140. Blatchley 1910 : 148. Leng 1920 : 66 (*Dianchomena*).

Dianchomena scapularis; Chaudoir 1870 : 52. Horn 1872 : 138.

Lebia flavolineata Motschoulsky 1864 : 127. Type locality - "Am[erique] bor[eale]".

Lebia websteri Casey 1920 : 260. Type locality - Indiana. NEW SYNONYMY. Csiki 1932 : 1341 (*Aphelogenia*).

Description

Length of elytra - 2.76 - 4.28 mm; mean (25 specimens) 3.60 mm.

Head - Frons, clypeus, vertex and genae pale; frons striated on lateral thirds, central section with distinct microsculpture and a few fine punctures. Mouth parts pale except for infuscated palpi. Antennae with segments one to three pale, four to eleven infuscated. Neck strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc pale with dark vittae (typical pattern as in fig. 27); epipleura pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Endophallic armature as in figs. 84, 85; apex of median lobe tapered to a narrow point. The endophallic armature of 5 specimens was examined.

Discussion

Recognition - Although showing considerable variation in elytral pattern *solea* is readily distinguished from the rest of our *Lebia* by the combination of strongly constricted neck, basally widened pronotal margins, and the frons striated only on the lateral thirds. North of Mexico the elytral pattern never appears like that of the closely related *miranda*.

Variation - This species is usually vittate with the dark stripes separate. Occasionally the dark vittae coalesce, in a few specimens to such an extent that the elytral disc is almost entirely black.

Synonymy - This species was for a long time called *scapularis* Dejean but this is a homonym of *scapularis* Fourcroy, a European species. *Lebia websteri* Casey is a synonym of this species. Casey seems to have overlooked the strongly constricted neck for he compares *websteri* to *vittata* and there is no mention of the neck in the description. However, the type of *websteri* has been examined by G. E. Ball and it is a specimen of *solea*.

Distribution - *Lebia solea* is found east of the Rocky Mountains in the United States and adjacent Canada (fig. 131). Over 650 specimens were studied from the following localities.

CANADA

MANITOBA - Aweme. NOVA SCOTIA - Yarmouth. ONTARIO - Brittania; Learnington; Marmora; Ottawa; Pelee Island; Point Pelee; Port Colborne; Prince Edward Co.; Ridgeway; Toronto; Trenton. QUEBEC - Aylmer; Brome. SASKATCHEWAN - Swift Current.

UNITED STATES

ALABAMA - Pyriton (Clay Co.). ARKANSAS - Hope (Hempstead Co.). COLORADO - Julesburg (Sedgwick Co.); Pinarze Park. DISTRICT OF COLUMBIA. FLORIDA - Alachua Co.; Enterprise (Volusia Co.); Jackson Co.; Lake Okeechobee; Marion Co.; Paradise Key; Royal Palm State Park (Dade Co.); South Bay (Palm Beach Co.); Winter Park (Orange Co.). ILLINOIS - Bosky Dell; Bowmanville; Cahokia (Saint Clair Co.); Champaign (Champaign Co.); Chicago (Cook Co.); Edgebrook; Forest City (Mason Co.); Galesburg (Knox Co.); Gillespie (Macoupin Co.); Glencoe (Cook Co.); Havana (Mason Co.); Kickapoo State Park (Vermilion Co.); LaSalle Co.; Moline (Rock Island Co.); Olive Branch (Alexander Co.); Palos Park (Cook Co.); Urbana (Champaign Co.). INDIANA - Dunes State Park; Gary (Lake Co.); Hammond (Lake Co.); Knox Co.; Kosciusko Co.; Lafayette (Tippecanoe Co.); Long Lake; Marion Co.; Marshall Co.; Michigan City (LaPort Co.); Mineral Springs; Ogden Dunes; Pine; Posey Co.; Putnam Co. IOWA - Ames (Story Co.); Dubuque (Dubuque Co.); Elma (Howard Co.); Herrold (Polk Co.); Iowa City (Johnson Co.); Ruthven (Palo Alto Co.); Sioux City (Woodbury Co.). KANSAS - Chanute (Neosho Co.); Cheyenne Co.; Decatur Co.; Douglas Co.; Ellsworth Co.; Franklin Co.; Garden City (Finney Co.); Gove Co.; Madison (Greenwood Co.); Manhattan (Riley Co.); Marion Co.; Onaga (Pottawatomie Co.); Rawlins Co.; Reno Co.; Scott City (Scott Co.); Stockton (Rooks Co.); Topeka (Shawnee Co.); Wallace (Wallace Co.); Wellington (Sumner Co.). LOUISIANA. MARYLAND - Cabin John (Montgomery Co.); Chesapeake Beach (Calvert Co.); College Park (Prince Georges Co.); Great Falls (Montgomery Co.); Plummers Island; Travilah. MASSACHUSETTS - Boston (Suffolk Co.); Framingham (Middlesex Co.); Marion (Plymouth Co.). MICHIGAN - Ann Arbor (Washtenaw Co.); Cheboygan (Cheboygan Co.); Cooper Woods (Oakland Co.); Detroit (Wayne Co.); E. S. George Reserve (Livingston Co.); Harbert Dunes (Barrien Co.); Higgins Lake (Crawford Co.); High Island (Charlevoix Co.); Horseshoe Bay (Mackinac Co.); Ingham Co.; Macatawa (Ottawa Co.); Marquette (Marquette Co.); Naubinway (Mackinac Co.); Port Huron (Saint Clair Co.); Rochester (Oakland Co.); Selfridge Field, Mt. Clemens; Sharon (Washtenaw Co.); South Fox Island (Leelanau Co.); Whitefish Point (Chippewa Co.). MINNESOTA - Crookston (Polk Co.); Duluth (Saint Louis Co.); Fillmore Co.; Goodhue Co.; Houston Co.; LeSueur Co.; Newport (Washington Co.); Norman Co.; Olmsted Co.; Saint Anthony Park; Saint Paul (Ramsey Co.); Saint Peter (Nicollet Co.); Yellow Medicine Co. *MISSOURI - Saint Charles (Saint Charles Co.). NEBRASKA - Halsey (Thomas Co.); Kearney (Buffalo Co.);* Lincoln (Lancaster Co.); Sand Hills, Nebraska National Forest (Thomas Co.); West Point (Cuming Co.). NEW HAMPSHIRE - Cornish; Franconia (Grafton Co.); Hampton (Rockingham Co.); Meredith Center (Belknap Co.); Rumney (Grafton Co.). NEW JERSEY - Arlington (Hudson Co.); Boonton (Morris Co.); Clementon (Camden Co.); Collingswood (Camden Co.); Merchantville (Camden Co.); Orange (Essex Co.); Phillipsburg (Warren Co.); Riverton (Burlington Co.); Wenonah (Gloucester Co.); Woodbury (Gloucester Co.). NEW YORK - Bear Mountain (Rockland Co.); Buffalo (Erie Co.); Esopus (Ulster Co.); Florida (Orange Co.); Fire Island; Hamburg (Erie Co.); Ithaca (Tompkins Co.); New Rochelle (Westchester Co.); New York City; N. Fairhaven; Oneida Lake; Peekskill (Westchester Co.); Walton (Delaware Co.); Yaphank (Suffolk Co.). NORTH CAROLINA - Lake Junaluska (Haywood Co.); Raleigh (Wake Co.). NORTH DAKOTA - Bottineau (Bottineau Co.); Leonard (Cass Co.); Wilton (McLean Co.). OHIO - Champaign Co.; Cincinnati (Hamilton Co.); Cleveland (Cuyahoga Co.); Holmes Co.; Laforte Co.; Lucas Co.; Summit Co. PENNSYLVANIA - Ashbourne; Avondale (Chester Co.); Bethlehem (Northampton Co.); Broomall (Delaware Co.); Camp Hill (Cumberland Co.); Castle Rock; Easton (Northampton Co.); Hummelstown (Dauphin Co.); Indian Creek Res.; Lime Pk.; Linglestown (Dauphin Co.); Mt. Moriah; Ohiopyle (Fayette Co.); Ole Bull; Philadelphia (Philadelphia Co.); Racoon Creek; State College (Centre Co.); Swarthmore (Delaware Co.); Tinicum (Delaware Co.); Tinicum Island; West View (Allegheny Co.); Wilkes Barre (Luzerne Co.); Wyoming (Luzerne Co.). SOUTH CAROLINA - Clemson (Oconee Co.). SOUTH DAKOTA - Platte (Charles Mix Co.); Redfield (Spink Co.); Volga (Brookings Co.). TENNESSEE - Allardt (Fentress Co.); Columbus (Maury Co.); Knoxville (Knox Co.). TEXAS - College Station (Brazos Co.); Columbus (Colorado Co.); Forestburg (Montague Co.). VERMONT - Burlington (Chittenden Co.). VIRGINIA - Alexandria (Independent City); Falls Church (Fairfax Co.); Fredericksburg (Spotsylvania Co.); Rosslyn (Arlington Co.). WEST VIRGINIA - Berkeley Springs (Morgan Co.); White Sulphur Springs (Greenbrier Co.). WISCONSIN - Bayfield Co.

26. *Lebia (Lebia) miranda* (Horn)

Dianchomena miranda Horn 1872 : 139. Type locality - Camp Grant, Arizona. *Lebia miranda*; Leng 1920 : 66 (*Dianchomena*). Csiki 1932 : 1342 (*Dianchomena*).

Description

Length of elytra - 3.08-3.60 mm; mean (31 specimens) 3.29 mm.

Head - Frons, clypeus, and genae pale, vertex usually pale but occasionally darkened; frons and vertex striated. Mouth parts (including gula) pale; mentum without a tooth. Antennae entirely pale. Neck strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and sometimes very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Typical pattern as in fig. 28; epipleura pale. Elytral disc with striae distinct, intervals moderately convex; apical pinch well

developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter pale, darkening on apical segment. Pygidium varying from pale to dark.

Male genitalia - Armature of endophallus as in figs. 86, 87; apex of median lobe tapered to a narrow point. The endophallic armature in four specimens was examined.

Discussion

Recognition - Only one other species, *solea*, has a strongly constricted neck and wide pronotal margins. From this species *miranda* can be distinguished by its elytral pattern and completely striated frons.

Variation - There is little variation in *miranda*, at least north of Mexico (see discussion under Relationships below). The lateral spot on the elytra is sometimes joined to the dark sutural vitta and the vertex may show slight traces of dark coloration.

Relationships - North of Mexico *miranda* is fairly constant in color pattern. However, it seems very probable that it is only the northern end of a variable tropical species. I have seen specimens from Colombia (? = *rugatifrons* Chaudoir) and Mexico (species unknown) which were the same in genitalic and external morphology but differed in color. In the Colombian form the head was black and the lateral dark marking of the elytra was a vitta and not a spot. In the Mexican form the head was pale and the elytra were as in the Colombian specimens. This suggests a north-south cline. However, until there is more evidence that the gaps between the various color forms are bridged I prefer to retain the name *miranda* for the Arizona population.

Distribution - North of Mexico this species occurs in Arizona and Texas (probably western Texas); 37 specimens were studied from the following localities.

ARIZONA - Globe (Gila Co.); Peña Blanca (Santa Cruz Co.); Southwest Research Station, Portal (Cochise Co.); Tucson (Pima Co.). TEXAS.

27. *Lebia (Lebia) vittata* (Fabricius)

Carabus vittatus Fabricius 1776 : 240. Type locality - "in America boreali". Fabricius 1781 : 311. Fabricius 1787 : 203. Fabricius 1792 : 161. Olivier 1795 : 97. Fabricius 1801 : 202.

Lebia vittata; Say 1825 : 13. Dejean 1826 : 267. LeConte 1848 : 195. LeConte 1863 : 5. Motschoulsky 1864 : 227. Gemminger and Harold 1868 : 141. Bates 1883 : 240. Horn 1885 : 133. Blatchley 1910 : 148. Casey 1920 : 261. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1341 (*Aphelogenia*). Blackwelder 1944 : 56.

Aphelogenia vittata; Chaudoir 1871 : 40.

Lebia flavovittata Chevrolat 1835 : (5) No. 131. Type locality - "environs de Mexico". Gemminger and Harold 1868 : 138.

Lebia scapularis (in part - incorrect synonymy with *flavovittata*); Leng 1920 : 66.

Lebia furcata LeConte 1848 : 193. Type locality - "*ad flumen* Platte, *et ad Lacum Superiorem* ". NEW SYNONYMY. LeConte 1863 : 5. Gemminger and Harold 1868 : 138. Horn 1885 : 133 (in key).

Blatchley 1910 : 148. Casey 1913 : 191. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1340 (*Aphelogenia*). Blackwelder 1944 : 54.

Aphelogenia furcata ; Chaudoir 1871 : 41. Horn 1872 : 140.

Lebia conjungens LeConte 1848 : 194. Type locality - "...Nov Eboraci... ".

Lebia vittata conjungens; LeConte 1863 : 5. Gemminger and Harold 1868 : 141. Leng 1920 : 66. Csiki 1932 : 1341.

Aphelogenia vittata conjungens; Chaudoir 1871 : 40.

Lebia scapularis (in part - incorrect synonymy with *conjungens*); Horn 1872 : 138.

Aphelogenia vittata connecta Chaudoir 1871 : 41.

Lebia vittata connecta; Csiki 1932 : 1341.

Aphelogenia spraguei Horn 1872 : 139. Type locality - Texas.

Lebia vittata spraguei; Horn 1885 : 133. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1341 (*Aphelogenia*).

Lebia depicta Horn 1885 : 133. Type locality - Montana. NEW SYNONYMY. Casey 1913 : 191. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1341 (*Aphelogenia*).

Lebia sonomae Casey 1913 : 191. Type locality - California (Mendocino Co.). NEW SYNONYMY. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1341 (*Aphelogenia*).

Lebia debiliceps Casey 1913 : 192. Type locality - Indiana. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1340 (*Aphelogenia*).

Lebia amnicola Casey 1932 : 192. Type locality - Texas (Brownsville). NEW SYNONYMY. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1339 (*Aphelogenia*).

Lebia tempeana Casey 1924 : 92. Type locality - Arizona (Tempe). NEW SYNONYMY. Csiki 1932 : 1341. (*Aphelogenia*).

Description

Length of elytra - 3.04 - 5.00 mm; mean (26 specimens) 4.06 mm.

Head - Frons, clypeus, vertex and genae pale; frons with microsculpture variable, with scattered fine punctures and a few fine wrinkles at sides and across vertex. Mouth parts pale except palpi; mentum without a tooth. Antennae with segment one pale, segments two and three variable; segments four to eleven dark but becoming paler apically. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with fine transverse wrinkles, becoming confused laterally.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc pale with dark vittae (figs. 29, 30) or largely dark (fig. 31); epipleura pale. Disc with striae distinct, intervals flat; apical pinch well developed; basal ridge complete.

Legs- Coxae and trochanters pale; femora varying from entirely dark to dark on distal third only; tibae varying from entirely dark to dark only at ends; tarsi dark. Fourth segment of hind tarsus weakly bilobed or strongly emarginate.

Abdomen - Venter and pygidium pale.

Male genitalia- Armature of endophallus as in fig. 88; apex of median lobe tapered to a narrow point, narrow in lateral view. The endo-

phallic armature in 9 specimens was examined.

Discussion

Recognition - The vittate elytra, pale head, and femora dark at least apically, distinguish *vittata* from all our species of *Lebia* except *pectita*. From *pectita* this species is readily separated by its elytral pattern (sutural vitta forked basally) and the complete basal ridge of the elytra. Those specimens of *vittata* in which the pale vittae are obliterated and the furcation of the sutural vitta strongly reduced can be confused with no other species.

Variation - *Lebia vittata* varies considerably in both the extent of the dark markings on the elytra and the amount of dark coloration on the femora. These two characters seem to vary independently of each other and will be discussed separately.

Basically the elytral pattern can be divided into two types, each variable in itself. In the eastern United States (possibly only in the southern United States with extentions northward along the Atlantic coast and in the Mississippi Valley) occurs a small form in which the pale elytral vittae are very narrow or absent. In the same area and over the rest of the United States and adjacent Canada is a form which is usually larger and in which the pale vittae are usually wider. Intergrades occur between the two. Two possible explanations for this variation may be suggested. First, the small dark form is being replaced by the larger and paler form. The populations of the small dark form in the east are either the only ones not yet replaced or this area is the only place where the older darker form can successfully compete with the new form. Second, in the east a second host is available. Adults developing at the expense of this host are modified in size and elytral color expression.

The femora vary in color from predominantly pale with only the apical third or fourth dark to entirely or predominantly dark. Plotting geographically the percentage of specimens with the hind femora predominantly dark (fig. 142; data in Table 2) seems to indicate that the gene (or genes) for dark femora is spreading from a center of origin in the northwest (perhaps Montana) and that it is more successful in the cooler regions. It appears not to have reached the southeast and is rare in California and Arizona.

Synonymy - The name *vittata* strictly applies to the dark eastern form, *furcata* to the larger, paler form with predominantly pale femora, *depicta* to the larger, paler form with entirely dark femora and the four Casey names apply to the same form as *furcata*. The Casey names apply to variations in the width of the elytral vittae. They are not sharply separated but rather intergrade into each other. *L. depicta* is considered a synonym because numerous intermediate types of femoral coloration can be found between typical *depicta* and typical *furcata*. Also, the two forms are largely sympatric and would be expected to have more than color differences if they were specifically distinct. *L. furcata* and *L. vittata* are considered conspecific for two reasons. First, intergrades in elytral coloration can be found and secondly, *vittata* and *furcata* in the eastern United States show the same type of variation in femoral coloration, that is, both are represented by the pale form in the southeastern U.S. and

both have some individuals with dark femora in the northeast.

TABLE 2. Geographic variation in coloration of hind femora of *Lebia vittata*.

Province or State	No. Examined	No. Dark	Province or State	No. Examined	No. Dark
Alta.	64	59	Mont.	58	55
Man.	10	9	Neb.	14	14
Ont.	3	3	Nev.	4	1
Ariz.	12	1	N.J.	28	3
Ark.	2	0	N.M.	26	23
Calif.	14	5	N.Y.	16	1
Colo.	19	11	N.C.	3	0
D.C., Md.	2	1	N.D.	2	2
Fla.	26	0	Ohio	2	1
Ga.	2	0	Ore.	8	8
Idaho	8	4	Penn.	5	1
Ill.	10	6	S.C.	9	0
Ind.	23	15	S.D.	3	2
Ks.	18	4	Tenn.	2	0
La.	9	2	Tex.	17	2
Me.	4	3	Ut.	7	5
Mass., N.H.	31	13	Va.	5	0
Mich.	36	29	Wash.	4	4
Minn.	18	17	Wis.	3	2
Miss.	1	0	Wyo.	14	13
Mo.	7	1			

Distribution - *Lebia vittata* occurs throughout the United States and adjacent Canada (fig. 118). Over 550 specimens were studied from the following localities.

CANADA

ALBERTA - Cypress Hills; Edmonton; Laggan; Lethbridge; Medicine Hat; Onefour; Orion; Pincher Creek; Whitla. MANITOBA - Aweme; Brandon; Reynolds; Saint Lazare; Winnipeg. ONTARIO - Lanark; London; Point Pelee; Port Colborne; Port Rowan; Prince Edward Co. SASKATCHEWAN - Atlon's Lake (Cut Knife); Swift Current; Torch River.

UNITED STATES

ARIZONA - Diamond Creek, White Mountains; Fairbank (Cochise Co.); Grand Canyon (Coconino Co.); Oak Creek Canyon (Coconino Co.); Phoenix (Maricopa Co.); Yuma (Yuma Co.). ARKANSAS. CALIFORNIA - Bartlett Springs (Lake Co.); Los Angeles (Los Angeles Co.); Mendocino Co.; Modesto (Stanislaus Co.); Oroville (Butte Co.); Sacramento (Sacramento Co.); San Diego (San Diego Co.); Yuma. COLORADO - Berkeley; Clear Creek; Glenwood Springs (Garfield Co.); Julesburg (Sedgewick Co.); Masonville (Larimer Co.); Monte Vista (Rio Grande Co.); Poudre Canyon (Larimer Co.); Rifle (Garfield Co.); San Luis Valley. FLORIDA - Crescent City (Putnam Co.); Dunedin (Pinellas Co.); Gainesville (Alachua Co.); Jacksonville (Duval Co.); Levy Co.; Marion Co.; Sebastian (Indian River Co.); S. Miami (Dade Co.); Tampa (Millsborough Co.). GEORGIA - Tifton (Tift Co.). IDAHO - Blackfoot (Bingham Co.); Boise (Ada Co.); Idaho Falls (Bonneville Co.); Mackay (Custer Co.); Pocatello (Bannock Co.); Rock Creek (Owyhee Co.); Slate Creek (Idaho Co.). ILLINOIS - Cahokia (Saint Clair Co.); Chicago (Cook Co.); Homewood (Cook Co.); Jasper Co. INDIANA - Elkhart (Elkhart Co.); LaFayette (Tippecanoe Co.); Lake Station; Mishawaka (Saint Joseph Co.); Pine; Posey Co.; Vigo Co. KANSAS - Douglas Co.; Meade Co.; Topeka (Shawnee Co.). LOUISIANA - Covington (Saint Tammany Co.); Tallulah (Madison Co.). MAINE - Jonesboro (Washington Co.); Paris (Oxford Co.); Saco (York Co.); Waldoboro (Lincoln Co.). MARYLAND - Nanjemoy (Charles Co.). MASSACHUSETTS - Amherst (Hampshire Co.); Arlington (Middlesex Co.); Canton (Norfolk Co.); Northfield (Franklin Co.); Petersham (Worcester Co.); Springfield (Hampden Co.); Wollaston. MICHIGAN - Battle Creek (Calhoun Co.); Beaver Isle (Charlevoix Co.); Big

Rapids (Mecosta Co.); Douglas Lake (Cheboygan Co.); Marquette (Marquette Co.); New Baltimore (Macomb Co.); Port Austin (Huron Co.); Port Similac (Similac Co.); Royal Oak (Oakland Co.); Sand Point (Huron Co.). MINNESOTA - Big Stone Co. Itasca State Park (Clearwater Co.); Laporte (Hubbard Co.); Pine River (Cass Co.); Rock Creek (Chis - ago Co.); Saint Paul (Ramsey Co.). MISSISSIPPI. MISSOURI - Saint Louis (Independent City). MONTANA - Assini- boine; Bear Paw Mountain (Blaine Co.); Chester (Liberty Co.); Helena (Lewis and Clark Co.); Judith Valley; Rapelje (Stillwater Co.). NEBRASKA - Glen (Sioux Co.). NEVADA - Ely (White Pine Co.). NEW HAMPSHIRE - Franconia (Grafton Co.); Mount Surprise, Intervale (Carroll Co.); Mount Washington (Coos Co.); Rumney (Grafton Co.); Three Mile Island. NEW JERSEY - Anglesea; Clementon (Camden Co.); Collingswood (Camden Co.); Egg Harbor City (Atlantic Co.); Hillsdale (Bergen Co.); Hopatcong (Sussex Co.); Riverton (Burlington Co.); Woodbury (Gloucester Co.). NEW MEXICO - Gallina Hot Springs; Porvenir; Ramah (McKinley Co.); San Juan Valley (Taos Co.); Santa Fe (Santa Fe Co.); Tusas-No Agua (Rio Arriba and Taos Cos.). NEW YORK - Babylon (Suffolk Co.); Catskill Mountains; New York City; Quogue (Suffolk Co.); Yaphank (Suffolk Co.). NORTH CAROLINA - Chapel Hill (Orange Co.); Raleigh (Wake Co.); Wendell (Wake Co.). NORTH DAKOTA - Devil's Lake (Ramsey Co.); Williston (Williams Co.). OHIO - Sandusky (Erie Co.). OREGON - Corvallis (Benton Co.); Kerby (Josephine Co.); Medford (Jackson Co.); Murphy (Josephine Co.); Rogue River (Jackson Co.). PENNSYLVANIA - Easton (Northampton Co.); Indian Creek Res.; Lancaster (Lancaster Co.); Lehigh Gap. SOUTH CAROLINA - Beaufort (Beaufort Co.); Clemson (Oconee Co.); Lexington (Lexington Co.). SOUTH DAKOTA - Brookings (Brookings Co.); Volga (Brookings Co.). TENNESSEE - Elmwood (Smith Co.). TEXAS - Brownsville (Cameron Co.); Buckeye (Matagorda Co.); Calvert (Robertson Co.); College Station (Brazos Co.); Co- lumbia; Columbus (Colorado Co.); Hallettsville (Lavaca Co.); Victoria (Victoria Co.). UTAH - Emory Co.; Kimball Junction (Summit Co.); Richfield (Sevier Co.); Utah Lake. VIRGINIA - Alexandria (Independent City); Fairfax Co.; Fort Monroe (Elizabeth City Co.). WASHINGTON - Wawawai (Whitman Co.). WISCONSIN - Bayfield (Bayfield Co.); Worden Township (Clark Co.). WYOMING - Carbon Co.; Cheyenne (Laramie Co.).

