

A REVIEW
OF THE
MEXICAN TIGER BEETLES
OF THE
GENUS *CICINDELA*
(COLEOPTERA, CICINDELIDAE)

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OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 103 : ARTICLE 3 NEW YORK : 1954

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BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Volume 103, article 3, pages 227–310, text
figures 1–223, plates 10–12

Issued February 22, 1954

Price: \$1.50 a copy

INTRODUCTION

THE PRESENT REVIEW is part of a series of studies dealing with the Coleoptera fauna of Mexico and the relationship of this fauna with that of the United States. The studies were begun in 1947 and were based primarily on material collected on the David Rockefeller Mexican expedition of the American Museum of Natural History. This expedition collected material in the central plateau and the Sierra Madre Occidental from the border to as far south as Zacatecas. As originally proposed, this review was to deal only with the material collected on the expedition. However, as work progressed it became apparent that a more inclusive paper was desirable, because there has never been a comprehensive work on the tiger beetles of Mexico. The species have been described in many different publications, and the names have been brought together only in lists (W. Horn, 1897, 1903, 1908). The distributions, subspeciation problems, ecology, and faunal relationships have received only brief mention in the past. In many instances the paucity of Mexican material has precluded comprehensive studies but this difficulty is being rapidly overcome, as many expeditions to that area have gathered, and are gathering, substantial quantities of specimens and data. This is not meant to imply that all or even a majority of the species are known completely. On the contrary, much field work is still necessary, especially in central and southern Mexico.

In the preparation of a monograph of the North American species of *Cicindela*, it became increasingly apparent that the Mexican relatives of our species must be known before a proper analysis could be made. Over one-third of the species occurring in the United States extend into Mexico. Some of these show little change while others exhibit complex geographical variability. Although our Mexican collections are not so complete as those from North America, it is felt that a review at this time, while admittedly not complete, will add much to our knowledge, will bring together all the important published data, and should stimulate interest in the group. About 20,000 specimens were examined during the study.

Although some 22 individuals have been involved in describing the Mexican species of *Cicindela*, the more important contributions were made by Chevrolat, Bates, and W. Horn. Chevrolat (1834, 1835, 1841) described a number of new species in his papers on "Coléoptères du Mexique." Bates (1881-1884) gave a brief but incomplete summary of the fauna and in other papers (1878a, 1878b, 1882) described a number of new species. Walther Horn (1897) published a list of the Mexican species and in 1903 and 1908 brought this list up to date and discussed briefly the relationships between the Mexican and United States species. Since 1908 a number of new species have been described and a great deal of additional information is available.

ACKNOWLEDGMENTS

Much of this additional information has been gained from expeditions and through the efforts of numerous individuals, some of the more important being as follows: the David Rockefeller American Museum of Natural History Expeditions to north central Mexico (1947) and to Tamaulipas, Sonora, and Baja California (1952); Vaurie-the American Museum of Natural History expedition to Sonora and Tiburon Island (1952); Mr. George Bradt from most of the states in the northern half of Mexico (1949); Dr. Ray Smith from many states (1950); Mr. John Pallister from central Mexico (1946) and from Yucatan (1952). Much information and aid were obtained through the cooperation of Dr. E. A. Chapin, United States National Museum; Dr. P. J. Darlington, Jr., Museum of Comparative Zoölogy, Cambridge; Dr. T. H. Hubbell, University of Michigan; Mr. Hugh B. Leech, California Academy of Sciences; Dr. H. E. Evans, Cornell University; Dr. Paul Hurd, University of California; Mr. E. Greywood Smyth.

The writer is deeply indebted to Miss Marjorie Statham who made the drawings and the distributional maps which so greatly enhance the value of the paper. Thanks are also due to Mrs. Patricia Vaurie who tested the key, to the above-mentioned and Mrs.

Rose Adlington for the preparation of most of the specimens used in this study.

FAUNAL RELATIONSHIPS

The *Cicindela* fauna of Mexico consists of 78 species, 45 of which are monotypic and 33 polytypic, the latter group comprising some 65 subspecies, thus making a total of 110 populations to be considered. It is very difficult if not impossible to assign each species to a given faunal zone, or for that matter to find any two authors who agree on the nature and extent of faunal zones in Mexico. Most workers agree that the Mexican fauna is made up of elements from the Nearctic, Neotropical, and Tropical regions, but the position and extent to which the faunas interdigitate appear to vary from group to group and area to area. There is also considerable difference of opinion concerning the names to be used for the individual zones within these regions, and there are a number of different terminologies covering the same or similar zones. In the present study the species are listed under four general headings.

Nearctic species, of which the distribution is confined largely to the Nearctic region, with little or no overlap with either the Neotropical or the Tropical regions

Neotropical or tropical species, of which the distribution is primarily in the Neotropical or Tropical regions, with little or no overlap with the Nearctic region

Species with extensive distributions in all three regions

Species that occur in areas where the regional picture is doubtful

NEARCTIC SPECIES

1. *hirticollis*
2. *oregona*
3. *punctulata*
4. *politula*
5. *pusilla*
6. *circumpicta*
7. *lepida*
8. *belfragei*
9. *pamphila*
10. *haemorrhagica*
11. *nevadica*
12. *schauppi*
13. *obsoleta*
14. *togata*
15. *latesignata*
16. *pimeriana*

17. *nigrocoerulea*
18. *hornii*
19. *tenuisignata*
20. *lemniscata*
21. *wickhami*
22. *debilis*
23. *californica*
24. *gabbi*
25. *sperata*
26. *marutha*
27. *sinaloae*
28. *beneshi*
29. *rockefelleri*

Of this number the last 15 appear to be typical Sonoran zone species.

NEOTROPICAL OR TROPICAL SPECIES

1. *cyaniventris*
2. *papillosa*
3. *radians*
4. *vasseleti*
5. *hydrophoba*
6. *roseiventris*
7. *argentata*
8. *macrocnema*
9. *chlorocephala*
10. *auraria*
11. *carthagena*
12. *smaragdina*
13. *ioessa*
14. *aterrima*
15. *rugatilis*
16. *semicircularis*
17. *euthales*
18. *luteolineata*
19. *craveri*
20. *guerrerensis*
21. *aeneicollis*
22. *fera*
23. *hoge*
24. *aurora*
25. *phosphora*
26. *flohri*
27. *clarina*
28. *dysentrica*
29. *klugi*
30. *praecisa*
31. *speculans*
32. *leuconoe*
33. *sommeri*
34. *curvata*
35. *bradti*

SPECIES WITH EXTENSIVE DISTRIBUTIONS IN BOTH NEARCTIC AND NEOTROPICAL REGIONS

1. *severa*
2. *rufiventris*
3. *dorsalis*

4. *hamata*
5. *sedecimpunctata*
6. *trifasciata*
7. *flavopunctata*
8. *viridisticta*

SPECIES WITH UNCERTAIN REGIONAL
RELATIONSHIPS

1. *chrysippe*
2. *nigrilabris*
3. *thalestris*
4. *nudata*
5. *nebuligera*
6. *nephelota*

Of the total of 78 species, 33 are endemic to Mexico, and the majority of these are confined to three general areas. Ten of the endemic species are found in the central western states of Colima, Michoacan, Guerrero, and Oaxaca; nine are found in the vicinity of Distrito Federal in the states of Mexico, Puebla, Tlaxcala, Hidalgo, and Morelos; six are found in southern Chihuahua and Durango. The remainder are found in four areas as shown in the tabulation to follow. It is interesting to note that there are no endemics in the northeast section of Mexico, only two in the state of Veracruz, and only one in the extreme south.

LIST AND DISTRIBUTION OF ENDEMIC SPECIES

Durango and Chihuahua

1. *chrysippe*
2. *nigrilabris*
3. *thalestris*
4. *nudata*
5. *nebuligera*
6. *nephelota*

Sonora and Baja California

1. *beneshi*
2. *rockefelleri*
3. *sinaloae*

Nayarit

1. *bradti*

Central western states

1. *aeneicollis*
2. *hogeii*
3. *aurora*
4. *phosphora*
5. *dysentrica*
6. *guerrerensis*
7. *sommeri*
8. *praecisa*
9. *speculans*
10. *leuconoe*

Vicinity of Distrito Federal

1. *klugi*
2. *clarina*
3. *flohri*
4. *luteolineata*
5. *euthales*
6. *semicircularis*
7. *rugatilis*
8. *aterrima*
9. *ioessa*

Veracruz

1. *smaragdina*
2. *curvata*

Southern states

1. *fera*

No definite locality

1. *craveri*

The most interesting feature in the study of tiger beetles is the interpretation of the polytypic species, of which there are 33 in the Mexican fauna. Geographical variability in the tigers is not random, and many of the areas of subspeciation are common to a number of species and are also correlated with those in other groups of animals, thus showing a certain amount of environmental control. Intermediate geographical areas, where sampled, tend to have intermediate populations or hybrids, but comparatively few such areas in Mexico have been studied.

So far as presently known, Sonora and Baja California are the areas of greatest frequency of geographical differentiation in the tiger beetles in Mexico. Klauer has shown that in the gopher snakes (1946b), the sidewinder (1944), and the glossy snake (1946a), that the fauna at the northern end of the Gulf of Baja California is similar to that of western Arizona and the Colorado desert in southern Arizona and distinct from faunas of western and southern Baja California and Sonora. In *Cicindela californica* (fig. 23), *Cicindela sinaloae* (fig. 12), *Cicindela latesignata* (fig. 1), and *Cicindela carthagena* (fig. 20), we find pictures of subspeciation that uphold this conclusion. In *sinaloae* the population on the southern end of the island of Tiburon is like that in southern Baja California, whereas that from the northern end and that from the island of Angel de la Guardia are hybrid in character and distinct from *sinaloae* from mainland Sonora. In *carthagena* we find the Baja California *colossea* on the northern end of Tiburon

Island and one locality on the adjacent mainland in Sonora. Hybrids between *carthagena* and *colossea* occur on the mainland opposite Tiburon and immediately to the south. This hybrid area corresponds to that in which we find *macrocnema* developing into *kino*, a subspecies distinct from the more southern *macrocnema*. *Cicindela californica brevipennis* extends through this area without differentiation, *californica* is confined to the southern half of Baja California, and *mojavensis* occurs at the northern end of the Gulf. The close affinity between the tiger fauna of the island of Tiburon and that of Baja California appears to be in contradiction to results published by Klauber (1952) in reptiles and Van Rossem (1945) in birds.

The next most prolific area of subspeciation

appears to be in Yucatan where we find *severa yucatanensis* and *hamata pallifera*, both coastal species, which show an increase in the white elytral markings in this southern portion of their distributions. In *hydrophoba atroreducta* (fig. 14) we find the opposite condition in Yucatan. Too little information is available from other areas to allow any definite conclusions as to the nature of the subspecific patterns. In general, however, it appears that a number of species that occur on the central plateau between Chihuahua and slightly below Mexico City are undergoing differentiation, but at present the variability appears to be clinal. Populations from Guerrero and northern Oaxaca show increased variability, and a number from Jalisco and Guanajuato appear to be hybrids.

TAXONOMY

EXCEPT FOR THE NEW SPECIES, new subspecies, and those species not available for study, no detailed morphological descriptions are given. At present we have insufficient material in collections to permit population descriptions, except in a few instances, and in a genus as variable as *Cicindela* it is the description of the entire population of each species that will be of value to future workers. The important differences between species are given in the key, in which an emphasis has been placed on structural rather than color differences. Extensive use has been made of the differences in the pilosity, especially in separating groups of species. The elytral maculations are used for smaller groups and individual species, but wide latitude is left to take care of individual variability. Sculpture, size, shape, and occasionally color are used to separate closely allied forms. It will be noted that several of the more variable species appear more than once in the key and that *flohri*, *rufiventris*, and *sedecimpunctata* appear in the same dichotomy. These species are very closely allied and appear to be separable only as populations and not on any one or several characters by themselves. A more general separation is given in the text. Because of the close relationship of a number of the species, the key is admittedly difficult to work in several places, and the worker not familiar with tiger beetles may have difficulty, especially when characters of degrees of difference have been used. The following seven species were unavailable for study, but their approximate placement in the key is indicated by footnotes, and the illustrations were copied from the indicated sources: *chryshippe*, *hogeii* (Bates, 1881); *ioessa*, *nudata*, *smaragdina* (W. Horn, 1938); *craveri* (W. Horn, 1915); *speculans* (Bates, 1890). Brief discussions of these species taken from previous works are given in the text. All the species are arranged in the phylogenetic order as given by W. Horn (1908).

Dorsal views of all the species and subspecies, except where the differences are only in the color, are included, as is the labrum of each species. The dorsal views and the labra are drawn to scale to facilitate comparisons between species. Distributional maps of

25 of the more interesting species are included. The numbers within the shaded areas refer to the localities, the details about which are to be found in the text. Plates 10 to 12 show a number of different types of habitats in which various species were collected.

The types of all the new species and new subspecies are in the collection of the American Museum of Natural History.

KEY TO THE MEXICAN SPECIES OF *Cicindela*

1. Antennal segments 3 and 4 sparsely irregularly setose; winged species . . . 2
 Antennal segments 3 and 4 densely pilose and with few scattered setae; wingless species *belfragei* (p. 297)
2. Trochanters of anterior legs and sometimes middle legs with subapical hair, seta, or pit 36
 Trochanters of anterior and middle legs without subapical hair, seta, or pit . . . 3
3. Tarsal claws very long, as long as, or almost as long as, last tarsal segment; posterior femora long, extending posteriorly one-third or more of their length beyond the body 4
 Tarsal claws shorter than last tarsal segment; posterior femora short, extending posteriorly to or a little beyond apex of body 8
4. Prosternum sparsely to densely pilose . 5
 Prosternum bare 6
5. Pronotal margins densely pilose, disc sparsely pilose medially
 *dorsalis* (p. 293)
 Pronotal margins sparsely pilose laterally, anterior margin bare medially, basal margin and disc bare
 *curvata* (p. 294)
- 6 (4). Pronotal margins densely pilose laterally, side margins straight
 *chlorocephala* (p. 293)
 Pronotal margins bare or sparsely pilose laterally, side margins shallowly curved 7
7. Inner portion of middle lunule extending towards base, parallel to suture (fig. 115) *leuconoe* (p. 293)
 Inner portion of middle lunule extending obliquely towards apex or broadly united with apical lunule (figs. 113, 114) *macrocnema* (p. 291)
- 8 (3). Elytral lunules dark orange or reddish orange in color, wide and transverse (fig. 95) *sommeri* (p. 283)

- Elytra immaculate or with maculations not dark orange in color 9
9. Elytra immaculate or with maculations pale, not pigmented 12
- Elytral disc maculated longitudinally with brilliant colors, following inner margins of the usual pale lunules 10
10. Pronotum with side margins rounded, constricted posteriorly; elytral disc with spots obscure 11
- Pronotum with side margins nearly straight and subparallel, not or but slightly constricted posteriorly; elytral disc with numerous green spots slightly depressed (fig. 71) . . . *vasseleti* (p. 265)
11. Front of head rugose medially; middle elytral lunule only faintly indicated internally (fig. 70) . . . *aurora* (p. 265)
- Front of head alutaceous medially; middle elytral lunule projecting obliquely posteriorly (fig. 69) . . . *radians* (p. 265)
- 12 (9). Abdomen entirely or in large part reddish brown or testaceous beneath 16
- Abdomen dark brown, black, blue, purple, or green, sometimes with cupreous reflections 13
13. Proepisterna glabrous except for few hairs along coxal margin . . . *phosphora* (p. 265)
- Proepisterna sparsely pilose throughout 14
14. Elytral markings broad and often connected along lateral margins 15
- Elytral markings not broad or connected along lateral margins, usually in the form of isolated spots (*rectilatera*) (fig. 86) *flavopunctata* (p. 275)
15. Apical elytral lunule complete; side margins of elytra evenly rounded in male and prominently expanded at basal third in the female (fig. 94) *beneshi* (p. 282)
- Apical elytral lunule not reaching suture, consisting of a lateral spot; side margins of elytra subparallel, not expanded at basal third in the female (fig. 89) *klugi* (p. 279)
- 16(12). Pronotum with lateral margins sparsely but evidently pilose; under surface sparsely pilose laterally 17
- Pronotum with lateral margins glabrous; under surface bare or sparsely pilose laterally *politula* (p. 264)
17. Proepisterna glabrous or with few hairs along base or lower part of disc 30
- Proepisterna sparsely pilose throughout 18
18. Side pronotal margins strongly constricted towards base; elytral disc with dark brown or black infuscations, pronotal disc deeply rugose 19
- Side pronotal margins not or but slightly constricted towards base; elytral disc usually without dark brown or black infuscations, pronotal disc not deeply rugose 20
19. Elytral apices serrate; form short, robust (fig. 83) *clarina* (p. 274)
- Elytral apices not serrate; form elongate narrow (fig. 85) . . . *nebuligera* (p. 275)
- 20(18). Apical elytral lunule extending near or to suture 21
- Apical elytral lunule absent or not extending to suture 25
21. Elytra gradually widened to apical fourth 23
- Elytra widest at middle or basal third. 22
22. Elytral margins deeply and regularly serrate in apical third; females with elytral margins broadly expanded at basal third (fig. 90). *carthagena* (p. 279)
- Elytral margins not or feebly and irregularly serrate in apical third; females with elytral margins only feebly expanded at basal third (fig. 92) *haemorrhagica* (p. 282)
- 23(21). Elytral foveae brilliant green on black background; basal and middle elytral lunules united laterally (fig. 106) *schauppi* (p. 287)
- Elytral foveae either lacking or dull green on brown or green background; basal and middle elytral lunules not united laterally 24
24. Middle elytral lunule with descending portion feebly oblique; color usually dark or light brown or occasionally dark blue, green, or black (fig. 77) *sedecimpunctata*¹ (p. 270)
- Middle elytral lunule with descending portion strongly oblique; color green or blue (fig. 79) . . . *rufiventris* (p. 272)
- 25(20). Elytra immaculate or markings broken into elongate spots forming sections of lunules; middle lunule often expanded along margin; postmedian lateral spot almost always present in maculated specimens 27
- Elytral markings consisting of rounded spots, middle lunule sometimes complete but not expanded along margin; postmedian lateral spot never present 26
26. Elytral apices evenly rounded from apical

¹ *Cicindela flohri* will also run to this dichotomy. Refer to key in section dealing with *rufiventris* and *sedecimpunctata* complex.

- third to suture; proepisterna, mesoepisterna, and metaepisterna usually cupreous red, form linear, size small (fig. 86) *flavopunctata* (p. 275)
- Elytral apices not evenly rounded, either straight or sinuate from apical third to apex; proepisterna, mesoepisterna, and metaepisterna usually dark or cupreous green; form robust, size medium (*mexicana*) (fig. 88). *roseiventris* (p. 278)
- 27(25). Elytral apices evidently and rather regularly serrate 28
- Elytral apices feebly and irregularly serrate *carthagena* (p. 279)
28. Elytra with puncture spots evident throughout; color brown *roseiventris* (p. 278)
- Elytra with puncture spots obscure on disc; color green or black 29
29. Proepisterna and metaepisterna cupreous red *sedecimpunctata* (p. 270)
- Proepisterna and metaepisterna blue or green tinged with cupreous *rufiventris* (p. 272)
- 30(17). Apical fourth of elytral margins strongly or minutely serrate 31
- Apical fourth of elytral margins not serrate *nebuligera* (p. 275)
31. Pronotal disc rugose and usually deeply transversely striate medially 32
- Pronotal disc not rugose, feebly grooved and shallowly striate medially 34
32. Pronotum with side margins nearly straight, not strongly constricted towards base; elytral disc usually without dark infuscations 33
- Pronotum with side margins broadly rounded and strongly constricted towards base; elytral disc usually with dark infuscations (fig. 83) *clarina* (p. 274)
33. Elytral foveae absent or obscure; size large, 10–15 mm. *hydrophoba* (p. 266)
- Elytral foveae distinct, especially in basal third; size small, 7–10 mm. *dysentrica* (p. 274)
- 34(31). Proepisterna cupreous red; elytra gradually widened from base to apical fourth 35
- Proepisterna green or blue, occasionally tinged with cupreous along upper margin; elytra gradually rounded from basal third, especially in the females (fig. 79) *rufiventris* (p. 272)
35. Pronotal disc strongly convex; basal and apical transverse impressions deep *hydrophoba* (p. 266)
- Pronotal disc feebly convex; basal and apical transverse impressions shallow *sedecimpunctata*¹ (p. 270)
- 36 (2). Trochanters of middle legs without subapical hair, seta, or pit 37
- Trochanters of middle and anterior legs with subapical hair, seta, or pit 44
37. Elytra deeply, densely punctate throughout; lunules connected internally, forming a median longitudinal vitta on each elytron extending from base to apex, occasionally broken in front of apical lunule (fig. 63) *lemniscata*² (p. 263)
- Elytra impunctate or sparsely irregularly punctate; lunules not united to form longitudinal median vitta 38
38. Base of elytra with small greenish spots not or but slightly impressed, impunctate 41
- Base of elytra with small greenish spots deeply impressed, punctate 39
39. Front of head pilose *sperata* (p. 296)
- Front of head bare except for ocular setae 40
40. Proepisterna and metaepisterna dull coppery; apical elytral lunule represented only by ante-apical spot (fig. 96) *praecisa* (p. 284)
- Proepisterna and metaepisterna brilliant green or blue; apical elytral lunule absent, complete, or extending to lateral margin (figs. 98–100) *viridisticta* (p. 284)
- 41(38). Pronotum without evident posterior angles, disc strongly convex from side to side, median line scarcely impressed; elytral foveae usually obscure 43
- Pronotum with pronounced posterior angles, disc shallowly convex, median line impressed; elytral foveae usually prominent 42
42. Anterior margin of labrum deeply cleft on each side of middle, giving the appearance of being five-toothed; color black (fig. 151) *cyaniventris* (p. 253)
- Anterior margin of labrum not deeply cleft laterally, unidentate; color reddish brown (fig. 154) *aeneicollis*³ (p. 256)
- 43(41). Color cupreous red or green; legs pale *wickhami* (p. 286)

¹ *Cicindela flohri* will also run to this dichotomy. Refer to key in section dealing with *rufiventris* and *sedecimpunctata* complex.

² Based on the original description and the discussion given by W. Horn (1908), *hogeii* and *speculans* will probably key out in or beyond this dichotomy.

³ Based on the original description and the discussion given by W. Horn (1908) *nudata* will probably key out in this dichotomy.

- Color black or dark brown; legs pigmented *argentata* (p. 286)
- 44(36). Front or vertex of head pilose 45
Front and vertex of head bare except for ocular setae or small tuft of hair in front of eye 53
45. Gena bare or with only an occasional hair; pile on front of head erect or semi-erect 46
Gena pilose, pile on front of head and gena decumbent 48
46. Body beneath sparsely pilose laterally; upper surface dark green or blue throughout *pimeriana* (p. 242)
Body beneath densely pilose laterally; upper surface varied in color 47
47. Antennal scape sparsely pilose throughout; interior portion of basal elytral lunule, when present, projecting posteriorly (fig. 28) *latesignata* (p. 241)
Antennal scape with subapical setae and at most an occasional hair below; interior of basal elytral lunule recurved or extending towards base (fig. 26) *hirticollis* (p. 240)
- 48(45). Antennae and legs pale yellow; posterior tibial spurs as long, or almost as long, as first tarsal segment *lepida* (p. 297)
Antennae and legs green or blue with cupreous reflections; posterior tibial spurs half or less than half as long as first tarsal segment 49
49. Prosternum glabrous; females without subapical spines on sutural margins of elytra 50
Prosternum densely clothed with decumbent pile; females with strong subapical spines on sutural margins of elytra 52
50. Pronotum rugose; color green, cupreous green, red, or cupreous red 51
Pronotum strongly alutaceous, finely wrinkled; color brown or reddish brown *sperata* (p. 296)
51. Antennal scape with subapical setae only; elytra with feeble sutural spine (fig. 124) *marutha* (p. 296)
Antennal scape sparsely pilose below subapical setae; elytra with prominent sutural spine (fig. 125) *nevadica* (p. 297)
- 52(49). Pronotum globular, males with apex of elytra not separately rounded; females with short subapical sutural spine (fig. 127) *togata* (p. 297)
Pronotum with side margins nearly straight, subparallel, dorsal surface flattened, males with apex of elytra separately rounded to suture; females with long, recurved, overlapping, subapical, sutural spines (fig. 120) *hamata* (p. 295)
- 53(44). Gena densely pilose 54
Gena bare 55
54. Head in front of the eyes with a small tuft of white hair; prosternum pilose medially *pamphila* (p. 295)
Head in front of the eyes without a small tuft of hair; prosternum bare medially *auraria* (p. 294)
- 55(53). Labrum with at most a single, irregular transverse row of setigerous punctures behind anterior margin 57
Labrum with two or more irregular rows of setigerous punctures or sparsely punctate and pilose in anterior half 56
56. Proepisterna bare except for lower margin; elytra with black maculations (fig. 53) *papillosa* (p. 255)
Proepisterna sparsely pilose throughout; elytral markings pale or reddish *fera* (p. 257)
- 57(55). Pronotum glabrous or with few scattered hairs, sides evenly rounded 58
Pronotum sparsely pilose, at least along lateral margins, sides usually margined 59
58. Elytral disc deeply, regularly punctate, punctures separated by about twice their own widths; elytral apices evenly rounded to apex in both sexes; color green or black (fig. 64) *severa*¹ (p. 261)
Elytral disc shallowly, irregularly punctate, punctures separated by about their own widths; elytral apices separately rounded to apex in the females; color cupreous brown (fig. 65) *rockefelleri* (p. 261)
- 59(57). Under surface sparsely to densely pilose laterally 65
Under surface bare except for few scattered hairs, especially on sides of metasterna 60
60. Pronotum rugose² 61
Pronotum smooth, alutaceous, or with few shallow wrinkles 62
61. Pronotum strongly margined laterally; color green; elytra immaculate, margins cupreous (fig. 39) *euthales* (p. 246)
Pronotum not margined laterally; color green, black, or brown; elytra macu-

¹ Based on the original description and the discussion given by W. Horn (1908), *ioessa* will probably key out in this dichotomy.

² Based on the original description and the discussion given by W. Horn (1908), *craveri* will probably key out beyond this dichotomy.

- lated, margins not cupreous (fig. 103)
 *debilis* (p. 287)
- 62(60). Elytra strongly punctate basally (not including foveae), impunctate apically *hornii* (p. 247)
- Elytra nearly impunctate or punctate throughout (not including foveae) 63
63. Apical elytral margins serrate; front of head between eyes rugose medially *aeneicollis* (p. 256)
- Apical elytral margin not serrate; front of head not rugose 64
64. Dorsal surface opaque, strongly alutaceous *thalestris*¹ (p. 251)
- Dorsal surface shining, not or feebly alutaceous *nigrilabris* (p. 247)
- 65(59). Proepisterna densely clothed with long decumbent hairs, obscuring surface 66
- Proepisterna bare or sparsely clothed with hairs, usually erect or semi-erect, not obscuring surface 68
66. Pronotum shallowly rugose 67
- Pronotum finely alutaceous, with shallow irregular furrows . *circumpicta* (p. 287)
67. Elytra with pigmented areas deeply punctate from base to apex; pronotum with side margins broadly rounded, strongly constricted before base and apex (fig. 112) *gabbi* (p. 291)
- Elytra with pigmented areas deeply punctate basally, shallowly or not punctate apically; pronotum with side margins feebly rounded (fig. 108) *californica* (p. 288)
- 68(65). Elytra with descending portion of middle lunule S-shaped (fig. 111) *trifasciata* (p. 289)
- Elytra immaculate or with middle lunule not S-shaped 69
69. Foveae or foveae spots on elytra irregularly scattered over discal surface, not confined to subsutural row 70
- Foveae or foveae spots on elytra lacking or confined to base or apex or all of subsutural row 74
70. Apical margins of elytra not serrate 71
- Apical margins of elytra minutely or prominently serrate 73
71. Under surface black . . . *aterrima* (p. 244)
- Under surface brilliant green or blue 72
72. Front of head shallowly, rugosely striate medially *semicircularis* (p. 245)
- Front of head deeply striate medially *aterrima* (p. 244)
- 73(70). Elytral markings black; labrum with anterior margin usually deeply incised laterally, giving the appearance of five teeth (figs. 53, 152) . *papillosa* (p. 255)
- Elytral margins white; labrum with anterior margin not incised laterally, unidentate (fig. 37, 137) *semicircularis* (p. 245)
- 74(69). Elytra with subsutural row of foveae evident, extending from base to near apex 75
- Elytra with subsutural row of foveae lacking or obscure or indicated only at base 84
75. Apices of elytra separately rounded in both sexes, exterior portion in males obliquely truncate 76
- Apices of elytra evenly rounded to apex 77
76. Elytra widest at or near middle; anterior margin of labrum in female tridentate; labrum in male feebly unidentate or tridentate (fig. 58) . . . *sinaloae* (p. 258)
- Elytra widest at apical third or fifth; anterior margin of labrum in female strongly unidentate; labrum in male not dentate (fig. 61) . *bradti* (p. 260)
- 77(75). Pronotum rugose or deeply, transversely striate 78
- Pronotum strongly alutaceous, sometimes finely grooved 82
78. Pronotum widest at apical third; elytra with dark brown infuscations 79
- Pronotum widest about middle; elytra without dark brown infuscation 80
79. Pronotum rugose, anterior and posterior transverse impressions deep, lateral margins strongly constricted from apical third to base; punctures on basal third of elytra shallowly impressed (fig. 36) *rugatilis* (p. 245)
- Pronotum transversely striate, anterior and posterior transverse impressions lacking or very shallow, lateral margins gradually constricted from apical third to base; punctures on basal third of elytra deeply impressed (fig. 98) *viridisticta* (p. 284)
- 80(78). Proepisterna and metaepisterna sparsely pilose 81
- Proepisterna and metaepisterna bare except for a few scattered marginal hairs *guerrerensis* (p. 255)
81. Elytral punctures deeply impressed; descending portion of middle elytral lunule absent, interrupted, or short (figs. 49-51) *punctulata* (p. 251)
- Elytral punctures not or but shallowly impressed; descending portion of mid-

¹ Based on the original description and discussion given by Horn (1908), *chrysisippe* and *smaragdina* will probably key out in this dichotomy.

- dle lunule long, never absent or interrupted (fig. 56) . . . *tenuisignata* (p. 256)
- 82(77). Apical margin of elytra serrate; pronotum widest about middle or side margins straight and parallel; form narrow . . . 83
- Apical margin of elytra not serrate; pronotum widest in front of middle; form robust (fig. 38) . . . *nigrocoerulea* (p. 246)
83. Anterior margin of labrum deeply cleft on each side of middle, giving appearance of being five-toothed; color black (fig. 151) . . . *cyaniventris* (p. 253)
- Anterior margin of labrum not cleft laterally, unidentate; color reddish brown, green, or blue (fig. 154) *aeneicollis* (p. 256)
- 84(74). Pronotum and base of head rugose; size small, 7.5–12 mm. 89
- Pronotum and base of head not rugose, finely alutaceous and with a few shallow grooves; size usually larger, 10–18 mm. 85
85. Posterior pronotal angles prominent; size large, 14–18 mm. 87
- Posterior pronotal angles not prominently produced; size small, 10–13 mm. 86
86. Basal third or half of elytra deeply punctate *hornii* (p. 247)
- Basal third or half of elytra (not including foveae) impunctate . . . *aterrima* (p. 244)
- 87(85). Elytra sparsely punctate in basal third. *obsoleta* (p. 249)
- Elytra not punctate in basal third . . . 88
88. Middle elytral lunule extending obliquely towards apex, not angulate and extending towards outer margin, middle and basal lunules usually united on disc (fig. 42) . . . *luteolineata* (p. 249)
- Middle elytral lunule angulate medially, outer portion extending towards margin, middle and basal lunules not united on disc (figs. 44–47) . . . *obsoleta* (p. 249)
- 89(84). Elytra with apical margins minutely or prominently serrate 90
- Elytra with apical margins not serrate 93
90. Anterior ocular setae or pits numerous; form robust *oregona* (p. 242)
- Anterior ocular setae single; form linear 91
91. Base of elytra impunctate; proepisterna and metaepisterna bare or with few marginal hairs . . . *guerrensis* (p. 255)
- Base of elytra shallowly to deeply punctate; proepisterna and metaepisterna sparsely pilose 92
92. Elytra with median lunule evenly curved at middle, posterior projection long (fig. 56) *tenuisignata* (p. 256)
- Elytra with markings absent or reduced to isolated spots, when middle lunule is complete it is sharply angular internally and its posterior projection is short (figs. 49–51) . . . *punctulata* (p. 251)
- 93(89). Elytra gradually attenuate from middle to apex; proepisterna bare (fig. 103) *debilis* (p. 287)
- Elytra abruptly attenuate from apical third to apex; proepisterna sparsely irregularly pilose 94
94. Pronotum strongly constricted from anterior third to base; form robust . . . 96
- Pronotum feebly constricted at base; form narrow. 95
95. Punctures on apical third of elytra deeply impressed; apices of elytra evenly rounded to apex (figs. 49–51) *punctulata* (p. 251)
- Punctures on apical third of elytra not or shallowly impressed; apices of elytra separately rounded (fig. 105) *pusilla* (p. 287)
- 96(94). Labrum wide, unidentate medially; base of elytra irregularly punctate (fig. 199) *nephelota* (p. 287)
- Labrum narrow, strongly tridentate medially; base of elytra impunctate except for foveae (fig. 136) . . . *rugatilis* (p. 245)

Cicindela hirticollis Say

This polytypic species has a very extensive distribution in the United States, and two subspecies occur in Mexico. There is no specific locality given by Thomson for his *ponderosa*, but it probably came from the vicinity of Veracruz. This population is widely distributed in the United States, and, although its status as a subspecies is in doubt, it is included here as such. Eight Mexican specimens from Veracruz have been seen and differ from those from the United States only by having the inner portion of the basal lunule less recurved. It has been found along the banks of the Colorado River in Baja California. The widespread Pacific coast *gravidata* LeConte extends into the northern portion of Baja California along the west coast.

GENERAL DISTRIBUTION: Canada, United States, Mexico.

HYBRID DISTRIBUTION: No hybrid populations from Mexico have been examined, and they will probably be found in the United States rather than in Mexico.

KEY TO THE SUBSPECIES OF
Cicindela hirticollis SAY

Color red, brown, black, cupreous red, or greenish brown; elytral lunules wide *ponderosa*
Color green, elytral lunules narrow *gravida*

Cicindela hirticollis ponderosa Thomson

Text figures 26, 129

Cicindela ponderosa THOMSON, 1859, Arcana Nat., Paris, p. 89.

This subspecies averages somewhat larger in size than most others, the elytral markings are heavier, and the color is black, brown, or red with a few specimens showing greenish reflections.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Veracruz*: Veracruz. *Baja California*: Algodones, June 28, 1952.

Cicindela hirticollis gravida LeConte

Text figures 27, 130

Cicindela gravida LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 170.

This subspecies is taken primarily along the ocean beaches and bays but also extends inland for short distances along the rivers where it is found on sand bars.

TYPE LOCALITY: California: San Diego.

GENERAL DISTRIBUTION: *Baja California*: Ensenada, August, sea level; 30 miles north of Ensenada, August, sea level; Estero Beach, April 24, 1950.

Cicindela latesignata LeConte

Text figure 1

This polytypic species has been divided into two subspecies, one from California and Baja California and the other from northern Sonora. Apparent hybrid populations exist between these areas, but as yet no samples adequate for a detailed analysis are available. The species occurs along the ocean beaches and on alkaline flats near sloughs and estuaries that are affected by the tides.

GENERAL DISTRIBUTION: United States: Southern California. Mexico: Baja California, Sonora.

HYBRID DISTRIBUTION: *Baja California*: San Bartholumne Bay (3), June; La Paz (4).

KEY TO THE SUBSPECIES OF *Cicindela latesignata*
LECONTE

Pigmented portion of elytra black or greenish black *latesignata*
Pigmented portion of elytra brilliant to dark cupreous red *parkeri*

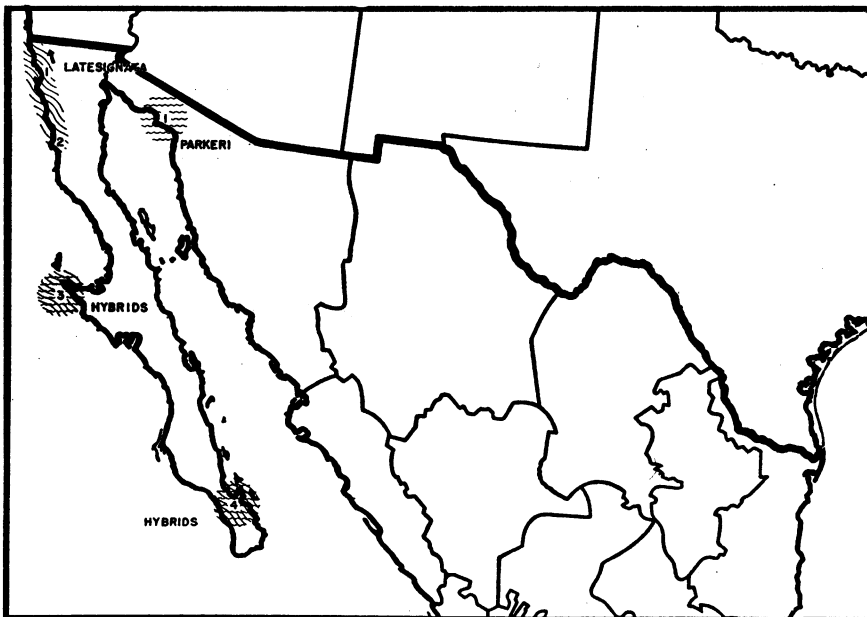


FIG. 1. Distribution of *Cicindela latesignata* LeConte.

***Cicindela latesignata latesignata* LeConte**

Cicindela latesignata LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 172.

Cicindela latesignata obliviosa CASEY, 1913, Memoirs on the Coleoptera, vol. 4, p. 20 (San Diego, California).

Typical populations of this subspecies are known from the northwest coast of Baja California, and isolated examples resembling it have been taken in several other localities. A series from San Bartholomne Bay, Baja California, located about midway on the west coast, appears to be a hybrid population between this subspecies and *parkeri* Cazier, and it seems probable that all the populations south of this locality and on the east coast will either be hybrids or *parkeri*. Only a few examples from La Paz have been examined, and these resembled the typical form except for a slight cupreous luster. When an adequate sample is available, however, it will probably be hybrid in its characteristics.

TYPE LOCALITY: California : San Diego.

GENERAL DISTRIBUTION: *Baja California*: Ensenada (1), August; Estero Beach, April (not located); San Quintin (2).

***Cicindela latesignata parkeri* Cazier**

Text figures 28, 29, 131, 132

Cicindela latesignata parkeri CAZIER, 1948, Amer. Mus. Novitates, no. 1382, p. 15.

This subspecies was originally described from 23 specimens, but since the description some 266 topotypes have been collected by George Bradt. The entire series is brilliant to dark cupreous red, and the white elytral maculations vary from being separated at the margins to completely convergent, leaving only a basal V-shaped pigmented area. This same variability exists in the populations of *latesignata* from southern California.

TYPE LOCALITY: Mexico: Sonora: La Cholla (1), April 20, 1941 (F. H. Parker).

GENERAL DISTRIBUTION: *Sonora*: Choya Bay (1) (same as La Cholla), March 27, 1949, June 12, 1952.

***Cicindela oregona* LeConte**

Text figures 30, 133

Horn (1897) records *C. duodecimguttata guttifera* LeConte from northern Sonora and

in 1903 placed *guttifera* as a synonym of *oregona* which was included in the list of Mexican species. In 1908 he elevated *guttifera* to a subspecies of *oregona* and did not list it from Mexico. He did, however, record *oregona* from Mexico, and this seems to conform with our present knowledge of the distribution of that subspecies, although no Mexican specimens have been examined. *Cicindela oregona oregona* is known from Southern California and Arizona, *oregona maricopa* Leng from northern Arizona and New Mexico, and *oregona guttifera* LeConte from Colorado, New Mexico, and southeastern Arizona. It is doubtful that the distribution of the last extends as far west as Sonora, and it is likely that *C. oregona oregona* extends into Sonora as recorded by Horn. The species is very widely distributed in Western United States and is extremely tolerant ecologically, occurring in saline or fresh-water situations along streams, springs, lakes, or ocean beaches.

GENERAL DISTRIBUTION: Canada, United States, northern Mexico.

HYBRID DISTRIBUTION: No hybrid areas are known in Mexico.

***Cicindela oregona oregona* LeConte**

Cicindela oregona LECONTE, 1857, Trans. Amer. Phil. Soc., vol. 11, art. 2, p. 41.

No Mexican specimens have been examined.

TYPE LOCALITY: "Oregon Territory and northern California, as far as San Francisco."

GENERAL DISTRIBUTION: *Sonora*: Northern.

***Cicindela pimeriana* LeConte**

Text figures 31, 134

Cicindela pimeriana LECONTE, 1866, Proc. Acad. Nat. Sci. Philadelphia, vol. 18, p. 363.

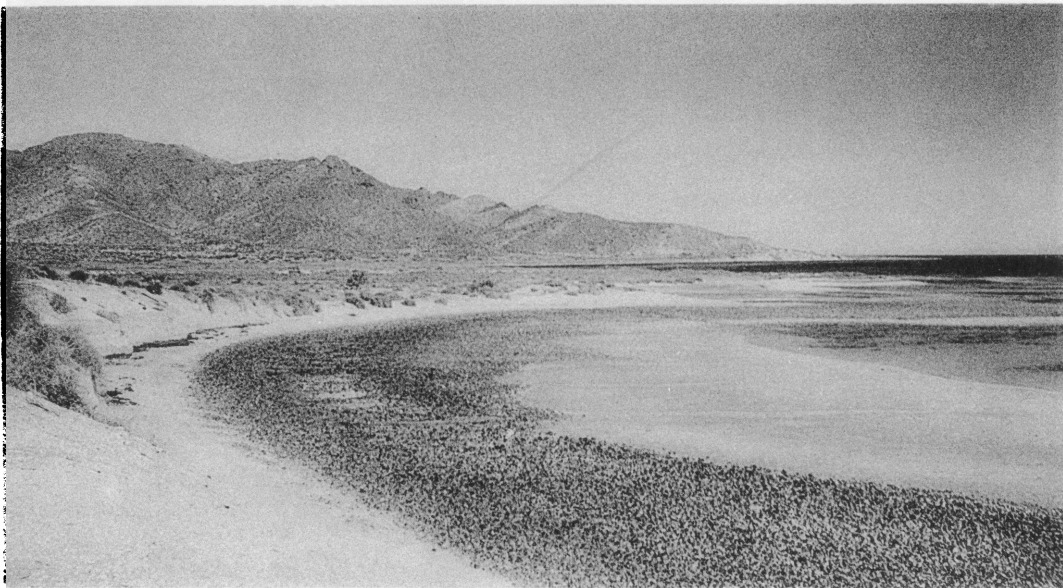
Cicindela viatica LECONTE, 1857, Trans. Amer. Phil. Soc., new ser., vol. 11, art. 2, app., p. 62 (Sonora).

Cicindela cochisensis CASEY, 1909, Canadian Ent., vol. 41, p. 274 (Douglas, Arizona).

No Mexican specimens of this monotypic species have been examined, but they undoubtedly occur there since the species has been taken on the border at Douglas, Arizona. It is possible that the specimens of *C.*



1

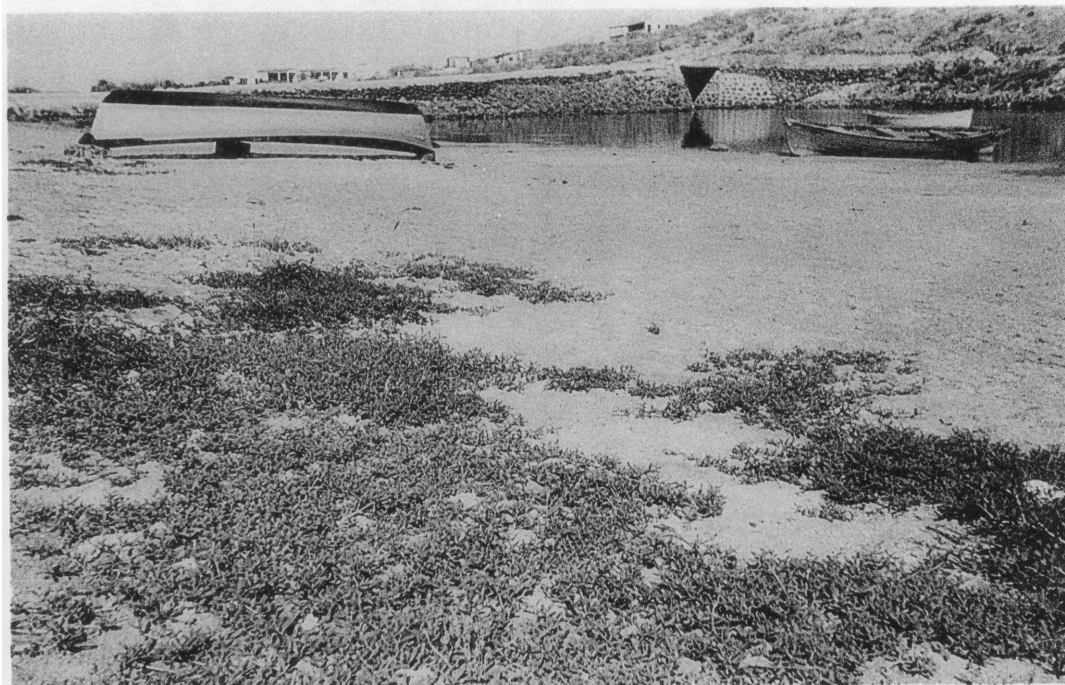


2

1. Habitat of *Cicindela fera*, *sommeri*, *sperata*, *vauriei*, *sedecimpunctata*, and *flavopunctata*. Pitiquito, Sonora
2. Habitat of *Cicindela carthagena colossae*, *digueti* hybrids. North end of Tiburon Island, Sonora



1



2

1. Habitat of *Cicindela digueti digueti*. South end of Tiburon Island, Sonora
2. Habitat of *Cicindela carthagena*. Miramar Beach, Guaymas, Sonora

scutellaris unicolor Dejean recorded from Mexico are actually this species. *C. scutellaris unicolor* is not known to occur west of Alabama. The Louisiana and eastern Texas population is *C. scutellaris rugata* Vaurie, and it is doubtful that this subspecies extends into Mexico. The species is usually collected on bare sandy soil in the vicinity of water.

TYPE LOCALITY: Sonora.

***Cicindela chrysippe* Bates**

Text figure 32

Cicindela chrysippe BATES, 1884, *Biologia Centrali-Americana*, Coleoptera, vol. 1, pt. 1, suppl., p. 257.

No specimens of this species have been available for study, and for convenience' sake Bates's discussion of the species is included. "This beautiful little species cannot be placed in any of the numerous groups indicated by Chaudoir in his Catalogue of the Cicindelidae. In some of its characters it approaches *C. pulchra* (Say), especially resembling that species in the form of the head, but differing greatly in the labrum, which in the male is greatly produced in the middle, the produced part having three acute teeth (the middle one longest), and the sides each having also a broad and sharp tooth. The head is finely anastomose-strigose, with the usual more distinct striae along the forehead near each eye. The palpi a dark piceous, with a red-coppery tinge. The color of the labrum is not clearly visible in the single specimen sent; but it is metallic on the side and apparently non-metallic and dingy testaceous in the middle. The thorax is rather narrower than the head (eyes included) and much more narrowed (in a straight line) to the base than is usual in the genus; its surface is only faintly sculptured and shining. The elytra are subcylindrical and convex; their surface moderately opaque, with very minute sculpture and numerous very shallow, scarcely perceptible punctures; the larger punctures or foveae so commonly seen in Cicindelae being also present but very faint. The body beneath is entirely free from hairs, of which also very few are visible on the femora and four anterior coxae." The color is brilliant green with cupreous reflections, and each elytron has two white marginal spots as follows: one at the

middle representing the lateral portion of the middle lunule and one subapical representing the marginal extremity of the apical lunule.

TYPE LOCALITY: Durango: Ciudad in Durango.

***Cicindela smaragdina* Chevrolat**

Text figure 33

Cicindela smaragdina CHEVROLAT, 1835, *Coléoptères du Mexique*, fasc. 8, species no. 179, *Cicindela* no. 19.

No specimens of this species have been available for study, but for convenience' sake a translation of Chevrolat's discussion is given. "A dull emerald green, very brilliant on the sides. Head broad and depressed on top, scarcely wrinkled, blue in front, the base of each antennae clear brilliant green. Palpi metallic green. Mandibles yellow, black at apex. Labrum yellow, elevated in center, straight laterally, rounded and unequal in front: six pits with hair, of which four are in the center. Antennae blackish brown, the four first segments of a coppery green and red. Eyes livid brown. Pronotum short, rounded on the sides, these latter sparsely hairy; straight at base and apex and advancing a bit onto the middle of the head, the two transverse impressions approaching the margins, dorsal line not very distinct; pronotum very finely scabrous. Scutellum broad, triangular. Elytra the width of the head, including the eyes, parallel, slightly widened towards the apex, a little convex; sharp spine on the suture; they have spaced pits, porous in shape, and of a velvety dull green; the margin is very brilliant; on the middle of each elytron is a longitudinal, irregular, short, black line. Below, body a beautiful blue. Epipleura and legs brilliant green."

TYPE LOCALITY: On the route from Veracruz to Mexico.

GENERAL DISTRIBUTION: *Veracruz*: Las Vigas, June.

***Cicindela ioessa* Bates**

Text figure 34

Cicindela ioessa BATES, 1881, *Biologia Centrali-Americana*, Coleoptera, vol. 1, pt. 1, p. 5.