28. *Lebia (Lebia) histrionica* Bates

Lebia histrionica Bates 1883 : 240. Type locality - Mexico, Guatemala. Schaeffer 1910 : 399. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1340 (*Aphelogenia*). Blackwelder 1944 : 54.

Lebia histrionica scutellata Bates 1883 : 241. Type locality - Mexico, Playa Vicente. NEW SYNONYMY. Csiki 1932 : 1340 (*Aphelogenia*). Blackwelder 1944 : 54.

Lebia histrionica nigrosignata Bates 1883 : 241. Type locality - Mexico, Guana- juato. NEW SYNONYMY. Csiki 1932 : 1340 (*Aphelogenia*). Black- welder 1944 : 54.

Description

Length of elytra - 3.00 - 4.00 mm; mean (21 specimens) 3.72 mm.

Head - Frons, clypeus, vertex, and genae pale; frons usually with distinct microsculpture, with scattered fine punctures and a few fine wrinkles at sides and across vertex. Mouth parts pale except for dark palpi; mentum without a tooth. Antennae with segments one to three pale, four to eleven dark but paler apically. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with fine, transverse wrinkles becoming confused at sides.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc pale with dark markings (typical pattern as in fig. 32); epipleura pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Coxae and trochanters pale; femora largely pale, dark on distal third; tibiae pale except at ends; tarsi dark. Fourth segment of hind tarsus emarginate.

Abdomen - Venter and pygidium entirely pale.

Male genitalia - Armature of endophallus similar to *vittata* but slight reduced; apex of median lobe tapered to a narrow point, narrow in lat- eral view. The endophallic armature in three specimens was examined.

Discussion

Recognition - The only other species with a pale head and black-tipped femora occurring in the range of *histrionica* north of Mexico is *vittata* . The two can easily be separated by their elytral patterns (figs. 29 to 32).

Variation - The basic elytral pattern exhibits considerable variation. The circumscutellar spot is entire, broken into two along the suture, or is intermediate between these conditions. Similarly the postmedian fascia is entire, or broken into three spots or usually is trilobed. In some specimens the circumscutellar and postmedian markings are joined together along the suture.

Synonymy - In addition to the type, Bates at the same time described four "varieties" lettered *a* to *d*. To two of these he referred previous names which had no nomenclatural validity and thus took their authorship. As no distinction between aberrations and subspecies was made these names must be regarded as subspecific. However, these two named variants occur with the nominate form in one population. They are accordingly synonymized.

Distribution - *Lebia histrionica* is known north of Mexico only in southern Arizona; 24 specimens were studied from the following localities.

Apache Pass, nr. Bowie (Cochise Co.); Cave Creek Ranch, Chiricahua Mountains (Cochise Co.); Huachuca Mountains; Madera Canyon, Santa Rita Mountains (Santa Cruz Co.); Nogales (Santa Cruz Co.); Patagonia (Santa Cruz Co.); Ruby (Santa Cruz Co.); Southwest Research Station, Portal (Cochise Co.); Tucson (Pima Co.).

29. *Lebia (Lebia) pectita* Horn

Aphelogenia vittata (incorrect identification); Horn 1872 : 140.

Lebia pectita Horn 1885 : 133. Type locality - not given. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1341 (*Aphelogenia*).

Description

Length of elytra - 3.04 - 3.88 mm; mean (20 specimens) 3.48 mm.

Head - Frons, clypeus, vertex, and genae pale; frons usually with distinct microsculpture, with scattered fine punctures and a few fine wrinkles at sides and across vertex. Mouth parts pale except for dark palpi; mentum without a tooth. Antennae with first segment pale, segments two to eleven dark but becoming paler apically. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with fine transverse wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc pale with dark vittae (fig. 33); epipleura pale. Disc with striae distinct and intervals flat; apical pinch well developed; basal ridge incomplete.

Legs - Coxae and trochanters pale; femora largely pale, dark on distal third; tibiae and tarsi dark. Fourth segment of hind tarsus weakly bilobed.

Abdomen - Venter and pygidium entirely pale.

Male genitalia - Armature of endophallus as in fig. 89; apex of median lobe tapered to a narrow point, but rather broad in lateral view. The endophallic armature in two specimens was examined.

Discussion

Recognition - The pale head and black-tipped femora separate *pectita* from all the other eastern species except *vittata*. The non-furcate, black, sutural vitta and the incomplete basal ridge of the elytra of *pectita* distinguish these two.

Variation - The width of the elytral vittae is quite constant but in a few specimens the mesal pale vitta is very narrow. In some specimens the two black vittae on each elytron are joined distally.

Distribution - *Lebia pectita* is found in the eastern half of the United States (fig. 121). However, from the specimens at hand it appears to be rather rare in the midwest. Over 175 specimens were studied from the following localities.

UNITED STATES

ALABAMA - Chickasaw (Mobile Co.); Mobile (Mobile Co.). CONNECTICUT - Lyme (New London Co.). DISTRICT OF COLUMBIA. FLORIDA - Jacksonville (Duval Co.). GEORGIA - Cherokee National Forest; Thomasville (Thomas Co.). ILLINOIS - Carbondale (Jackson Co.). INDIANA - Posey Co. KANSAS. KENTUCKY - Glasgow (Barren Co.). LOUISIANA - Lake Charles (Calcasieu Co.); Vowells Mill (Natchitoches Co.). MARYLAND - Baltimore (Independent City); Edgewood (Harford Co.). MASSACHUSETTS - Brookline (Norfolk Co.); Cambridge (Middlesex Co.); Dover (Norfolk Co.); Duxbury (Plymouth Co.); Medfield (Norfolk Co.); Needham (Norfolk Co.); Springfield (Hampden Co.); Wellesley (Norfolk Co.). MICHIGAN - Oakland Co. MISSISSIPPI - Beaumont (Perry Co.); Lucedale (George Co.); Natchez (Adams Co.). NEW HAMPSHIRE - East Wakefield (Carroll Co.); Pittsfield (Merrimack Co.); Tamworth (Carroll Co.). NEW JERSEY - Atco (Camden Co.); Bergen Co.; Clementon (Camden Co.); Da Costa; Dundee Lake; Egg Harbor City (Atlantic Co.); Hillsdale (Bergen Co.); Malaga (Gloucester Co.); Ocean City (Cape May Co.); Toy Hills. NEW YORK - Bellport (Suffolk Co.); Melville, L.I.; New York City; Nyack (Rockland Co.); Peekskill (Westchester Co.); Wading River (Suffolk Co.); Yaphank (Suffolk Co.). NORTH CAROLINA - Raleigh (Wake Co.). PENNSYLVANIA - Delaware Water Gap (Monroe Co.); Philadelphia (Philadelphia Co.). RHODE ISLAND - Warwick (Kent Co.). SOUTH CAROLINA. TEXAS - Columbus (Colorado Co.); Jefferson (Marion Co.); Maud (Bowie Co.). VIRGINIA - Alexandria (Independent City); Falls Church (Fairfax Co.); Fredericksburg (Spotsylvania Co.); Lucketts (Loudoun Co.).

30. *Lebia (Lebia) nigricapitata* new species

Holotype - A male labelled as follows: Oak Ck. Canyon. VII. 24. 36 Ariz. Bryant Lot. 109. To be deposited in the California Academy of Sciences.

Paratypes are from the following localities, all in the California Academy of Sciences. ARIZONA - Oak Creek Canyon (Coconino Co.) (eight males and 17 females); White Mountains (one male).

Description

Length of elytra - 3.34 - 3.72 mm; mean (26 specimens) 3.49 mm.

Head - Frons, clypeus, vertex, and genae dark (usually black); frons without distinct microsculpture, with scattered fine punctures, rugose around anterior supraorbital setae. Mouth parts with labrum, gula, palpi, and mandibular scrobe dark, the rest more or less pale; mentum without a tooth. Antennae entirely dark. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with fine transverse wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc pale with dark vittae (fig. 34); epipleura pale. Elytral disc with striae distinct, intervals flat; apical pinch well developed; basal ridge incomplete.

Legs - Entirely dark (usually black), somewhat lighter on coxae. Fourth segment of hind tarsus weakly bilobed.

Abdomen - Venter pale, apical segment fringed with black; pygidium pale, tipped with black laterally.

Male genitalia - Armature of endophallus and apex of median lobe similar to those of *pectita* (fig. 89). The endophallic armature in two specimens was examined.

Discussion

Recognition - Specimens of this species at first glance appear to be *bivittata* or *bilineata*, the only other black headed vittate species north of Mexico. The wide pronotal margins, the pale pterothoracic sclerites and the pale apex of the elytra will distinguish *nigrocapitata* from these superficially similar species.

Variation - There is no major variation in the small series of specimens available for study.

Etymology - The name is derived from the Latin adjectives *niger* - black - and *capitatus* - with a head - in reference to the black head of this species.

Distribution - This species is known only from Arizona; 27 specimens (type material) were studied.

31. *Lebia (Lebia) bivittata* (Fabricius)

Carabus bivittatus Fabricius 1798 : 59. Type locality - "Habitat in America". Fabricius 1801 : 203.

Lebia bivittata; LeConte 1863 : 5. Gemminger and Harold 1868 : 137. Bates 1883 : 241. Blatchley 1910 : 149. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1339 (*Aphelogenia*). Blackwelder 1944 : 53.

Aphelogenia bivittata ; Chaudoir 1871 : 45. Horn 1872 : 141.

Lebia quadrivittata Dejean 1825 : 268. Type locality - "Amerique septentrionale". LeConte 1848 : 195.

Dianchomena quadrivittata; Casey 1920 : 263.

Dianchomena aemula Casey 1920 : 263. Type locality - Kansas. NEW SYNONYMY.

Lebia aemula Csiki 1932 : 1342 (*Dianchomena*).

Diachomena devincta Casey 1920 : 264. Type locality - Colorado (Boulder Co.). NEW SYNONYMY.

Lebia devincta; Csiki 1932 : 1342 (*Dianchomena*).

Description

Length of elytra - 2.84 - 3.96 mm; mean (24 specimens) 3.56 mm.

Head - Frons, vertex, clypeus, and genae dark (frons usually black); frons with fine, rather indistinct microsculpture, moderately coarse punctures, and a few fine wrinkles near eyes. Mouth parts dark or infuscated except labium and posterior part of gula pale; mentum without a tooth. Antennae with segments one to three more or less pale, four to eleven dark. Neck not strongly constricted.

Prothorax - Entirely pale. Pronotum shaped as in fig. 7, lateral margins narrow, not widened basally; disc usually with indistinct microsculpture, fine punctures, and sometimes fine confused wrinkles.

Pterothorax - Mesosternum and pleura pale, metasternum and pleura dark, scutellum pale.

Elytra - Dark with pale vittae (typical pattern as in fig. 35); epipleura dark. Disc with striae weak and broken into spots, intervals flat; apical pinch small and poorly developed; basal ridge incomplete.

Legs - Coxae and trochanters pale; femora largely dark but with bases pale; tibiae pale with ends dark, especially distal end; tarsi dark. Fourth segment of hind tarsus strongly emarginate or weakly bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Armature of endophallus as in figs. 90, 91; apex of median lobe tapered to a narrow point. The endophallic armature in five specimens was examined.

Discussion

Recognition - The striped elytra, the narrow pronotal margins and the entirely pale abdomen combine to distinguish this species from all our other species. The allopatric *bilineata* is the most similar species but the abdomen is dark on the basal half. *Lebia nigricapitata* is also superficially similar but the pronotal margins are wide and the elytral pattern is somewhat different, the apex being pale instead of dark.

Variation - There seems to be no important variation.

Synonymy - Casey's *aemula* and *devincta* are here regarded as synonyms of *bivittata*. A series of specimens quickly reveals that the differences cited by Casey are only minor variations within *bivittata*.

Distribution - This species ranges from the eastern United States west to Arizona (fig. 124). However, it appears to be very rare in the east. Over 225 specimens were studied from the following localities.

UNITED STATES
ARIZONA - Antelope Peak (Yavapai Co.); Apache (Cochise Co.); Arivaca (Pima Co.); Bowie (Cochise Co.); Canelo; Carrizo; Continental (Pima Co.); Cortaro (Pima Co.); Douglas (Cochise Co.); Elfrida (Cochise Co.); Flagstaff (Coconino Co.); Fort Grant (Graham Co.); Galiuro Mountains; Globe (Gila Co.); Huachuca Mountains; Nogales (Santa Cruz Co.); Oracle (Pinal Co.); Palmerlee (Cochise Co.); Patagonia (Santa Cruz Co.); Phoenix (Maricopa Co.); Pinal Mountains; Prescott (Yavapai Co.); Sahuarita (Pima Co.); San Carlos Lake (Graham Co.); Santa Rita Mountains; Sierra Ancha Mountains; Sonoita (Santa Cruz Co.); Southwest Research Station, Portal (Cochise Co.); Tucson (Pima Co.). ARKANSAS - Washington Co. COLORADO - Colorado Springs (El Paso Co.); Fort Collins (Larimer Co.); Lamar (Prowers Co.); Pingree Park (Larimer Co.). DELAWARE. DISTRICT OF COLUMBIA. GEORGIA - Chester (Dodge Co.). ILLINOIS - Bloomington (McLean Co.); Galesburg (Knox Co.). INDIANA - Marion Co.; Vigo Co. IOWA - Fort Madison (Lee Co.). KANSAS - Clarendon Siding; Garden City (Finney Co.); Gove Co.; Lawrence (Douglas Co.); Manhattan (Riley Co.); Onaga (Pottawatomie Co.); Scott City (Scott Co.); Topeka (Shawnee Co.). KENTUCKY. MICHIGAN - Detroit (Wayne Co.). MISSOURI - Saint Louis (Independent City). NEBRASKA - Culbertson (Hitchcock Co.); Lincoln (Lancaster Co.); Minden (Kearney Co.). NEW JERSEY - Boonton (Morris Co.); Ocean City (Cape May Co.). NEW MEXICO - Alma; Amistad (Union Co.); Mesilla (Dona Ana Co.); Santa Fe (Santa Fe Co.). NEW YORK - New York City; Peekskill (Westchester Co.). OHIO - Franklin Co.; Lucas Co. PENNSYLVANIA - Philadelphia (Philadelphia Co.). TEXAS - Beeville (Bee Co.); Chisos Basin, Big Bend National Park; Cypress Mills (? Blanco Co.); Dallas (Dallas Co.); Davis Mountains; Fort Davis (Jeff Davis Co.); Marfa (Presidio Co.); New Braunfels (Comal Co.); San Diego (Duval Co.); Sharpsburg; Wades. VIRGINIA - Fredericksburg (Spotsylvania Co.). WISCONSIN.

32. *Lebia (Lebia) bilineata* Motschoulsky

Lebia bilineata Motschoulsky 1859 : 145. Type locality - Col. Ross. LeConte 1863 : 5. Gemminger and Harold 1868 : 136. Chaudoir 1871 : 82. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1339 (*Aphelogenia*).
Aphelogenia bilineata ; Horn 1872 : 141.
Dianchomena bilineata ; Casey 1920 : 263.

Description

Length of elytra - 2.68 - 3.44 mm; mean (26 specimens) 3.19 mm.

Head - Frons, vertex, clypeus, and genae dark (frons usually black); frons with rather indistinct microsculpture, fine punctures, and a few fine wrinkles near eyes. Mouth parts dark or infuscated except pale ligula and posterior part of gula; mentum without a tooth. Antennae with segments one to three more or less infuscated, four to eleven dark. Neck not strongly constricted.

Prothorax - Entirely pale except for darkened intercoxal process

and parts adjacent to mesosternum. Pronotum shaped as in fig. 7, lateral margins narrow, not widened basally; disc usually with indistinct microsculpture, fine punctures and sometimes fine confused wrinkles.

Pterothorax - Sterna, pleura, and scutellum dark.

Elytra - Disc dark with pale vittae (typical pattern as in fig. 36); epipleura varying from dark to pale. Disc with striae weak and broken into spots, intervals flat; apical pinch small and poorly developed; basal ridge incomplete.

Legs - Coxae and trochanters more or less dark (procoxae palest); femora dark; tibiae pale with ends dark, especially distal ends; tarsi dark. Fourth segment of hind tarsus strongly emarginate or weakly bilobed.

Abdomen - Venter dark with apical two segments pale. Pygidium pale.

Male genitalia - Armature of endophallus similar to *bivittata*; apex of median lobe tapered to a narrow point. The endophallic armature in two specimens was examined.

Discussion

Recognition - The vittate elytra, narrow pronotal margins, and abdomen with the basal half dark readily distinguish *bilineata*. The two similar species, *bivittata* and *nigricapitata* are both outside of the known range of *bilineata* and both have the abdomen with the basal half pale.

Variation - Typically there is only one pale vitta on each elytron. However, in some pale specimens the epipleuron is lighter in color and a second, more lateral vitta is present.

Distribution - This species occurs from Oregon and Idaho to southern California (fig. 133); 58 specimens were studied from the following localities.

CALIFORNIA - Azusa (Los Angeles Co.); Berkeley (Alameda Co.); Carmel (Monterey Co.); Carrville (Trinity Co.); Hullville (Lake Co.); Humboldt Co.; Mokelumne Hill (Calaveras Co.); Monterey (Monterey Co.); Mount Pinos (Kern Co.); Paraiso Springs (Monterey Co.); Pasadena (Los Angeles Co.); Poway (San Diego Co.); Sanford; San Francisco (San Francisco Co.); Shasta Co.; Truckee (Nevada Co.); Tulare Co.; Yreka (Siskiyou Co.). IDAHO - Slate Cr. R.S. (Idaho Co.). NEVADA. OREGON - Medford (Jackson Co.); Tygh Valley (Wasco Co.).

33. *Lebia (Lebia) abdominalis* Chaudoir

Lebia abdominalis Chaudoir 1843 : 704. Type locality - unknown. LeConte 1848 : 195. LeConte 1868 : 5. Gemminger and Harold 1868 : 136. Bates 1883 : 240. Blatchley 1910 : 148. Leng 1920 : 66 (*Dianchomena*). Csiki 1932 : 1342 (*Dianchomena*). Blackwelder 1944 : 52.

Dianchomena abdominalis; Chaudoir 1871: 47. Horn 1872 : 138. Casey 1920 : 262.

Dianchomena convictor Casey 1920 : 262. Type locality - Illinois (Cairo). NEW SYNONYMY.

Lebia convictor; Csiki 1932 : 1342 (*Dianchomena*).

Description

Length of elytra - 2.52 - 3.44 mm; mean (26 specimens) 2.98 mm.

Head - Frons and vertex metallic (usually green), clypeus and genae dark (sometimes slightly metallic); frons with distinct microsculpture, with a few fine punctures, and few fine wrinkles near eyes.

Mouth parts dark or infuscated except for labium; mentum without a tooth. Antennae with segments one and two, in some specimens three pale, others infuscated. Neck strongly constricted.

Prothorax - Entirely pale. Pronotum shaped as in fig. 8, lateral margins narrow and not widened basally; disc with distinct microsculpture and fine wrinkles.

Pterothorax - Mesosternum pale, metasternum and pleura dark (metepisternum with a metallic tinge), scutellum pale.

Elytra - Disc entirely metallic (usually green); epipleura usually dark with a metallic tinge, sometimes infuscated. Disc with striae indistinct, intervals flat; apical pinch well developed; basal ridge incomplete.

Legs - Coxae and trochanters pale; femora largely pale, slightly infuscated apically; tibiae pale with apical fourth to sixth dark; tarsi dark. Fourth segment of hind tarsus strongly emarginate or weakly bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Armature of endophallus as in fig. 92; apex of median lobe tapered to a narrow point. The endophallic armature in three specimens was examined.

Discussion

Recognition - This is our only species with both a strongly constricted neck and narrow pronotal margins. It is superficially similar in color to *viridipennis* but the latter has the pronotal margins widened basally.

Variation - There appears to be no major variation in *abdominalis*. The elytral disc is usually green, occasionally blue.

Synonymy - *Dianchomena convictor* Casey is here regarded as a synonym of *abdominalis*. The differences cited by Casey in the original description are considered to be only minor variations and of no taxonomic value.

Distribution - *Lebia abdominalis* occurs in the eastern United States (fig. 119). Over 200 specimens were studied from the following localities.

UNITED STATES
ALABAMA - Mobile (Mobile Co.). ARKANSAS - Conway Co.; Little Rock (Pulaski Co.). FLORIDA - Biscayne Bay (Dade Co.); Charlotte Harbor (Charlotte Co.); Enterprise (Volusia Co.); Homestead (Dade Co.); Jupiter (Palm Beach Co.); Lakeland (Polk Co.); Lake Worth (Palm Beach Co.); Moore Haven (Glades Co.). INDIANA - Perry Co.; Posey Co. KANSAS - Lawrence (Douglas Co.). LOUISIANA - Baton Rouge (East Baton Rouge Co.); Gueydan (Vermilion Co.); Harahan (Jefferson Co.); New Orleans (Orleans Co.); Opelousas (Saint Landry Co.); Rainy Refuge (Vermilion Co.). MARYLAND - Travilah. MISSOURI. PENNSYLVANIA - Philadelphia (Philadelphia Co.). OHIO - Cincinnati (Hamilton Co.); Oxford (Butler Co.); West Alexandria (Preble Co.). TENNESSEE - Nashville (Davidson Co.). TEXAS - Alice (Jim Wells Co.); Brazoria Co.; Brooks Co.; Brownsville (Cameron Co.); Carrizo Springs (Dimmit Co.); Cedar Lane (Matagorda Co.); Comal Co.; Corpus Christi (Nueces Co.); Cypress Mills (? Blanco Co.); Dallas (Dallas Co.); Fedor; Hidalgo (Hidalgo Co.); Kendall Co.; Kingsville (Kleberg Co.); Mountain Home (Kerr Co.); New Boston (Bowie Co.); San Antonio (Bexar Co.); San Diego (Duval Co.); Sharpsburg; Victoria (Victoria Co.). VIRGINIA - Falls Church (Fairfax Co.). WEST VIRGINIA - White Sulphur Springs (Greenbrier Co.).

34. *Lebia (Lebia) guttula* LeConte

Lebia guttula LeConte 1849 : 178. Type locality - "ad Colorado". LeConte 1863 : 5. Gemminger and Harold 1868 : 139. Casey 1920 : 259. Leng 1920 : 66 (*Aphelogenia*). Csiki 1932 : 1340 (*Aphelogenia*).
Aphelogenia guttula; Chaudoir 1870 : 44. Horn 1872 : 141.
Lebia metuens Casey 1920 : 258. Type locality - California. NEW SY-

NONYMY. Csiki 1932 : 1340 (*Aphelogenia*).

Lebia pacifica Casey 1920 : 259. Type locality - California (Lake Co.).

NEW SYNONYMY. Csiki 1932 : 1341 (*Aphelogenia*).

Description

Length of elytra - 1.92 - 3.04 mm; mean (24 specimens) 2.60 mm.

Head - Frons, vertex, and genae varying from pale to dark, clypeus pale; frons with confused wrinkles on lateral thirds, center with variable microsculpture and scattered fine punctures. Mouth parts pale; mentum without a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Pronotal disc and proepisternum varying from dark to pale (the pronotal disc lighter than the frons and the proepisternum lighter than pronotal disc), the rest pale. Pronotum transverse in shape, with lateral margins widened basally; disc with indistinct microsculpture and fine transverse wrinkles.

Pterothorax - Sterna somewhat darkened when frons is very dark; metepisterna same color as frons, other pleurites pale; scutellum pale.

Elytra - Disc largely pale with dark markings (fig. 37); epipleura pale. Disc with striae distinct medially, becoming indistinct at sides and apex; intervals weakly convex; apical pinch well developed; basal ridge variable, complete or incomplete.

Legs - Entirely pale. Fourth segment of hind tarsus strongly emarginate.

Abdomen - Venter and pygidium dark.

Male genitalia - Armature of endophallus as in figs. 93, 94; apex of median lobe narrow (fig. 95). The endophallic armature in five specimens was examined.

Discussion

Recognition - *Lebia guttula* can be distinguished by its elytral pattern from all our other species of *Lebia* except dark specimens of *abdita*. From this latter species it can be distinguished by its entirely dark abdomen, smoother frons, and its endophallic armature.

Variation - Color varies considerably in *guttula*. The color of the frons, pronotal disc and proepisternum varies from pale to dark. In the dark forms there is also a distinct dark circumscutellar spot which is lacking in the paler specimens. The frontal sculpture is also fairly variable, with the lateral wrinkles fairly strong in some specimens, and very poorly developed in other specimens.

Synonymy - Casey's *metuens* and *pacifica* are here regarded as synonyms of *guttula*. Both are based on minor characters, *metuens* on the elytral pattern (lateral spot broadly separate from the sutural spot) and *pacifica* on the width of the body and color of the head. Both have a dark abdomen and head and could not be the related species *abdita*.

Distribution - This western species ranges from southern British Columbia to southern California and New Mexico (fig. 134). Over 250 specimens were studied from the following localities.

CANADA
BRITISH COLUMBIA - Basave; Basque; Hope; Lytton; Salmon Arm; Summerland.

UNITED STATES
ARIZONA - Globe (Gila Co.); Montezuma, near Prescott (Yavapai Co.); Peach Springs (Mohave Co.); Phoenix (Maricopa Co.); Salt River; San Simon (Cochise Co.); Selligman (Yavapai Co.); Southwest Research Station, Portal (Cochise Co.); Tucson (Pima Co.); Texas Pass, Dragoon Mountains (Cochise Co.); Willcox (Cochise Co.); Winslow (Navajo Co.). CALIFORNIA - Alhambra Valley (Contra Costa Co.); Amedee; Antioch (Contra Costa Co.); Argus Mountains (Inyo Co.); Cole; Folsom (Sacramento Co.); Goodale Creek, near Lone Pine (Inyo Co.); Hesperia (San Bernardino Co.); Lake Co.; Lassen Co.; Los Gatos (Santa Clara Co.); Merced (Merced Co.); Mohawk (Plumas Co.); Olancha (Inyo Co.); Paraiso Springs (Monterey Co.); Pasadena (Los Angeles Co.); Patterson (Stanislaus Co.); Poway (San Diego Co.); Saint Helena (Napa Co.); *San Jose* (Santa Clara Co.); *Santa Monica* (Los Angeles Co.); *Sobre Vista* (Sonoma Co.); *Vine Hill* (Contra Costa Co.). COLORADO - Durango (La Plata Co.); La Posta; Steamboat Springs (Routt Co.). IDAHO - Dixie (Elmore Co.); Indian Cove (Owyhee Co.); Jerome (Jerome Co.); Moscow (Latah Co.); Mountain Home (Elmore Co.); Parma (Canyon Co.); Pegina (Ada Co.); Tuttle (Gooding Co.). KANSAS. MONTANA - Missoula (Missoula Co.); Ravalli Co. NEVADA - Eureka (Eureka Co.); Reno (Washoe Co.). NEW MEXICO - Alamogordo (Otero Co.); Jemez Mountains; Silver City (Grant Co.); Thornton; White Sands (Dona Ana Co.). OREGON - Baker (Baker Co.); Fremont National Forest (Klamath Co.); Grants Pass (Josephine Co.); Harney Co.; Hood River (Hood River Co.); Huntington (Baker Co.); Klamath Falls (Klamath Co.); McMinnville (Yamhill Co.); Medford (Jackson Co.); Portland (Multnomah Co.); Salem (Marion Co.); Salmon River; Talent (Jackson Co.); Tumalo State Park (Deschutes Co.); Weston (Umatilla Co.); *Wildwood, Ochoco National Forest (Wheeler Co.). UTAH - American Fork Canyon; Buckek Valley (Iron Co.); Chad's* Ranch; Iron Springs; Leeds (Washington Co.); Parowan (Iron Co.); Richfield (Sevier Co.); Saint George (Washington Co.); Wildcat Valley (Beaver Co.). WASHINGTON - Cherry (Spokane Co.); Palouse (Whitman Co.); Ritzville (Adams Co.); Toppenish (Yakima Co.). WYOMING - Green River (Sweetwater Co.).

35. *Lebia (Lebia) abdita* new species

Holotype - A male labelled as follows: Pena Blanca, Sta. Cruz Co. Ariz. 4000' Aug. 27. 60 at light G. E. Ball family and R. B. Madge. To be deposited in the Canadian National Collection.

Paratypes are from the following localities.

ARIZONA - Baboquivari Canyon, Baboquivari Mountains (Pima Co.) (one male, California Academy of Sciences); Brown's Canyon, Baboquivari Mountains (Pima Co.) (four males and two females, Museum of Comparative Zoology); Elfrida (Cochise Co.) (one male, University of Arizona); Elkhorn Ranch, east slope of north end of Baboquivari Mountains (Pima Co.) (one female, California Academy of Sciences); Hot Springs (one male, United States National Museum); Kansas Settlement (Cochise Co.) (one female, University of Arizona); Oracle, 14 m E. (Pinal Co.) (one male and four females, California Academy of Sciences); Organ Pipe Cactus National Monument (Pima Co.) (one female, University of Arizona); Peña Blanca (Santa Cruz Co.) (five males and three females, personal collection of G. E. Ball, University of Alberta); Sabino Canyon, Santa Catalina Mountains (Pima Co.) (two males, University of Arizona); San Pedro River, near Palominas (Cochise Co.) (one female, personal collection of G. E. Ball, University of Alberta); Tucson (Pima Co.) (one female, California Academy of Sciences; one male, United States National Museum; one male; University of Arizona).

Description

Length of elytra - 2. 08 - 2. 48 mm; mean (22 specimens) 2. 30 mm.

Head - Frons, vertex, clypeus, and genae pale; frons striated at sides, usually striated or rugose at the center. Mouth parts pale; mentum without a tooth. Antennae pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale except for infuscated metepisternum.

Elytra - Disc largely pale with dark markings (darkest specimens as in fig. 37); epipleura pale. Disc with striae distinct medially, becoming indistinct at sides and apex; intervals weakly convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus strongly emarginate.

Abdomen - Venter pale medially, infuscated or dark laterally and apically. Pygidium infuscated or dark.

Male genitalia - Armature of endophallus as in figs. 96, 97; apex of median lobe narrow as in *guttula*. The endophallic armature in four specimens was examined.

Discussion

Recognition - Dark specimens of *abdita* may be confused with speci-

mens of *guttula*, pale specimens with *subrugosa* or *perpallida*. The differences between *guttula* and *abdita* have already been pointed out under the former species. The rugose frons, infuscated metepisternum, and the abdomen darkened at the sides will distinguish *abdita* from *subrugosa* and *perpallida*. In addition *subrugosa* has a well developed dark circumscutellar marking, usually lacking in *abdita*, and *perpallida* lacks any dark lateral markings on the elytra (usually present in *abdita*).

Variation - I have encountered no marked variation in the small series of specimens available for study. Some of the darkest specimens have the dark apical marking present but even in these this marking is rather faint.

Relationships - *Lebia abdita* is similar to but quite distinct from *guttula*. Their ranges overlap in southern Arizona and probably in northern Mexico.

Etymology - The name is derived from the Latin adjective *abditus* - hidden, concealed - in reference to this species being previously confused with the similar *guttula*.

Distribution - North of Mexico this species occurs only in southern Arizona. I have also seen specimens from Baja California; 32 specimens (type material) were studied.

36. *Lebia (Lebia) insulata* new species

Lebia rhodope (not Bates); Casey 1920 : 258. Leng 1920 : 66 (*Lebia*).

Holotype - A male labelled as follows: Esper. [anza] Ranch Brownsville Tex. 6. 14 Liebeck Collection. Deposited in the Museum of Comparative Zoology at Harvard University.

Paratypes are all from Brownsville, Texas (some Esperanza Ranch, Brownsville, Texas) except two in the United States National Museum which lack any locality data. They are deposited in the following institutions. American Museum of Natural History (one male); California Academy of Sciences (two males and three females); Chicago Natural History Museum (two females); Cornell University (three females, one of which is damaged by museum pests); Museum of Comparative Zoology (two males); United States National Museum (one male and five females).

Description

Length of elytra - 3.32 - 3.84 mm; mean (18 specimens) 3.63 mm.

Head - Frons, vertex, clypeus, and genae pale; frons with fine microsculpture. Mouth parts pale; mentum without a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings (fig. 38); epipleura pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Armature of endophallus as in figs. 98, 99; apex of median lobe tapered to a narrow point. The endophallic armature in four specimens was examined.

Discussion

Recognition - *Lebia insulata* is easily recognized by its elytral pattern. The only other species in which the pattern is similar (especially in the shape of the pale apical marking of the elytra) are *fuscata* and *subrugosa*, both allopatric to *insulata*. The elytral pattern of the present species differs from both of these species in the shape of the pale basal spot (elliptical and not reaching the base of the elytra in *insulata*, and a distorted tear drop shape reaching the base in *fuscata* and *subrugosa*) and by its lack of a tooth on the mentum.

Variation - There appears to be no marked variation in *insulata*.

Notes - This species, although known to previous workers, apparently is without a valid name. It has been called *rhodope* Bates but from the shape of the basal pale spot of the elytra and the lack of a tooth on the mentum it is obviously not Bates' species.

Etymology - The name is derived from the Latin adjective *insulatus* - made into an island, insulated - in reference to the pale basal spots of the elytra being entirely surrounded by dark coloration.

Distribution - *Lebia insulata* is known only from southeastern Texas; 20 specimens (type material) were studied.

37. Lebia (Lebia) fuscata Dejean

Lebia fuscata Dejean 1825 : 270. Type locality - "Amerique septentrionale". LeConte 1848 : 194. LeConte 1863 : 5. Gemminger and Harold 1868 : 138. Chaudoir 1870 : 230. Horn 1872 : 137. Blatchley 1910 : 147. Casey 1920 : 258. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1329 (*Lebia*).

Lebia canonica Casey 1920 : 257. Type locality - Lake Superior (Marquette) and Rhode Island (Boston Neck). NEW SYNONYMY. Csiki 1932 : 1340 (*Aphelogenia*).

Description

Length of elytra - 2.60 - 5.40 mm; mean (26 specimens) 3.96 mm.

Head - Frons, vertex, clypeus, and genae infuscated or dark; frons with distinct microsculpture and sometimes a few fine wrinkles near eyes. Mouth parts pale; mentum with a tooth. Antennae entirely pale or with segments four to eleven slightly infuscated. Neck not strongly constricted.

Prothorax - Pale, infuscated on disc (darkest at center of each discal half) and center of episternum. Disc with distinct microsculpture and fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings (typical pattern as in fig. 39); epipleura pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Armature of endophallus as in figs. 100, 101; apex of median lobe tapered to a broad point. The endophallic armature in seven specimens was examined.

Discussion

Recognition - Within its range *Lebia fuscata* most closely resembles *ornata*. From *ornata*, *fuscata* can be distinguished by its complete basal ridge to the elytra and by the shape of the pale apical marking of the elytra. *Lebia insulata* and *subrugosa* have the pale apical spot of the elytra shaped similarly but are allopatric to *fuscata*.

Variation - There is considerable variation in size and some in color in *fuscata*. In most specimens the dark post median fascia is wide but in many of the larger individuals it is reduced or entirely absent. Both the size and color variants are connected by intermediates.

Synonymy - The name *fuscata* Dejean strictly applies to the large specimens lacking the dark postmedian fascia. The common form with this fascia broad was named *canonica* by Casey. As pointed out above the two forms are connected by intermediates. As the endophallic armature in the two forms is the same and there are no other differences besides color I regard the two as being conspecific.

Distribution - This species is probably transcontinental across the northern United States and adjacent Canada with extensions south along the west coast to central California, and in the east to the gulf coast (fig. 127). The single record from the prairie region of the northern United States and adjacent Canada may be evidence of insufficient collecting in this area or it may indicate that *fuscata* is rare in this part of its range. A third possibility is that the record is erroneous and that the west coast population is disjunct from that in the east. Over 625 specimens were studied from the following localities.

CANADA

BRITISH COLUMBIA - Bowser; Courtney; Langley; Robson; Saanich; Wellington. NOVA SCOTIA - Kentville; Kedgemakooge Lake; Port au Pique; Truro. ONTARIO - Britannia; Emo; Hastings Co.; Leamington; Marmora; Mer Bleue; Port Colborne; Prince Edward Co.; Sudbury; Tilsonburg; Toronto; Trenton. QUEBEC - Aylmer; Brome; Covey Hill; Duchesnay; Duparquet; Kazubazua; Laniel; Montreal; Saint Hilaire; Wakefield.

UNITED STATES

ALABAMA - Tuscaloosa (Tuscaloosa Co.). CALIFORNIA - Ben Lomond (Santa Cruz Co.); Bullrun Flat, Garberville (Humboldt Co.); Carrville (Trinity Co.); Castle Crag (Shasta Co.); Guerneville (Sonoma Co.); Lagunitas (Marin Co.); Scotia (Humboldt Co.). CONNECTICUT - Cornwall (Litchfield Co.); Litchfield (Litchfield Co.); New Canaan (Fairfield Co.); Storrs (Tolland Co.). DISTRICT OF COLUMBIA. FLORIDA - Belleair (Pinellas Co.); Dunedin (Pinellas Co.); Fort Lauderdale (Broward Co.); Jacksonville (Duval Co.); Mayport (Duval Co.); Oneco (Manatee Co.); Paradise Key, Everglades National Park; Putnam Co. GEORGIA - Savannah (Chatham Co.). ILLINOIS - Bowmanville; Edgebrook (Cook Co.); Galesburg (Knox Co.); Kickapoo State Park (Vermilion Co.); Palos Park (Cook Co.); Peoria (Peoria Co.); Riverside (Cook Co.); Willow Springs (Cook Co.). INDIANA - Hammond (Lake Co.); Marion Co.; Michigan City (La Porte Co.); Mineral Springs; Pine. IOWA - Ames (Story Co.); Council Bluffs (Pottawattamie Co.); Iowa City (Johnson Co.); Lake Okoboji (Dickinson Co.). KANSAS - Douglas Co.; Onaga (Pottawatomie Co.); Riley Co.; Topeka (Shawnee Co.). LOUISIANA - New Orleans (Orleans Co.). MAINE - Bethel (Oxford Co.); Passadumkeag (Penobscot Co.); Salsbury Cove (Hancock Co.). MARYLAND - Baltimore (Independent City); Chalk Point; Piney Point (Saint Marys Co.); Sparrows Point (Baltimore Co.). MASSACHUSETTS - Amherst (Hampshire Co.); Brookline (Norfolk Co.); Framingham (Middlesex Co.); Holliston (Middlesex Co.); Humarock (Plymouth Co.); Lenox (Berkshire Co.); Lexington (Middlesex Co.); Marion (Plymouth Co.); Nahant (Essex Co.); Natick (Middlesex Co.); Petersham (Worchester Co.); Sharon (Norfolk Co.); Tyngsboro (Middlesex Co.). MICHIGAN - Ann Arbor (Washtenaw Co.); Beaver Island (Charlevoix Co.); Charlevoix (Charlevoix Co.); Cross Village (Emmer Co.); Detroit (Wayne Co.); Farmington (Oakland Co.); Five Mile Point (Keweenaw Co.); Floodwood (Schoolcraft Co.); George Reserve (Livingston Co.); Gull Island (Charlevoix Co.); Harbert Dunes (Barrien Co.); Huron Mountains Club (Marquette Co.); Ingham Co.; Isle Royal (Keweenaw Co.); Luzerne (Oscoda Co.); Marquette (Marquette Co.); Pigeon (Huron Co.); Port Huron (Saint Clair Co.); Rochester (Oakland Co.); Saint Ignace (Mackinac Co.); Southfield (Oakland Co.). MINNESOTA - Battle Creek (Ramsey Co.); Ely (Saint Louis Co.); Hennepin Co.; Houston Co.; Itasca State Park (Clearwater Co.); Olmsted Co.; Saint Paul (Ramsey Co.); Two Harbors (Lake Co.). MONTANA - Bear Paw Mountain (Blaine Co.). NEBRASKA - Omaha (Douglas Co.); West Point (Cuming Co.). NEW HAMPSHIRE - Durham (Strafford Co.); Franconia (Grafton Co.); Hampton (Rockingham Co.); Lake of Clouds, Mount Washington (Coos Co.); Meredith Centre (Belknap Co.); Milton (Strafford Co.); Plymouth (Grafton Co.); Randolph (Coos Co.); Rumney (Grafton Co.); Squam Lake; White Mountains. NEW JERSEY - Arlington (Hudson Co.); Atlantic City (Atlantic Co.); Bergenfield (Bergen Co.); Burlington Co.; Chester (Morris Co.); Fort Lee (Bergen Co.); Greenwood Lake; Hillsdale (Bergen Co.); Irvington (Essex Co.); Lakehurst (Ocean Co.); Manasquan (Monmouth

Co.); Ocean City (Cape May Co.); Palisades; Phillipsburg (Warren Co.); Pocono Lake; Roselle Park (Union Co.); Seaside Park (Ocean Co.). NEW YORK - Batavia (Genesee Co.); Bear Mountain (Rockland Co.); Branchport (Yates Co.); Buffalo (Erie Co.); Catskill Mountains; Chateaugay Lake, Adirondack Mountains; East Aurora (Erie Co.); Elbridge (Onondaga Co.); Freeville (Tompkins Co.); Ghent (Columbia Co.); Hamburg (Erie Co.); Irving (Chautauqua Co.); Ithaca (Tompkins Co.); Lockport (Niagara Co.); Mendon (Monroe Co.); Mendon Ponds (Wayne Co.); Newport (Herkimer Co.); New Rochelle (Westchester Co.); New York City; Ocean Beach, Fire Island (Suffolk Co.); Olcott (Niagara Co.); Oneida Lake; Stow (Chautauqua Co.); Tuxedo Park (Orange Co.); Upper Saranac Lake (Franklin Co.); Wanakena (Saint Lawrence Co.); Wyandanch (Suffolk Co.). OHIO - Allen Co.; Buckeye Lake; Cincinnati (Hamilton Co.); Cleveland (Cuyahoga Co.); Logan Co.; Putnam Co.; Sandusky Co. PENNSYLVANIA - Avondale (Chester Co.); Black Moshannon (Centre Co.); Buck Hill Falls (Monroe Co.); Easton (Northampton Co.); Hazelton (Luzerne Co.); Hummelstown (Dauphin Co.); Indian Creek Res.; Martinsburg (Blair Co.); Nanticoke (Luzerne Co.); Ohiopyle (Fayette Co.); Ole Bull; Phillipsburg (Centre Co.); Pittsburgh (Allegheny Co.); Shingletown (Centre Co.); State College (Centre Co.); Tannersville (Monroe Co.); Williamsport (Lycoming Co.); Windgap (Northampton Co.). RHODE ISLAND - Warwick (Kent Co.). SOUTH CAROLINA - Blackville (Barnwell Co.). TENNESSEE - Unicoi Co. TEXAS - Carthage (Panola Co.). VERMONT - Burlington (Chittenden Co.). VIRGINIA - Alexandria (Independent City); Blacksburg (Montgomery Co.); Fairfax Co.; Nelson Co. WASHINGTON - Factoria (King Co.); Monroe (Snohomish Co.); Orting (Pierce Co.); Puyallup (Pierce Co.); Seattle (King Co.); Spillman Camp (Mason Co.); Tenino (Thurston Co.). WEST VIRGINIA - Wardensville (Hardy Co.). WISCONSIN - Bayfield (Bayfield Co.).