No specimens of this species have been available for study, but the following description and discussion given by Bates may

facilitate identification. "Similar to *smaragdina* Chevrolat; slender in form; unicolorous opaque green above, slightly shining laterally, undersurface and legs violaceous; thorax small, transverse, pronotal margins not pilose; labrum in male strongly produced medially, margin straight, truncate, obtusely tridentate, in the female shallowly produced and with a small median tooth; under surface of thorax bare. A color variety is entirely violaceous. The numerous examples in the Salle collection differ constantly from the description and type specimens of *C. smaragdina*, not only in the colour of the legs, but in the elytra being uniform in colour and wanting the dark velvety clothing

of the disk. The form of the thorax is also different, and the labrum much more produced in the middle."

Judging from the description, this species is closely related to *nigrilabris* Bates but appears to differ from that species by having the lateral margins of the pronotum bare rather than sparsely pilose.

TYPE LOCALITY: Puebla: Huauchinango.

GENERAL DISTRIBUTION: *Tlaxcala*: Tenancingo.

***Cicindela aterrima* Klug**

Text figures 2, 35, 135

Cicindela aterrima KLUG, 1834, *Jahrb. Insectenk.*, p. 35.

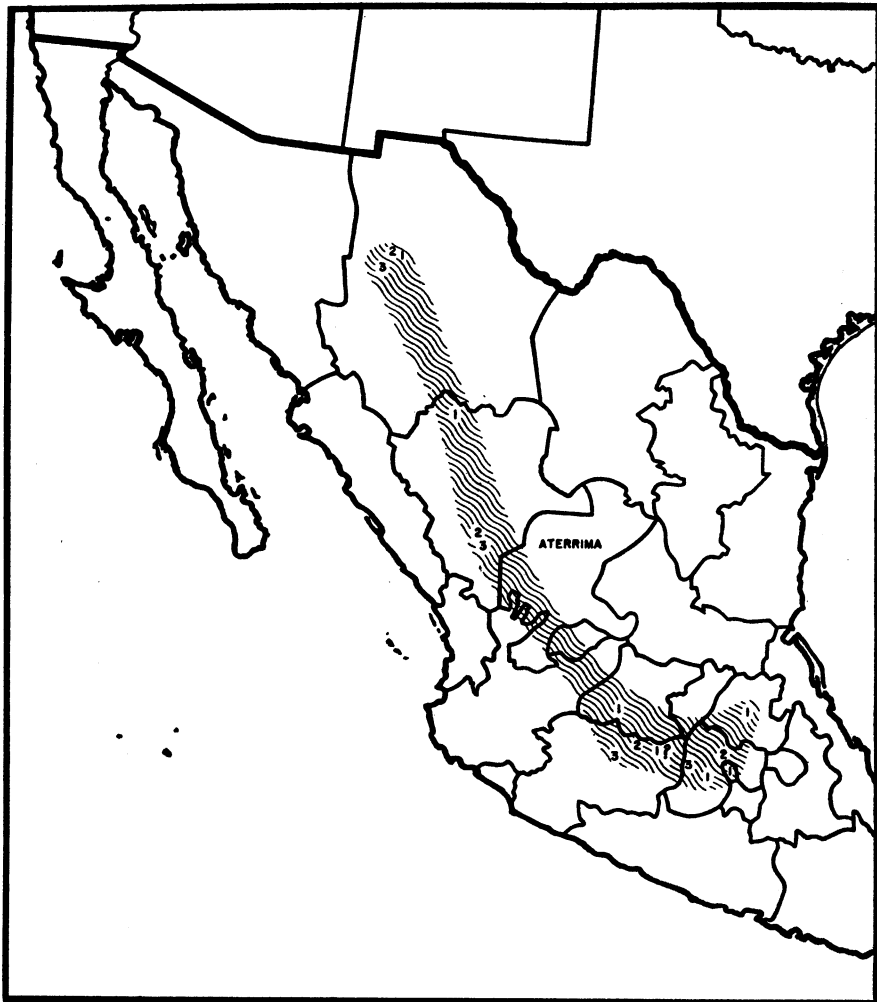


FIG. 2. Distribution of *Cicindela aterrima* Klug.

Cicindela lugens KLUG, 1834, Jahrb. Insectenk., p. 34 (Mexico); synonym and name preoccupied by *lugens* Dejean, 1831.

Cicindela carbonaria CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 6, species no. 128, *Cicindela* no. 13 (Las Vigas, Veracruz).

This species was probably described from specimens collected in central Mexico from Veracruz, Mexico, or Michoacan, and its presence north of this area is herein recorded for the first time. The northern series agrees in every respect with specimens from Distrito Federal except that the average size appears to be slightly larger. In color they vary from black to purplish and greenish. They were collected in dry, open, grassy areas in the pine forests, along dirt roads in llanos, and along a dry rocky hillside near a stream (pl. 12, fig. 2).

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Chihuahua*: Summit northeast of San Jose Babicora (1), July 4, 1947, 7700 feet; San Jose Babicora (2), July 5, 1947, 7100 feet; Madera (3), July 6, 1947, 7200 feet. *Durango*: Ocampo (1), August 2, 1947; Durango City (2); Sierra de Durango (3). *Guanajuato*: Tupataro (1). *Michoacan*: Llano Salado (1?); Morelia (2); Putzcuaro (3). *Mexico*: Toluca (1), August; Cuantitlan (2); Tultenango (3), July 13; Atzacapotzalco, August. *Distrito Federal*: Guadalupe (1), August, 1923; Xochimilco (1), July 30, 1947; Mexico City (1), August, 1923. *Hidalgo*: Ixmiquilpan (1), August 15-22, 1947.

Cicindela rugatilis Bates

Text figures 36, 136

Cicindela rugatilis BATES, 1890, Trans. Ent. Soc. London, p. 497.

Cicindela semicircularis BATES, 1881, Biologia Centrali-Americana, Coleoptera, vol. 1, pt. 1, p. 6 (Toluca, Mexico); name preoccupied by *semicircularis* Klug, 1834.

Most of the specimens of this species taken in the states of Mexico and Distrito Federal are dark brown in color, whereas those from Durango are usually a more brilliant cupreous brown. There are, however, dark individuals in the Durango series, and there is less variability in samples from this area. In a large sample from Toluca, Mexico, the color

varies from brilliant green, greenish, cupreous brown, and dark brown to black above and beneath. All the elytral lunules are generally evident, but one specimen lacks the humeral lunule. Both the middle and apical lunules may be complete or interrupted, and there is a post median lateral spot in all specimens examined.

In Durango the species was collected in dry, open, sandy or rocky situations along roads or in wooded country. In Zacatecas specimens were collected in the bottom of a sandy wash grown up with *Baccharis*.

TYPE LOCALITY: Mexico: Toluca.

GENERAL DISTRIBUTION: *Mexico*: Toluca, July. *Distrito Federal*: Guadalupe, August. *Zacatecas*: Fifteen kilometers east of Sombrerete, July 28-31, 1951. *Durango*: Sierra de Durango; Palos Colorados, August 5, 1947, 8000 feet; Otinapa, August 7, 1947, 7500 feet. *Jalisco*: San Juan Lagos, July 27, 1951.

Cicindela semicircularis Klug

Text figures 37, 137

Cicindela semicircularis KLUG, 1834, Jahrb. Insectenk., p. 33.

Cicindela plurigemmata BATES, 1890, Trans. Ent. Soc. London, p. 496 (Refugio in Durango).

The color in the series from Durango and Chihuahua is rather constant, but a few specimens are more greenish or have a purplish tinge. The elytra vary from having a spot at the posterior portion of the basal lunule, complete middle lunule not reaching margin and inner spot of apical lunule to being completely immaculate. They were collected along dirt roads, on rocky hillsides, and in open pasture land.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Chihuahua*: Summit northeast of San Jose Babicora, July 4, 1947, 7700 feet; Kilometer 36, Santa Barbara-Ojito Road, August 17, 1947, 6900 feet; 1 mile east of La Saucedá, July 21, 1947, 7000 feet. *Durango*: Ciudad Durango; Las Puentes, July 24, 1947, 7000 feet; near Otinapa, August 7, 1947, 7500 feet; same locality, August 11, 1947, 8200 feet; Sierra de Durango. *Guanajuato*: San Marcos Maravatio. *Mexico*: Toluca; San Juan de las Huertas (listed as San Juan); "Vulcans of Toluca"; Tultenango, July 13. *Hidalgo*: Real de Monte. *Distrito*

Federal: Guadalupe, July. *Zacatecas*: Zacatecas, July 26, 1907.

***Cicindela nigrocoerulea* LeConte**

Text figure 3

This species is herein treated as being polytypic because of the existence of the Texas *Cicindela nigrocoerulea subtropica* Vogt. There is a possibility that there may be at least one other subspecies, but as yet no detailed analysis has been made of numerous samples from the United States. Only *nigrocoerulea* is known from Mexico. Specimens are found in open places in woods, along roads, in dry ditches, and seem to prefer dry areas.

GENERAL DISTRIBUTION: *United States*: Southwestern states. *Mexico*: Chihuahua, Durango, Coahuila.

HYBRID DISTRIBUTION: Although no Mexican hybrid populations have been seen, it is possible that they may occur in northern Nuevo Leon and Tamaulipas. The specimen from Coahuila is similar to specimens from the Big Bend area of Mexico and not of southern Texas where *subtropica* occurs.

***Cicindela nigrocoerulea nigrocoerulea* LeConte**

Text figures 38, 138

Cicindela nigrocoerulea LECONTE, 1848, Ann. Lyc. Nat. Hist., New York, vol. 4, p. 181.

Specimens taken in three Mexican localities show the same variability in color and maculation as those from Texas, New Mexico, and Arizona. They vary from black and purple to green and from immaculate to having all three lunules represented by isolated spots.

TYPE LOCALITY: Arkansas River (probably in Colorado).

GENERAL DISTRIBUTION: *Chihuahua*: Encinillas (1); Charcos, Allende District (2), July 27, 1947, 6000 feet. *Coahuila*: Guadalupe (1), August 23, 1947; Mesa del Hillcoat, Sierra del Carmen (2), July, 7000 feet; Puerta de la Goriona, Sierra del Carmen, July 13, 1938, 4900 feet. *Sonora*: Cabullona (1), August. *Durango*: El Tascate (1), July 28, 1947, 6400 feet.

***Cicindela euthales* Bates**

Text figures 39, 139

Cicindela euthales BATES, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 9, p. 319.

Nine specimens of this species have been available for study. The color varies from bright green to dark green or blue, and Bates (1881-1884, suppl., p. 256) mentions a black variety. The side margins of the elytra are cupreous rather than green, the head and pronotum are rugose, and the elytra are alutaceous.

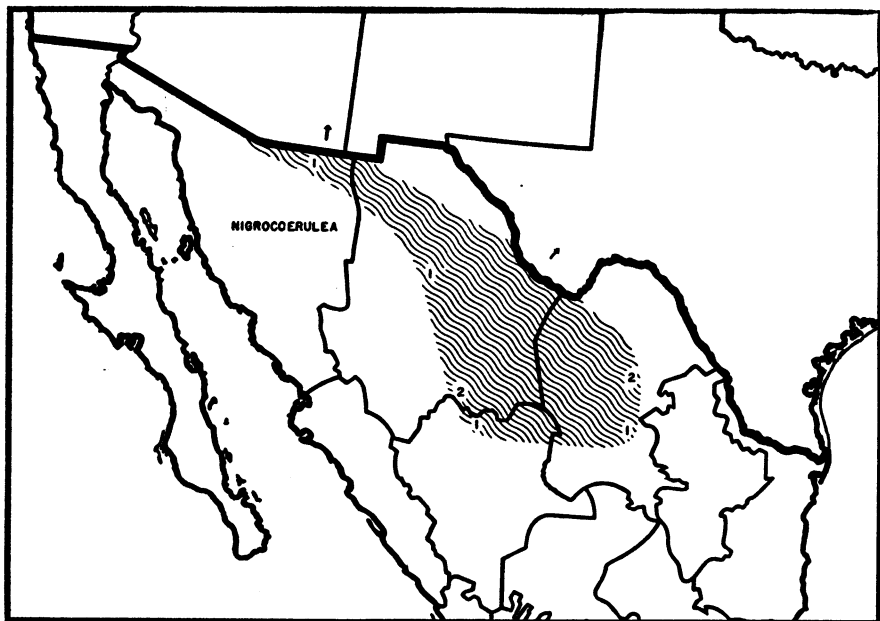


FIG. 3. Distribution of *Cicindela nigrocoerulea* LeConte.

TYPE LOCALITY: Durango: Ciudad in Durango.

GENERAL DISTRIBUTION: *Mexico*: Salazar: near Toluca, 10,000 feet.

***Cicindela nigrilabris* Bates**

Text figures 40, 140

Cicindela viatica var. *nigrilabris* BATES, 1890, Trans. Ent. Soc. London, p. 495.

Cicindela viatica CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 8, species no. 180, *Cicindela* no. 20 (*Mexico*); name preoccupied by *viatica* Klug, 1834.

Cicindela melania BATES, 1890, Trans. Ent. Soc. London, p. 495 (Refugio in Durango).

Cicindela filitarsis CASEY, 1909, Canadian Ent., vol. 41, p. 274 (Chihuahua, Mexico).

Cicindela tumidifrons CASEY, 1909, Canadian Ent., vol. 41, p. 275 (Chihuahua, Mexico).

Cicindela aterrima CASEY, 1909, Canadian Ent., vol. 41, p. 275 (Chihuahua, Mexico).

Cicindela townsendi CASEY, 1913, Memoirs on the Coleoptera, vol. 4, p. 19 (Sierra Madre Mountains, 7300 feet, Chihuahua, Mexico).

Although this species is considered to be monotypic, it may prove to be polytypic when more material from Chihuahua is available for study. *Cicindela melania* Bates represents the toptotypical black phase of *nigrilabris* and is therefore a synonym. However, two specimens from Chihuahua, and apparently those used by Casey, differ in several respects from most of the specimens in a series from Durango. The Chihuahua specimens have the front of the head more impressed and more densely striate, the elytra are only faintly punctate, and the discal row of foveae is scarcely evident. Only two specimens, of a series of 51 from Durango, approach these characteristics of the Chihuahua sample, and the latter may prove eventually to represent a distinct subspecific population.

The color varies from green, blue, and purple to black, and all specimens are devoid of maculations. They are collected along dirt roads and in open places in forests where the ground is rocky and sparsely covered with grass. They apparently do not require standing or running water.

TYPE LOCALITY: "Refugio in Durango." According to the latest maps, there are at least nine such localities scattered throughout Durango, but the types probably came from the western mountain section.

GENERAL DISTRIBUTION: *Durango*: Six

miles northeast of El Salto, Durango District, August 10, 1947, 8500 feet; Otinapa, August 11, 8200 feet; Palos Colorados, August 5, 1947, 8000 feet; Ventanas; Ciudad Durango. *Chihuahua*: Summit northeast of San Jose Babicora, July 4, 1947, 7700 feet; Sierra Madre Mountains, 7300 feet; Chihuahua (probably in the mountains).

***Cicindela hornii* Schaupp**

Text figure 4

This species is herein considered as being polytypic. Bates (1890) described *ritteri* from Villa Lerdo, Durango, which has since been relegated to synonymy. The latter name was based on bluish green specimens, but in four Arizona, three New Mexico, and three Texas localities the blue, green, and purplish specimens are intermixed and intergrade into the typical black *hornii*. It is probable that the black form will be found at Villa Lerdo when more specimens are collected. On the David Rockefeller expedition to north central Mexico, samples that differ in several respects from the typical *hornii* population were collected in southern Chihuahua and western Durango at high elevations. This population appears to be *scotina* Bates which was described from a unique male collected in Durango. The series agrees in all respects with the original description and with the illustration given by W. Horn (1938). It does not, however, belong to the *obsoleta* Say group as supposed by Bates and can be readily separated by the lack of pile on the under surface of the thoracic and abdominal sternites and by the asperate elytral sculpturing. It occurs sympatrically without intergrading with *obsoleta santaclarae* Bates at Las Puentes, Durango, and San Francisco Mesa, Chihuahua. It can be separated from black specimens of *thalestris* Bates by its smaller size, narrower shape, and asperate basal elytral sculpturing. From *hornii* it can be separated as shown in the key, but in all major characters it is like *hornii* and is herein considered to be a subspecies of that species.

The species is found in rather dry areas on hillsides or mesas where the soil is rocky or loamy and covered with grasses of various types. The beetles prefer to rest beneath the clumps of grass and are often difficult to catch with a net.

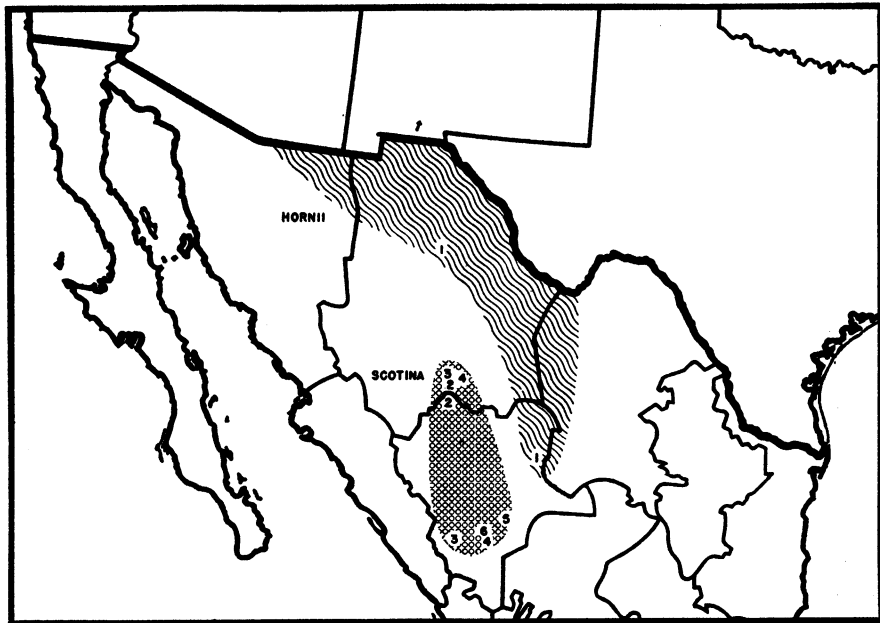


FIG. 4. Distribution of *Cicindela hornii* Schaupp.

GENERAL DISTRIBUTION: *United States:* Arizona, New Mexico, Texas. *Mexico:* Chihuahua, Durango.

HYBRID DISTRIBUTION: No hybrid populations are available but will probably be found in the northern portion of the Sierra Madre Occidental and in central Durango.

**KEY TO THE SUBSPECIES OF
Cicindela hornii SCHAUPP**

Head, pronotum, and elytra opaque, finely, densely alutaceous; population entirely black *scotina*
Head, pronotum, and elytra shiny, coarsely alutaceous; population black, green, blue, or purple *hornii*

***Cicindela hornii hornii* Schaupp**

Cicindela hornii SCHAUPP, 1883, Bull. Brooklyn Ent. Soc., vol. 6, p. 80; new name.

Cicindela anthracina G. HORN, 1880, Trans. Amer. Ent. Soc., vol. 8, p. 139.

Cicindela ritteri BATES, 1890, Trans. Ent. Soc. London, p. 496 (Villa Lerdo, Durango).

Although *C. ritteri* Bates is based on a bluish green specimen which resembles specimens from the United States, it is possible that some of the "two or three" additional specimens mentioned in Bates's discussion were black. If samples from this area are

found to be bicolored, they will be of similar composition to those in Arizona, New Mexico, and Texas.

TYPE LOCALITY: New Mexico: Fort Bayard.

GENERAL DISTRIBUTION: *Durango:* Villa Lerdo (1). *Chihuahua:* Santa Clara (1).

***Cicindela hornii scotina* Bates**

Text figures 41, 141

Cicindela scotina BATES, 1890, Trans. Ent. Soc. London, p. 494.

Cicindela scotina var. *chloris* HÖGE, 1897, in W. Horn, Deutsche Ent. Zeitschr., p. 168 (no type locality).

Similar in every respect to *hornii* except that the upper surface is opaque, more densely, finely alutaceous; the average size is somewhat smaller; the population is entirely black. Specimens from the mountains in Durango are less opaque than those from Durango City and may prove to be intermediates between *scotina* and *hornii*.

TYPE LOCALITY: Durango.

GENERAL DISTRIBUTION: *Chihuahua:* San Francisco Mesa, Santa Barbara, Santa Barbara District (2), July 18, 1947, 7500 feet; Huejotitlan (3), July 21, 1947, 5700 feet; Kilometer 36, Santa Barbara-Ojito Road (4), August 17, 1947, 6900 feet. *Durango:* Las

Puentes (2), July 24, 1947, 7500 feet; Coyote (3); Durango City (4); Cerro Mercado (6); El Temascal (5).

***Cicindela luteolineata* Chevrolat**

Text figures 42, 142

Cicindela luteolineata CHEVROLAT, 1856, Rev. Zool., Paris, ser. 2, vol. 8, p. 351.

Cicindela flammula THOMSON, 1856, Ann. Ent. Soc. France, ser. 3, vol. 4, p. 326.

This very distinctive monotypic species occurs in the central portion of Mexico and was erroneously reported from Jalapa, Veracruz.

TYPE LOCALITY: Michoacan: Morelia.

GENERAL DISTRIBUTION: *Distrito Federal*: San Angel. *Michoacan*: Maravatio; Morelia. *Mexico*: Toluca. *Colima*: Colima. *Jalisco*: Villa Guadalupe, July 26, 1951.

***Cicindela craveri* Thomson**

Text figure 43

Cicindela craveri THOMSON, 1856, Rev. Zool., Paris, ser. 2, vol. 8, p. 528.

No specimens of this species have been available for study, but a translation of Thomson's description may aid in making identifications. "Above dull green; below brilliant green. Mouth parts black except mandibles, which are white at their base. Antennae black. Labrum white. Prothorax and elytra shining; eight yellow spots on the latter, as follows: two humeral, two at anterior fourth, two near the middle, descending obliquely towards the suture, and two posteriorly in the form of parenthesis. Body below shining. Tarsi black."

TYPE LOCALITY: Mexico.

***Cicindela obsoleta* Say**

Text figure 5

This polytypic species was originally described by Say from the area around the upper portions of the Platte and Arkansas rivers but is now known to be widespread throughout the southwestern United States and the northern half of Mexico. Nine names have been proposed for various populations and individual variants of this species. Two of these are considered synonyms: *prasina* LeConte the immaculate green form of *obsoleta* Say, and *anita* Dow the black phase

of *santaclarae* Bates. One Mexican population (*thalestris* Bates) is herein elevated to specific status since it is distinct morphologically and was found to occur sympatrically with *latemaculata* Becker in one locality in Durango, Mexico. The species is therefore divided into six subspecies, four of which are known from Mexico. They occur in dry prairie land among clumps of bunch grass, along dirt roads in mesquite-covered land, on grassy meadows and hillsides, and in grazing lands. They are usually strong fliers and seem to prefer dry areas which are wetted only by rainfall although in several places they have been collected in the vicinity of springs and streams.

GENERAL DISTRIBUTION: *United States*: Central and southwestern states. *Mexico*: Sonora, Chihuahua, Durango, Coahuila, Jalisco.

HYBRID DISTRIBUTION: No hybrid populations from Mexico have been examined, and it is uncertain as to where they might be expected to occur.

KEY TO THE SUBSPECIES OF

Cicindela obsoleta SAY

1. Elytral markings very wide, often connected along margin; population primarily black *latemaculata*
Elytra immaculate or with smaller maculations, usually not connected along margin; population color variable 2
2. Proepisterna and metaepisterna pilose; elytral maculations heavy and usually complete, color green, brown, reddish, or black . . . 3
Proepisterna and metaepisterna glabrous, elytral maculations smaller and sometimes reduced to humeral spot only; color black to dark reddish brown *juvenilis*
3. Elytra immaculate or with lunules elongate, narrow *vulturina*
Elytra maculate, lunules wide and spots rounded, not elongate *santaclarae*

***Cicindela obsoleta vulturina* LeConte**

Text figures 45, 144

Cicindela vulturina LECONTE, 1853, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, p. 439.

Only one specimen of the immaculate and one maculated green form have been examined and found to be similar to those specimens from the Big Bend region of Texas.