38. *Lebia (Lebia) subrugosa* Chaudoir

Lebia subrugosa Chaudoir 1870 : 227. Type locality - "Mexique". Bates 1883 : 230. Csiki 1932 : 1338 (*Lebia*). Blackwelder 1944 : 55.

Description

Length of elytra - 3.12 - 4.00 mm; mean (21 specimens) 3.71 mm.

Head - Frons, vertex, clypeus, and genae usually pale, frons sometimes infuscated; frons lacking distinct microsculpture, with a strong groove along mesal margin of eye, weaker wrinkles mesad of this and scattered fine punctures. Mouth parts pale; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Usually entirely pale, sometimes pronotal disc infuscated, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc strongly wrinkled.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings (fig. 40); epipleura pale. Disc with striae distinct, intervals moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter pale, darkest apically. Pygidium infuscated.

Male genitalia - Armature of endophallus as in figs. 102, 103; apex of median lobe tapered to a broad point. The endophallic armature in six specimens was examined.

Discussion

Recognition - *Lebia subrugosa* can usually be distinguished from the other pale species occurring in the southwestern United States by the lateral dark vitta on the elytra. Specimens with this vitta reduced to a postmedian spot resemble specimens of *abdita*. However, *abdita* is smaller and lacks a well defined dark circumscutellar marking. *Lebia guttula* and *perpallida* are also largely pale species but *guttula* has the apex of the elytra dark and *perpallida* lacks lateral dark markings on the elytra.

Variation - North of Mexico *subrugosa* varies slightly. Some specimens lack the anterior part of the lateral vitta. Also, the connection between the lateral vitta and the postmedian sutural spot of the elytral disc, although always present is poorly developed in some specimens. The head and pronotum are usually pale but are infuscated in some specimens.

In Mexico there is further variation. I have seen specimens which are much larger, with the frons and pronotal disc darker, the frons more wrinkled, and the elytra lacking the dark fascia connecting the lateral vitta to the dark postmedian sutural spot. This variation seems to be analogous to that found in *Lebia fuscata*.

Notes - As the variation known to occur in the present species covers all the features mentioned in the description of *subrugosa* I have used this name. Two forms later described by Bates, *rhodope* and *rufilia*, possibly belong with *subrugosa* also.

Distribution - North of Mexico *Lebia subrugosa* occurs in southern Arizona and western Texas; 31 specimens were studied from the following localities.

ARIZONA - Ash Fork; Bisbee (Cochise Co.); Chiricahua Mountains; Gilman Ranch, Mule Mountains (Cochise Co.); Kansas Settlement (Cochise Co.); Southwest Research Station, Portal (Cochise Co.). TEXAS - Terlingua (Brewster Co.).

39. *Lebia (Lebia) perpallida* new species

Holotype - A male labelled as follows: Pena Blanca, Sta. Cruz Co. Ariz. 4000' Aug. 27.60 at light G. E. Ball family and R. B. Madge collectors. To be deposited in the Canadian National Collection, Ottawa.

Paratypes are from the following localities.

ARIZONA - Nogales (Santa Cruz Co.) (one female, California Academy of Sciences); Peña Blanca (Santa Cruz Co.) (one male and one female, personal collection of G. E. Ball, University of Alberta); Stuart Forest Camp, Cave Creek Canyon, Chiricahua Mountains (Cochise Co.) (one male, Chicago Natural History Museum).

Description

Length of elytra - 2.88 - 3.64 mm; mean (5 specimens) 3.45 mm.

Head - Frons, vertex, clypeus, and genae pale; frons with distinct microsculpture and a few fine punctures. Mouth parts pale; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and fine wrinkles.

Pterothorax - Sterna, pleura and scutellum pale.

Elytra - Disc largely pale with variable dark sutural markings (reduced pattern as in fig. 41); epipleura pale. Disc with striae distinct, moderately convex; apical pinch well developed; basal ridge usually complete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter pale, darkest apically. Pygidium infuscated.

Male genitalia - Armature of endophallus as in figs. 104, 105; apex of median lobe tapered to a broad point. The endophallic armature in two specimens was examined.

Discussion

Recognition - This very pale species may be confused with three other pale species, *guttula*, *abdita*, and *subrogosa*, which occur within its range. There is usually a dark lateral marking on the elytra in these three but never in *perpallida*.

Variation - The postmedian sutural spot varies from a "V" shaped

marking (fig. 41) to a solid diamond. Specimens exhibiting the latter condition also exhibit a weak circumscutellar spot.

Etymology - The name is derived from the Latin adjective *perpallidus* - very pale - in reference to the predominantly pale coloration.

Distribution - *Lebia perpallida* is known only from southern Arizona. Five specimens (type material) were studied.

40. *Lebia (Lebia) lobulata* LeConte

Lebia lobulata LeConte 1863a : 5. Type locality - Ohio or Louisiana. Gemminger and Harold 1868 : 139. Horn 1872 : 135. Blatchley 1910 : 146. Casey 1920 : 254. Leng 1920 : 55 (*Lebia*). Csiki 1932 : 1329 (*Lebia*).

Description

Length of elytra - 1.96 - 2.56 mm; mean (21 specimens) 2.28 mm.

Head - Frons, vertex, clypeus, and genae dark (usually dark brown); frons with distinct microsculpture and strong punctures. Mouth parts pale except for dark gula; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Pale except for dark pronotal disc and infuscated episternum. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and fine transverse wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Typical pattern as in fig. 42; epipleura pale. Elytral disc with striae distinct, intervals weakly convex; apical pinch well developed; basal ridge incomplete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Armature of endophallus as in figs. 106, 107; apex of median lobe tapered to a broad point. The endophallic armature in four specimens was examined.

Discussion

Recognition - *Lebia lobulata* can be readily recognized by its strong frontal punctation. The only other species with similar punctation are *divisa* and *pulchella*, but both of these have the pronotum pale and the elytra are at least partly metallic. The elytral pattern, when fully developed, facilitates separation of *lobulata* from the similar *ornata* and *fuscata*. *Lebia analis* sometimes has a similar pattern but again the pronotum is pale.

Variation - Some specimens from Florida have the pale basal marking of the elytra somewhat modified. In these the pale mesal lobe is reduced but around the shoulder the pale spot is expanded so that the usual dark markings are obliterated. Although the pattern of variation is the opposite of what would be expected no genitalic or other differences were found. This variation, although apparently very localized, is similar to the type found in *pulchella*; Arizona specimens of the latter species have the posterior half of the elytra darker but the base paler than in eastern specimens.

Distribution - *Lebia lobulata* occurs in the eastern United States (fig. 135). It is doubtful if it occurs in adjacent Canada. Over 150 specimens

were studied from the following localities.

UNITED STATES

ARKANSAS. DISTRICT OF COLUMBIA. FLORIDA - Dunedin (Pinellas Co.); Enterprise (Volusia Co.); Gainesville (Alachua Co.); Marion. GEORGIA - Kennesaw Mountain (Cobb Co.). ILLINOIS - Gillespie (Macoupin Co.); Kickapoo State Park (Vermilion Co.); Saint Clair Co.; Starved Rock State Park (LaSalle Co.). INDIANA - Crawford Co.; Marion Co. KANSAS - Riley Co. MARYLAND - Bowie (Prince Georges Co.); Cabin John (Montgomery Co.); Great Falls (Montgomery Co.); Jackson's L.; Plummers Island; Popes Creek (Charles Co.). MISSISSIPPI - Lucedale (George Co.). MISSOURI - Columbia (Boone Co.); Saint Charles (Saint Charles Co.). NEW JERSEY - Chester (Morris Co.); Stanhope (Sussex Co.); Towaco (Morris Co.). NEW YORK - Bear Mountain (Rockland Co.); New York City; Peekskill (Westchester Co.); West Point (Orange Co.). NORTH CAROLINA - Highlands (Macon Co.); White Lake (Bladen Co.). OHIO - Champaign Co.; Cincinnati (Hamilton Co.). PENNSYLVANIA - Allegheny Co.; Arcola (Montgomery Co.); Lancaster (Lancaster Co.); Lime Pk. SOUTH CAROLINA - Clemson (Oconee Co.). TENNESSEE - Elmwood (Smith Co.). TEXAS - Beaumont (Jefferson Co.); Victoria (Victoria Co.). VIRGINIA - Alexandria (Independent City); Great Falls (Fairfax Co.); Loudoun Co.; Rosslyn (Arlington Co.); Warm Springs (Bath Co.). WEST VIRGINIA - Fairmont (Marion Co.).

41. *Lebia (Lebia) ornata* Say

Lebia ornata Say 1825 : 13. Type locality - not given. LeConte 1848 : 194. LeConte 1863 : 5. Gemminger and Harold 1868 : 139. Chaudoir 1870 : 198. Horn 1872 : 136. Blatchley 1910 : 146. Casey 1920 : 254. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1330 (*Lebia*).

Lebia analis (in part - incorrect synonymy with *ornata*); Dejean 1826: 452.

Lebia axillaris Dejean 1831 : 372. Type locality - "Amerique septentrionale". LeConte 1848 : 194. LeConte 1863 : 5.

Lebia analis (in part - incorrect synonymy with *axillaris*); Chaudoir 1870 : 211. Blackwelder 1944 : 52.

Lebia marginella Dejean 1831 : 373. Type locality - "Amerique septentionale".

Lebia ornata marginella; LeConte 1863 : 5. Gemminger and Harold 1868 : 140. Chaudoir 1870 : 198. Horn 1872 : 136.

Lebia nigripennis Dejean 1831 : 373. Type locality - "Amerique septentrionale". NEW SYNONYMY. LeConte 1848 : 195. Chaudoir 1870 : 200.

Lebia collaris nigripennis; LeConte 1863 : 5. Gemminger and Harold 1868 : 137.

Lebia collaris (in part - incorrect synonymy with *nigripennis*); Horn 1872 : 136. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1328 (*Lebia*). Blackwelder 1944 : 53.

Lebia nigripennis erythrocephala Dejean 1831 : 373. Type locality - "Amerique septentrionale".

Dromius apicalis Haldeman 1843 : 298. Type locality - not given.

Lebia brunnea Haldeman 1843 : 298. Type locality - not given.

Lebia axillaris brunnea; LeConte 1848 : 194. Gemminger and Harold 1868 : 137.

Lebia frigida Chaudoir 1879 : 242. Type locality - Boston. Horn 1872 : 137.

Lebia fuscata (in part - incorrect synonymy with *frigida*); Leng 1920 : 66 (*Lebia*) Csiki 1932 : 1329 (*Lebia*).

Lebia reperta Casey 1920 : 255. Type locality - New York. NEW SYNONYMY. Csiki 1932 : 1341 (*Aphelogenia*).

Lebia virginica Casey 1920 : 255. Type locality - Virginia. Csiki 1932 : 1341 (*Aphelogenia*).

Lebia virginica ashevillensis Casey 1920 : 256. Type locality - North Carolina (Asheville). Csiki 1932 : 1341 (*Aphelogenia*).

Lebia fluviatilis Casey 1920 : 256. Type locality - Mississippi (Vicksburg)

and Illinois. NEW SYNONYMY. Csiki 1932 : 1340 (*Aphelogenia*).

Description

Length of elytra - 2.28 - 3.20 mm; mean (20 specimens) 2.66 mm.

Head - Frons, vertex, clypeus, and genae dark; frons with fine distinct microsculpture and scattered very fine punctures. Mouth parts pale or infuscated except dark gula; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale or with disc of pronotum and episternum darkened to various degrees. Pronotum transverse in shape, lateral margins widened basally; disc with indistinct microsculpture and fine transverse wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings (figs. 43-45) or entirely dark; epipleura pale. Disc with striae distinct, intervals weakly convex; apical pinch well developed; basal ridge incomplete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium dark or pale.

Male genitalia - Armature of endophallus as in fig. 108; apex of median lobe tapered to a broad point. The endophallic armature in eight specimens was examined.

Discussion

Recognition - There are several species within its geographical range with which *Lebia ornata* can be confused. From *fuscata* pale-marked *ornata* can be recognized by the shape of the pale apical marking of the elytral disc (figs. 43, 44, 45 cf. fig. 39) and the incomplete basal ridge of the elytra. Specimens of *ornata* with an entirely dark elytral disc can be distinguished from *collaris* by the oblongum cell of the wing (entirely absent in *ornata*, a triangular remnant in *collaris*). From *esurialis*, *ornata* is best distinguished by the endophallic armature although there are slight differences in the elytral pattern. For a discussion of these see *Lebia esurialis*. *Lebia lobulata* is also somewhat similar but the frons is strongly punctured and the shape of the pale basal spot is quite different.

Variation - There is considerable variation in color in *ornata*. The pronotal disc in most northern specimens is dark although in a few specimens it is partly pale. This region of dark specimens is roughly across the northern states from Minnesota to New York and south along the Appalachians. In the southern regions most specimens have the pronotal disc pale with only a few having it dark. In a similar geographic pattern the abdomen in northern specimens is usually dark while in southern specimens it is pale. The maculation of the elytral disc also varies considerably. In northern specimens the pale markings are usually small with the basal pale spot usually separated from the base and side of the disc by dark coloration. In the more southern specimens the pale markings are enlarged so that the basal spot reaches the base and the sides of the elytral disc. This more or less corresponds to the type of variation found in the color of the pronotal disc and the abdomen. However, from Georgia to Mississippi a different type of elytral coloration is also present in the populations. In these areas many specimens have the pale

elytral markings strongly reduced or absent although the pronotum and the abdomen remain pale. In addition to this color variation there is a north-south variation in the prominence of the eyes, northern specimens having less bulging eyes than southern specimens.

Synonymy - In spite of the considerable color variation there seems to be only one species involved here. The very distinctive endophallic armature is the same throughout the various forms, and the color variants intergrade.

I do not agree with Lindroth (1955) who considered *axillaris* (the southern form with the pale pronotum and more prominent eyes) distinct from *ornata*. *Lebia frigida* Chaudoir, judging from Chaudoir's illustration of the elytral pattern, is almost certainly this species as was recognized by Casey (1920). *Lebia nigripennis*, usually synonymized with *Lebia collaris*, appears to be the dark form of this species. Two characters mentioned by Dejean in the original description of *nigripennis*, the small size and the reddish head, indicate that it does not belong with *collaris* but rather with *ornata*. Both Chaudoir (1863, 1870) and Lindroth (1955) considered the type of *nigripennis* to be not conspecific with *collaris*.

Casey's *reperta*, *virginica*, *virginica ashevillensis*, and *fluviatilis* are regarded as synonyms of *ornata*. The types have been compared by G. E. Ball with specimens here regarded as *ornata*. These could not be the similar appearing *fuscata* either because of the flattened eyes (*reperta*) or because of the shape of the pale apical spot (widest suturally in *virginica*, *v. ashevillensis* and *fluviatilis*). As these forms do not occur in Texas they could not be *esurialis* or *calliope*.

Distribution - This species occurs in the eastern half of the United States and adjacent Canada (fig. 128). Over 900 specimens were studied from the following localities.

CANADA

ONTARIO - Bells Corners; Constance Bay; Fisher Glen; Go Home Bay; Gull Lake; Jarvis Lake; Leamington; Marmora; Toronto; White Lake. QUEBEC - Brome; Gracefield; Kirks Ferry; Laniel; Wakefield.

UNITED STATES

ALABAMA - Coleta; Pyriton (Clay Co.). CONNECTICUT - Cornwall (Litchfield Co.); East Hartford (Hartford Co.); New Canaan (Fairfield Co.); New Haven (New Haven Co.); Stamford (Fairfield Co.). DISTRICT OF COLUMBIA. FLORIDA - Brooksville (Hernando Co.); DeLeon Springs (Volusia Co.); Dunedin (Pinellas Co.); Enterprise (Volusia Co.); Gainesville (Alachua Co.); Jacksonville (Duval Co.); Levy Co.; Myakka River State Park (Sarasota Co.); O'Leno State Park (Columbia Co.); Sanford (Seminole Co.); Tallahassee (Leon Co.); Taylor Co.; Wakulla Co. GEORGIA - Atlanta (Fulton Co.); Pine Mountain (Rabun Co.); Prattsburg (Talbot Co.); Savannah (Chatham Co.); Tifton (Tift Co.). ILLINOIS - Argo (Cook Co.); Cahokia (Saint Clair Co.); Chicago (Cook Co.); Evanston (Cook Co.); Galesburg (Knox Co.); Joliet (Will Co.); Murphysboro (Jackson Co.); Olive Branch (Alexander Co.); Palos Park (Cook Co.); Ravinia (Lake Co.); Riverside (Cook Co.); Urbana (Champaign Co.); Willow Springs (Cook Co.). INDIANA - Beverley Shores (Porter Co.); Gary (Lake Co.); Hammond (Lake Co.); Kosciusko Co.; Marion Co.; Marshall Co.; Mineral Springs; Osborn; Posey Co. IOWA - Dubuque (Dubuque Co.); Fort Madison (Lee Co.); Hills (Johnson Co.); Iowa City (Johnson Co.); Sioux City (Woodbury Co.). KANSAS - Douglas Co.; Labette Co.; Manhattan (Riley Co.); Topeka (Shawnee Co.). KENTUCKY - Wyecliffe. LOUISIANA - Alexandria (Rapides Co.); Vowell's Mill (Natchitoches Co.). MAINE - Bangor (Penobscot Co.); Bethel (Oxford Co.); Blackwood Camp, Acadia National Park; Casco (Cumberland Co.); Isle of Springs (Lincoln Co.); Orono (Penobscot Co.); Waldoboro (Lincoln Co.). MARYLAND - Baltimore (Independent City); Bladensburg (Prince Georges Co.); Bowie (Prince Georges Co.); Frederick (Frederick Co.); Glen Echo (Montgomery Co.); Great Falls (Montgomery Co.); Lanham (Prince Georges Co.); Oakland (Garrett Co.); Plummers Island; Sparrows Point (Baltimore Co.); Travilah. MASSACHUSETTS - Beach Bluff; Bedford (Middlesex Co.); Brookline (Norfolk Co.); Canton (Norfolk Co.); Clayton (Berkshire Co.); Dedham (Norfolk Co.); Dover (Norfolk Co.); Framingham (Middlesex Co.); Goshon (Hampshire Co.); Hadley (Hampshire Co.); Hopkinton (Middlesex Co.); Humarock (Plymouth Co.); Milton (Norfolk Co.); Mount Tom (Hampshire Co.); Nantucket (Nantucket Co.); Princeton (Worcester Co.); Sherborn (Middlesex Co.); Springfield (Hampden Co.); Wayland (Middlesex Co.); Woburn (Middlesex Co.). MICHIGAN - Boyne Falls (Charlevoix Co.); Cheboygan Co.; Deerfield Township (Lapeer Co.); Detroit (Wayne Co.); Douglas Lake; Galesburg (Kalamazoo Co.); Harbert Dunes (Barrien Co.); Midland Co.; Royal Oak (Oakland Co.); Sanford (Midland Co.); South Haven (Van Buren Co.); Washtenaw Co. MINNESOTA - Houston Co.; Lake Minnetonka; Olmsted Co.; Pine Co.; Two Harbors (Lake Co.); Winona Co. MISSISSIPPI - Beaumont (Perry Co.); Hancock Co.; Lucedale (George Co.); Oxford (Lafayette Co.); Starkville (Okitibbeha Co.). MISSOURI - Jefferson City (Cole Co.); Saint Louis (Independent City). NEBRASKA - West Point (Cuming Co.). NEW HAMPSHIRE - Christine Lake, Percy (Coos Co.); Claremont (Sullivan Co.); Exeter (Rockingham Co.); Franconia (Grafton Co.); Hampton (Rockingham Co.); Hocksett (Merrimack Co.); Mount Surprise, Intervale (Carroll Co.); Rumney (Grafton Co.); Three Mile Island. NEW JERSEY - Alpine (Bergen Co.); Anglesea; Atco (Camden Co.); Berkeley Heights (Union Co.); Brown's Mills (Burlington Co.); Butler (Morris Co.); Chester (Morris Co.); Clementon (Camden Co.); Elizabeth (Union Co.); Hillsdale (Bergen Co.);

Iona (Gloucester Co.); Jamesburg (Middlesex Co.); Lahaway; Lake Hopatcong; Lakehurst (Ocean Co.); Lakewood (Ocean Co.); Lucaston; Madison (Morris Co.); Malaga (Gloucester Co.); Manasquan (Monmouth Co.); Manchester; Manumuskin; Montclair (Essex Co.); Morristown (Morris Co.); Mountain View (Passaic Co.); Newark (Essex Co.); Oradell (Bergen Co.); Orange Mountains; Ramapo Mountains; Ramsey (Bergen Co.); Riverton (Burlington Co.); Roselle Park (Union Co.); Towaco (Morris Co.); Vineland (Cumberland Co.). NEW YORK - Allegany State Park (Cattaraugus Co.); Amagansett (Suffolk Co.); Barryville (Sullivan Co.); Beaverkill (Sullivan Co.); Bolton (Warren Co.); Buffalo (Erie Co.); Danby (Tompkins Co.); East Aurora (Erie Co.); Ellenville (Ulster Co.); Greenwood Lake (Orange Co.); Hamburg (Erie Co.); Huguenot (Orange Co.); Indian Falls; Ithaca (Tompkins Co.); Lake George (Warren Co.); Lancaster (Erie Co.); New Baltimore (Greene Co.); Newport (Herkimer Co.); New York City; Olcott (Niagara Co.); Oliverea (Ulster Co.); Peekskill (Westchester Co.); Pike (Wyoming Co.); Pine Island (Orange Co.); Quogue (Suffolk Co.); Riverhead (Suffolk Co.); Trout Lake; West Nyack (Rockland Co.); West Point (Orange Co.); Whiteface Mountain (Essex Co.); White Lake (Sullivan Co.); Yaphank (Suffolk Co.). NORTH CAROLINA - Alleghany Co.; Balsam Gap, Balsam Mountains; Benson (Johnston Co.); Black Mountain (Buncombe Co.); Black Mountains; Bryson City (Swain Co.); Cherokee (Swain Co.); Crestmont (Haywood Co.); Edgecomb Co.; Gray Beard Mountain; Highlands (Macon Co.); Mount Mitchell; Pisgah Mountain; Raleigh (Wake Co.); Retreat; Rnd. Knob; Washington (Beaufort Co.); Willard (Pender Co.). OHIO - Athens (Athens Co.); Cincinnati (Hamilton Co.); Cleveland (Cuyahoga Co.); Columbus (Franklin Co.); Conneaut (Ashtabula Co.); Erie Co.; Lake Co.; Marietta (Washington Co.); Rock Creek (Ashtabula Co.). PENNSYLVANIA - Bear Meadows; Black Moshannon (Centre Co.); Burnt Cabins (Fulton Co.); Clearfield (Clearfield Co.); Delaware Water Gap (Monroe Co.); Hummelstown (Dauphin Co.); Lehigh Gap; Pocone Lake (Monroe Co.); Tannersville (Monroe Co.); Twin Lakes (Pike Co.); Wilmerding (Allegheny Co.); Windgap (Northampton Co.); Wisahickn. RHODE ISLAND - Warwick (Kent Co.). SOUTH CAROLINA - Clemson (Oconee Co.); Florence (Florence Co.). TENNESSEE - Elmwood (Smith Co.); Knoxville (Knox Co.); Memphis (Shelby Co.). TEXAS - Kirbyville (Jasper Co.); Victoria (Victoria Co.). VIRGINIA - Alexandria (Independent City); Falls Church (Fairfax Co.); Fredericksburg (Spotsylvania Co.); Great Falls (Fairfax Co.); Mount Vernon (Fairfax Co.); Richmond (Henrico Co.); Rosslyn (Arlington Co.); Warm Springs (Bath Co.). WEST VIRGINIA - White Sulphur Springs (Greenbrier Co.). WISCONSIN - Bayfield Co.