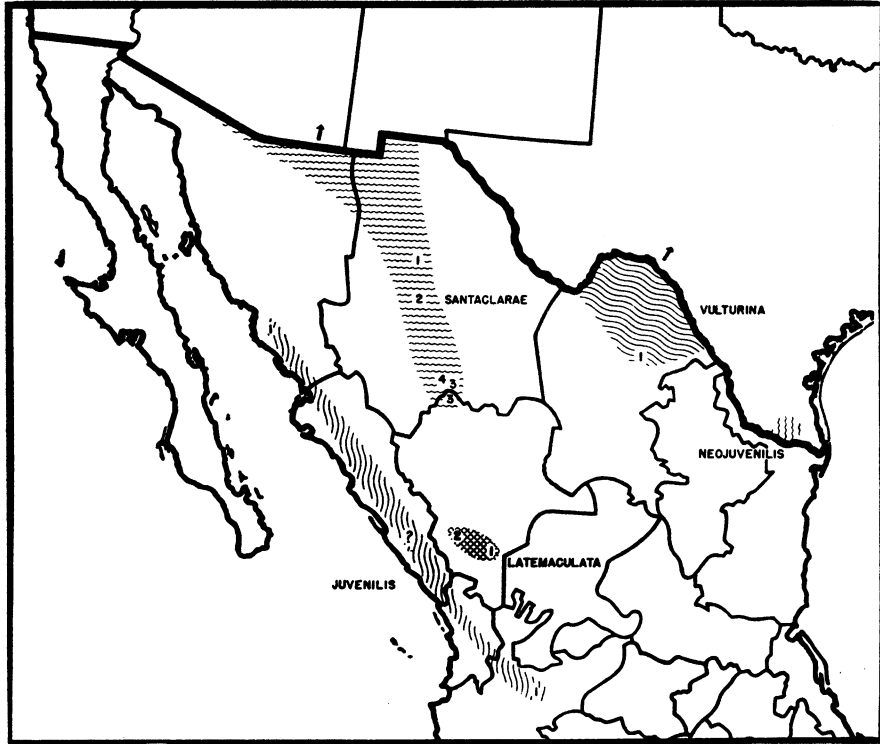


FIG. 5. Distribution of *Cicindela obsoleta* Say.

Black specimens will probably be found when additional collections are made in Coahuila.

TYPE LOCALITY: Texas: Eagle Pass.

GENERAL DISTRIBUTION: *Coahuila*: Mesa del Hillcoat, Sierra del Carmen (1), July, 7000 feet; Puerta de la Goriona, Sierra del Carmen, June 13, 1938, 4900 feet.

***Cicindela obsoleta latemaculata* Becker**

Text figures 44, 143

Cicindela obsoleta latemaculata BECKER, 1897 in W. Horn, *Deutsche Ent. Zeitschr.*, p. 169.

Thirty-eight specimens of this subspecies were collected in Durango just north of the type locality. All but one specimen are heavily marked and many of them more heavily so than figured by W. Horn (1938, pl. 77, fig. 5). One male taken in copulation with a heavily marked female resembles *juvenilis* Horn in that the markings are very narrow and interrupted. This is probably a normal variation in this subspecies, and the one mentioned under *juvenilis* by Horn as occurring in Ventanas, Durango, probably

belongs to this population rather than to *juvenilis*. On August 7, 1947, at Otinapa, Durango, 7500 feet, one black immaculate specimen of *thalestris* Bates was collected in the same spot with 20 specimens of *latemaculata*. There were no hybrids in the samples, and they are therefore considered as distinct species. *C. thalestris* is smaller, more robust, immaculate, and the under side of the thorax and abdomen are glabrous laterally. In color *latemaculata* varies from black to greenish black, the former being the most prevalent. The species was collected on open grassy hillsides in the pine forest. The general area was dry, but there was a small stream near by.

TYPE LOCALITY: Durango: Sierra del Nayar (1).

GENERAL DISTRIBUTION: *Durango*: Near Otinapa (2), August 7, 1947, 7500 feet; same general locality, August 11, 1947, 8200 feet.

***Cicindela obsoleta santaclarae* Bates**

Text figures 47, 145

Cicindela obsoleta santaclarae BATES, 1890, *Trans. Ent. Soc. London*, p. 493.

Cicindela obsoleta anita Dow, 1911, Ent. News, vol. 22, p. 271 (Fort Wingate, New Mexico).

The Mexican samples of this subspecies always have at least six white spots on the elytra, or the lunules may be complete or united along the margins. The color varies from black to reddish brown, cupreous green to brilliant green. It was found rather commonly at higher elevations in meadows, grasslands, and pastures among short grass. On San Francisco Mesa, Chihuahua, it was cool and cloudy, and the beetles were collected primarily by hand from among the grass (pl. 12, fig. 2; the legend to pl. 12, fig. 2, should read "Habitat of *Cicindela . . . obsoleta santaclarae . . .*"). In other localities and on warmer days, they had to be netted.

TYPE LOCALITY: Chihuahua: Santa Clara.

GENERAL DISTRIBUTION: *Chihuahua*: Summit, northeast of San Jose Babicora (1), July 4, 1947, 7700 feet; and 1 mile north of San Isidro (2), August 19, 1950; Charcos (3), Allende District, July 26, 1947, 6000 feet; San Francisco Mesa (4), Santa Barbara, Santa Barbara District, July 18, 1947, 7500 feet. *Durango*: Las Puentes (3), July 24, 1947, 7000 and 7500 feet.

***Cicindela obsoleta juvenilis* W. Horn**

Text figures 46, 146

Cicindela obsoleta juvenilis W. HORN, 1897, Deutsche Ent. Zeitschr., p. 169.

This is the smallest of the subspecies of *obsoleta* known to occur in Mexico, and according to W. Horn (1938) it is extremely variable in maculation. The known distribution is so discontinuous that it is difficult to anticipate its relationship with other Mexican subspecies and with *neojjuvenilis* Vogt from southern Texas.

TYPE LOCALITY: Jalisco: Guadalajara in the Barranca del Portillo (1).

GENERAL DISTRIBUTION: *Sonora*: Baka-chaka (1), Rio Mayo, July 6, 1935. *Sinaloa*: Venodio (?), August 18-27, 1918.

***Cicindela thalestris* Bates**

Text figures 48, 147

Cicindela thalestris BATES, 1890, Trans. Ent. Soc. London, p. 494.

This species has been considered in the past

to be a subspecies of *obsoleta* Say, but recent collections have shown that it is a distinct species even though it resembles superficially the immaculate green form of *obsoleta*. It can be separated from that species by the absence of pile on the sides of the prothorax, meta-thorax, and abdomen, and its smaller size and more robust shape. The difference in the labrum as given by Bates is not definitive, as specimens of both species have it three- or five-toothed. The entire series of 33 specimens collected in six localities is immaculate, and the color is black or green and red infuscated with black. In Mexico it occupies much of the same area as *obsoleta santaclarae* Bates and was found to occur sympatrically without intergrading with *obsoleta latemaculata* Becker.

TYPE LOCALITY: Durango: Ventanas.

GENERAL DISTRIBUTION: *Chihuahua*: Eight miles west of Matachic, July 8, 1947, 7200 feet. *Durango*: Durango City, August 14, 1947, 6200 feet; Otinapa, August 7, 1947, 7500 feet; Palos Colorados, August 5, 1947, 8000 feet; Coyotes, Durango District, August 8, 1947, 8300 feet; 6 miles northeast of El Salto, Durango District, August 10, 1947, 8500 feet; Sierra Madre de Durango; Sierra del Nayar, 9000-10,000 feet; El Temascal.

***Cicindela punctulata* Olivier**

Text figure 6

This is one of the most widely distributed species in the United States, where it is represented by the high-altitude form *chihuahuae* Bates and the lower-altitude form *punctulata*. At present only *chihuahuae* is represented in north central Mexico, but a hybrid specimen between *chihuahuae* and *punctulata* was collected in southern Coahuila, and *punctulata* will probably be found in the northern portion of that state. *Cicindela catharinae* Chevrolat has been considered to be a distinct species, but it is very similar to *chihuahuae* morphologically, and we have no evidence to support the conclusion that it is distinct. In the state of Chihuahua, where both *catharinae* and *chihuahuae* occur, the former is found at high elevations in the mountains whereas the latter occurs at lower elevations and on the central plateau. In Chihuahua the population of *chihuahuae* is uniformly blue, green, or purple, as in samples

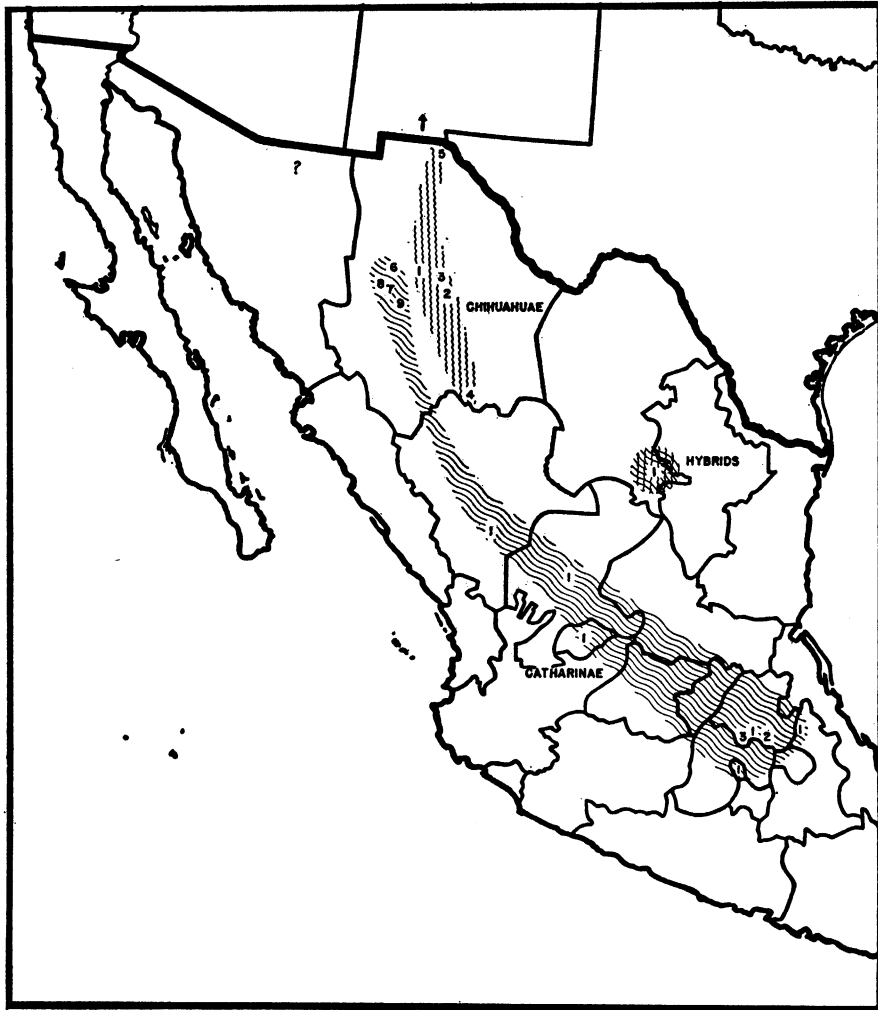


FIG. 6. Distribution of *Cicindela punctulata* Olivier.

from various localities in the United States; the form is slightly more robust; and the size is somewhat larger than in *catharinae*. In the samples of *catharinae* taken in the vicinity of San Jose Babicora and Matachic there is considerable variability in color and markings. The color varies from black, cupreous red, and brown to cupreous green and green, and the elytra from being almost fully maculated to immaculate. A small sample from Pedernales, Chihuahua, is all blue or green with the markings well represented, whereas one specimen from Durango City, Durango, is black. Those samples from south of Durango appear to be green or blue with variable markings. The variability in

catharinae is considered to be of a clinal nature, and it is expected that hybrids between this form and *chihuahuae* will be found. Therefore in view of the morphological similarity and the lack of information concerning reproductive isolation (they are allopatric), the three populations are herein considered to belong to one species, *punctulata*.

GENERAL DISTRIBUTION: United States, Mexico.

HYBRID DISTRIBUTION: One specimen from Saltillo (1), Coahuila, July, is a hybrid between *punctulata* and *chihuahuae*. Hybrids between *catharinae* and *chihuahuae* will probably be found along the eastern side of the Sierra Madre Occidental in Chihuahua.

KEY TO THE SUBSPECIES OF
Cicindela punctulata OLIVIER

1. Color greenish black, puncture spots green *punctulata*
Color black, black with red puncture spots, cupreous red, or brown, green, blue, or purple 2
2. Form elongate, slightly robust; color green, blue, or purple *chihuahuae*
Form narrower, shorter; color black, cupreous red or brown, green, or blue . . . *catharinae*

Cicindela punctulata punctulata Olivier

Cicindela punctulata OLIVIER, 1790, Entomologie, ou histoire naturelle des insectes . . . coléoptères, vol. 2, no. 33, p. 27.

This common United States subspecies has not been taken in Mexico so far as known but will probably be found in Coahuila or eastern Chihuahua.

TYPE LOCALITY: New Jersey.

Cicindela punctulata chihuahuae Bates

Text figures 49, 148

Cicindela punctulata chihuahuae BATES, 1890, Trans. Ent. Soc. London, p. 500.

No large Mexican samples of this subspecies have been available but apparently the population is entirely green, blue, or purple. They occur in a number of different types of habitats including the margins of fresh or alkaline streams, lakes, marshes, in dry open land, and on rocky hillsides.

TYPE LOCALITY: "North America, Arizona; Mexico, Santa Clara [1], Chihuahua, and Chihuahua City [2]."

GENERAL DISTRIBUTION: *Chihuahua*: Encinillas (3); Catarinas (4), July 25, 1947, 5800 feet; Ciudad Juarez (5). *Sonora*: Northern.

Cicindela punctulata catharinae Chevrolat

Text figures 50, 51, 149, 150

Cicindela catharinae CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 8, species no. 178, *Cicindela* no. 18.

This subspecies varies in color from brilliant green and blue, cupreous red and brown, and dark brown to black. The markings vary from being almost complete to being nearly absent, and the front and middle lunules may be connected along the margin. It was collected in dry washes along dirt roads, and in

grassy meadows where there were bare areas (pl. 12, fig. 2). It is closely related to *C. punctulata chihuahuae* Bates but is usually smaller in size, the elytra are not so profusely punctate, and the population variability is quite different; *catharinae* grades into reddish brown and completely black forms which do not exist in *chihuahuae*. In some areas it appears to be represented only in the green phase, in others only in the black, and in some samples all color variants are present.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Chihuahua*: Summit, northeast of San Jose Babicora (6), July 4, 1947, 7700 feet; Matachic (7), July 7, 1947; 2 miles west of Matachic (7), July 7, 1947, 6400 feet; 2 miles south of Matachic (7), August 21, 1950; Carta Blanca (8), 16 miles west of Matachic, July 8, 1947; 2 miles west of Pedernales (9), August 17, 1950. *Zacatecas*: Fresnillo (1), August 15, 1947, 7000 feet. *Hidalgo*: Llanos de Apam (2); Tula (3), June; Pachuca (1), July 28. *Distrito Federal*: Lake Tezcoco (1), August, 1923; San Angel (1), August; Mixcoac (1); Guadalupe (1), July; Mexico City (1), August 26, 1923. *Durango*: Durango City (1); Aguas Calientes (1), August 29, 1907. *Puebla*: Huachinango (1). *Mexico*: Teotihuacan, June 16, 1951.

Cicindela cyaniventris Chevrolat

Text figures 7, 52, 151

Cicindela cyaniventris CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 2, *Cicindela* no. 1.

Cicindela corvina LECONTE, 1857, Trans. Amer. Phil. Soc., new ser., vol. 11, p. 53 (northern Mexico, near the Rio Grande).

Cicindela chevrolatei W. HORN, 1892, Deutsche Ent. Zeitschr., p. 371 (Yucatan).

This species has been divided into three subspecies, two of which occur in Mexico. Additional material is necessary for the proper analysis of the subspecies, but based on the specimens available *cyaniventris* Chevrolat and *papillosa* Chaudoir appear to be distinct species. *Cicindela cyaniventris* appears to be confined to the eastern side of Mexico extending from Tamaulipas to Yucatan and into Central America. *Cicindela papillosa* occurs primarily in central and western Mexico from Durango to Oaxaca and into Central America. However, in Veracruz, and especially at Jalapa, the popu-

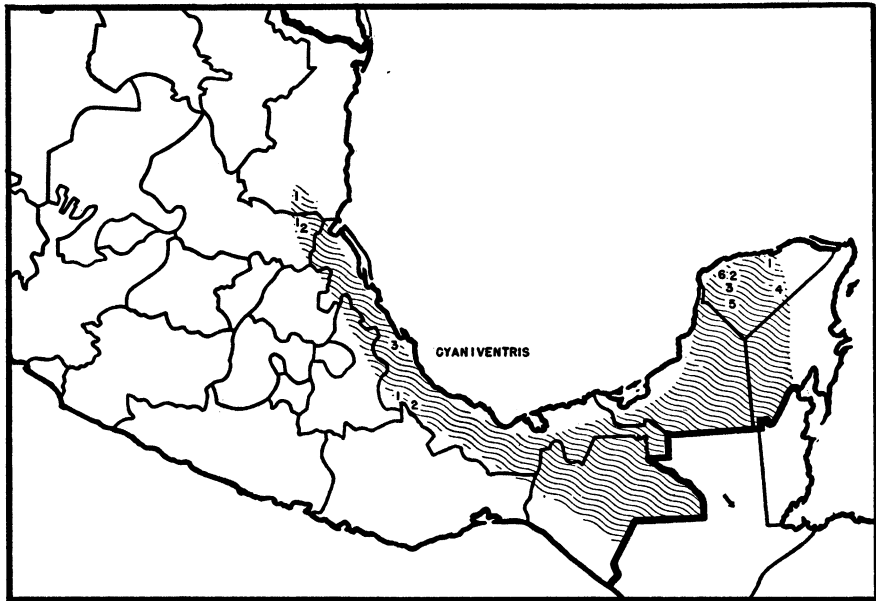


FIG. 7. Distribution of *Cicindela cyaniventris* Chevrolat.

lations are sympatric, and there appear to be no hybrids. Although they are very similar structurally and in color, one difference might indicate a more profound genetic change. In *cyaniventris* most of the specimens lack markings on the elytra but when they are present they are white. In the more western *papillosa* the populations have black markings.

In the northern section of the distribution of this species the elytra become more even, and there is a gradual reduction in the number of large green foveae. However, there is considerable variability in this character in some of the southern samples.

TYPE LOCALITY: Veracruz: Ojochico, Cordoba (1).

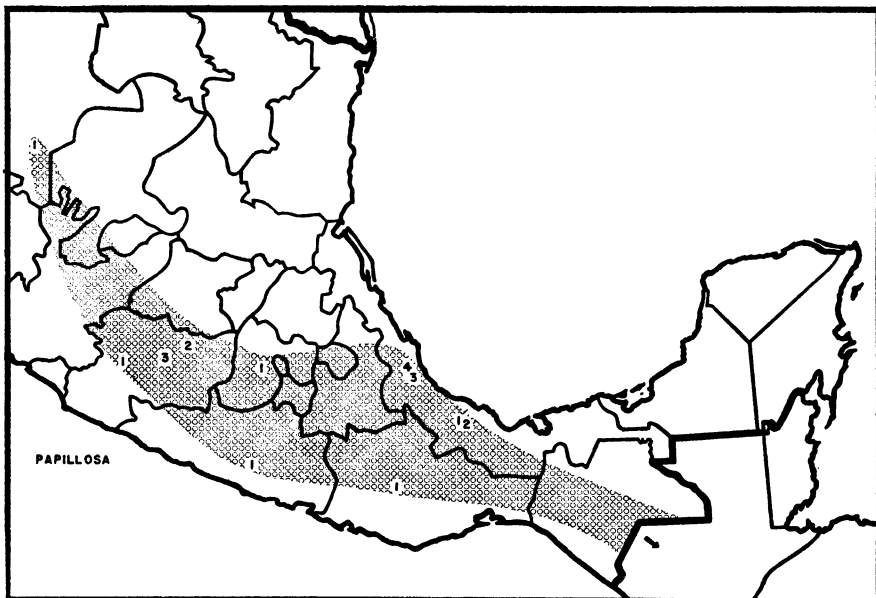


FIG. 8. Distribution of *Cicindela papillosa* Chaudoir.

GENERAL DISTRIBUTION: *Yucatan*: Temax (1), Chuminopolis (2), July 12, 1952; Dolores Otero (3), July 13, 1952; Valladolid (4), September 13, 1952; Uxmal (5), July 25, 1952; Hunucma (6), July 30, 1952. *Veracruz*: Cordoba (1); Motzorongo (2); Jalapa (3). *San Luis Potosi*: Between Barbarita and Aguazarca (1), June 18, 1949, 3600 feet; Valles (2), June 16, 1937, 300 feet. *Tamaulipas*: Ciudad Mante (1), June 18, 1949, 100 feet. Central America: Guatemala; British Honduras.

***Cicindela papillosa* Chaudoir**

Text figures 8, 53, 152

Cicindela papillosa CHAUDOIR, 1854, Bull. Soc. Imp. Nat. Moscou, vol. 27, no. 1, p. 123.

Since this species occurs from Mexico to Panama there is considerable doubt as to the status of *walkeriana* Thomson from Costa Rica and *chontalensis* Bates from Nicaragua; they may be but variants of this species or distinct species, the former being more probable. (See discussion under *cyaniventris* Chevrolat.)

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Michoacan*: Salto Tzararacua (1), June 17-18, 1947, 1490 meters; Morelia (2); Patzcuaro (3). *Oaxaca*: Oaxaca (1). *Veracruz*: Tuxtla (1); Catemarco (2); Coatepec (3); Jalapa (4). *Mexico*: Toluca (1). *Guerrero*: Omilteme (1), August, 8000 feet. *Durango*: Sierra de Durango (1). Central America: Nicaragua; Honduras; Panama.

***Cicindela guerrerensis* Bates**

Text figures 54, 153

Cicindela guerrerensis BATES, 1890, Trans. Ent. Soc. London, p. 499.

Three specimens of this distinct monotypic species have been examined. Two of these were coppery red above as in the types, but the third, from the same locality, was blue with purplish reflections both above and beneath.

TYPE LOCALITY: Guerrero: Tepetlapa, Chilpancingo.

GENERAL DISTRIBUTION: *Guerrero*: Apipilulco, August; Rio Balsas, August 4-8.

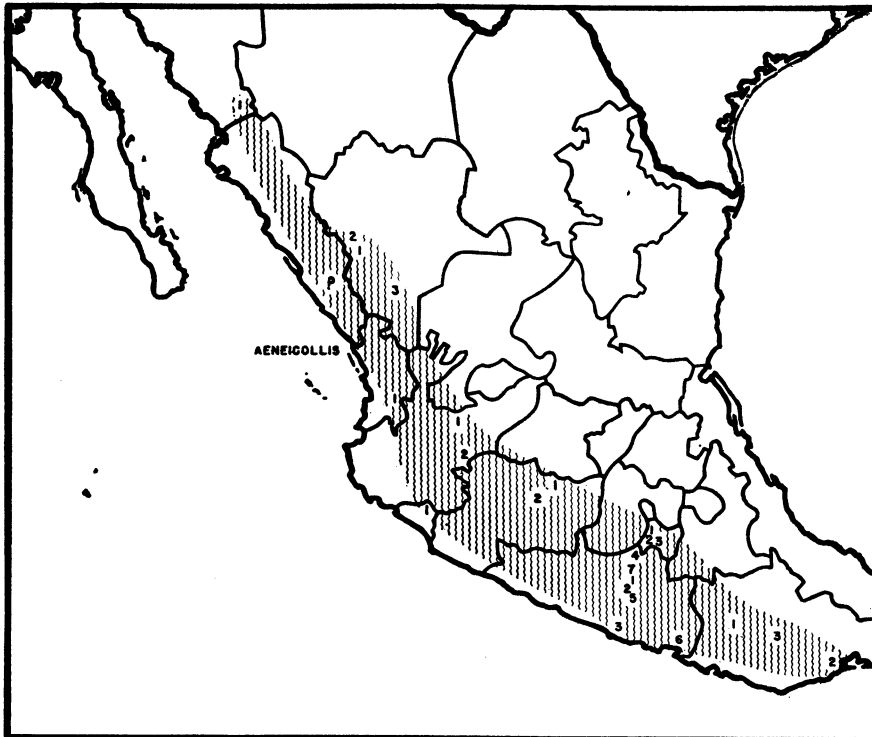


FIG. 9. Distribution of *Cicindela aeneicollis* Bates.

***Cicindela aeneicollis* Bates**

Text figures 9, 55, 154

Cicindela aeneicollis BATES, 1881, *Biologia Centrali-Americana*, Coleoptera, vol. 1, pt. 1, p. 13.

Cicindela aeneicollis var. *viridis* BECKER, 1897, in W. Horn, *Deutsche Ent. Zeitschr.*, p. 176.

The green variety *viridis* was proposed for specimens in the variable Michoacan population and does not represent a distinct subspecies. The typical form occurs both to the north and south of this state, and many of the specimens have a greenish tinge mixed with the coppery red color. It occurs in the western portion of Mexico in dry areas away from water in rocky situations devoid of vegetation (pl. 12, fig. 1). Near Cuernavaca specimens were collected in the bottom of an intermittent stream in mesquite park land.

TYPE LOCALITY: Oaxaca: Panistlahuca (1) (Panixtlahuca = San Miguel); Tehuantepec (2); Oaxaca (3).

GENERAL DISTRIBUTION: *Sonora:* Alamos (1), July 28, 1940; Minas Nuevas (1), August 7, 1952. *Sinaloa:* Venodio (?), July 23, 1918. *Nayarit:* Ixtlan del Rio (1), June 15, 1949.

Colima: Colima (1). *Jalisco:* Chapala (2); 9 miles east of Guadalajara (1), June 16, 1949, 5200 feet. *Michoacan:* Morelia (1); San Juan Tumbio; Patzcuaro (2); Apatzingan, July 21, 1947, 330 meters. *Guerrero:* Xalitla (1), June 16, 1946; Rio Balsas (2), August; Apipilulco (7), August; Chilpancingo (5); Acapulco (3); Iguala (4), August; Cerro de Plumas (6) (possibly Pluma Hidalgo, near Rio Capalita), *Morelos:* Cuernavaca (1); Taxco (Tasco) (2); Puente de Ixtla (3), July 4, 1900; Alpuyecá, June 27, 1951, July 3, 1951. *Durango:* Canelas (1), Ventanas (2), Sierra de Durango (3).

***Cicindela tenuisignata* LeConte**

Text figures 10, 56, 155

Cicindela tenuisignata LECONTE, 1851, *Ann. Lyc. Nat. Hist.*, New York, vol. 5, p. 171.

Cicindela psilogramma BATES, 1890, *Trans. Ent. Soc. London*, p. 507 (Villa Lerdo, Durango).

This monotypic species is widespread in the southwestern portion of the United States, does not appear to have undergone any geographical changes, and there is little intra-specific variability in available samples. It is most commonly collected along the sandy

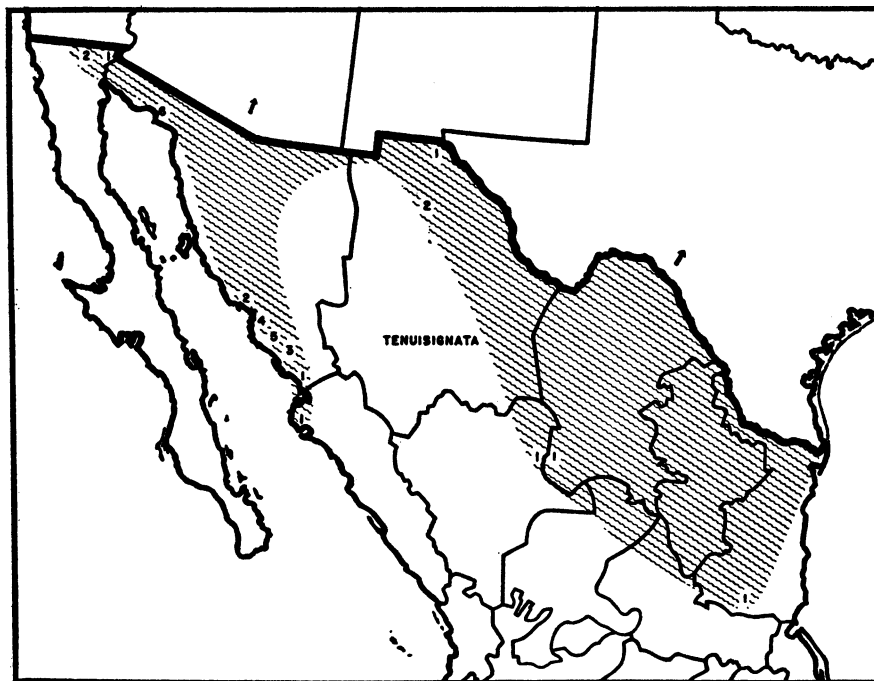


FIG. 10. Distribution of *Cicindela tenuisignata* LeConte.

margins of estuaries, streams, lakes, and irrigation ditches and is known from alkali flats in several areas.

TYPE LOCALITY: "Colorado Desert," probably California.

GENERAL DISTRIBUTION: *Baja California*: Seventeen miles southeast of Mexicali (2), June 15, 1952; Algodones (1), June 28, 1952. *Sonora*: Agiobampo Estuary (1), April; Empalme (2), April; Navojoa (3), April 27, 1949, 150 feet; Cochore Beach, Empalme (2), July 26, 1952; Obregon (4), July 29, 1952; Rio Yaqui near Cocorit (5), July 29, 1952; La Choya (6), June 12, 1952; Agua Caliente near Los Hornos (4), July 29, 1952. *Sinaloa*: Los Mochis (1), July. *Chihuahua*: Ciudad

Juarez (1); Villa Ahumada (2), June 28, 1947. *Durango*: Lerdo (1), July 23; Gomez Palacio (1), May, 1918. *Coahuila*: Torreon (1), July 22. *Tamaulipas*: Ciudad Mante (1), June 4, 1935.

Cicindela fera Chevrolat

Text figures 11, 57, 156

Cicindela fera CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 2, *Cicindela* no. 4.

Cicindela tenuilineata AUDOUIN AND BRULLÉ, 1839, Arch. Mus. Hist. Nat., Paris, vol. 1, p. 128 (Mexico).

This monotypic species shows comparatively little variability throughout its dis-

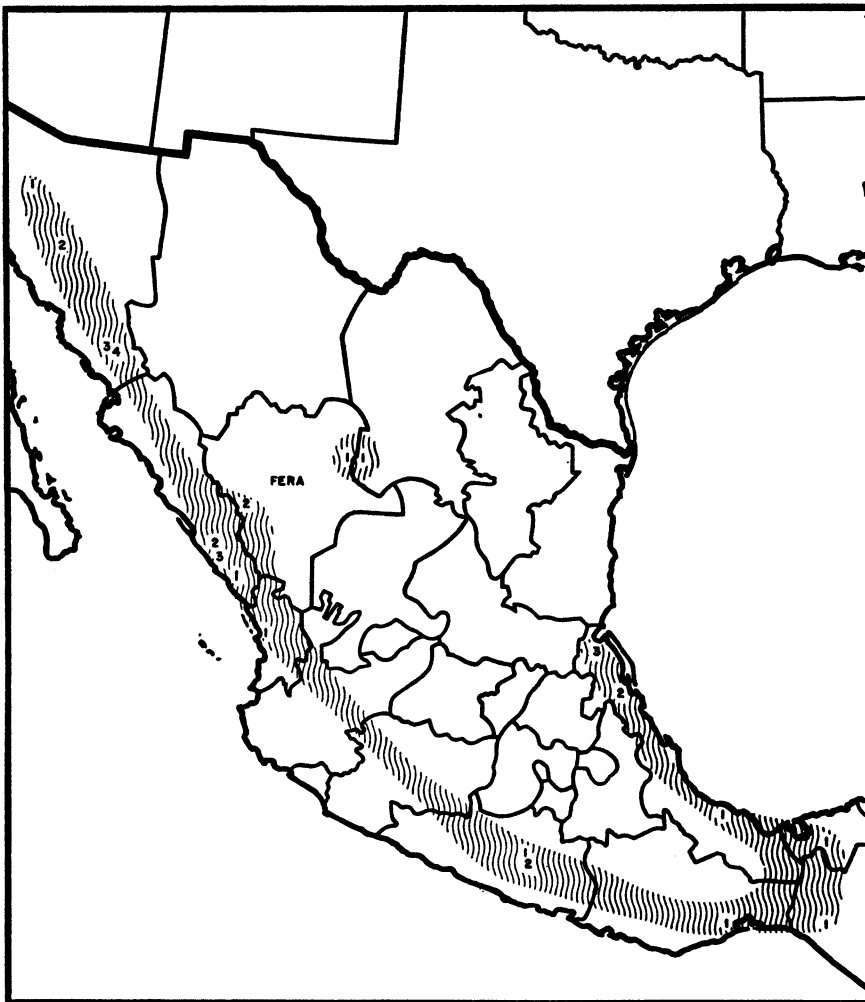


FIG. 11. Distribution of *Cicindela fera* Chevrolat.

tribution in central and southern Mexico. However, in the samples from Sonora the elytral markings, especially the humeral and middle lunules, are pale orange in color, and in a few specimens all the lunules are deep orange as in *sommeri*. Samples from Sinaloa also show this difference which decreases in frequency as the distribution extends southward, until in the Veracruz samples all markings are pale and narrower. It is one of the more common inhabitants of sandy banks of

(1); Ventanas (2). *Coahuila*: Torreon (1). *Oaxaca*: Tehuantepec (1), July 16, 1947. *Tabasco*: San Juan Bautista (1). *Veracruz*: Tuxpan (2), February; Tlacotalpam (1); Panuco River (3), March 25, 1948. *Chiapas*: Santa Cruz (1), February 27, 1948.

***Cincindela sinaloae* Bates**

Text figure 12

Until the present writing and the collection of additional samples by the Vauries in 1953,

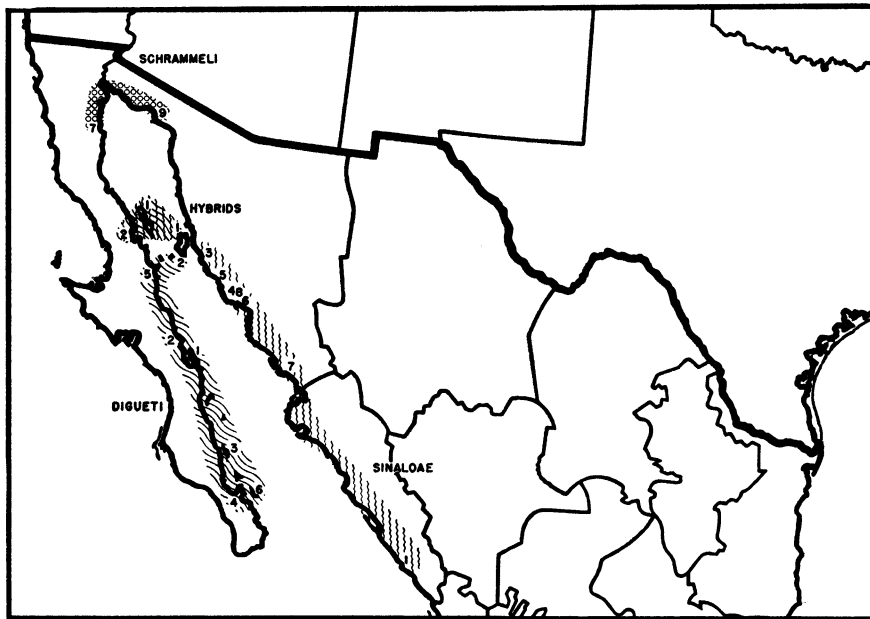


FIG. 12. Distribution of *Cincindela sinaloae* Bates.

streams and also occurs along the seashore (pl. 10, fig. 1).

TYPE LOCALITY: None given.

GENERAL DISTRIBUTION: *Sonora*: Pitiquito (1), July 4, 1952; El Gavilan (2), July 19, 1952; Rio Yaqui near Cocorit (3), July 29, 1952; Santa Rosa Ranch near Navajoa (4), August 2, 1952; Hermosillo (2), July 19, 1952. *Sinaloa*: Rosario (1), Rio de Buluarte, May 12, 1949, 150 feet, March 19, 1918; Presidio River near Union (3), September 26, 1918; Camino Real de Piaxtla (2), May 3, 1949, 200 feet; Villa Union (3), May 11, 1949. *Nayarit*: Los Corchos (1), 20 miles west of Santiago, Ixcuintla, May 14, 1949, sea level. *Guerrero*: Rio Balsas (1), August 4-6; Mexcala (2), June 3, 1946. *Durango*: Villa Lerdo

C. sinaloae Bates and *C. digueti* W. Horn have been treated as closely related but distinct species (Cazier, 1948). Large collections made in 1952 and 1953 at the head of the Gulf of California, on Tiburon Island, mainland Sonora, and Mazatlan, Sinaloa, show that they are but subspecies of the same species. In all basic structural features, the Mazatlan (type locality for *sinaloae*) sample agrees with the Baja California population of *diguetti*, and the original descriptions fail to disclose any differences of specific value.

Cincindela sinaloae digueti occurs on the Gulf side of Baja California, and on several of the islands off the coast. The samples taken in the area south of Bahia de los Angeles are rather uniform in color, being a dark shining brown,



1



2

1. Habitat of *Cicindela sedecimpunctata*, *lemniscata*, *wickhami*, *hydrophoba taretana*, and *aeneicollis*. Minas Nuevas, Sonora

2. Habitat of *Cicindela aterrima*, *obsoleta*, *santaclarae*, *punctulata catharinae*, *sedecimpunctata*, and *flohri*. Continental divide east of San Jose de Babicora, Chihuahua

the average size is large, and the markings are usually broken up into isolated spots and not connected along the lateral margins. Specimens from Angeles Bay and Mejia Island are both brown and greenish and appear to be hybrids between *digueti* and *sinaloae*. A series of 117 specimens taken on the north end of the island of Tiburon shows every possible combination of characters between *digueti* and *sinaloae* and is considered to be a hybrid population. One specimen from Isla de los Patos, just north of Tiburon, resembles *digueti* but is also similar to some of the specimens from north Tiburon and is considered to represent a hybrid population. On the south end of Tiburon, 32 specimens show a completely different type of variability from that found in the series from the northern end. The specimens are larger, all but one are dark reddish brown, and only two specimens have the elytral markings connected along the margin. This sample, in spite of its close geographical proximity to *sinaloae*, is considered to be *digueti*. This difference between the faunas of the north and south ends of Tiburon is supported by the observations of Van Rossem (1932) on the avifauna and in the flora by Johnston (1924).

On the mainland of Sonora, extending from Kino Bay opposite the southern end of Tiburon to Yavaros in the southern portion of the state, and at Mazatlan, Sinaloa, the samples of *sinaloae* are relatively uniform in composition and quite unlike those of either *digueti* or the hybrids. The color is primarily an opaque green or blue, with only a few brown individuals, and the elytral markings except in a few individuals are expanded along the margins. The average size is smaller than in *digueti*, and the size range is not so great as in the hybrids. In *digueti* the surface is shining, in *sinaloae* it is opaque, and the hybrids are mixed in this character.

No specimens of *sinaloae* have been found in the area north of Kino Bay, and the species does not appear again except at La Choya near the head of the Gulf in Sonora and at San Felipe in Baja California. Specimens from the latter two localities are alike and represent a population that is distinct from either *digueti* or *sinaloae* although more closely resembling the latter. The average size is much smaller than in *sinaloae* or *digueti*, the elytral

markings are more complete and more expanded along the margins, and the color is uniformly opaque green. As a population it is quite distinct from either *digueti* or *sinaloae* and is herein named *schrammeli*.

GENERAL DISTRIBUTION: Baja California, Sonora, Sinaloa.

HYBRID DISTRIBUTION: *Baja California*: Mejia Island (1), Gulf of California, June 28, 1921; Angeles Bay (2), Gulf of California, June 25, 1921. *Sonora*: Tiburon Island, north end (1), July 10, 1952. Habitat shown in plate 10, figure 2, the legend of which should read "Habitat of *Cicindela* . . . *digueti* × *sinaloae* hybrids."

KEY TO THE SUBSPECIES OF *Cicindela sinaloae* BATES

1. Color dark reddish brown; elytral lunules usually incomplete and indicated by isolated spots; size large, 10–12.5 mm. *digueti*
- Color green or greenish brown; elytral lunules usually complete; size medium to small 2
2. Size small (7–9 mm.); elytra heavily maculated *schrammeli*
- Size medium (9.5–11.0 mm.); elytra not so heavily maculated *sinaloae*

Cicindela sinaloae sinaloae Bates

Text figures, 60, 159

Cicindela sinaloae BATES, 1890, *Trans. Ent. Soc. London*, p. 505.

Similar to *digueti* but smaller in average size, the color is cupreous green rather than dark reddish brown, and the elytral maculations are more complete. The middle lunule is expanded along the lateral margins and is sometimes connected with both basal and apical lunules. The inner projection of the basal and middle lunules is either interrupted or complete, and the apical lunule is always complete.

Specimens have been collected on open sandy beaches, in grassy inlets behind the beaches, on sandy strips in small bays, and by jack-lighting at night among dune plants.

TYPE LOCALITY: Sinaloa: Mazatlan.

GENERAL DISTRIBUTION: *Sonora*: Kino Bay (3), July 14, 1952; San Carlos Bay, 16 miles west of Guaymas (4), July 25, 1952, July 8, 1921 (E. P. Van Duzee); Tastiota (5), July 18, 1952; Cocho Beach, Empalme (6), July 26, 1952, August 6, 1950 (R. P. Allen);

Yavaros (7), July 31, 1952; Miramar, Guaymas (8), July 25, 1952. *Sinaloa*: Mazatlan (1), August 2, 1953 (C. and P. Vaurie).

***Cicindela sinaloae digueti* W. Horn**

Text figures 58, 157

Cicindela digueti W. HORN, 1897, Deutsche Ent. Zeitschr., p. 186.

As indicated in the preceding discussions, *digueti* is closely related to *sinaloae* and, judging from its distributional picture, it started to diverge from *sinaloae* on the northern end of Tiburon Island. These hybrids were able to cross the Gulf to the area around Mejia Island and Angeles Bay, but as the distribution spread southward the populations changed into what we now know as *digueti*. The same changes occurred on Tiburon Island as the hybrid population migrated southward and developed into a population that is phenotypically inseparable from the Baja California *digueti*. Habitat shown in plate 11, figure 1, the legend of which should read "Habitat of *Cicindela sinaloae digueti*. . . ."

TYPE LOCALITY: "California inf."

GENERAL DISTRIBUTION: *Baja California*: "Insel San José"; Coyote Cove, Conception Bay (1), June 29, 1938; 12 miles south of Santa Rosalia (2), June 27, 1938; San Jose Island (3), Gulf of California, June 10, 1921; La Paz (4), June 4, 1921; San Francisquito Bay (5), Gulf of California, May 10, 1921; Ceralbo Island (6), Gulf of California, June 6, 1921. *Sonora*: Tiburon Island, south end (2), July 13, 1952.

***Cicindela sinaloae schrammeli*, new subspecies**

Text figures 59, 158

Similar to *sinaloae* but differing in being smaller in size and by having the elytral maculations broader and usually widely connected along the lateral margins. It can be separated from *digueti* by its small size, greenish color, and wide elytral lunules. Length, 7-9 mm.; width, 2.5-3.5 mm.

TYPE MATERIAL: Holotype male, allotype female, and 57 paratopotypes collected at La Choya (9), Sonora, Mexico, June 12, 1952 (R. Schrammel, W. Gertsch, and M. Cazier). Twenty-four paratopotypes collected on August 16, 1952 (C. and P. Vaurie). Two paratypes collected at San Felipe (7), Baja Cali-

fornia, June 15, 1952 (R. Schrammel, W. Gertsch, and M. Cazier).

***Cicindela bradti*, new species**

Text figures 61, 160

Medium sized, somewhat narrow and elongate; color brown, opaque; elytral lunules narrowly connected, inner projections evident; head bare except for ocular setae; pronotum sparsely pilose laterally; elytra separately rounded to sutural spine; anterior and middle trochanters with subapical setae.

MALE: Head bare, color brown, with cupreous reflections, vertex and front finely rugose and feebly striate, front shallowly impressed, head including eyes wider than pronotum; antennal segments 1 to 4 green, scape with single subapical seta; labrum narrow, anterior margin shallowly sinuate medially, not dentate, single submarginal row of four setae; maxillary and labial palpi testaceous except for green apical segments; gena bare. Pronotum one-third wider than long, widest at apical third, side margins rounded, more strongly constricted basally, disc feebly convex, transverse impressions shallowly impressed, longitudinal impression shallow, surface shallowly rugose, lateral margins sparsely pilose. Elytra with side margins subparallel, widest at apical fifth, apical margins finely serrate, obliquely constricted and separately, obtusely rounded to suture, sutural spine short, surface moderately densely punctate, punctures green and slightly impressed, humeral lunule complete, C-shaped, narrowly connected to middle lunule along lateral margin, middle lunule with short transverse bar, inner portion projecting obliquely posteriorly, interrupted at middle, narrowly connected to apical lunule along lateral margin, apical lunule complete and reaching suture, inner portion slightly recurved towards lateral margin. Under surface cupreous green except for fifth and sixth abdominal segments which are testaceous, episternites and lateral margins of abdomen sparsely pilose, trochanters rufo-testaceous, femora with cupreous green reflections, tibiae cupreous green. Length, 9.0 mm.; width, 3.5 mm.

FEMALE: Similar to the male in every respect except that the labrum is strongly unidentate medially and the apices of the elytra are more deeply indented to the suture.

TYPE MATERIAL: Holotype male, allotype female, and six paratopotypes collected 10 miles south of Santiago Ixcuintla, Nayarit, Mexico, 100 feet, May 15, 1949. Five paratypes collected at San Blas, Nayarit, sea level, April 18, 1949, and six paratypes collected at Los Corchos, 20 miles west of Santiago Ixcuintla, Nayarit, sea level, May 14, 1949. All specimens were collected by Mr. George M. Bradt in whose honor the species is named.

This species is most closely related to *C. sinaloae* Bates but can be separated from it by the fact that the elytra are widest at the apical third to fifth and the labrum in the female is unidentate and in the male either truncate or sinuate medially. In the male the apex of the penis is more elongate in *bradti* than in *sinaloae*.

***Cicindela severa* La Ferté**

It still remains uncertain as to whether or not this species is polytypic, since only one Mexican specimen is available for examination. However, in view of the existence of a widely maculated population in Yucatan, it is considered as being polytypic in the present paper, with both subspecies occurring in Mexico. The species is confined to the sea coast and is most commonly collected in open areas in saline marshes along the coast. Records from states in the interior are undoubtedly based on misidentifications, and are probably *circumpicta* La Ferté rather than this species.

GENERAL DISTRIBUTION: *United States*: Florida, Alabama, Louisiana, Texas. *Mexico*: Tamaulipas, Yucatan.

HYBRID DISTRIBUTION: No hybrid areas are known in Mexico.

KEY TO THE SUBSPECIES OF *Cicindela severa*
LA FERTÉ

Humeral and middle elytral lunules represented only by small inner spots *severa*
Humeral and middle elytral lunules well developed *yucatanana*

***Cicindela severa severa* La Ferté**

Text figures 64, 161

Cicindela severa LA FERTÉ, 1841, Rev. Zool., Paris, vol. 4, p. 41.

In the United States this subspecies varies from black to green in various samples, and the black form, although it has been de-

scribed, is here considered as an individual variant.

TYPE LOCALITY: Texas.

GENERAL DISTRIBUTION: *Tamaulipas*: Tampico; La Pesca, May 17, 1952.

***Cicindela severa yucatanana* W. Horn**

Cicindela yucatanana W. HORN, 1896, Deutsche Ent. Zeitschr., no. 2, p. 354.

No specimens of this subspecies have been available for study but the geographical distribution and differentiation seem to parallel, in part, those of *hamata* Audouin and Brullé except that in this species the elytral lunules are more distinct in the Yucatan population. In *hamata pallifera* Chaudoir the elytral markings are confused and the lunules broadly coalescent in Yucatan.

TYPE LOCALITY: Yucatan.

GENERAL DISTRIBUTION: Yucatan.

***Cicindela rockefelleri*, new species**

Text figures, 65, 162

Medium-sized, robust; color cupreous brown with greenish reflections; elytral lunules broadly united along margin, inner projections not or scarcely evident; pronotum bare or with few scattered hairs; head bare except for ocular setae; male with apex of elytra evenly rounded to suture which is feebly spined; female with apex of elytra separately rounded to suture which is strongly spined.

MALE: Head bare, color cupreous green, vertex and front finely wrinkled and shallowly striate, front not impressed, head including eyes wider than pronotum; antennal scape ferrugino-testaceous with greenish reflections, segments 2, 3, and 4 green, 5 to 11 ferrugineous, scape with two subapical setae and one median seta; labrum moderately wide, feebly produced, and tridentate medially, single submarginal row of six setae; maxillary and labial palpi testaceous except for brown apical segment; gena bare. Pronotum only slightly wider than long, widest at apical third, margins feebly constricted apically, strongly constricted towards base, disc feebly convex, transverse impressions moderately deep, longitudinal impression shallow, surface finely, shallowly wrinkled, glabrous except for a few lateral hairs along anterior margin. Elytra with side margins

subparallel, widest at apical third, apical margins finely serrate, obliquely constricted, and slightly rounded to suture, pigmented discal area shallowly, irregularly punctate, punctures separated by about their own widths. Under surface of thorax with episterna cupreous green, sterna green, abdomen and legs piceous with cupreous or greenish reflections, episternites and lateral margins of abdomen sparsely pilose throughout, pile decumbent, prosternum glabrous, front and middle trochanters with subapical seta. Length, 11.5 mm.; width, 4.5 mm.

FEMALE: Similar to the male in every respect except that the apical margins of the elytra are separately rounded to the suture. Length, 12.0 mm.; width, 5.0 mm.

TYPE MATERIAL: Holotype male, allotype female, and 114 paratopotypes collected at La Choya, Sonora, Mexico, June 12, 1952 (R. Schrammel, W. Gertsch, M. Cazier). This species is named in honor of Dr. David Rockefeller whose continued interest and support have enabled us to make large Mexican collections.