42. *Lebia (Lebia) esurialis* Casey

Lebia esurialis Casey 1920 : 257. Type locality - Texas (Brownsville). Csiki 1932 : 1340 (*Aphelogenia*).

Description

Length of elytra - 2.12 - 2.80 mm; mean (21 specimens) 2.51 mm.

Head - Frons, vertex, clypeus, and genae dark (usually brownish, genae lightest); frons with distinct microsculpture, a few very fine punctures. Mouth parts pale except the darkened gula; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with fine microsculpture, sometimes indistinct, and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with extensive pale markings (fig. 46); epipleura pale. Disc with striae distinct, intervals more or less weakly convex; apical pinch well developed; basal ridge incomplete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Armature of endophallus as in figs. 109, 110; apex of median lobe tapered to a broad point. The endophallic armature in five specimens was examined.

Discussion

Recognition - This species on external characters may be confused with *ornata* and possibly with *calliope*. The distinctive features of *calliope* and the points separating it from *esurialis* are discussed under that species. The features of the elytral pattern separating *esurialis* from Texas specimens of *ornata* (only two seen) lie in the basal dark markings. In *esurialis* the dark markings either do not reach the shoulder or if they do are solid all the way across. In *ornata* the basal dark marking is divided or almost so with the result that there are separate humeral and circumscutellar markings.

Variation - The humeral area of the elytra is usually without dark markings but in some specimens the coloration spreads across from the dark circumscutellar spot.

Distribution - North of Mexico this species is known only from eastern Texas; 34 specimens were studied from the following localities. Brownsville (Cameron Co.); Columbus (Colorado Co.); Dallas (Dallas Co.); Kingsville (Kleberg Co.); Laredo (Webb Co.); Lavaca Co.; Uvalde (Uvalde Co.); Victoria (Victoria Co.).

43. *Lebia (Lebia) calliope* Bates

Lebia calliope Bates 1883 : 231. Type locality - Mexico, Mirador, Cerro de Plumas; Guatemala, San Geronimo. Schaeffer 1910 : 398. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1333 (*Lebia*). Blackwelder 1944 : 53.

Lebia serpentina Casey 1920 : 256. Type locality - Texas (Brownsville). NEW SYNONYMY. Csiki 1932 : 1341 (*Aphelogenia*).

Description

Length of elytra - 2.72 - 3.32 mm; mean (19 specimens) 3.04 mm.

Head - Frons, vertex, and genae dark (usually brownish), clypeus usually pale; frons with distinct microsculpture, without distinct macrosculpture. Mouth parts pale; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of the pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with fine microsculpture and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings (fig. 47); epipleura pale. Disc with striae distinct, intervals more or less weakly convex; apical pinch well developed; basal ridge incomplete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium pale.

Male genitalia - Armature of endophallus as in fig. 111; apex of median lobe tapered to a broad point. The endophallic armature in five specimens was examined.

Discussion

Recognition - *Lebia calliope* resembles two other species occurring in Texas, *ornata* and *esurialis*. The most distinctive external feature of *calliope* is its elytral pattern, especially the shape of the basal pale spot. As the base of elytra is always dark in *calliope* most specimens of *esurialis* can be separated by the pale humeral area. Also, the gula is usually pale in *calliope*, dark in *ornata* and *esurialis*. Males of all three species can be readily identified by the endophallic armature.

Variation - There appears to be no important variation in *calliope*.

Synonymy - *Lebia serpentina* Casey is here regarded as a synonym of *calliope*. Casey's description fits the present species very well and could not apply to either *esurialis* or *ornata*. The features used by Casey to separate his *serpentina* from *calliope* (prothorax relatively narrower and the pattern slightly different) are of minor importance.

Distribution - This species is found north of Mexico only in southeastern Texas; 21 specimens were studied, all from Brownsville (Cam-

eron Co.).

44. *Lebia (Lebia) bumeliae* Schaeffer

Lebia bumeliae Schaeffer 1910 : 399. Type locality - Brownsville, Texas. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1328 (*Lebia*).

Description

Length of elytra - 1.76 - 2.20 mm; mean (6 specimens) 1.98 mm.

Head - Frons, vertex, clypeus, and genae pale; frons with distinct microsculpture, macrosculpture lacking. Mouth parts pale; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc dark with pale markings (fig. 48); epipleura pale. Disc vaulted, with striae distinct, intervals flat or weakly convex; apical pinch well developed; basal ridge incomplete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter pale basally, darker apically and at the sides; pygidium dark.

Male genitalia - Armature of endophallus as in fig. 112; apex of median lobe tapered to a broad point. The endophallic armature in two specimens was examined.

Discussion

Recognition - The color pattern, vaulted elytra, and small size serve to separate this species from any others within its range. It might possibly be confused with *esurialis* on size but the head is pale in *bumelieae*, dark in *esurialis*.

Variation - This species apparently varies in its elytral pattern. Although in all six specimens seen the elytral pattern was as figured, in the original description Schaeffer mentions that some of the specimens lack the pale apical spot and that the basal spot is smaller.

Distribution - *Lebia bumeliae* is known only from southeastern Texas. Six specimens were studied from the following localities: Brownsville (Cameron Co.); Corpus Christi (Nueces Co.).

45. *Lebia (Lebia) lecta* Horn

Lebia lecta Horn 1885 : 131. Type locality - Florida. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1329 (*Lebia*).

Description

Length of elytra - 2.00 mm (1 specimen).

Head - Frons, vertex, clypeus, and genae pale; frons with distinct microsculpture, macrosculpture lacking. Mouth parts pale; mentum with a tooth. Antennae entirely pale. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc metallic green; epipleura pale. Disc vaulted, with striae distinct, intervals weakly convex; apical pinch well developed; basal ridge incomplete.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter (except very base) and pygidium dark.

Male genitalia - Unknown.

Discussion

Recognition - *Lebia lecta* is the only extremely small *Lebia* with metallic green elytra and a pale head and thorax known to occur in Florida.

Distribution - This species is known only from Florida. The one specimen seen was from Miami (Dade Co.). Very possibly *lecta* occurs in the Caribbean although Blackwelder (1944) does not list it.

46. *Lebia (Lebia) collaris* Dejean

Lebia collaris Dejean 1826 : 456. Type locality - "Amerique septentrionale". LeConte 1848 : 195. LeConte 1863 : 5. Gemminger and Harold 1868 : 137. Chaudoir 1870 : 199. Horn 1872 : 136. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1328 (*Lebia*). Blackwelder 1944 : 53.

Description

Length of elytra - 3.04 - 4.00 mm; mean (24 specimens) 3.42 mm.

Head - Frons, vertex, clypeus, and genae dark (genae palest); frons with distinct microsculpture, fine punctures, and a few wrinkles next to eyes. Mouthparts dark, ligula and maxillae pale in some specimens; mentum with a tooth. Antennae with segments one to three pale, four to eleven infuscated. Neck not strongly constricted.

Prothorax - Entirely pale, lateral margins of pronotum palest. Pronotum transverse in shape, lateral margins widened basally; disc with distinct microsculpture and very fine wrinkles.

Pterothorax - Sterna, pleura, and scutellum pale.

Elytra - Disc entirely dark except for pale lateral margin; epipleura pale. Elytral disc with striae distinct, intervals weakly convex; apical pinch well developed; basal ridge incomplete.

Wings - Triangular remnant of oblongum cell present.

Legs - Entirely pale. Fourth segment of hind tarsus bilobed.

Abdomen - Venter pale, darkened towards apex. Pygidium infuscated.

Male genitalia - Armature of endophallus as in figs. 113, 114 (note the large basal bulge and abruptly cut off apex of endophallus); apex of median lobe tapered to a broad point. The endophallic armature in four specimens was examined.

Discussion

Recognition - Only the immaculate forms of *analis* and *ornata* are similar to *collaris* in color (head and elytral disc dark, the rest pale). *Lebia analis* can be distinguished by its striated frons, this area being smooth in *collaris*. From *ornata*, *collaris* can be distinguished by the triangular remnant of the oblongum cell in its wing and by the endophallic

armature of the male genitalia. Immaculate specimens of *ornata* are usually smaller than *collaris* and the abdomen is pale throughout, not darkened apically.

Variation - There appears to be no important variation in *collaris*.

Synonymy - *Lebia nigripennis* has often been regarded as a small form of *collaris*. However, judging from its size and reddish head, it is almost certainly the immaculate form of *ornata*.

Distribution - *Lebia collaris* occurs in the southeastern United States northward to Indiana (fig. 136); 26 specimens were studied from the following localities.

FLORIDA - Crescent City (Putnam Co.); Dade Co.; Dunedin (Pinellas Co.); Marion Co.; Orange Co.; Tampa (Hillsborough Co.). GEORGIA - Savannah (Chatham Co.). INDIANA - Crawford Co. NORTH CAROLINA - Southern Pines (Moore Co.).

47. *Lebia (Lebia) pumila* Dejean

Lebia pumila Dejean 1831 : 388. Type locality - "Amerique septentrionale". LeConte 1848 : 195. LeConte 1863 : 5. Gemminger and Harold 1868 : 140. Chaudoir 1870 : 190. Horn 1872 : 135. Blatchley 1910 : 146. Casey 1920 : 249. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1330 (*Lebia*).

Lebia maculicornis LeConte 1848 : 195. Type locality - Georgia. LeConte 1863 : 5. Gemminger and Harold 1868 : 139.

Lebia pumila maculicornis; Chaudoir 1870 : 190. Horn 1872 : 135.

Lebia rhodopus Schwarz 1878. Type locality - "Tampa", Florida. NEW SYNONYMY. Blatchley 1910 : 145. Casey 1920 : 248. Leng 1920 : 66 (*Lebia*). Csiki 1932 : 1330 (*Lebia*).

Lebia viridis (in part, incorrect synonymy with *rhodopus*); Horn 1882 : 130.

Lebia tertiaria Casey 1920 : 248. Type locality - District of Columbia. NEW SYNONYMY. Csiki 1932 : 1331 (*Lebia*).

Lebia ludoviciana Casey 1920 : 248. Type locality - Louisiana (Alexandria). NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Lebia quadrata Casey 1920 : 249. Type locality - North Carolina (Southern Pines). Csiki 1932 : 1330 (*Lebia*).

Lebia illini Casey 1920 : 249. Type locality - Northern Illinois. NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Lebia frugalis Casey 1920 : 250. Type locality - Lake Superior (Bayfield, Wisconsin). NEW SYNONYMY. Csiki 1932 : 1329 (*Lebia*).

Description

Length of elytra - Metallic form: 2.16 - 2.80 mm; mean (19 specimens) 2.62 mm; non-metallic form: 1.56-2.64 mm; mean (20 specimens) 1.96 mm.

Head - Frons, clypeus, vertex, and genae dark; frons with distinct microsculpture but without punctures and wrinkles. Mouth parts dark except pale ligula; mentum with a tooth. Antennae with segments one and two variable in color but palest on under surface, segment three usually pale, segments four to eleven dark. Neck not strongly constricted.

Prothorax - Entirely dark, pronotum slightly metallic in some specimens. Pronotum shaped as in fig. 9, lateral margins narrow and weakly widened basally; disc with distinct microsculpture, lacking any

fine punctures or wrinkles.

Pterothorax - Sterna, pleura, and scutellum dark (usually piceous).

Elytra- Disc dark, sometimes metallic; epipleura dark. Disc with striae indistinct, intervals very weakly convex; apical pinch well developed; basal ridge incomplete.

Legs- Varying in color from dark to pale, tarsi always dark or infuscated. Fourth segment of hind tarsus bilobed.

Abdomen - Venter and pygidium dark (usually piceous). Lateral lobes of fifth abdominal sternum very wide (fig. 12).

Male genitalia - Armature of endophallus as in figs. 115, 116; apex of median lobe tapered to a broad point. The endophallic armature in nine specimens was examined.

Discussion

Recognition - The pale-legged forms of *Lebia pumila* present no difficulty in identification, there being no other species with the upper surface entirely dark or metallic and the legs pale. However, specimens with dark legs resemble the non-metallic form of *viridis*. The most distinctive feature separating these is the width of the lateral lobes of the fifth abdominal sternum, each of these being wider than the central trough in *pumila*, equal to or narrower than it is in *viridis*. In addition the third antennal segment is usually pale in *pumila*, dark in *viridis*.

Variation - Specimens of *pumila* vary in color and size. Northern specimens are entirely dark and are usually small. South of a line running approximately through Pennsylvania the legs are usually pale. A few of these pale-legged specimens, especially those in the extreme south, are much larger and have a tendency to become metallic. The endophallic armature also shows some variation. The number of spines is reduced in some specimens with the result that the spines on the right side of the endophallus may be absent.

Synonymy- The small dark form with dark legs is the form evidently described by Dejean. Casey's names *illini* and *frugalis* also apply to this form. The strength of the elytral striae used by Casey to distinguish these two from *pumila* is a variable and entirely unreliable character in this species. The names *Lebia quadrata* Casey and *Lebia ludoviciana* Casey apply to the small form with dark elytra and more or less pale legs. It is rather doubtful if the elytra of *quadrata* are actually not longer than wide as stated by Casey. Quite possibly the elytra are somewhat split along the suture. The fifth species described by Casey, *tertiaria*, is that form of *pumila* which is large, non-metallic, and with pale legs. The other two names considered synonyms here apply to the large pale-legged form with the elytral disc either slightly metallic (*maculicornis*) or distinctly metallic (*rhodopus*).

The name *Lebia floricola* Harris is apparently a *nomen nudum*. There is no type in the Harris collection at the Museum of Comparative Zoology and no description could be found by G. E. Ball when he checked through *The New England Farmer* where the name was supposedly published. The first reference to the species is apparently that of LeConte (1948) where it is listed as a synonym of *pumila*.

Even though there is considerable variation in both color and size

there seems to be only one species present. Both the external and genitalic structures are the same throughout. In color intermediate types occur between the metallic and non-metallic forms and between the pale and dark-legged forms. Large specimens, occurring mainly in the south, usually have pale legs but in a few of the more northerly ones the legs are dark.

Distribution - *Lebia pumila* ranges across the northern United States and adjacent Canada and south to the Gulf Coast in the east (fig. 132). Over 750 specimens were studied from the following localities.

CANADA

ALBERTA - Medicine Hat. BRITISH COLUMBIA - Hope. MANITOBA - Aweme; Carberry; Roblin; Saint Lazare; Stony Mountain; Treesbank. NEW BRUNSWICK - Penobquis. ONTARIO - Bell's Corners; Brittania; Consecon; Emo; Gravenhurst; Gull Lake; Marmora; Moosonee; Point Pelee; Toronto; White Lake. QUEBEC - Duchesnay; Duparquet; Hull; Kazubazua; Knowlton; Laurel; Schwarz; Val Morin; Wolf Lake. SASKATCHEWAN - Canora; Kenosee Lake; Oxbow; Saskatoon; Torch River.

UNITED STATES

ALABAMA - Birmingham (Jefferson Co.); Coleta; Oak Grove (Mobile Co.); Pyriton (Clay Co.). ARKANSAS - Hope (Hempstead Co.). CONNECTICUT - Canaan (Litchfield Co.); Cornwall (Litchfield Co.); Kent (Litchfield Co.); Litchfield (Litchfield Co.); Stafford (Tolland Co.). DISTRICT OF COLUMBIA. FLORIDA - Dunedin (Pinellas Co.); Enterprise (Volusia Co.); Fort Myers (Lee Co.); Oneco (Manatee Co.); Orlando (Orange Co.). GEORGIA - Atlanta (Fulton Co.); Savannah (Chatham Co.). ILLINOIS - Chicago (Cook Co.); Evanston (Cook Co.); Galesburg (Knox Co.); Palos Park (Cook Co.); Steger (Cook Co.). INDIANA - Franklin Co.; Hammond (Lake Co.); Jackson Co.; Jennings Co.; Lake Station; Marion Co.; Mineral Springs; Pine; Posey Co.; Putnam Co.; Springville (Lawrence Co.); Starke Co.; Vermilion Co.; Winona Lake (Kosciusko Co.). IOWA - Ames (Story Co.); Fort Madison (Lee Co.); Iowa City (Johnson Co.); Lake Okoboji (Dickinson Co.); Ledyard (Kossuth Co.); Sioux City (Woodbury Co.). KANSAS - Blackjack Creek (Pottawatomie Co.); Douglas Co.; Kiowa Co.; Onaga (Pottawatomie Co.); Riley Co.; Topeka (Shawnee Co.); Trego Co. KENTUCKY - Livingston (Rockcastle Co.). LOUISIANA - Bayou Sara; Bossier Co.; Covington (Saint Tammany Co.); Desoto; Franklin (Saint Mary Co.); Opelcusas (Saint Landry Co.). MAINE - Bar Harbor (Hamcock Co.); Baxter State Park (Piscataquis Co.); Casco (Cumberland Co.); Greenville (Piscataquis Co.); Paris (Oxford Co.); Salsbury Cove (Hancock Co.); Stratton (Franklin Co.). MARYLAND - Baltimore (Independent City); Bladenburg (Prince Georges Co.); Glen Echo (Montgomery Co.); Nanjemoy (Charles Co.). MASSACHUSETTS - Brookline (Norfolk Co.); Cambridge (Middlesex Co.); Framingham (Middlesex Co.); Granby (Hampshire Co.); Hadley (Hampshire Co.); Milton (Norfolk Co.); Natick (Middlesex Co.); North Attleboro (Bristol Co.); Northboro (Worcester Co.); Northfield (Franklin Co.); Sanborn; Sherborn (Middlesex Co.); Southboro (Worcester Co.); Springfield (Hampden Co.); Tyngsboro (Middlesex Co.); Wellesley (Norfolk Co.); Westfield (Hampden Co.). MICHIGAN - Ann Arbor (Washtenaw Co.); Cedar River (Menominee Co.); Galesburg (Kalamazoo Co.); Grand Ledge (Eaton Co.); Lansing (Ingham Co.); Royal Oak (Oakland Co.); Sanford (Midland Co.). MINNESOTA - Chisago Co.; Crookston (Polk Co.); Euclid (Polk Co.); Frontenac (Goodhue Co.); Itasca State Park (Clearwater Co.); Kawishiwi; Middle River (Marshall Co.); Mille Lacs (Crow Wing Co.); Mora (Kanabec Co.); Olmsted Co.; Saint Paul (Ramsey Co.); Tamarack (Aitkin Co.); Traverse Co.; Two Harbors (Lake Co.); Washington Co. MISSISSIPPI - Lucedale (George Co.). MISSOURI - Saint Louis (Independent City). NEBRASKA - Glen (Sioux Co.); West Point (Cuming Co.). NEW HAMPSHIRE - Barnstead (Belknap Co.); Dover (Stafford Co.); Durham (Stafford Co.); Franconia (Grafton Co.); Hampton (Rockingham Co.); Mount Surprise, Intervale (Carroll Co.); Mount Washington (Coos Co.); Randolph (Coos Co.); Rumney (Grafton Co.); Squam Lake; Twin Mountain (Coos Co.). NEW JERSEY - Atlantic City (Atlantic Co.); Atsion; Boonton (Morris Co.); Chester (Morris Co.); Clifton (Passaic Co.); Denville (Morris Co.); Fort Lee (Bergen Co.); Hillsdale (Bergen Co.); Manasquan (Monmouth Co.); Midvale; Montclair (Essex Co.); Oak Ridge (Passaic Co.); Palisades; Paterson (Passaic Co.); Phillipsburg (Warren Co.); Stockholm (Sussex Co.); Upper Montclair (Essex Co.); NEW YORK - Bellport (Suffolk Co.); Callicoon (Sullivan Co.); Croton-on-Hudson (Westchester Co.); Delmar (Albany Co.); Gowanda (Cattaraugus Co.); Harmon-on-Hudson (Westchester Co.); Horicon; Huguenot (Orange Co.); Lake George (Warren Co.); Mohegan Lake (Westchester Co.); Mount Kisco (Westchester Co.); Mount Whiteface; New Rochelle (Westchester Co.); New York City; Roslyn (Nassau Co.); Saranac Lake (Franklin Co.); Ulster Co.; West Point (Orange Co.); White Lake (Sullivan Co.); Wilmington (Essex Co.); Wyandanch (Suffolk Co.); Yaphank (Suffolk Co.). NORTH CAROLINA - Black Mountain (Buncombe Co.); Black Mountains; Blue Ridge (Buncombe Co.); Charlotte (Mecklenburg Co.); Cherokee (Swain Co.); Gray Beard Mountain; Highlands (Macon Co.); Lake Toxaway (Transylvania Co.); Swannanoa Val. OHIO - Bedford (Cuyahoga Co.); Cincinnati (Hamilton Co.); Cleveland (Cuyahoga Co.); Kirtland; Pierpoint (Ashtabula Co.); OKLAHOMA - Atoka (Atoka Co.); McAlester (Boone Co.); Tulsa (Tulsa Co.). PENNSYLVANIA - Arendtsville (Adams Co.); Canadensis (Monroe Co.); Clark's Valley; Delaware Water Gap (Monroe Co.); Easton (Northampton Co.); Effort (Monroe Co.); Greentown (Pike Co.); Lehigh Gap; McKeesport (Allegheny Co.); Montrose (Susquehanna Co.); New Cumberland (Cumberland Co.); Olive Branching; Philadelphia (Philadelphia Co.); Pittsburgh (Allegheny Co.); Pocono Lake (Monroe Co.); Reading (Berks Co.); State College (Centre Co.); Wind Gap (Northampton Co.). RHODE ISLAND - Warwick (Kent Co.). SOUTH CAROLINA - Charleston (Charleston Co.). SOUTH DAKOTA - Brookings (Brookings Co.); Sheridan Lake, Black Hills (Pennington Co.); Volga (Brookings Co.). TENNESSEE - Burrville (Morgan Co.); Chapman's, Great Smoky Mountains National Park; Johnson City (Washington Co.); Memphis (Shelby Co.); Mount LeConte (Sevier Co.). TEXAS - Brownsville (Cameron Co.). VERMONT - Bennington Co.; Brattleboro (Windham Co.); Wookstock (Windsor Co.). VIRGINIA - Alexandria (Independent City); Buffalo Creek; Dead Run (Fairfax Co.); Falls Church (Arlington Co.); Fredericksburg (Spotsylvania Co.); Great Falls (Fairfax Co.); Pennington Gap (Lee Co.); Shenandoah Park; Stone Creek (Lee Co.); Vienna (Fairfax Co.); Warm Springs (Bath Co.). WASHINGTON - Olympia (Thurston Co.). WEST VIRGINIA - Fairmont (Marion Co.); Mount Pendleton; White Sulphur Springs (Greenbrier Co.). WISCONSIN - Bayfield (Bayfield Co.).

Doubtful Species

Motschoulsky (1864) described five new species of North American *Lebia* in addition to giving descriptions of several previously named species. Most of the descriptions were based entirely on color with no morphological characters and no specific localities. One of the previously named species mentioned by Motschoulsky, *L. scapularis* Dejean, has a description which obviously does not apply to Dejean's species. Horn guessed at the identities of this and four of the new species as follows.

L. scapularis Motschoulsky (not Dejean) = *L. ornata* Say
L. flavolineata Motschoulsky = *L. scapularis* Dejean (= *L. solea* Hentz)
L. subfigurata Motschoulsky = *L. analis* Dejean
L. flaviventris Motschoulsky = *L. ornata* Say
L. brunnicollis Motschoulsky = *L. lobulata* LeConte

Horn did not guess at the identity of the fifth new species, *sublimbata*. The suggested identity of *flavolineata* is here accepted as correct; the others remain doubtful. The above guesses, if proven correct, would have no effect on the nomenclature of the species involved.

Chaudoir (1870), on the basis of two specimens in the Reiche collection, listed *Lebia (Loxopeza) chloroptera* Chaudoir as questionably coming from Florida. As the few specimens of *Loxopeza* I have seen from Florida could be assigned to either *grandis*, *atriventris*, or *tricolor* this record of *chloroptera* is probably invalid. It may have been based on either misidentified or mislabelled specimens.

Lebia punctifera LeConte 1884 cannot be reconciled with any species recognized in this study. Judging from its brown coloration and punctate upper surface it could be a *Cymindis* or *Pinacodera*.

I have seen one specimen of *Lebia quadricolor* Chevrolat from Carbon Co., Wyoming. This record of this Central American species is almost certainly incorrect.

PHYLOGENY OF THE GENUS *LEBIA*

Relationships of the Genus

From a comparison of the North American and a few exotic *Lebia* with the other North American lebiines the greatest similarity is found between some members of the subgenus *Lamprias* and the genus *Cymindis*. Both have the upper surface of the body covered with strong punctures and short erect hairs, a strongly arched frons, a more or less lobed pronotum which is not strongly transverse, and stout truncate palpi. Assuming that these characters in common are indicative of close relationship the features of the ancestral *Lebia* can be postulated. This will provide a basis for an intrageneric classification of *Lebia*.

In addition to the generic characters and the four characters mentioned above, the primitive *Lebia* would have had epilobes and a distinct tooth on the mentum, an upper protibial spur, a complete oblongum cell in the wing venation, the basal ridge of the elytra complete, and the fourth segment of the hind tarsus emarginate. These characters are common to *Cymindis* and the primitive *Lamprias* as well as being found in most other carabids. As *Lamprias* has the elytral disc metallic this was

probably the condition present in the primitive *Lebia* and not non-metallic as in *Cymindis*. Since a dark abdomen is often associated with metallic elytra in *Lebia* this feature is considered to be primitive also. The head, thorax, and legs were probably pale. The apex of the median lobe was probably tapered to a broad point and not specialized in any way.

Relationships of the Subgenera

I. Loxopeza

Of the four subgenera found north of Mexico *Loxopeza* seems to have diverged very early from the primitive stock. It has retained such primitive morphological features as a complete oblongum cell in the wing venation, epilobes and a tooth on the mentum, an upper protibial spur, and the primitive coloration. It has developed distinctive genitalia (strong endophallic armature and a short apex to the median lobe), obliquely expanded protarsi in the males, and a rather small tooth on the mentum. The strong punctation and short hairs of the ancestral stock have been lost. The subgenus is found only in the New World and probably arose here. The tropical American subgenus *Lia* (as represented by the Mexican *ocelligera*) also has expanded protarsi in the male, a small tooth on the mentum, and the apex of the median lobe of the male very short (although different from *Loxopeza*). It may well be a branch of the line leading to *Loxopeza*.

II. Polycheloma

The position of this subgenus in relation to the other subgenera is uncertain. It retains an upper protibial spur and indistinct epilobes on the mentum but has lost the strong punctation and pubescence of the ancestral type as well as the primitive coloration. However, the apex of the median lobe is of the primitive type. Tentatively the subgenus is placed as a specialized branch arising before the separation of *Lamprias* and *Lebia s.s.*

III. Lamprias

The subgenus *Lamprias* is considered to be most like the ancestral stock. The most primitive species retain all the features of the hypothetical ancestral group except that the oblongum cell is not quite complete. In the more advanced species (two have been seen, *chlorocephala* Hoffman and *cyanocephala* Linnaeus) the oblongum cell and the punctation are markedly reduced. As most species of *Lamprias* are found in the Palaearctic Region the subgenus probably originated there.

IV. Lebia s.s.

The fourth and by far the largest subgenus is *Lebia s.s.* with more than three fourths of our species. The subgenus is considered to be a branch of the ancestral stock in which the upper protibial spur, the epilobes on the mentum, and the complete oblongum cell were lost. A few species retain the strong punctation and short erect hairs on the frons and are probably the most primitive. Although considered here to be a natural group of species it should be pointed out that the three characters which hold the subgenus together all represent a reduction and

all three have been attained independently either in other subgenera of *Lebia* or in other Lebiine genera. It is thus possible that *Lebia* s.s. is polyphyletic.

Relationships of the Species within the Subgenera

I. Loxopeza

The eight species of the subgenus *Loxopeza* occurring north of Mexico are difficult to relate with any degree of certainty. The difficulty can be ascribed to the few characters available, the classification proposed here being almost entirely based on the endophallic armature of the male genitalia. In outlining the relationships the presentation is divided into two parts. In the first part the species are placed together into small groups. These groups are thought to be natural and there is good evidence for them. In the second part the small groups are related. However, the evidence for relating these groups is usually poorer. The species groups are referred to by the name of the first species listed in the group and their relationships are portrayed graphically in fig. 143.

Lebia atriventris *and* atriceps. These two species are placed together because they both lack the seventh group of spines and the spines of the sixth group are short and broad. Also in these two species the palpi and the distal antennal segments are usually dark.

Lebia tricolor, subdola, *and* deceptrix. These three species appear to be related because the first group of spines is small and the seventh group curves around the base of the first and is not found in a fold in the endophallus. Of these three *tricolor* and *subdola* seem to be the closest together since in these two the sixth group is made up of very short broad spines arranged in a loose cluster. In *deceptrix* the spines of the sixth group are longer and more densely clustered. The presence of an eighth group in *tricolor* is considered to be a specialization and seems to indicate that the specific distinctness of *tricolor* and *subdola* is not just a relatively recent happening.

Lebia grandis, subgrandis, *and* pimalis. In this group of species the first group of spines on the endophallus is large and well developed, and the seventh group is situated mainly at the side of the first and in a fold of the endophallus. Of the three *grandis* and *subgrandis* are the most closely allied, differing mainly in the size of the third group of spines of the endophallic armature. *Lebia pimalis* with its strongly convex elytral intervals seems to be related to a Mexican species with similar elytra but a dark colored head.

Of the three groups proposed here it would seem that the *tricolor* and the *grandis* groups are the most closely allied. In these the seventh group of spines is present (absent in the *atriventris* group). As the subgenus is very isolated as far as I know it is difficult to determine which group is the most primitive. On the assumption that the most primitive type of endophallic armature in *Loxopeza* is the simplest in structure the *atriventris* group which lacks the seventh group of spines would occupy this position. The idea that the largest number of species occurs in the more advanced (and presumably more successful) groups agrees with this position.

II. Polycheloma

With only one species there is no intra subgeneric classification.

III. Lamprias

The only New World species of *Lamprias*, *divisa*, is a primitive member of the subgenus, having well developed punctures and pubescence and a partially complete oblongum cell in the wing venation.

IV. Lebia s. s.

Thirty-seven of our 47 species of *Lebia* belong to the nominate subgenus. The relationships of the species belonging to this section of the genus are uncertain at the present time. Although the majority of the species can be grouped into species groups the relationships between these groups are in most cases vague. The reason for this is that the "missing links", if extant, do not occur in the area under study here. The relationships are portrayed in the same manner as in the subgenus *Loxopeza*, first by grouping the species and then relating the species groups.

Lebia pulchella, viridipennis, *and* bitaeniata. The first two species, although appearing quite different, are closely related and have very similar endophallic armatures. Both species have the basal ridge of the elytra incomplete. Judging from the overlap in distribution these two have been distinct for a considerable period of time. *Lebia bitaeniata*, a predominantly tropical species, probably belongs in this group. The endophallic armature, although appearing very different, shows the same pattern of spines. Also, the basal ridge of the elytra is incomplete, the elytra are metallic with pale fasciae as in most specimens of *pulchella*, and the femora are dark tipped like *viridipennis* and like some specimens of *pulchella*.

Lebia rufopleura. This species, although evidently indistinguishable from *pleuritica* on external characters, is not closely related to it, the endophallic armature being much stronger and better developed in *rufopleura*. The relationships seem to be with two Mexican species I have seen (*Lebia chalybe* Bates and an unknown species).

Lebia pleuritica, tuckeri, arizonica, *and* cyanipennis. This group of four species is held together by similarities in the structure of the endophallus, the armature being either weak or lacking. In external structure, all have metallic elytra, a dark abdomen, a complete basal ridge to the elytra, and the frons weakly sculptured. Within the group, *arizonica* and *cyanipennis* are probably closely allied as evidenced by the flat or weakly convex elytral intervals, the infuscated metepisternum and the usually unarmed endophallus. *L. pleuritica* is probably most closely related to *tuckeri* judging from their very similar endophallic armatures.

Lebia viridis, perita, *and* marginicollis. The group comprising these species is characterized by similarities in endophallic armature; the elytra are usually metallic; the head, thorax, and abdomen dark or metallic; and the frons is usually striated at least at the sides. Of the three, *perita* and *marginicollis* are the most closely related, both with the basal ridge of the elytra incomplete (complete in *viridis*), the head and pronotum dark or only feebly metallic (concolorous with the elytra in *viridis*), and the lobe of the endophallus in a central position (figs. 75,

77, cf. *viridis*, fig. 73).

Lebia scapula. There appears to be no closely related species, at least north of Mexico.

Lebia analis. North of Mexico there appears to be no species which could be placed in the same group as *analis*. The closest species is *scalpta*.

Lebia scalpta. This is another species which stands alone. Externally it appears very closely related to *analis* but the armature of the endophallus and the narrowly pointed apex of the median lobe indicate that it is more advanced and approaches the following species.

Lebia solea *and* miranda. These two species are part of a group in which the neck is strongly constricted, the frons is striated at least on the lateral thirds, the mentum is without a tooth, and the pronotal margins are widened basally. Most of the species making up Chaudoir's genus *Dianchomena* belong here. Within this group *solea* and *miranda* seem to be closely related judging from their similar endophallic armature and basically vittate elytra.

Lebia vittata, histrionica, pectita, *and* nigricapitata. The mentum of these species lacks a tooth, the femora are at least dark tipped, the apex of the median lobe is narrow, and the armature of the endophallus is very similar. *L. vittata* and *histrionica* are placed together because of their complete basal ridge to the elytra and the somewhat narrower apex to the median lobe when seen in lateral view. In *pectita* and *nigricapitata* the basal ridge is incomplete and the apex of the median lobe is slightly broader in lateral view.

Lebia bivittata, bilineata, *and* abdominalis. This is another group without a tooth on the mentum and with a narrow apex to the median lobe. The pronotum has narrow margins which do not widen basally, the endophallus is unarmed, and the sterna and pleura are mostly dark. Of these three *bivittata* and *bilineata* are the closest. They do not have the neck strongly constricted as in *abdominalis* and the apical pinch of the elytra is poorly developed.

Lebia guttula, abdita, *and* insulata. These three species seem to form a natural group even though the elytral patterns are rather different. The tooth on the mentum is absent and the endophallic armature in all three is basically the same. The smaller size and elytral pattern of *abdita* and *guttula* indicate that these are closer to each other than either is to *insulata*.

Lebia fuscata, subrugosa, *and* perpallida. The first two of these have a strong groove on the frons next to the eye and a similar elytral pattern. *Lebia perpallida* is grouped with them as it seems related, on the basis of the endophallic armature, to an unidentified Mexican species which in turn seems related to *fuscata* and *subrugosa* on elytral color pattern.

Lebia lobulata. I have seen no other species which I would group with *lobulata*.

Lebia ornata, esurialis, *and* calliope. No doubt *Lebia ornata* and *esurialis* belong together. Their elytral patterns are very similar (in some specimens almost indistinguishable) and the endophallic armatures are basically the same although strongly different in details. Whether *calliope* belongs here is uncertain but because it is similar in size, elytral color pattern, and basic structure of the endophallus it is included.

Lebia bumeliae *and* lecta. These two species are placed together be-

cause of their small size, vaulted elytra, and frons without macrosculpture. The endophallic armature of only *bumeliae* has been seen so it is uncertain how similar this structure is in the two species.

Lebia collaris. Although this species on external structure is very similar to the southern dark form of *ornata* it is exceedingly different in the structure of the endophallic armature. I can place no other species with it.

Lebia pumila. I have seen no species which I would regard as being at all close to *pumila*.

Of the groups proposed here the *pulchella* group is possibly an early offshoot of the base of the subgenus. The only evidence for this is the strong punctation and short erect setae on the frons of *pulchella*. In other characters, such as the incomplete basal ridge of the elytra, the usually maculate elytral disc, and the pale abdomen these species are advanced. It is possible that this group is not closely related to the other New World species as the endophallic armature of *pulchella* and *viridipennis* is similar to that found in the European *Lebia crux-minor* Linnaeus. The frons of this species is also strongly punctate with short setae, and the basal ridge of the elytra is incomplete.

The *rufopleura*, *pleuritica*, and *viridis* groups seem to be closely related and to occupy a position near the base of the subgenus because of their metallic elytra and dark abdomen. The *rufopleura* and *pleuritica* groups are the most closely allied of these three, lacking the strong lobe found on the endophallus in the *viridis* group, and usually having the head and thorax pale (dark or metallic in the *viridis* group).

The position of the *scapula* group is uncertain at the present time. The endophallic armature has a well developed lobe on it and the spines are small and arranged in simple rows which is suggestive of the *viridis* group. In addition the abdomen is dark. However, the elytra are nonmetallic and maculate although the type of maculation is peculiar, there being no pale apical markings. Perhaps it could be placed at the base of the maculate species but after the metallic species.

The remaining groups of mainly maculate species are difficult to relate. However, of these the *analis*, *scalpta*, *solea*, *vittata*, and *bivittata* groups can be placed together. In these species the dark coloration of the head and elytral disc is usually black and not brownish although there are exceptions. Other than this there is really no character which connects them all, although they can be arranged in a series. Starting with *analis* with a tooth on the mentum and a wide apex to the median lobe the series advances to *scalpta* in which the tooth on the mentum is present but the apex of the median lobe is narrow. Both of these species have the frons strongly striated. In the remaining three groups the tooth on the mentum is absent, the apex of the median lobe is narrow, and the elytra are usually vittate. The *solea* group in which at least some of the species have the frons completely striated is probably the most primitive even though the strongly constricted neck is a specialized feature. Of the *bivittata* and *vittata* groups, both having the frons smooth, the former is probably the more advanced. Its species have the pronotal margins narrow and the basal ridge to the elytra incomplete.

The *guttula* group may be related to the preceding groups as the

species in it lack the tooth on the mentum and have the apex of the median lobe narrow. However, the elytral patterns and the brownish dark coloration of the elytral disc are suggestive of the *fuscata* group as is the endophallic armature.

In the remaining groups, except *pumila* and *collaris*, the dark coloration of the elytral disc is usually brownish and not black. Of these groups the *fuscata* group is probably the most primitive (complete basal ridge of the elytra, transverse armature on the endophallus, and larger size). In the *lobulata*, *ornata*, and *bumeliae* groups the species are small and usually the basal ridge of the elytra is incomplete. As the armature of the endophallus is transverse in the *lobulata* group but reduced to a spot in the other two I have placed these together.

The *collaris* and *pumila* groups cannot be related to any of our other groups. In *Lebia collaris* there is a very strange type of endophallic armature similar to the *Lamprias* type in which the spines are arranged in longitudinal rows. However, there is nothing else to suggest a relationship to *Lamprias* and it is almost certain that *collaris* is a good *Lebia*. In *pumila* there is a similarity to the *guttula* type of endophallic armature but again there is nothing else suggestive of a relationship.

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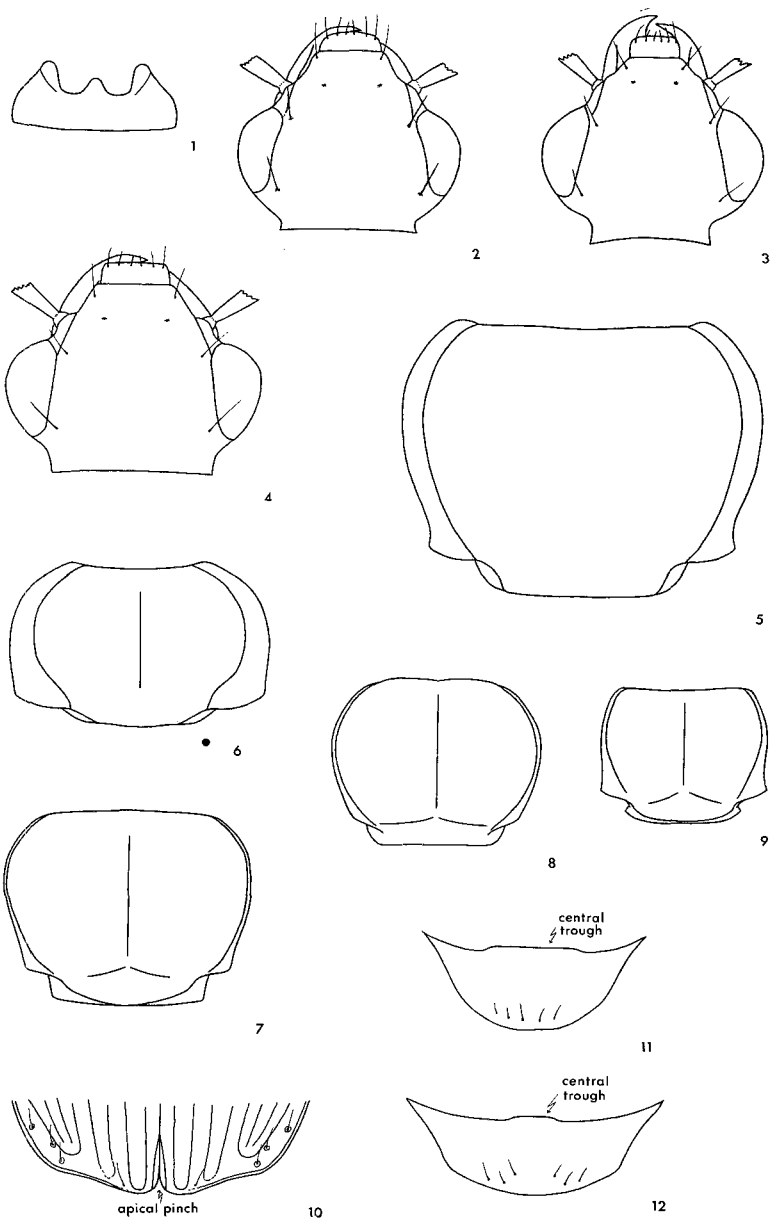

Fig. 1. Mentum of *Lebia grandis*. Fig. 2. Head of *Lebia viridipennis*, dorsal view. Fig. 3. Same of *Lebia solea*. Fig. 4. Same of *Lebia lecontei*. Fig. 5. Pronotum of *Lebia divisa*. Fig. 6. Same of *Lebia insulata*. Fig. 7. Same of *Lebia bivittata*. Fig. 8. Same of *Lebia abdominalis*. Fig. 9. Same of *Lebia pumila*. Fig. 10. Apex of elytra of *Lebia deceptrix*. Fig. 11. Sixth abdominal sternum and posterior margin of fifth of *Lebia viridis*, male. Fig. 12. Same of *Lebia pumila*, female.