There is comparatively little variability in the series, although a few specimens are dark brown with only slight cupreous reflections. The elytral markings show little variability except that in a few specimens the inner portion of the lunules is slightly more evident. Although *rockefelleri* runs to the same dichotomy in the key as *severa*, it is actually only distantly related and can be separated as shown in the key. From *euryscopia* Bates it can be separated by the glabrous gena and pronotum, by the wrinkled rather than rugose pronotum, and by the fact that the legs are short and the elytral apices are rounded rather than pointed. Superficially it resembles *californicus mojavi* Cazier, with which it is sympatric, but it can be separated by the glabrous pronotum, less deeply sculptured head and pronotum, by the fact that the pronotum is widest at the anterior third rather than medially, and by its smaller size.

Cicindela hoguei Bates

Text figure 66

Cicindela hoguei BATES, 1881, *Biologia Centrali-Americana*, Coleoptera, vol. 1, pt. 1, p. 6.

No specimens of this species have been available for study, but the following transla-

tion of the original description may facilitate identification. "Elongate, rectangular, subdepressed, green or dark cupreous, opaque; vertical epipleura of elytra polished, with a narrow, white, winding submarginal vitta; body beneath dark blue; episterna cupreous, alutaceous, glabrous; femora golden cupreous, tibiae and tarsi rufus tinged with cupreous; labrum long, white, produced anteriorly, broadly truncate, conspicuously dentate medially in both male and female; palpi rufo-testaceous, last segment large; head broadly depressed above, confluent strigate, front tumid and with median whorls; thorax round; narrowed posteriorly, surface shallowly rugose; elytral apices rounded, narrowly open before suture, dorsal surface finely strigulose, foveal punctures marked not numerous."

TYPE LOCALITY: Oaxaca: Oaxaca; Juquila (listed as Santa Catarina).

GENERAL DISTRIBUTION: Oaxaca: Villa Alta; Talca.

Cicindela nudata W. Horn

Text figure 62

Cicindela nudata W. HORN, 1915, in Wytzman, *Genera insectorum*, fasc. 82A, p. 384; new name.

Cicindela beckeri HÖGE, 1897, in W. Horn, *Deutsche Ent. Zeitschr.*, p. 185; preoccupied by *beckeri* W. Horn, 1897.

No specimens of this species have been available for study, but the following translation of Höge's description will aid in its identification. "Somewhat like *ioessae*; color cupreous purple, slightly shining, head and thorax entirely but lightly sculptured; labrum in front transversely truncate, without teeth; thorax slightly dilated anteriorly [or slightly constricted posteriorly]; elytra rarely punctate anteriorly, sparsely punctate posteriorly, apices strongly, separately rounded, unequally impressed, humeral margin much less abruptly reflexed, middle and apex less flattened [lateral margin slightly declivous to outer apical angles]; white longitudinal submarginal vittae, beginning behind the humerus, ending slightly before apex, short internal projection before middle. Body beneath bare [except coxae]; color below violaceous. Length, 8 mm."

TYPE LOCALITY: Canelas, Durango.

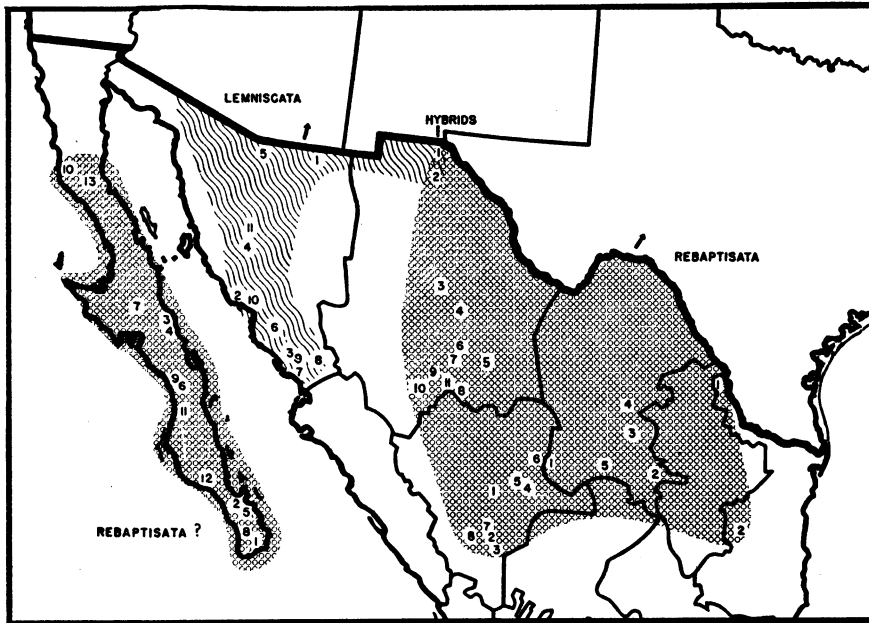


FIG. 13. Distribution of *Cicindela lemniscata* LeConte.

***Cicindela lemniscata* LeConte**

Text figure 13

This Sonora species is now divided into two subspecies, one from the west and the other from the east side of the Sierra Madre Occidental. It has a rather extensive distribution in the southwestern United States in the desert areas, and the two subspecies apparently meet and hybridize in southwestern New Mexico and northern Chihuahua. It occurs along the banks of streams and ponds, in dry lake beds, and also away from water among grasses in sandy or clay soils. It is most commonly collected at night around lights.

GENERAL DISTRIBUTION: United States. Mexico: Baja California, Sonora, Chihuahua, Durango, Coahuila, Tamaulipas.

HYBRID DISTRIBUTION: *New Mexico*: Deming, Lordsburg, and Grand County. *Chihuahua*: Samalayuca (2); Ciudad Juarez (1).

KEY TO THE SUBSPECIES OF *Cicindela lemniscata* LECONTE

Femora testaceous or transparent, occasionally with slight metallic reflections on upper surface *lemniscata*

Femora strongly pigmented red or green *rebaptisata*

***Cicindela lemniscata lemniscata* LeConte**

Cicindela lemniscata LECONTE, 1854, Proc. Acad. Nat. Sci. Philadelphia, vol. 7, p. 220.

For many years this species was recorded in the literature as being monotypic. However, Vaurie (1950) discovered that it was divisible into two geographically distinct subspecies with an intermediate area of intergradation. This division is very evident in Mexico proper, but the population from Baja California, which from a distributional standpoint should be *lemniscata*, is actually *rebaptisata* Vaurie, although the specimens have the apex of the femora and at least the base of the tibiae testaceous. Habitat shown in plate 12, fig. 1.

TYPE LOCALITY: "San Diego trip."

GENERAL DISTRIBUTION: *Sonora*: Agua Prieta (1), August; Posa (4), September; Guaymas (2), August; Rio Mayo (3), June; Agua Zarca (5), August 6, 1952; Obregon (6), July 29, 1952; Yavaros (7), July 31, 1952; Minas Nuevas (8), August 7, 1952; Santa Rosa Ranch, north of Navojoa (9), August 2, 1952; Empalme, Cochore Beach (10), July 26, 1952; Hermosillo (11), July 10, 1952.

***Cicindela lemniscata rebaptisata* Vaurie**

Text figures 63, 163

Cicindela lemniscata rufipes VAURIE, 1950, Amer. Mus. Novitates, no. 1458, p. 5.*Cicindela lemniscata rebaptisata* VAURIE, 1951, Amer. Mus. Novitates, no. 1479, p. 12.

Vaurie (1950) records seven paratypes of this subspecies from Samalayuca, Chihuahua. On examining these and many additional specimens collected recently in this locality, we found that this population more properly belongs with the hybrids. There is every gradation in the pigmentation of the femora from cupreous red to testaceous and transparent.

TYPE LOCALITY: Texas: Culberson County, Van Horn, July 10, 1948 (C. and P. Vaurie).

GENERAL DISTRIBUTION: *Chihuahua*: Chihuahua City (3), July 18, 1907; Delicias (4), and 10 miles south of Delicias (4), July 11, 1947, 4150 feet; 10 miles north of Jimenez (5), September 10, 1950; 20 miles southwest of Camargo (6), July 13, 1947, 4500 feet; 42 miles southwest of Camargo (7), July 15, 1947, 4900 feet; Santa Barbara (8), July 18, 1947, 6300 feet; Valle de Olivos (9), July 20, 1947, 5500 feet; 63 miles west of Santa Barbara (10), July 20, 1947, 5500 feet; 1 mile east of La Saucedá (11), July 21, 1947, 7000 feet. *Durango*: San Juan del Rio (1), July 30, 1947, 5200 feet; Durango City (2); Nombre de Dios (3), August 13, 1947, August 6, 1951, 5900 feet; Cuencame (4), August 19, 1947, 5500 feet; Pedricena (5), August 19, 1947, 4500 feet; Lerdo (6), July 7, 1918; Cerro Mercado (7); Coyote (8). *Coahuila*: Torreon (1), July; Cabos (5), August 21, 1947, 4000 feet; Saltillo (2), July; Guadalupe (3), August 23, 1947; La Gloria (4), south of Monclova, August 24, 1947, 3300 feet. *Tamaulipas*: Nuevo Laredo (1); Tlahualilo (2), July. *Baja California*: San Jose del Cabo (1); La Paz (2), October 7, 1941; Santa Rosalia (3); El Mogote; 25 miles south of Santa Rosalia (4), July 25, 1938; Triunfo (5), July 13, 1938; 20 miles north of Comondú (6), July 23, 1938; 45 miles north of San Ignacio (7), July 27, 1938; Todos Santos (8), October 10, 1941; Purissima (9), October; 7 miles east of El Rosario (10), September 1, 1951; 10 miles west of San Agustin (13); September 2, 1951; San Venancio (12), October 8, 1941; 15

miles south of San Domingo (11), October 4, 1941.

***Cicindela politula* LeConte**

This polytypic species is known only from Texas and Coahuila, Mexico, and both subspecies occur in Mexico. It is collected in dry areas along dirt roads and on open hillsides.

GENERAL DISTRIBUTION: Texas, Mexico.

HYBRID DISTRIBUTION: No hybrid populations are known at the present time but will probably be found in northern Coahuila and Texas.

KEY TO THE SUBSPECIES OF *Cicindela politula* LECONTE

Color green to purplish blue *laetipennis*
Color black *politula*

***Cicindela politula politula* LeConte**

Text figures 67, 164

Cicindela politula LECONTE, 1875, Trans. Amer. Ent. Soc., vol. 5, p. 159.*Cicindela politula cribrum* CASEY, 1913, Memoirs on the Coleoptera, vol. 4, p. 39 (Texas).

One black immaculate specimen that agrees with individuals in the Texas population was collected in Coahuila about 90 miles north of the type locality of *laetipennis* W. Horn. The intermediates between these two subspecies will probably be found in the areas between Saltillo and Texas or Monterey and Saltillo.

TYPE LOCALITY: Texas.

GENERAL DISTRIBUTION: *Coahuila*: La Gloria, south of Monclova, August 24, 1947, 3300 feet. *Nuevo Leon*: Monterey.

***Cicindela politula laetipennis* W. Horn**

Text figures 68, 165

Cicindela politula laetipennis W. HORN, 1913, Arch. Naturgesch., vol. 79, div. A, no. 11, p. 32.*Cicindela alleni* CAZIER, 1939, Bull. Brooklyn Ent. Soc., vol. 34, no. 1, p. 24 (United States, Texas); new synonym.

Comparison of the holotype of *alleni* Cazier with six topotypes of *laetipennis* has shown the former to be a synonym. In the topotypical series the color varies from green to purplish blue and the markings vary from being fully developed to entirely absent.

TYPE LOCALITY: Saltillo, Coahuila.

GENERAL DISTRIBUTION: No additional Mexican localities are known.

***Cicindela radians* Chevrolat**

Text figures 69, 166

Cicindela radians CHEVROLAT, 1841, Mag. Zool., Paris, ser. 2, vol. 3, p. 5, pl. 57.

This monotypic species is one of three occurring in Mexico in which the elytral maculations consist of a pattern of different colors rather than the almost universal white or orange lunules. They occur along roads in damp areas and around springs or damp spots in open areas.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Veracruz*: Tox-pam; Cordoba; Jalapa; Veracruz; Mirador; Sierra de Zongolica. *Chiapas*: Tapachula; Colonia; Chiapas; Pacific slope of the Cordilleras, 800–1000 meters. Central America: British Honduras; Guatemala; El Salvador.

***Cicindela aurora* Thomson**

Text figures 70, 167

Cicindela aurora THOMSON, 1859, Arcana Nat., Paris, p. 90.

Only two specimens of this monotypic species have been examined. It is probably the most beautiful of all the Mexican tigers but appears to be rather rare in collections.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Oaxaca*: Panixtlahuca (San Miguel); Juquila (Santa Catarina). *Guerrero*: Cerro de Plumas (possibly Pluma Hidalgo near Rio Copalita).

***Cicindela vasseleti* Chevrolat**

Text figures 71, 168

Cicindela vasseleti CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 2, *Cicindela* no. 7.

This monotypic species is much less brilliantly colored than either *aurora* Thomson or *radians* Chevrolat, and although it might be suspected of being a subspecies of *radians* it cannot be because of their sympatric distribution and the lack of intergrading forms. The species occurs on sand bars along rivers.

TYPE LOCALITY: Veracruz.

GENERAL DISTRIBUTION: *Veracruz*: Motzorongo; Playa Vicente; Cosamaloapam; Coapiloloya, May 9–30; Coapiloloya Minatitlan, May, June; St. Lucrecia; Minatitlan, May 28 to June 9, 1905. Central America: Guatemala; British Honduras; El Salvador.

***Cicindela phosphora* Dejean**

Text figures 72, 169

Cicindela phosphora DEJEAN, 1878, Cistula Ent., vol. 2, p. 329.

Only two specimens that might belong to this species have been available for study, but they differ in a number of ways from the original description according to the following translation. "Elongate, convex, parallel laterally; elytra purple, evenly opaque, intramarginal vitta ending a little behind middle, white ante-apical spot; head and thorax dark olivaceous, opaque, alutaceous, the latter with sides nearly straight medially, narrowly rounded to base and apex; front entirely shallowly strigose; neck thick; eyes moderately prominent; labrum strongly produced medially, obtusely tridentate; maxillary palpi piceous; body beneath dark blue, glabrous; legs cupreous, tarsi dark blue."

Two male specimens collected at Mexcala, Guerrero, by H. E. Evans differ from the above description as follows: Elytra cupreous with greenish reflections, margins greenish purple when viewed from above, elongate submarginal spot postmedian in position; head with vertex cupreous green, front greenish purple; pronotum cupreous red with greenish reflections; labrum moderately produced, anterior margin strongly tridentate medially but with two additional smaller teeth, one on each side; body beneath purplish blue; femora green, tibiae and tarsi cupreous. Most of these differences are in color or degrees of modification of characters and are therefore of doubtful specific value. *Cicindela phosphora* is also known from Guerrero and it is doubtful that this Mexcala population is of subspecific value, especially since other species occurring in this area show a considerable amount of individual variability. Until additional material is available, these two specimens are considered as individual variants of *phosphora*.

While this paper was being set into type, a series of specimens of this species were collected by the Vauries at two localities in Colima: Tecolapa, July 21, 1953, and 5 miles southwest of Colima, July 18, 1953. In the series of 115 specimens, all have the elytra maculated as shown by W. Horn (1938) and as described by Dejean (1878). The submar-

ginal lateral vittae extend almost to the apical third of the elytra, and there is a small ante-apical submarginal spot. In color the specimens vary from brilliant red, cupreous red, to cupreous green, with the under surface green or bluish green. The most striking feature is the sexual dimorphism. In the male the lateral margins of the mesosternum, metasternum, and abdomen are sparsely pilose; in the female only the sides of the metasternum behind the middle coxae are sparsely pilose.

The two male specimens from Mexcala, Guerrero, are bare beneath except for a few scattered hairs in the middle of the abdomen, and neither specimen appears to be rubbed. Additional material and especially female specimens will be necessary before the true relationship can be established.

The Colima series was collected along dry rocky woodland paths away from water, and during the heat of the day several specimens were taken on vegetation along the paths.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Guerrero*: Iguala; Mexcala, June 29, 1951. *Morelos*: Puente de Ixtla.

Cicindela hydrophoba Chevrolat

Text figure 14

This polytypic species is closely allied to *C. sedecimpunctata* Klug and resembles the subspecies *sallei* Chevrolat superficially. However, it occurs sympatrically with *sallei* in many of the southern localities and can be distinguished from it by its more produced labrum and more convex pronotum. The variability in individual samples is quite different from that in *sallei* and in the portion of the distribution where *sallei* is relatively uniform, *hydrophoba* is very plastic, and most of the samples show considerable variability. It is therefore considered to be a distinct species.

Isolated geographical samples of *hydrophoba* are often very different and might be considered to be distinct allopatric species if it were not for the intermediate characteristics shown by the intermediate geographical samples. Four names have been proposed for variants of this species, as follows: *hydrophoba* for the relatively narrowly marked form with the pronotum smooth (Veracruz);

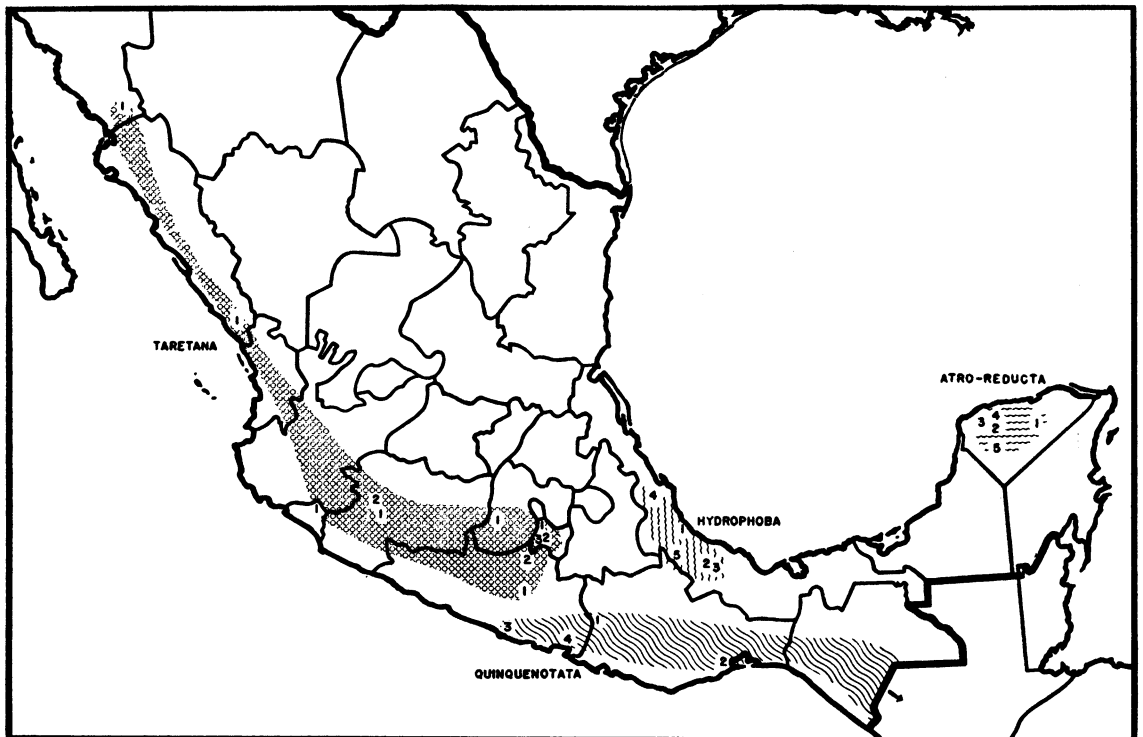


FIG. 14. Distribution of *Cicindela hydrophoba* Chevrolat.

taretana Bates for the broadly marked form having the basal and middle lunules connected and the pronotum rugose (Guerrero); *quinquenotata* Gistel for the form having the markings isolated but heavier than in *hydrophoba* (no Mexican locality) and *atro-reducta* W. Horn for the form having the markings reduced (Yucatan). Of these four forms *taretana* appears to be the most divergent, *quinquenotata* is intermediate between *taretana* and *hydrophoba*, and *atro-reducta* is a variant from *hydrophoba*. None of the populations appear to be well stabilized and are of doubtful genetic divergence, but until additional information and specimens are available all four are recognized as subspecies.

GENERAL DISTRIBUTION: Mexico, Guatemala, Honduras, Nicaragua, Costa Rica.

HYBRID POPULATIONS: Intergrades between *atro-reducta* and *hydrophoba* should be found in southern Veracruz and Tabasco, hybrids between *hydrophoba* and *taretana* in Puebla or Mexico, and those between *taretana* and *quinquenotata* will probably be found in Oaxaca or Guerrero. Some of the samples now in hand may prove to be of hybrid nature, but they are too small to show this conclusively.

KEY TO THE SUBSPECIES OF *Cicindela hydrophoba* CHEVROLAT

- 1. Pronotal disc rugosely punctate; humeral and middle lunules usually connected internally *taretana*
 Pronotal disc smooth or shallowly wrinkled; humeral and middle lunules not connected internally 2
- 2. Elytral lunules broad and usually complete . 3
 Elytral lunules very narrow, usually incomplete and sometimes lacking *atro-reducta*
- 3. Elytral markings very broad, middle lunule usually transverse, only slightly angulate *quinquenotata*
 Elytral markings narrower, middle lunule usually angulate *hydrophoba*

Cicindela hydrophoba hydrophoba Chevrolat

Text figures 73, 170

Cicindela hydrophoba CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 5, species no. 125, *Cicindela* no. 10.

Although this subspecies appears to be confined to the east coast of Mexico in Veracruz, it will almost certainly be found

elsewhere and will be found to intergrade with the other three subspecies in the intervening areas. The population is fairly uniform, but there is a tendency for the markings to become reduced, indicating an affinity with *atro-reducta*.

TYPE LOCALITY: Veracruz.

GENERAL DISTRIBUTION: Veracruz: Veracruz (1); Tuxtla (2); Catemaca (3); Jalapa (4); Motzorongo (5).

Cicindela hydrophoba taretana Bates

Text figures 74, 171

Cicindela hydrophoba var. *taretana* BATES, 1884, Biologia Centrali-Americana, Coleoptera, vol. 1, pt. 1, suppl., p. 259.

This name was applied to the northwestern form of *hydrophoba* that has the basal and middle lunules united medially; the shape is more parallel and the pronotum rugose. In various samples of *taretana* there is considerable variability in the markings and the sculpturing of the pronotum but the more parallel elytra appear to remain fairly uniform throughout its distribution. The basal and middle lunules may be separated, narrowly or broadly united, and occasionally the apical lunule is also united with the middle lunule. In the Vulcano de Colima sample, seven specimens have all the lunules separated and two have the basal and middle united. In the Venodio, Sinaloa, sample the elytral markings are united but the pronotum is less rugose than in specimens from Michoacan or Guerrero. The samples from Morelos and Mexico also have the elytral markings united in most specimens, but the sculpturing of the pronotum approaches that of the Veracruz samples of *hydrophoba* and the Oaxaca samples of *quinquenotata*. Specimens of *taretana* with separated lunules resemble *quinquenotata* and can be separated only by the more rugosely sculptured pronotum. In Guerrero this subspecies was taken at lights in very dense vegetation about 10 feet from a small tributary of the Rio Balsas and during the daytime in xerophytic situations along this river. Habitat shown in plate 12, figure 1.

TYPE LOCALITY: Michoacan: Taretan (1).

GENERAL DISTRIBUTION: Guerrero: Mexcala (1), June 29, 1951; Igualala (2), August. Morelos: Cuernavaca (1), June, July, 1945;

Alpuyeca (2) June 27, 1951, July 3, 1951; Puenta de Ixtla (2); Taxco (3). *Mexico*: Ixtapan (1). *Michoacan*: Salto Tzararacua (1), June 17, 1947, 1490 meters; Uruapam (2). *Colima*: Vulcano de Colima (1). *Sinaloa*: Venodio (1), June, July, 1918. *Sonora*: Minas Nuevas (1), August 7, 1952.

***Cicindela hydrophoba quinquenotata* Gistl**

Text figures 75, 172

Cicindela quinquenotata GISTL, 1837, *Systema insectorum*, vol. 1, p. 88.

This name applies to the southern population that has large elytral markings, but they are not united with each other, the pronotum is not rugose as in *taretana*, being more like that of *hydrophoba*, but the elytra are parallel as in *taretana*. It has been collected along sandy streams, clay roads, bare spots along paths in high prairie, and along moist ravines.

TYPE LOCALITY: "Brasilia?"

GENERAL DISTRIBUTION: *Guerrero*: Acapulco (3), June 23, 1936, August 8, 1933; Cerro de Plumas (4) (possibly Pluma Hidalgo near the Rio Copalita). *Oaxaca*: Topetlapa (1); Salina Cruz (2), July 9-17, 1947, October; San Geronimo, August 6, 1923; Oaxaca, July 9, 1949. Central America: Guatemala, Honduras, Nicaragua, Costa Rica.