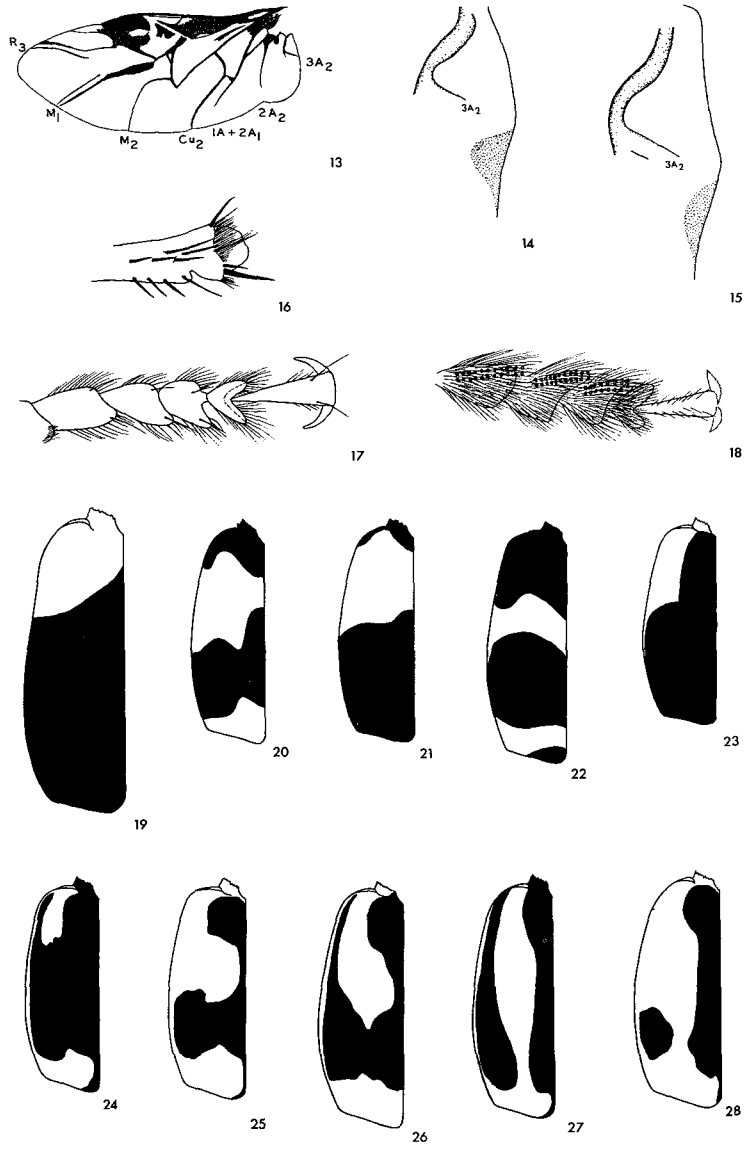

Fig. 13. Left wing of *Lebia viridis*. Fig. 14. Sclerotized area just distad of vein $3A_2$ of *Lebia subgrandis*. Fig. 15. Same of *Lebia deceptrix*. Fig. 16. Preapical notch on mesotibia of male of *Lebia grandis*. Fig. 17. Left protarsus of male of *Lebia grandis*, dorsal view. Fig. 18. Same, ventral view. Fig. 19. Color pattern of left elytron of *Lebia divisa*. Fig. 20. Same of *Lebia pulchella*, eastern form. Fig. 21. Same of *Lebia pulchella*, Arizona form. Fig. 22. Same of *Lebia bitaeniata*. Fig. 23. Same of *Lebia scapula*, typical form. Fig. 24. Same of *Lebia analis*, typical eastern form. Fig. 25. Same of *Lebia analis*, Arizona form. Fig. 26. Same of *Lebia scalpta*, Texas form. Fig. 27. Same of *Lebia solea*.

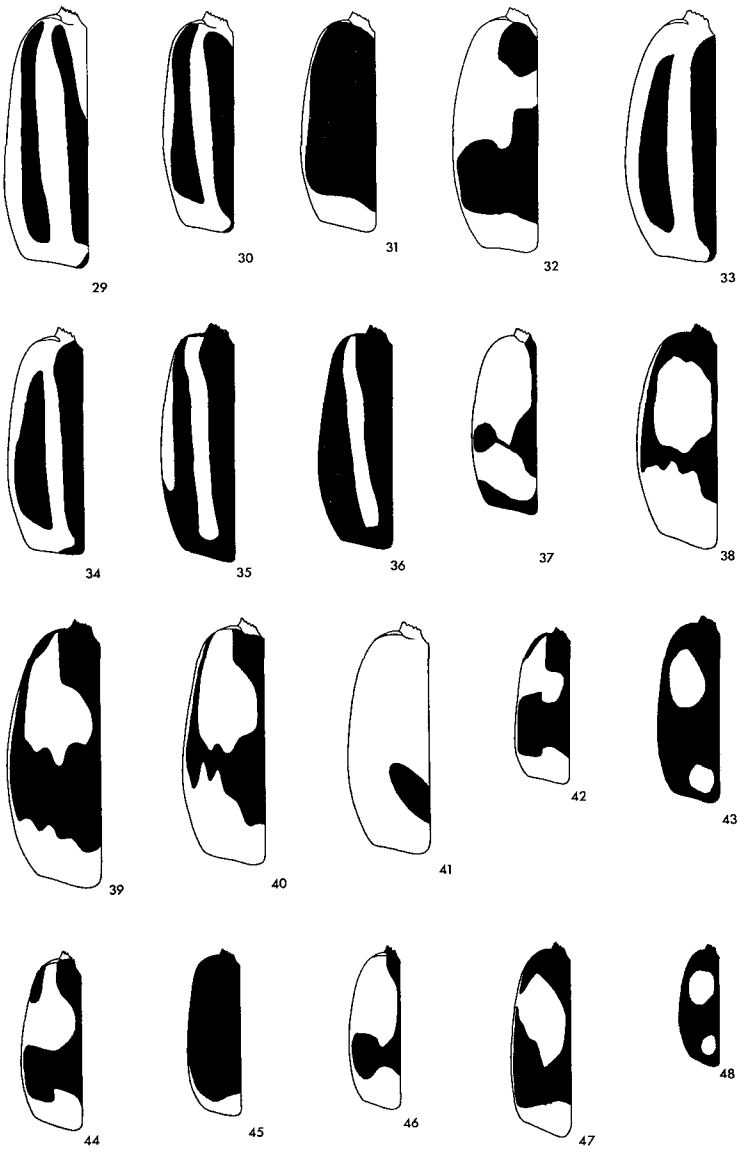

Fig. 29. Color pattern of left elytron of *Lebia vittata*, pale form. Fig. 30. Same of *Lebia vittata*, intermediate form. Fig. 31. Same of *Lebia vittata*, darkest form. Fig. 32. Same of *Lebia histrionica*. Fig. 33. Same of *Lebia pectita*. Fig. 34. Same of *Lebia nigricapitata*. Fig. 35. Same of *Lebia bivittata*. Fig. 36. Same of *Lebia bilineata*. Fig. 37. Same of *Lebia guttula*. Fig. 38. Same of *Lebia insulata*. Fig. 39. Same of *Lebia fuscata*. Fig. 40. Same of *Lebia subrugosa*. Fig. 41. Same of *Lebia perpallida*. Fig. 42. Same of *Lebia lobulata*. Fig. 43. Same of *Lebia ornata*. Fig. 44. Same of *Lebia ornata*, pale southern form. Fig. 45. Same of *Lebia ornata*, dark southern form. Fig. 46. Same of *Lebia esurialis*. Fig. 47. Same of *Lebia calliope*. Fig. 48. Same of *Lebia bumeliae*.

Fig. 49. Apex of median lobe in the subgenus *Loxopeza*. Fig. 50. Numbering system for groups of spines on endophallus in the subgenus *Loxopeza* . Fig. 51. Endophallic armature of *Lebia atriventris*. Fig. 52. Same of *Lebia atriceps*. Fig. 53. Same of *Lebia tricolor*. Fig. 54. Same of *Lebia subdola*. Fig. 55. Same of *Lebia deceptrix*. Fig. 56. Same of *Lebia pimalis*. Fig. 57. Same of *Lebia subgrandis*. Fig. 58. Same of *Lebia grandis*.

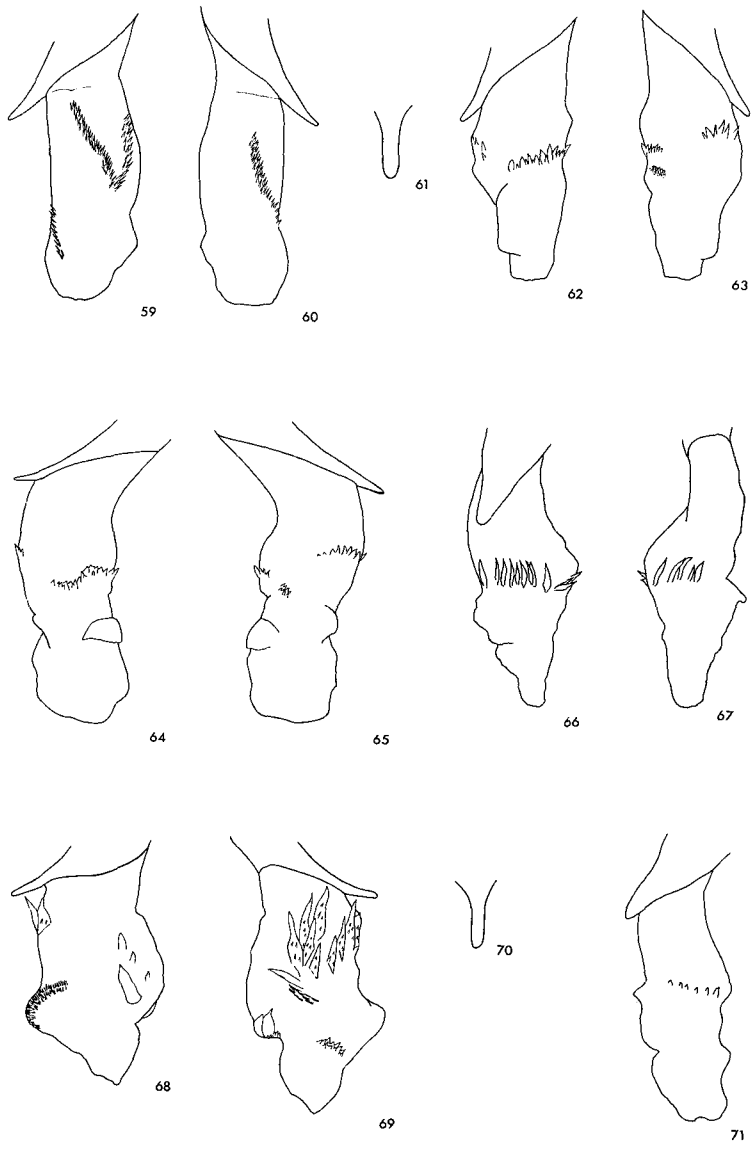

Fig. 59. Endophallus of *Lebia divisa*, left view. Fig. 60. Same, right view. Fig. 61. Apex of median lobe of *Lebia divisa*. Fig. 62. Endophallus of *Lebia pulchella*, left view. Fig. 63. Same, right view. Fig. 64. Endophallus of *Lebia viridipennis*, left view. Fig. 65. Same, right view. Fig. 66. Endophallus of *Lebia rufopleura*, apical view. Fig. 67. Same, abapical view. Fig. 68. Endophallus of *Lebia bitaeniata*, left view. Fig. 69. Same, right view. Fig. 70. Apex of median lobe of *Lebia bitaeniata*. Fig. 71. Endophallus of *Lebia pleuritica*, left view.

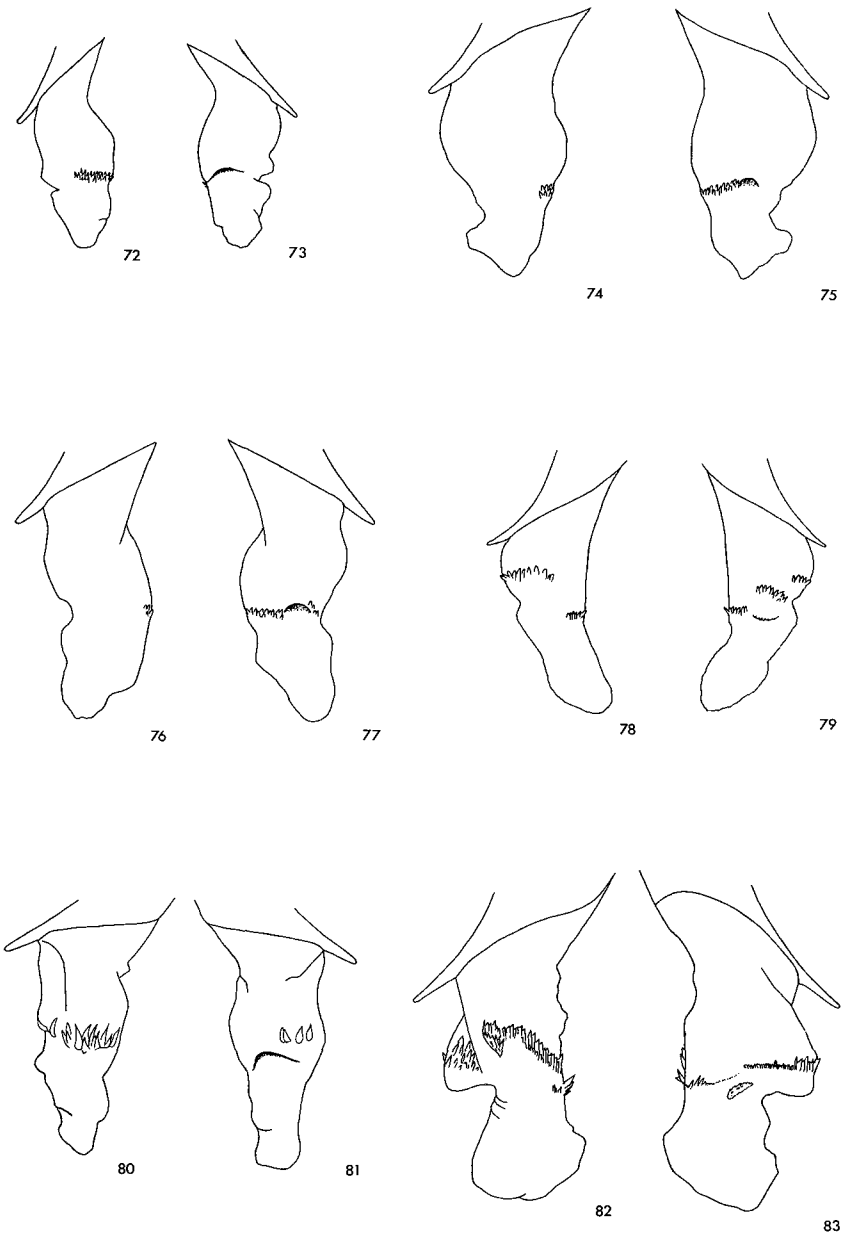

Fig. 72. Endophallus of *Lebia viridis*, left view. Fig. 73. Same, right view. Fig. 74. Endophallus of *Lebia marginicollis*, left view. Fig. 75. Same, right view. Fig. 76. Endophallus of *Lebia perita*, left view. Fig. 77. Same, right view. Fig. 78. Endophallus of *Lebia scapula*, left view. Fig. 79. Same, right view. Fig. 80. Endophallus of *Lebia analis*, left view. Fig. 81. Same, right view. Fig. 82. Endophallus of *Lebia scalpta*, left view. Fig. 83. Same, right view.

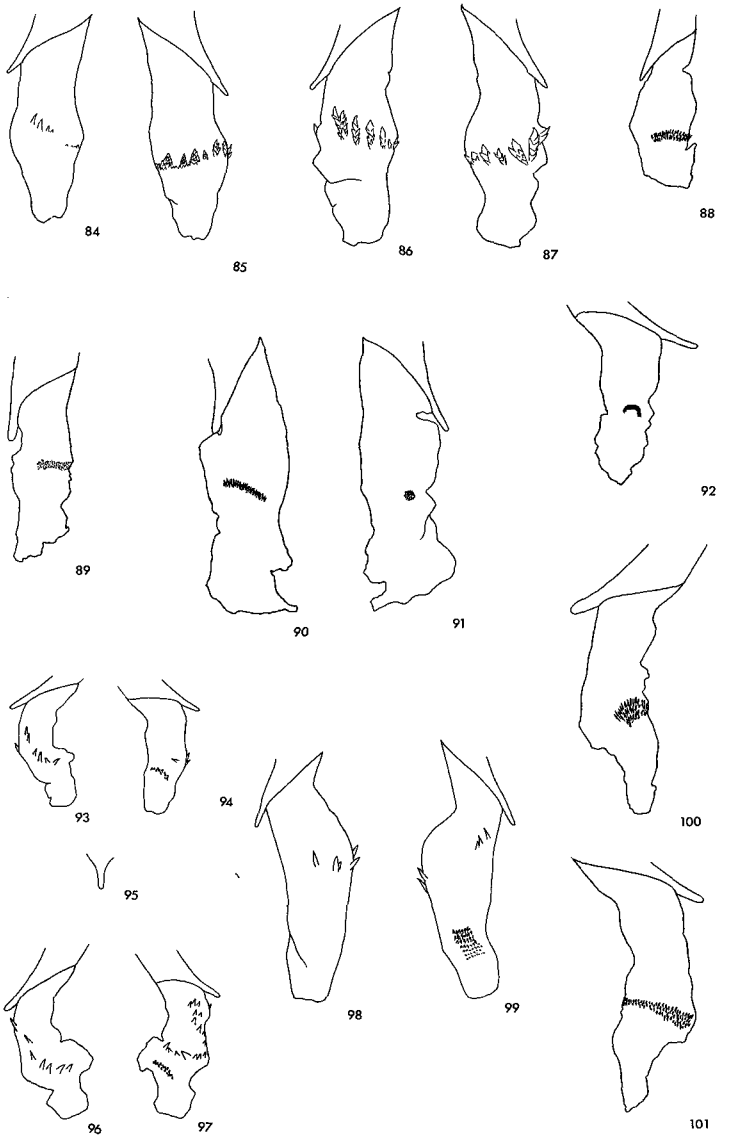

Fig. 84. Endophallus of *Lebia solea*, left view. Fig. 85. Same, right view. Fig. 86. Endophallus of *Lebia miranda*, left view. Fig. 87. Same, right view. Fig. 88. Endophallus of *Lebia vittata*, left view. Fig. 89. Endophallus of *Lebia pectita*, left view. Fig. 90. Endophallus of *Lebia bivittata*, left view. Fig. 91. Same, right view. Fig. 92. Endophallus of *Lebia abdominalis*, right view. Fig. 93. Endophallus of *Lebia guttula*, left view. Fig. 94. Same, right view. Fig. 95. Apex of median lobe of *Lebia guttula*, Fig. 96. Endophallus of *Lebia abdita*, left view. Fig. 97. Same, right view. Fig. 98. Endophallus of *Lebia insulata*, left view. Fig. 99. Same, right view. Fig. 100. Endophallus of *Lebia fuscata*, left view. Fig. 101. Same, right view.

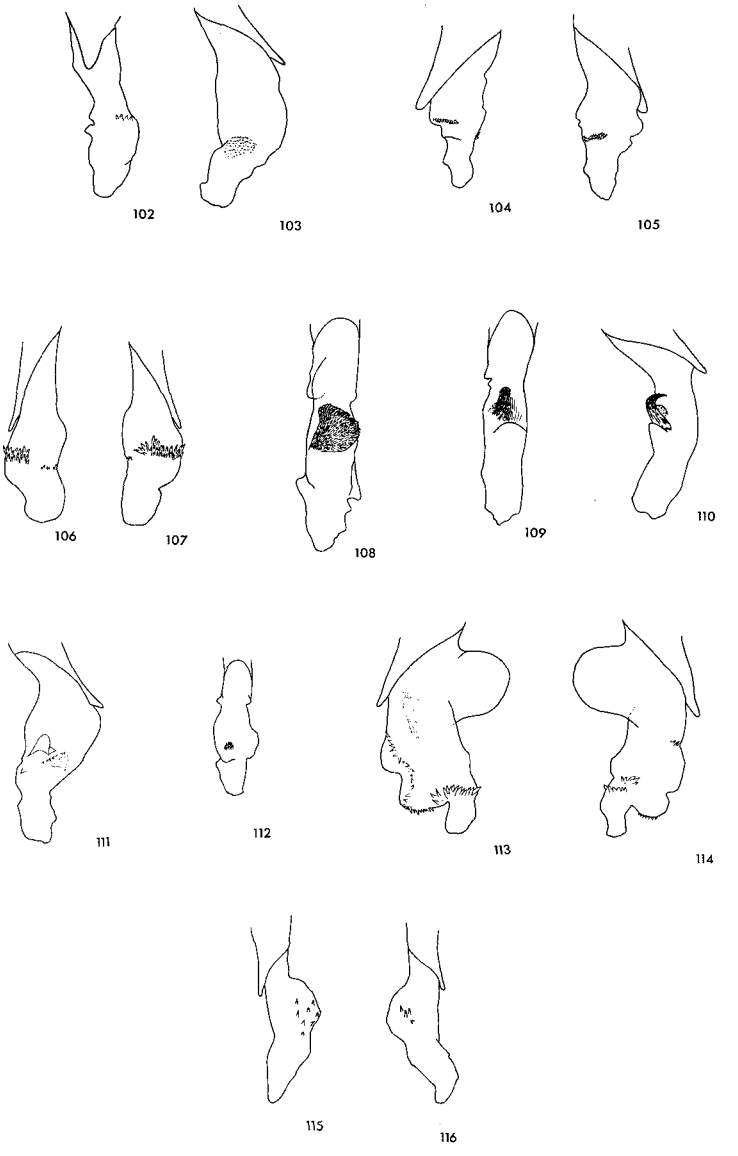

Fig. 102. Endophallus of *Lebia subrugosa*, apical view. Fig. 103. Same, right view. Fig. 104. Endophallus of *Lebia perpallida*, left view. Fig. 105. Same, right view. Fig. 106. Endophallus of *Lebia lobulata*, left view. Fig. 107. Same, right view. Fig. 108. Endophallus of *Lebia ornata*, abapical view. Fig. 109. Endophallus of *Lebia esurialis*, abapical view. Fig. 110. Same, right view. Fig. 111. Endophallus of *Lebia calliope*, right view. Fig. 112. Endophallus of *Lebia bumeliae*, abapical view. Fig. 113. Endophallus of *Lebia collaris*, left view. Fig. 114. Same, right view. Fig. 115. Endophallus of *Lebia pumila*, left view. Fig. 116. Same, right view.