***Cicindela hydrophoba atro-reducta* W. Horn**

Text figures 76, 173

Cicindela hydrophoba atro-reducta W. HORN, 1930, *Rev. Chilena Hist. Nat.*, vol. 34, p. 9.

This name applies to the Yucatan population that differs from *hydrophoba* in being smaller in size, darker in color, and the fact that the markings are smaller or reduced so that some specimens have only a small discal elytral spot. In 15 topotypical specimens all gradations in this reduction of pattern are present. Of 23 specimens from three localities, only one is greenish black rather than black, the elytral punctation is evident on the basal third, and the head and pronotum are cupreous red. Some specimens of *hydrophoba* from Jalapa and Veracruz have the markings slightly reduced but not to the extent in *atro-reducta*.

TYPE LOCALITY: Yucatan: Chichen Itza, June, 1929.

GENERAL DISTRIBUTION: *Yucatan*: Chichen Itza (1), July 5, 1937, July 18, 1952; Chuminopolis (2), July 12, 1952; Hunucma (3), July 3-9, 29, 1952; Cordeleria Mayapan (4), August 3, 1952; Uxmal (5), July 25, 1952.

***Cicindela rufiventris* DEJEAN-*sedecimpunctata* KLUG COMPLEX**

The pattern of speciation and subspeciation in this complex of populations is an exceedingly difficult one to interpret, and much field work remains to be done before the status of a number of populations can be definitely established. Although many samples are available for study, some of them are too small to be of much value, and many areas critical to the analysis are unrepresented. At present it appears that field observations on behavior and ecology will be of great importance in establishing the relationships between the numerous populations.

In the United States both *rufiventris* and *sedecimpunctata* behave as, and appear to be distinct, allopatric species but as their distributions extend into Mexico they become less obvious as specific entities, and many divergent populations of uncertain relationships are found. Few if any morphological differences can be used to separate the samples, which appear to be distinct because of differences in general appearance, color, or population variability. In general *rufiventris* can be separated from *sedecimpunctata* by the green or blue rather than cupreous color of the proepisterna, but in some samples there is some variability in this difference. The individual variability in each sample of *rufiventris* appears to be much greater than in most samples of *sedecimpunctata*, but the hybrid samples between *sedecimpunctata* and *sallei* Chevrolat and those of *reducens* W. Horn show the same variability as in *rufiventris*. Samples of *flohri* Bates, and *sallei*, except in the hybrid areas, show comparatively little variability.

So far as presently known, *sedecimpunctata* and *sallei* are allopatric throughout most of their distributions but recent collections from western Mexico, Sinaloa, Nayarit, Jalisco, and Colima are hybrid in character, and the two must therefore be considered as subspecies. *Cicindela sallei* occurs primarily

at lower elevations in the coastal states and is not found with *flohri* which appears to be a closely related higher-altitude form. *Cicindela flohri* is a robust, cupreous brown form known to occur from Puebla to Chihuahua where it occurs sympatrically with *sedecimpunctata* and *rubriventris* Chevrolat without evidence of hybridization. Although it is behaving as a species distinct from *sedecimpunctata* in the above-mentioned states, it is probably a variant of *sallei* and therefore closely related to it. Additional information and collections are necessary to establish its relationship but for the present it must be considered a distinct species. Samples from eastern Jalisco may prove to be hybrids between this population and *sallei*. If this is the case, the sympatric occurrence of *flohri* with *sedecimpunctata* can be accounted for by a circular arrangement and development. Since the entire complex is probably Neotropical in origin, *sallei* may have been the parental type, diverging into *sedecimpunctata* along the west coast of Mexico and into *flohri* at high altitudes in central Mexico. *Cicindela sedecimpunctata* spread northward into the United States and then south along the central Mexican plateau, being reproductively distinct by the time its distribution overlapped that of *flohri*. In Distrito Federal *sedecimpunctata* diverged into the blue, green, or black form described as *rubriventris* Chevrolat. If no intermediates are found between *flohri* on one hand and either *sallei* or *sedecimpunctata*, they must be recognized as distinct sympatric species (sibling species), even though they are practically inseparable morphologically. In the present analysis *flohri* and *sedecimpunctata* are considered distinct species and *sallei* and *rubriventris* as subspecies of *sedecimpunctata*.

Cicindela rufiventris was described from a specimen that was supposed to have been taken in Saint-Dominique, but this is almost certainly an incorrect locality. The description fits equally well specimens from northeastern United States and from the states of Tamaulipas and Nuevo Leon in Mexico. It is assumed that the type probably came from eastern United States since most of Dejean's North American species were either from eastern United States or southern Mexico, south of the distribution of *rufiventris*. *Cicindela rufiventris* occurs from Massachu-

setts to Alabama where it turns into the green or blue subspecies *cumatilis* which extends from Mississippi into eastern Texas. In south central Texas (Weser) the population is darker than in *cumatilis* and more greenish than samples from northern Tamaulipas and Nuevo Leon, Mexico. It is probable that these samples from south central Texas and those from southwestern Texas will be found to be hybrids, but insufficient material is available to draw any definite conclusions. Specimens from Nuevo Leon and Tamaulipas are darker in color, and each sample varies from immaculate to fully maculated, the latter being predominant. As the distribution extends southward in Tamaulipas the percentage of immaculate individuals increases, and at Valles, San Luis Potosi, only a few specimens are maculated. There is also a tendency for the southern samples to be more greenish and smaller in size, but these differences appear to be clinal from north to south with no geographical break. W. Horn described *reducens* from Jalisco as a subspecies of *rufiventris*, but this relationship is somewhat doubtful. In general appearance and variability the samples resemble *rufiventris cumatilis*(?), but the color of the under surface and the size are as in *sedecimpunctata*. However, in Colima and Jalisco *r. reducens* and *s. sallei* occur sympatrically and behave as distinct species and in southern Tamaulipas *r. cumatilis*(?) and *s. sallei* occur sympatrically without interbreeding. In 1897 W. Horn described *rufiventris* variety *hoegeana* from LeBarea and Chapala in Jalisco, and a study of a small series taken near these localities indicates that they are probably hybrids between *s. sallei* and *r. cumatilis*(?). It is obvious from the above discussion that there is considerable confusion in this complex and until more material is available from Jalisco and Guanajuato, *rufiventris* is regarded as a distinct species with the Mexican subspecies *cumatilis*(?) and *reducens*.

KEY TO THE SPECIES

1. Proepisternum blue or green, occasionally cupreous on dorsal margin . . . *rufiventris*
Proepisternum in large part cupreous red . . . 2
2. Color above cupreous brown or green . *flohri*
Color above dark brown or black
. *sedecimpunctata*

Cicindela sedecimpunctata Klug

Text figure 15

Samples of this polytypic species from the northern portion of its distribution show relatively little variability. In Chihuahua and Durango a few individuals in several samples have the head and pronotum a brilliant cupreous red, but this variability appears to be individual and of little significance from a subspecific standpoint. In the states of Mexico and Distrito Federal the population is green, blue, or black and is named *rubriventris* Chevrolat. On the west coast in the states of Sinaloa, Nayarit, Jalisco, and Colima *sedecimpunctata* hybridizes with *sallei* which is primarily southern in distribution.

In central Jalisco there is a population, *C. rufiventris hoegeana* W. Horn, that appears to be a hybrid between *sedecimpunctata* and *rufiventris*, but additional material is necessary to verify or disprove this relationship.

They are collected in a variety of different types of inland habitats, along streams, lakes, and springs or in dry open grassy areas (pl. 10, fig. 1; pl. 12, figs. 1 and 2).

GENERAL DISTRIBUTION: United States: Southwest. Mexico. Central America: Guatemala; Nicaragua.

HYBRID DISTRIBUTION: What appear to be hybrid populations between *sedecimpunctata* and *rufiventris* have been taken in Jalisco at 9 to 13 miles east of Guadalajara (1), June 16, 1949, 5200 feet; Lagos de Moreno, June 16,

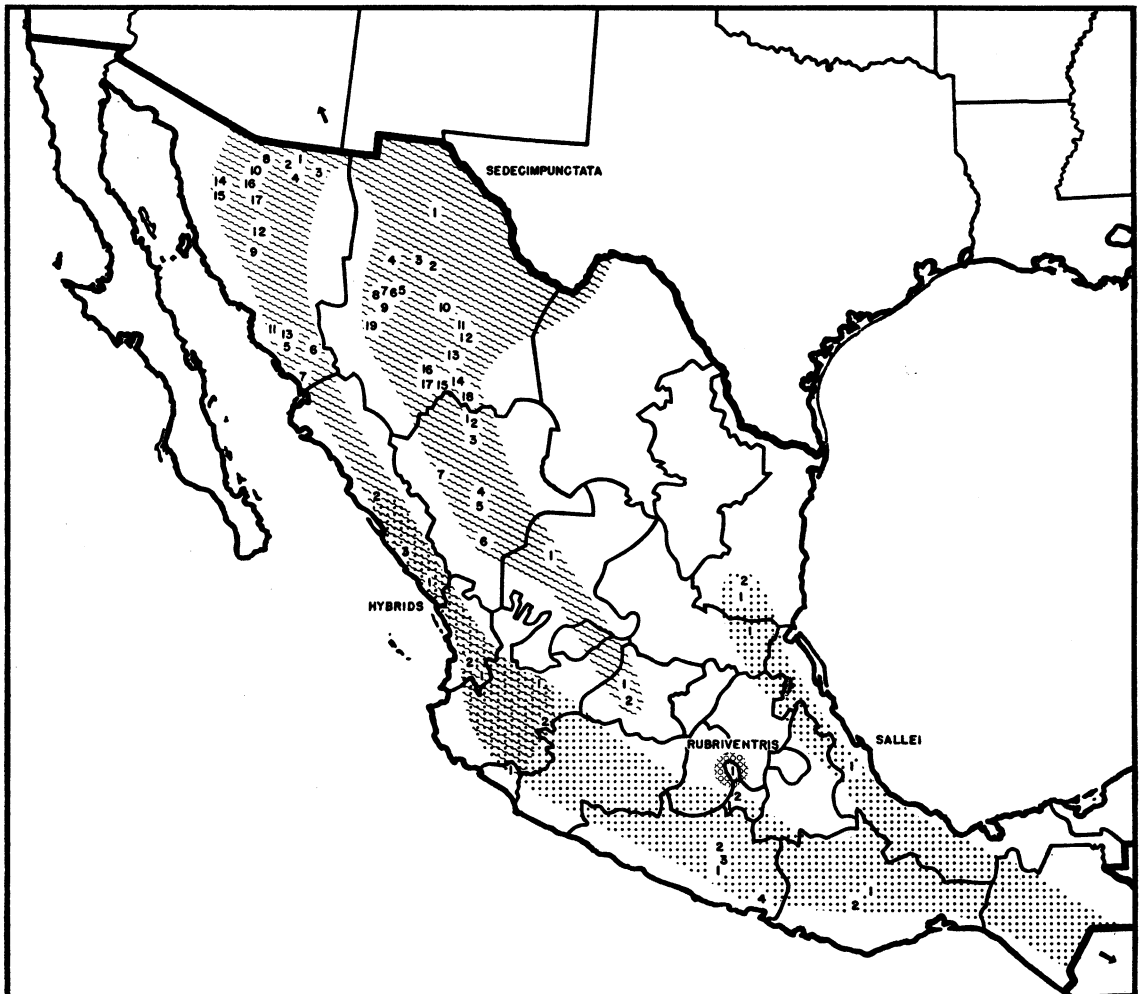


FIG. 15. Distribution of *Cicindela sedecimpunctata* Klug.

1949, 6300 feet; La Barca and Chapala (2). Hybrids between *sedecimpunctata* and *sallei* are known from the following localities in western Mexico: *Sinaloa*: La Noria; Rosario, Rio de Buluarte (1), May 12, 1949, 150 feet; 20 miles south of Culiacan (2), May 1, 1949, 250 feet; 4 miles east of Coyotitan (3), May 5, 1949, 500 feet; Camino Real de Piaxtla (3), May 3, 1949, 200 feet. *Nayarit*: Ixtlan del Rio (1), June 15, 1949, 3800 feet; 5 miles north of Tepic (2), May 21, 1949, 2300 feet. *Jalisco*: Envir de Guadalajara (1), 1901, 5051 feet. *Colima*: Vulcano de Colima (1).

KEY TO THE SUBSPECIES OF *Cicindela*
sedecimpunctata KLUG

1. Size small, form linear 2
Size large, form more robust *sallei*
2. Color black, dark green, or blue *rubriventris*
Color dark cupreous brown or dark brown
. *sedecimpunctata*

Cicindela sedecimpunctata sedecimpunctata Klug

Text figures 77, 174

Cicindela 16-punctata KLUG, 1834, Jahrb. Insectenk., p. 32 (Mexico).

Cicindela rufiventris var. *ventanasa* BATES, 1890, Trans. Ent. Soc. London, p. 503 (Ventanas in Durango, La Noria in Sinaloa).

Cicindela sedecimpunctata sonora CASEY, 1913, Memoirs on the Coleoptera, vol. 4, p. 40 (Arizona, New Mexico, and southward to Durango).

There is comparatively little variability within or between samples of this subspecies taken in southern United States and the northern portion of Mexico. However, in the area of San Jose Babicora, Chihuahua, Mexico, a portion of three samples has the head and pronotum brilliant cupreous red or violet with intermediates between this and the normal dull brown color. Adjacent samples and those taken farther south and north do not show this variability, which appears to be individual in nature.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Sonora*: Halfway between Naco and Cananea (1), August 16, 1949, 5000 feet; 10 miles east of Cananea (2), August 16, 1949, 4500 feet; Fronteras (3), August 18, 1949, 3800 feet; Bacoachic (4), August 17, 1949, 3400 feet; San Bernardino, Rio Mayo (5), June 24, 1935; Otatis,

Rio Mayo (5), July 1, 1935; Rio Mayo (5), June 23, 1935; Alamosa (6), July 28, 1940; Agiabampo (7), April 29, 1949, sea level; Cocospera Canyon, 8 miles east of Imuris (8), July 2, 1952; Hermosillo (9), July 19, 1952; Magdalena (10), July 23, 1952; Minas Nuevas (6), August 7, 1952; Imuris (8), July 2, 1952; Agua Caliente near Los Hornos (11), July 29, 1952; Rancho Salada, 25 miles north of Hermosillo (12), July 23, 1952; Santa Rosa Ranch, near Navojoa (13), August 2, 1952; Pitiquito (14), July 4, 1952; El Gavilan (9), July 19, 1952; Cibuta (8), July 1, 1952; Agua Zarca (8), July 1, 1952; La Cienaga (15), July 5, 1952; Santa Ana (16), July 23, 1952; 55 miles north of Hermosillo (17); July 23, 1952. *Chihuahua*: Villa Ahumada (1), June 28, 1947; 92 kilometers north of Chihuahua City (2), June 30, 1947; Santa Clara, Namiquipa District (3), July 3, 1947, 6500 feet; Santa Clara Canyon, 5 miles west of Parrita (3), June 27, 1947, 5600 feet; Primavera (3), June 30, 1947, 5500–6000 feet; Canon Prieto near Primavera (3), July 2, 1947, 6500–6800 feet; summit northeast of San Jose Babicora (4), July 4, 1947, 7700 feet; San Jose Babicora (4), July 4, 1947, 7100 feet; Matachic (5), July 7, 1947; 2 miles west of Matachic (5), July 7, 1947, 6400 feet; 8 miles west of Matachic (6), July 8, 1947, 7200 feet; Carta Blanca, 16 miles west of Matachic (7), July 8, 1947; 20 miles west of Matachic (8), July 7, 1947; Bacuchi (9), August 27, 1950; Chihuahua City (10), July 13–18, 1907; Delicias (11), July 11, 1947, 4150 feet; La Cruz (12), July 13, 1947; 42 miles southwest of Camargo (13), July 15, 1947, 4900 feet; Parral (14), July 16, 1947; San Francisco Mesa Santa Barbara, Santa Barbara District (15), July 17, 1947, 6300 feet; Valle de Olivos (16), July 20, 1947, 5500 feet; Huejotitlan (17), July 21, 1947, 5700 feet; Catarinas (18), July 26, 1947, 5800 feet; Pinos Altos (19). *Durango*: Tepehuanes (7); Durango City (6); Villa Ocampo (1), July 27, 1947; El Tascate (2), July 28, 1947, 6400 feet; Santa Maria del Oro (3), July 28, 1947, 5700 feet; San Juan del Rio (4), July 30, 1947, 5200 feet; San Lucas (5), August 2, 1947, 6700 feet. *Zacatecas*: Sain Alto (1), August 14, 1947, 7000 feet. *Guanajuato*: Gonzales Junction (1), July; Irapuato (2), July.

***Cicindela sedecimpunctata rubriventris* Chevrolat**

Cicindela rubriventris CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 5, species no. 101, *Cicindela* no. 9 (Mexico).

This subspecies appears to be rather local in its distribution and is similar to *sedecimpunctata* in every respect except the color which is uniformly darker.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Distrito Federal*: Mexico City (1); San Angel (1), August 4, July 18-20, August 1923; Guadalupe (1), July 18.

***Cicindela sedecimpunctata sallei* Chevrolat**

Text figures 78, 175

Cicindela sallei CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 6, species no. 126, *Cicindela* no. 11.

Cicindela mellyi CHAUDOIR, 1852, Bull. Soc. Imp. Nat. Moscou, vol. 25, p. 19 (Mexico).

Cicindela calochroides MOTSCHULSKY, 1853, Études entomologiques, p. 109 (Nicaragua).

This subspecies has a very extensive distribution in central and southern Mexico and extends into Central America as far south as Nicaragua. In Mexico it is extremely variable and when more material is available it may be shown that the more southern, dark velvety black forms are deserving of subspecific status. At the present time there seems to be a gradual gradation (cline) in color from north to south, but the data are poor. On the western coast in Colima, Jalisco, Nayarit, and Sinaloa this subspecies grades gradually into the smaller and narrower *sedecimpunctata* Klug, and the samples from this hybrid area are more unstable than has been observed in samples taken elsewhere in its distribution. The size range is greater, and the elytra may be fully maculated or with only a faint indication of the middle lunule remaining. This subspecies is usually found in collections under the name *mellyi* Chaudoir which was described 17 years after *sallei*.

TYPE LOCALITY: Taken on trip from Veracruz to Irizaba, Veracruz.

GENERAL DISTRIBUTION: *Veracruz*: Jalapa (1). *Oaxaca*: Oaxaca (1); Oclan (2), May, 1922. *Morelos*: Cuernavaca (2); Pointe de Ixtla (1), August. *Guerrero*: Cerro de Plumas (4); Rio Balsas (2), August 5; Chilpancingo

(1), June, 4600 feet; Mexcala (3), June 3, 1946. *San Luis Potosi*: Between Barbarita and Aguazarca (1), June 18, 1949, 3600 feet. *Tamaulipas*: Twenty-seven miles north of Ciudad Mante (2), June 18, 1949, 300 feet; Ciudad Mante (1), June 18, 1949, 100 feet. Central America: Guatemala; Nicaragua; Costa Rica.

***Cicindela rufiventris* Dejean**

Text figure 16

A general discussion of this species is presented in the account of the *rufiventris-sedecimpunctata* complex.

GENERAL DISTRIBUTION: United States; Mexico.

HYBRID DISTRIBUTION: See discussion under *sedecimpunctata*.

KEY TO THE SUBSPECIES OF *Cicindela rufiventris* DEJEAN

Elytra with puncture spots evident; color dark blue or green *cumatilis*
Elytra without evident puncture spots; color brilliant opaque blue or purplish blue . . . *reducens*

***Cicindela rufiventris cumatilis* LeConte**

Text figures 79, 80, 176, 177

Cicindela cumatilis LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 173.

Cicindela quexiana CHEVROLAT, 1852, Rev. Mag. Zool., Paris, ser. 2, vol. 4, p. 419 (Shreveport, Louisiana).

The Mexican representatives of this subspecies are discussed under the *rufiventris-sedecimpunctata* complex. The available samples are as variable as those from Texas, and the color is only slightly darker. The Louisiana specimens are green and blue but grade into the darker Texas samples.

In Nuevo Leon, Tamaulipas, and San Luis, Potosi this subspecies was taken around lights in a grassy area about 50 feet from a stream, along the banks of stagnant and fresh-water streams and rivers.

TYPE LOCALITY: Louisiana.

GENERAL DISTRIBUTION: *Nuevo Leon*: Four miles west of El Cercado (1), June 6, 1951; 7 miles south of Sabinas Hidalgo (2), June 20, 1949, 1100 feet; Monterrey (3), July, May 23, 1952; Montemorelos (4), May 23, 1952; Rio Potosi, south of Montemorelos (5), May 23, 1952; Linares (5), May 22, 1952.

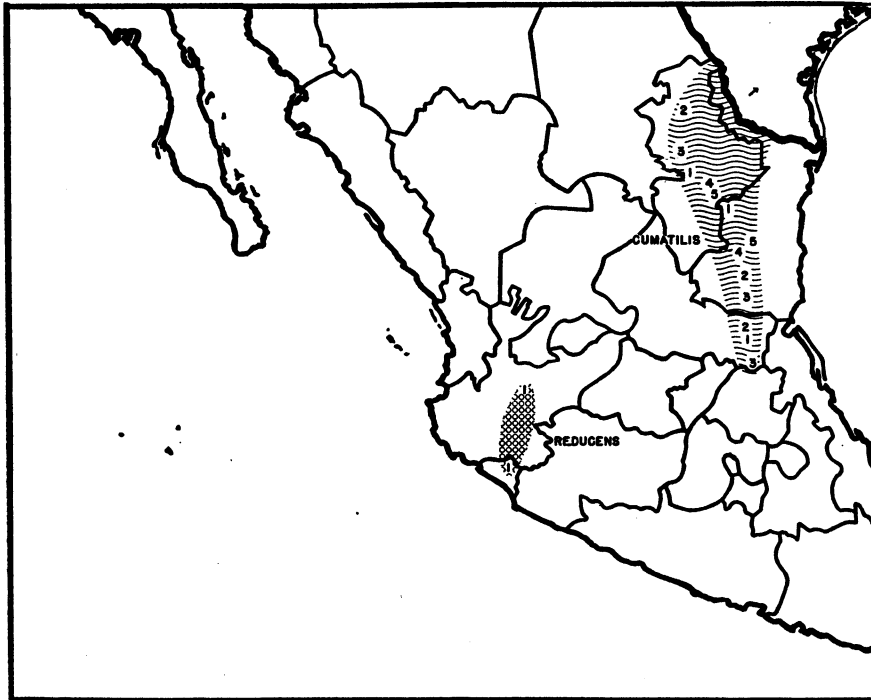


FIG. 16. Distribution of *Cicindela rufiventris* Dejean.

Tamaulipas: Villagran (1), June 19, 1949, May 22, 1952, 1250 feet; 27 miles north of Ciudad Mante (2), June 18, 1949, 300 feet; Ciudad Mante (3), June 18, 1949, 100 feet; 15 miles north of Villagran (1), May 22, 1952; 11 miles north of Victoria (4), May 22, 1952; Santa Cruz (4), May 22, 1952; Victoria (4), May 22, 1952; Padilla (5), May 17, 1952; El Limon, June 9, 1951. *San Luis Potosi*: Valles (1), July 21, 1946, May 18, 1952; between Barbarita and Aguazarca (2), June 18, 1949, 3600 feet; Pujal (1), May 19, 1952; Tamazunchale (3), May 20, 1952.

***Cicindela rufiventris reducens* W. Horn**

Text figures 81, 178

Cicindela rufiventris race *reducens* W. HORN, 1915, in Wytzman, *Genera insectorum*, fasc. 82A, p. 386.

Cicindela rufiventris race *reducta* W. HORN, 1897, *Deutsche Ent. Zeitschr.*, p. 171 (Guadalajara, Jalisco).

Cicindela rufiventris var. *hoegeana* W. HORN, 1897, *Deutsche Ent. Zeitschr.*, p. 171 (La Barca and Chapala, Jalisco); may be hybrid population.

Only one specimen of this subspecies has been available for study. It is somewhat

larger and more robust than *cumatilis*, in addition to the differences used in the key.

TYPE LOCALITY: Jalisco; Guadalajara (1).

GENERAL DISTRIBUTION: *Colima*: Colima (1).

***Cicindela flohri* Bates**

Text figures 82, 179

Cicindela flohri BATES, 1879, *Proc. Zool. Soc. London*, p. 588.

Cicindela rufiventris beckeri W. HORN, 1897, *Deutsche Ent. Zeitschr.*, p. 171 (Sierra del Nayar, Durango).

This species is closely allied to *sedecimpunctata* and its subspecies *sallei*, but since it occurs sympatrically without hybridization with both *sedecimpunctata* and its subspecies *rubriventris* it is considered to be a distinct species. It is most closely allied to *sedecimpunctata sallei*, but the two are allopatric and there is therefore no evidence of hybridization. In north central Mexico it grades gradually into the slightly more elongate *beckeri* W. Horn, but this variation seems to be of a clinal nature, and no advantage would be gained by retaining the latter name. It is

usually found in relatively dry situations at high elevations on hillsides or in dry sandy washes or along roads in the high prairie (pl. 12, fig. 2).