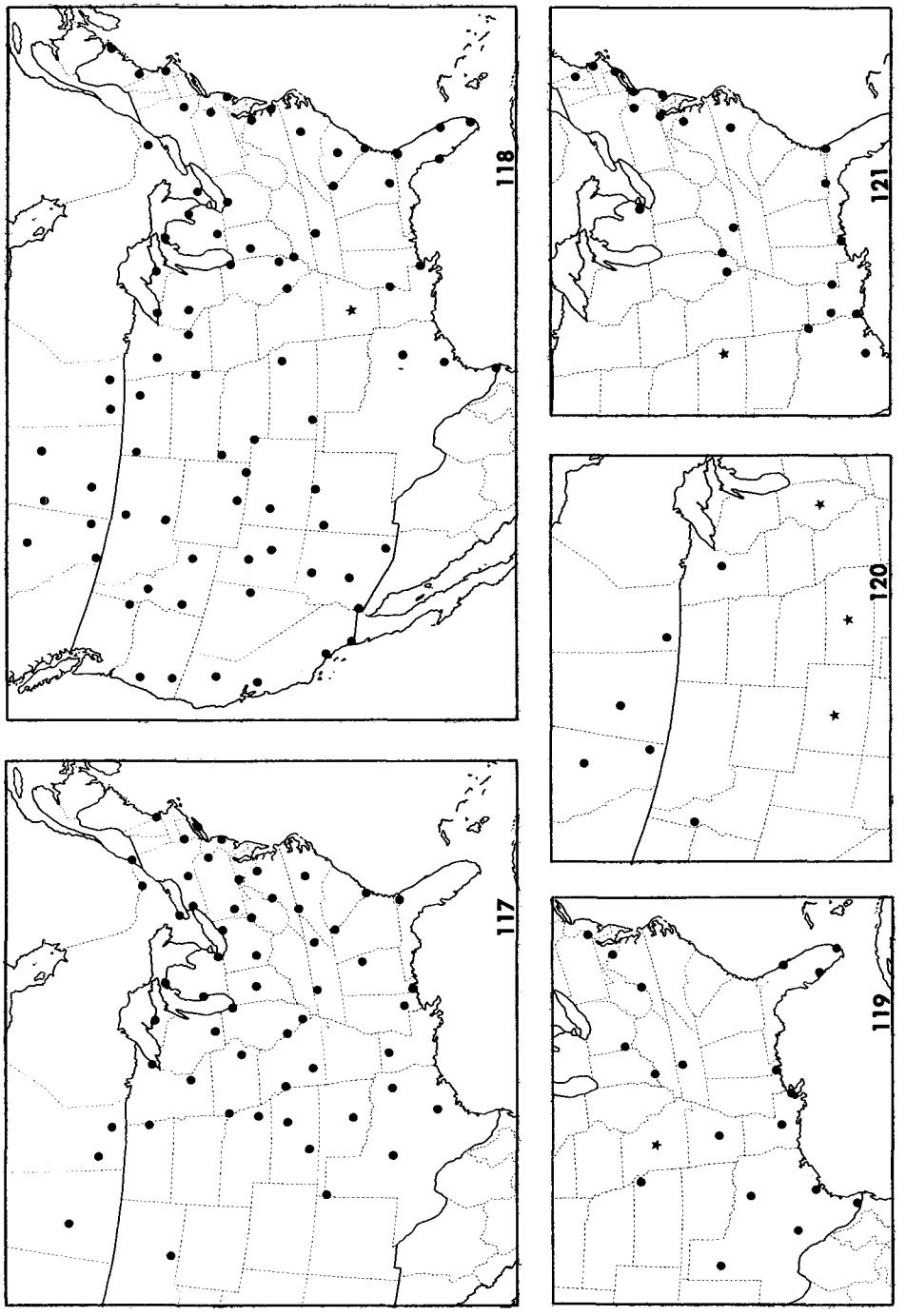

Fig. 117. Distribution of *Lebia atriventris*, north of Mexico. Fig. 118. Same of *Lebia vittata*. Fig. 119. Same of *Lebia abdominalis*. Fig. 120. Same of *Lebia divisa*. Fig. 121. Same of *Lebia pectita*.

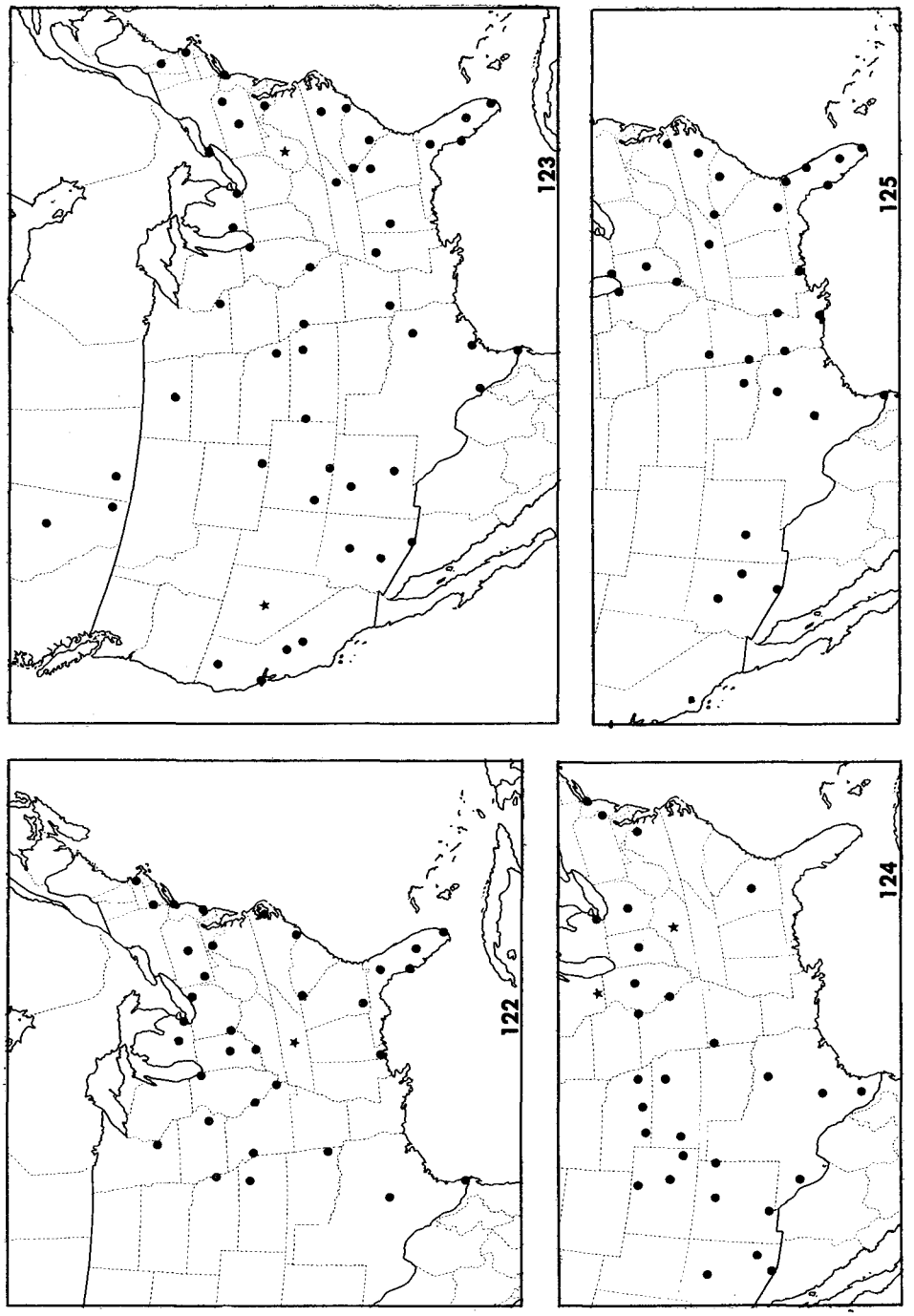

Fig. 122. Distribution of *Lebia viridipennis* north of Mexico. Fig. 123. Same of *Lebia pulchella*. Fig. 124. Same of *Lebia bivittata*. Fig. 125. Same of *Lebia marginicollis*.

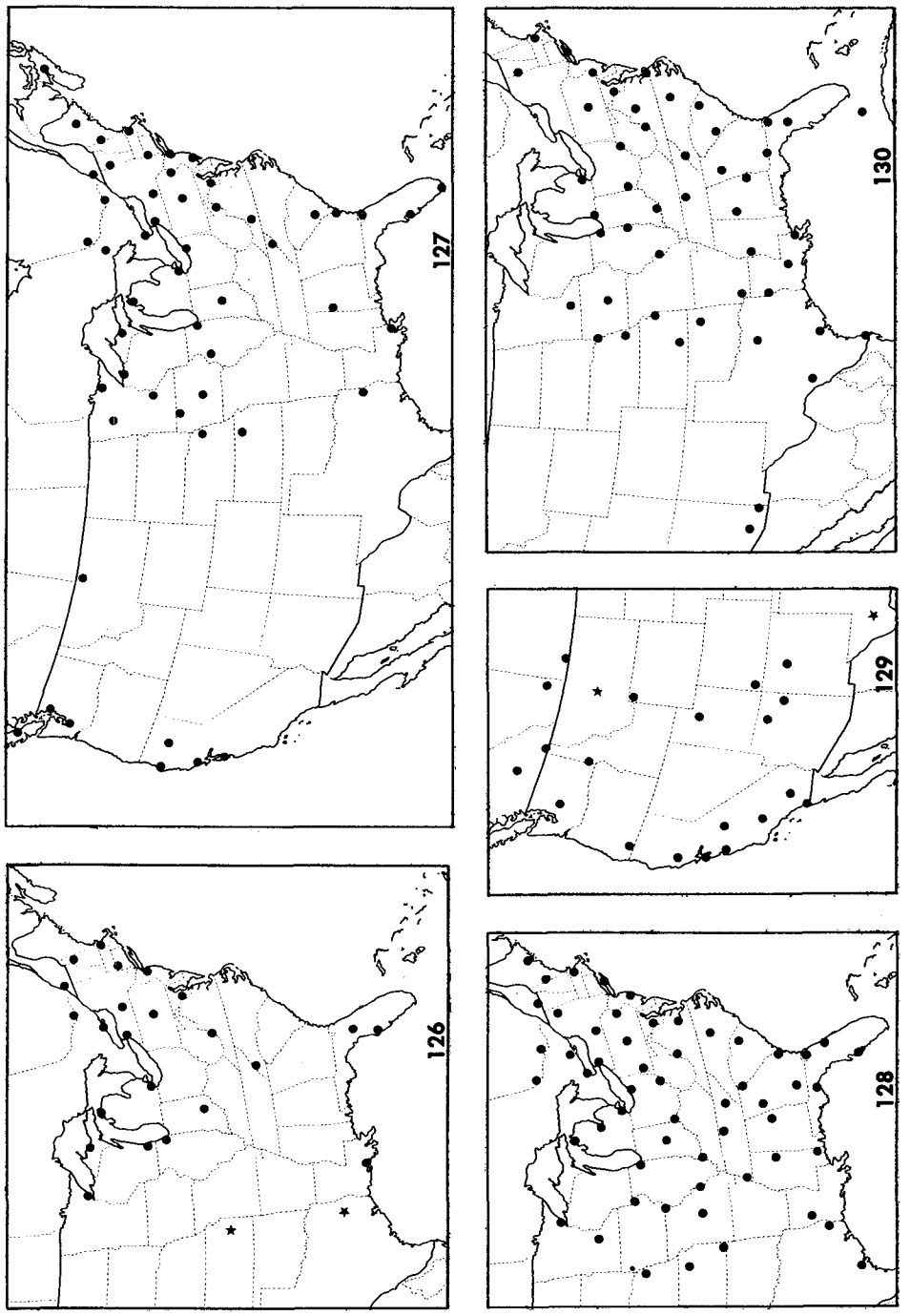

Fig. 126. Distribution of *Lebia tricolor* north of Mexico. Fig. 127. Same of *Lebia fuscata*. Fig. 128. Same of *Lebia ornata*. 129. Same of *Lebia cyanipennis*. Fig. 130. Same of *Lebia analis*.

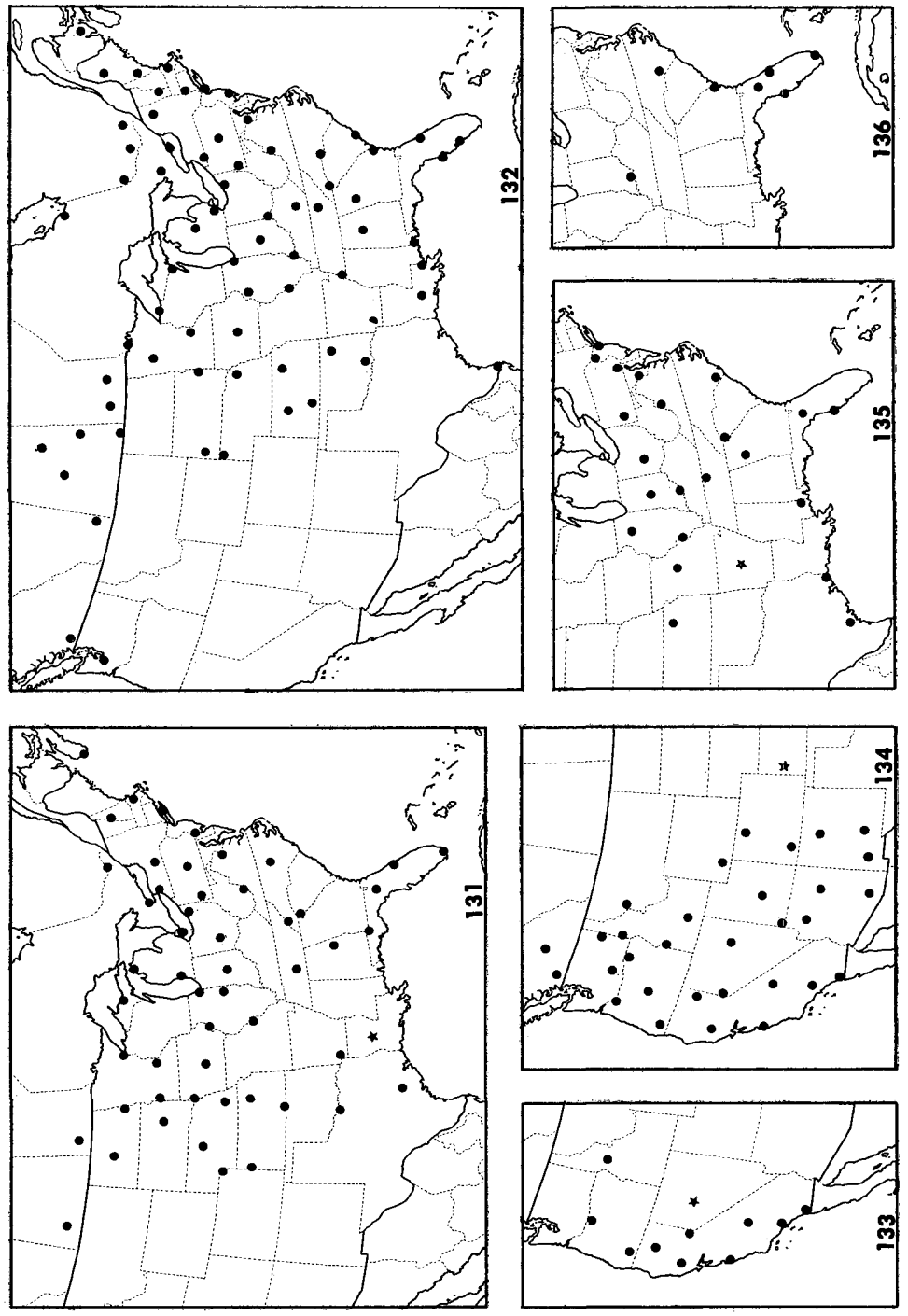

Fig. 131. Distribution of *Lebia solea* north of Mexico. Fig. 132. Same of *Lebia pumila*. Fig. 133. Same of *Lebia bilineata*. Fig. 134. Same of *Lebia guttula*. Fig. 135. Same of *Lebia lobulata*. Fig. 136. Same of *Lebia collaris*.

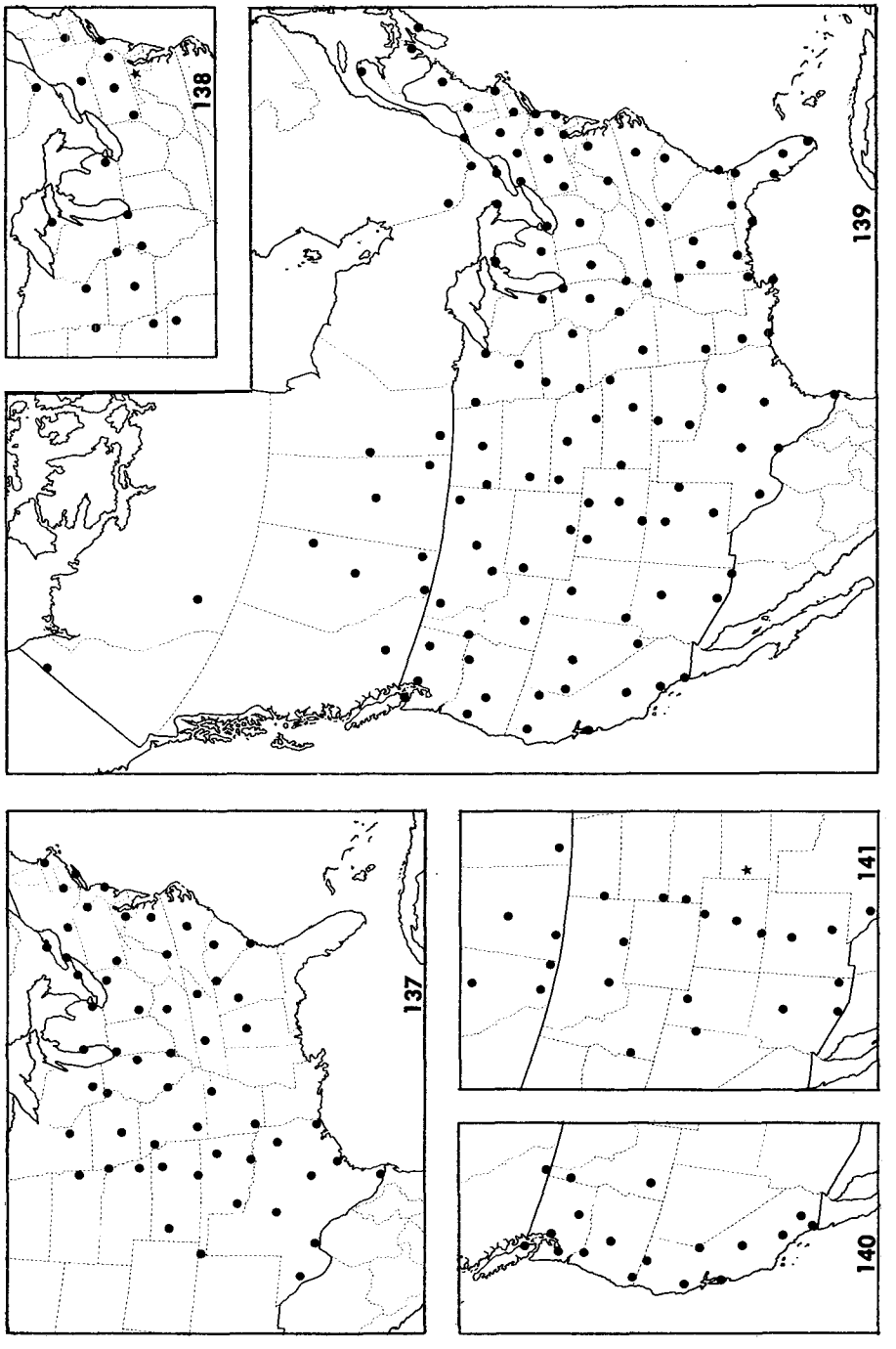

Fig. 137. Distribution of *Lebia grandis* north of Mexico. Fig. 138. Same of *Lebia pleuritica*. Fig. 139. Same of *Lebia viridis*. Fig. 140. Same of *Lebia perita*. Fig. 141. Same of *Lebia atriceps*.

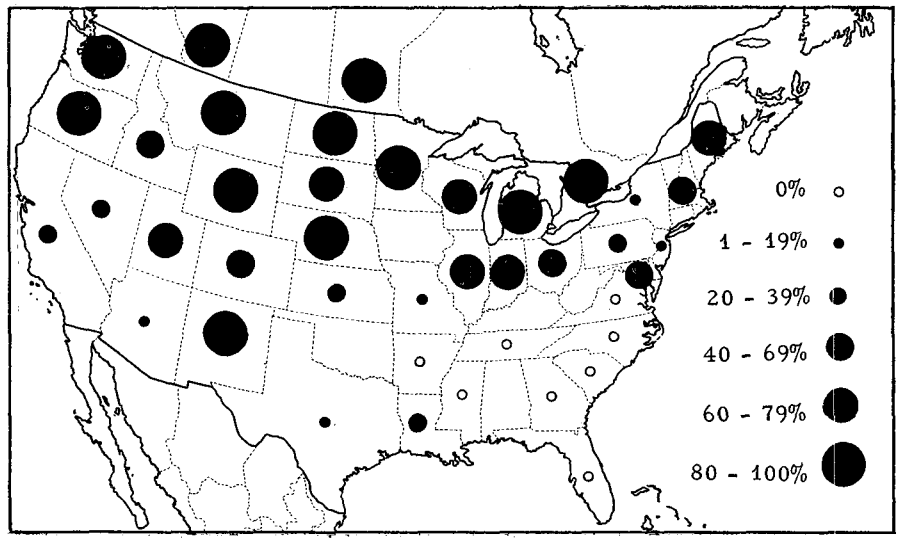

Fig. 142. Geographic variation in femoral coloration in *Lebia vittata*. Circles show percent of specimens with the femora largely dark.

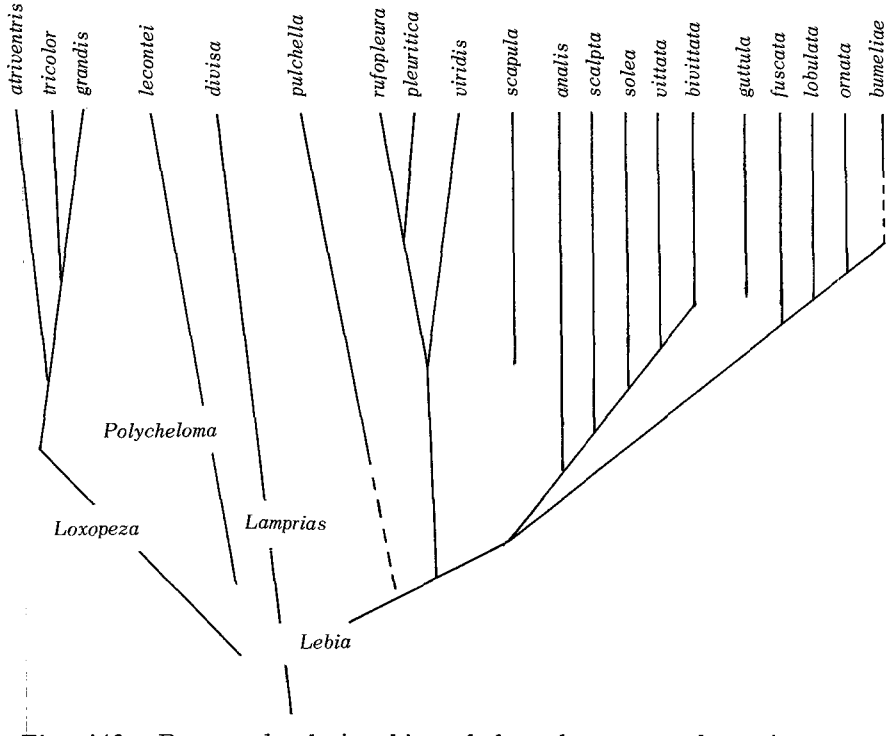

Fig. 143. Proposed relationships of the subgenera and species groups of the genus *Lebia*.