TYPE LOCALITY: Distrito Federal: San Angel; Guadalupe.

GENERAL DISTRIBUTION: *Puebla*: Huauchinango. *Distrito Federal*: Mexico City, August 27, 1923; San Angel, August 4. *Mexico*: Toluca, July 12; Tultenango, July 13. *Michoacan*: Patzcuaro. *Guanajuato*: Guanajuato. *Zacatecas*: Fifteen kilometers east of Sombrerete, July 28-31, 1951. *Durango*: Durango City; Tepehuanes; 6 miles northeast of El Salto, Durango District, August 10, 1947, 8500 feet; El Salto, August 3, 1951; Otinapa, August 7, 1947, 7500 feet; same locality, August 11, 1947, 8200 feet; Canelos. *Chihuahua*: Summit northeast of San Jose Babicora, July 4, 1947, 7700 feet; Matachic, July 7, 1947; 2 miles west of Matachic, July 7, 1947, 6400 feet; 8 miles west of Matachic, July 8, 1947, 7200 feet; San Francisco Mesa, Santa Barbara, Santa Barbara District, July 17, 1947, 6300 feet.

Cicindela clarina Bates

Text figures 83, 180

Cicindela clarina BATES, 1881, *Biologia Centrali-Americana*, Coleoptera, vol. 1, pt. 1, p. 6.

Cicindela deliciola BATES, 1890, *Trans. Ent. Soc. London*, p. 502, pl. 16, fig. 7 (Real de Monte, Hidalgo).

This rather uncommon species was placed under *C. dysenterica* Bates by Walther Horn, but since they occur sympatrically in several localities without hybridization and are morphologically distinct it is herein treated as a distinct species. *Cicindela deliciola* Bates was also placed as a subspecies of *dysenterica*, but structurally it is the same as *clarina*, and the name was applied to the green form that has the basal and middle elytral markings united laterally. In most of the specimens examined the markings are reduced or nearly absent, and the color varies from green, blue, and cupreous green to reddish brown. The pronotum is more robust and deeply sculptured than in *dysenterica*, and the disc of the elytra have dark infuscations around the middle lunule.

In Puebla Paul D. Hurd collected a small

series on the sandy banks of a stream in the pine belt and in Distrito Federal E. G. Smyth collected brown and green forms in moist spots along a ravine draining the high prairie.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Hidalgo*: Real de Monte. *Mexico*: Amecameca, June; Toluca, August 24, Chalco. *Michoacan*: Maravatio, 5 kilometers west of Zacapu, July 13, 1951. *Puebla*: Fourteen miles west of Huauchinango, June 17, 1951. *Distrito Federal*: Mexico City, August 27, 1923.

Cicindela dysenterica Bates

Text figures 17, 84, 181

Cicindela dysenterica BATES, 1881, *Biologia Centrali-Americana*, Coleoptera, vol. 1, pt. 1, p. 7.

Cicindela dugesi BATES, 1884, *Biologia Centrali-Americana*, vol. 1, pt. 1, suppl., p. 258 (Guanajuato; Tapatara; Michoacan: Morelia; Taretan); new synonym.

Cicindela dugesi calomicra BATES, 1890, *Trans. Ent. Soc. London*, p. 501 (Morelos: Cuernavaca; Guerrero: Chilpancingo); new synonym.

Although this species is herein treated as being monotypic it is recognized that eventually populations outside the present known distribution may be shown to be distinct subspecies. In series of specimens from four localities in Guerrero and two in Morelos the variability is great, and individuals assignable to *C. dysenterica* Bates, *dugesi* Bates, and *calomicra* Bates as well as intermediates can be found in single interbreeding populations. Individuals in small samples from other localities fit into the variability pattern of the larger samples, and there appears to be no geographical segregation of the populations in the areas from which samples named *dugesi* and *calomicra* were taken.

In color the species varies from black, brown, and blue to green, and the markings may be lacking, all lunules distinct or with the basal and middle lunules united, or all three lunules connected marginally. In series from numerous localities all stages in the reduction of markings and in color are to be found. Structurally all the samples are similar.

In Guerrero this species was taken in a flat sandy area some 50 feet from a tributary of the Rio Balsas and in Cuernavaca on bare ground near a quarry in the hills.

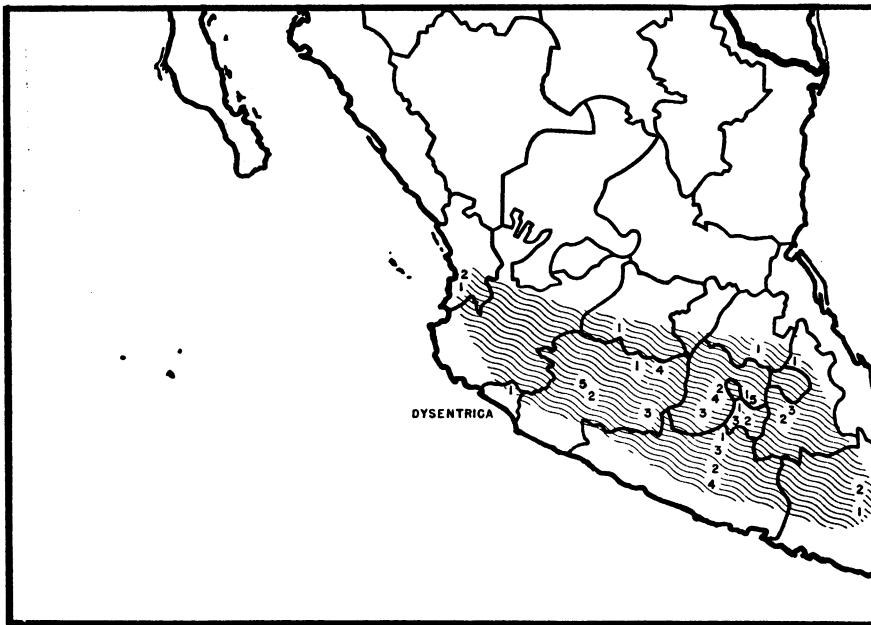


FIG. 17. Distribution of *Cicindela dysenterica* Bates.

TYPE LOCALITY: Oaxaca: Oaxaca (1).
Puebla: Huanchinango (1).

GENERAL DISTRIBUTION: *Oaxaca:* Oaxaca (1); Dominguillo (2). *Guerrero:* Iguala (1), August 14; Rio Balsas (2), August 5-17; Apipilulco (3), August 8; Mexcala (2), June 29, 1951; Chilpancingo (4), June 30, 1951. *Puebla:* Huanchinango (1); Atlixco (2); Puebla (3). *Morelos:* Cuernavaca (1), July 27, September 5, 1923, October 22, 1922; Puente de Ixtla (2), August 11; Taxco (3); Alpuyecá (2), June 27, 1951. *Mexico:* Chalco (1); Salazar (2); San Juan de las Huertas (3); Toluca (4); Amecameca (5). *Michoacan:* Morelia (1); Taretan (2); Huetamo (3); San Juan Tumbio; Moravatio (4); Apatzingan (5), July 20, 1947, 400 meters. *Colima:* Alvarez (1). *Nayarit:* Navarrete (1); Santiago Ixcuintla (2). *Guanajuato:* Tupataro (1). *Hidalgo:* Real de Monte (1).

***Cicindela nebuligera* Bates**

Text figures 85, 182

Cicindela nebuligera BATES, 1890, Trans. Ent. Soc. London, p. 504.

Although this species closely resembles *C. sedecimpunctata* Klug, it can be separated by its more rounded and rugulose pronotum, the

fact that the labrum is more produced medially, the brilliant cupreous red color, with greenish reflections, and by the fact that the disc of the elytra surrounding the inner portion of the middle lunule is infuscated with brown or black. It occurs at higher elevations in Durango than *sedecimpunctata* but was collected sympatrically with *flohri* at two localities near Otinapa. The species occurs on dry, open, rocky hillsides and along dirt roads.

TYPE LOCALITY: Refugio in Durango.

GENERAL DISTRIBUTION: *Durango:* Otinapa, August 7, 1947, 7500 feet; near same locality, August 11, 1947, 8200 feet; Palos Colorados, August 5, 1947, 8000 feet; Ciudad Durango.

***Cicindela flavopunctata* Chevrolat**

Text figure 18

This polytypic species is divided into two subspecies, one of which is found from southern Arizona to Costa Rica, the other from New Mexico, Texas, and northeastern Mexico. Except for the hybrid area in Mexico, both subspecies are remarkably uniform in size, maculation, and color throughout their distributions and most specimens can be distinguished from other

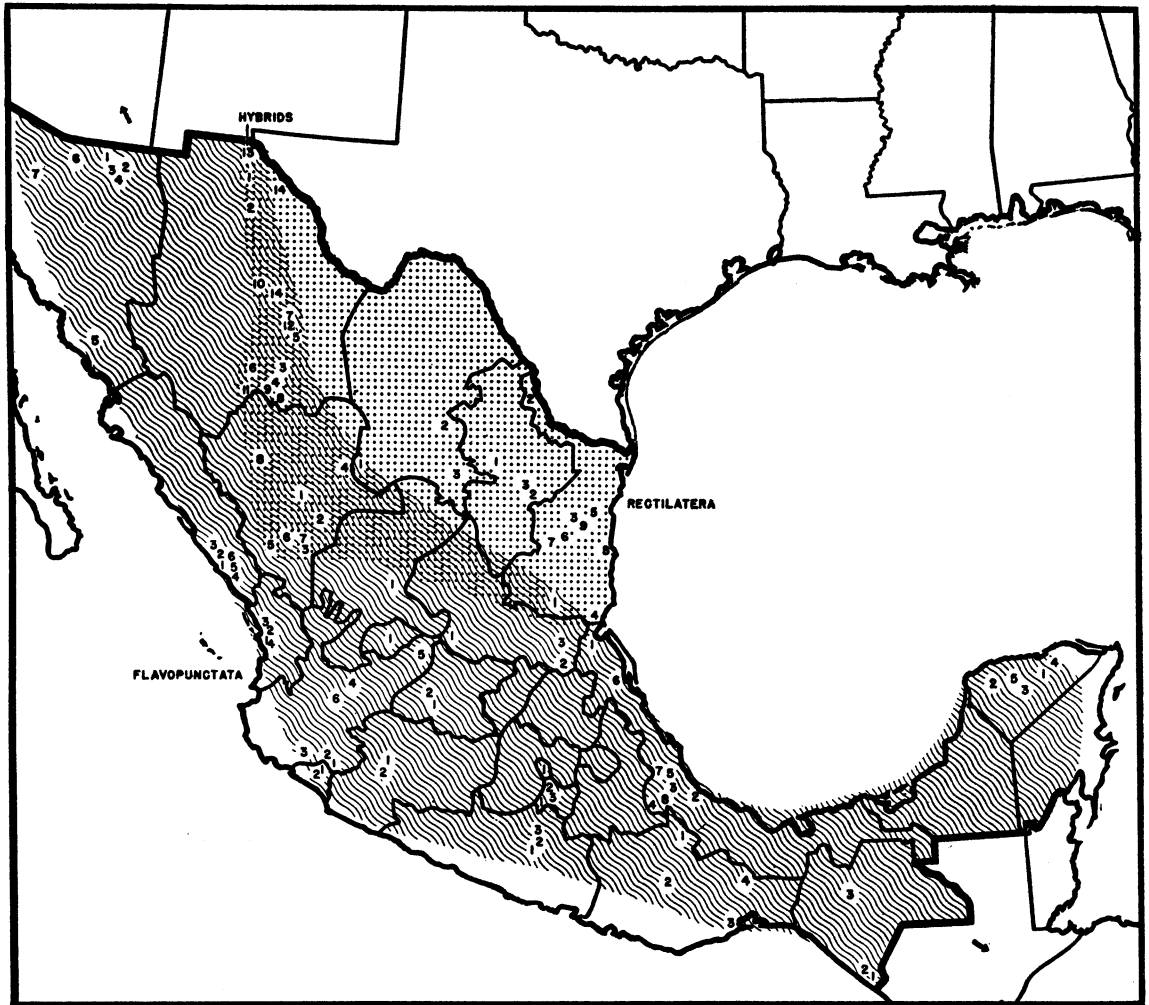


FIG. 18. Distribution of *Cicindela flavopunctata* Chevrolat.

species by the maculation alone. They occur in sandy areas around lakes and ponds, banks of streams, ditches, cattle watering tanks, in irrigated fields and moist pastures (pl. 10, fig. 1).

GENERAL DISTRIBUTION: United States, Mexico, and Central America.

HYBRID DISTRIBUTION: Hybrid populations have been collected in central Chihuahua, Durango, southern Coahuila, and Nuevo Leon (fig. 18). Examples of both subspecies and the intermediates are known from 19 samples collected in these states. Samples from the following localities are considered as being hybrids. *Chihuahua*: Samalayuca (1), August 6, 1950; Laguna del Riataso, Sama-

layuca (1), August 7, 1950; Villa Ahumada (2), June 28, 1947; 42 miles southwest of Camargo (3), July 15, 1947, 4900 feet; Parral (4), July 17, 1947, 5500 feet; La Cruz (5), July 13, 1947; Huejotitlan (6), July 21, 1947, 5700 feet; Delicias (7), July 11-13, 1947, 4150 feet; Catarinas (8), July 26, 1947, 5800 feet; Santa Barbara, Santa Barbara District (9), July 17, 1947, 6300 feet; Chihuahua City (10), July 13-18, 1907; Balleza (11), July 21, 1947, 5200 feet; 10 miles south of Delicias (12), July 13, 1947; Ciudad Juarez (13). *Coahuila*: Torreón (1), July 22. *Durango*: San Juan del Rio (1), July 30, 1947; San Lucas (2), August 2, 1947, 6700 feet; Nombre de Dios (3), August 13, 1947, 5900 feet, August 6, 1951; Villa

Lerdo (4), July 23; Otinapa (5), August 11, 1947, 8200 feet; Palos Colorados (6), August 5, 1947, 8000 feet; Durango City (7), August 14, 1947, 6200 feet; Tepehuanes (8). *Tamaulipas*: Ciudad Mante (1), June 18, 1949, 100 feet.

KEY TO THE SUBSPECIES OF *Cicindela flavopunctata* CHEVROLAT

Abdomen blue, green, or black; elytra dark brown or black; medium sized *rectilatera*
Abdomen with at least the last two segments reddish brown or testaceous; elytra lighter brown or reddish brown, green, or blue; smaller in size *flavopunctata*

Cicindela flavopunctata flavopunctata Chevrolat

Text figures 86, 183

Cicindela flavopunctata CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 2, *Cicindela* no. 2.

Cicindela humeralis CHEVROLAT, 1841, Mag. Zool., Paris, ser. 2, vol. 3, p. 13 (Mexico).

Cicindela flavopunctata chiapana BATES, 1890, Trans. Ent. Soc. London, p. 505 (Tapachula, Chiapas).

Cicindela ocellata KLUG, 1834, Jahrb. Insectenk., p. 33 (Jalapa, Veracruz).

Cicindela incerta CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 6, species no. 127, *Cicindela* no. 12 (Mexico).

In a few specimens the elytral maculations are almost completely lacking, or the middle and basal lunules are complete internally; however, in most examples each elytron has five spots representing the extremes of the lunules. Most specimens are dark brown above but some are dark reddish brown. In Jalisco a small percentage of the individuals are green or blue. The abdomen is largely testaceous, but there is some variability, and only the last two segments are reddish brown or testaceous in some examples.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Sonora*: Halfway between Naco and Cananea (1), August 16, 1949, 5000 feet; Fronteras (2), August 18, 1949, 3800 feet; 10 miles east of Cananea (3), August 16, 1949, 4500 feet; Bacoachic (4), August 17, 1949, 3400 feet; Rio Yaqui, near Cocorit (5), July 29, 1952; Immuris (6), July 2, 1952; Pitiquito (7), July 4, 1952. *Sinaloa*: Venodio, June 19, 1918; Presidio River near Union (1), September 26, 1918; Villa Union (1), May 11, 1949; Quelite (2),

May 6, 1949, 100 feet; Camino Real de Piaxtla (3), May 3, 1949, 200 feet; Rosario, Rio de Buluarte (4), May 12, 1949, March, 1917, 150 feet; Aguas Calientes (5) July, August; La Noria (6). *Nayarit*: Tepic (3), November; San Blas (1), May 18, 1949, sea level; Mecatan (1), May 23, 1949, 800 feet; 10 miles northeast of San Blas (2), May 18, 1949, 150 feet; 33 miles northwest of Tepic, Rio Grande de Santiago (3), October 7, 1950; San Pedro River and highway (3), October 3, 1950; 5 miles north of Tepic (3), May 21, 1949, 2300 feet; 3 miles northwest of Las Varas (4), November 11, 1950; El Cora (3). *Jalisco*: Tonila (1); Barranca de Atenuquique (2); 2 miles southwest of La Resolana (3), November 20, 1950; 9 miles east of Guadalajara (4), June 16, 1949, 5200 feet, July 16, 1951; vicinity of Pegueros (4), June 16, 1949, 6700 feet; Lagos de Moreno (5), June 16, 1949, 6300 feet; Zapotlanejo (6), June. *Michoacan*: Urapam (1), July 12, 1900, 5000 feet; 17 miles south of Apatzingan (2), December 1, 1950. *Guerrero*: Iguala, July, 1909; Rio Balsas (1), August 5; Mexcala (2), June 3, 1946, June 29, 1951; Xalitla (3), June 16, 1946. *Oaxaca*: Tuxtepec (1), May 12, 1933; Oaxaca (2), August 16-24, 1937 and September, 1923; Salina Cruz (3), July 9-17, 1947; Ocotlan, May, 1922; Huilotepec (3), February 10, 1952, 15 feet; Tollosa (4), August 27, 1947; Tehuantepec (3), May 25, 1896, July 16, 1947, August 24, 1938. *Chiapas*: Finca Santa Marta (3), July 31, 1950; Tapachula (1); Escuintla (2), June; Finca La Isle (not located). *Yucatan*: Valladolid (3), September 13, 1952; Colonia (4), August 19, 1952; Chichen Itza (1), June, July 18, September 11, 1952; Cordeleria Mayapan (5), September 8, 1952; Hunucma (2), July 3, 1952. *Veracruz*: Moctezuma River, El Higo (1), March 22, 1948; Veracruz (2), December, August 16, June 20, 1951; Jalapa (3); Montemorelos (6), May 1923; Coatepec (7); Santa Rosa; Cordoba (8); La Gloria Cardel, June and August, 1937; Orizaba (4); Misantla (5); Tecolutla, June 19, 1951. *Morelos*: Pointe de Ixtla (1), August; Cuernavaca (2), July; Cuautla (3), July 13, 1946. *Distrito Federal*: Mexico City (1). *Guanajuato*: Irapuato (1), July 30; Gonzales Junction (2). *Aguascalientes*: Aguascalientes (1), July 29. *Zacatecas*: Fresnillo (1), August

15, 1947, 7000 feet. *San Luis Potosi*: Hacienda de Bledos; Moctezuma River, March 20, 1948; 30 miles southwest of San Luis Potosi (1), June 16, 1949, 7000 feet; Pujal (3), May 19, 1952; Tamazunchale (2), May 20, 1952. *Colima*: Vulcano de Colima (1); Colima (2). Central America: Guatemala; British Honduras; El Salvador; Honduras; Nicaragua; Costa Rica.

Cicindela flavopunctata rectilatera Chaudoir

Cicindela rectilatera CHAUDOIR, 1843, Bull. Soc. Imp. Nat. Moscou, vol. 16, p. 693.

Cicindela decostigma LECONTE, 1860, Trans. Amer. Phil. Soc., new ser., vol. 11, p. 54 (Fredericksburg, Texas, and Tampico, Mexico).

This subspecies is found most abundantly and occurs in pure populations throughout the greater portion of Texas and southeastern New Mexico. Many of the Mexican localities formerly listed for this subspecies are now known to be populated with hybrid samples.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Tamaulipas*: Seventeen miles north of Victoria, December 28, 1941; 34 miles south of Nuevo Laredo (2), June 20, 1949, 400 feet; 8 miles east of Padilla, Rancho Santa Ana (3), December 26, 1941; Tampico (4); San Fernando (5), May 15, 1952; Padilla (6), May 17, 1952; 11 miles north of Victoria (7), May 22, 1952; La Pesca

(8), May 17, 1952; Tres Palos (9), May 15, 1952. *Coahuila*: Guadalupe (2), August 23, 1947; Saltillo (3), July; 15 miles north of Saltillo (3), May 24, 1952. *Chihuahua*: Six miles northeast of Meoqui (14), September 2, 1950. *Nuevo Leon*: Monterrey, July (1); Linares (2), May 22, 1952; Rio Potosi, south of Montemorelos (3), May 23, 1952.

Cicindela roseiventris Chevrolat

Text figure 19

Two of the three subspecies of this polytypic species are found in Mexico; *roseiventris* extends south into Central America, and *mexicana* Klug is known only from Mexico. The last subspecies may be confused with *Cicindela flavopunctata rectilatera* Chaudoir but can be distinguished by its testaceous abdomen, its nearly truncate, scarcely unispinose anterior labral margin, and its more rounded shape. Walther Horn (1926) places *C. tascosaensis* W. T. Davis, described from Texas, as a synonym of *C. roseiventris linearis* W. Horn described from Costa Rica, and his illustration of the elytral pattern (1938) agrees with that of a paratype of *tascosaensis*. Two subspecies of this species are known from the area between these two distant localities, and it is doubtful that this synonymy is correct, unless one of the type

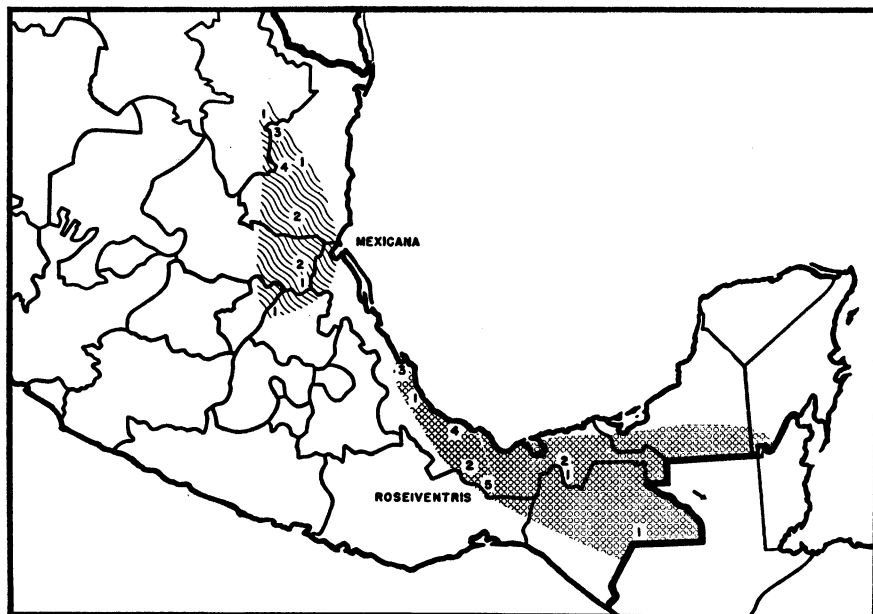


FIG. 19. Distribution of *Cicindela roseiventris* Chevrolat.

localities is incorrect. No additional specimens of *tascosaensis* have been taken in the United States or Mexico, and there is some doubt therefore as to the Texas type locality. It is quite different from *mexicana* Klug, which is the northernmost Mexican subspecies, and resembles most closely the southern *roseiventris* and *linearis*.

The species is collected along the sandy and rocky shores of streams and ponds.

GENERAL DISTRIBUTION: Central America, Mexico, United States (?).

HYBRID DISTRIBUTION: No hybrid populations have been available but will probably be found in northern Veracruz.

KEY TO THE SUBSPECIES OF *Cicindela roseiventris* CHEVROLAT

1. Elytra dark brown *linearis*
Elytra with punctures green, surface cupreous brown or black 2
2. Middle elytral lunule expanded along the margin, often connected with basal lunule and occasionally with ante-apical spot
. *roseiventris*
Middle elytral lunule not expanded along the margin *mexicana*

Cicindela roseiventris roseiventris Chevrolat

Text figures 87, 184

Cicindela roseiventris CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 2, no. 3, *Cicindela*.

Cicindela belti BATES, 1878, Proc. Zool. Soc. London, p. 588 (Chontales, Nicaragua).

This subspecies is primarily Central American, entering Mexico only in the southern portion. The original types probably came from the vicinity of Veracruz.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Veracruz*: Veracruz (1); Playa Vincente (2); Misantla (3); Tlacotalpam (4); Jesus Carranza (5), April 29, 1946. *Tabasco*: Santa Lucrecia, August 8, 1923; San Juan Bautista (2); Teapa (1), March. *Chiapas*: Colonia (1). Central America: Guatemala; Honduras; British Honduras; Nicaragua; Costa Rica; Panama.

Cicindela roseiventris mexicana Klug

Text figures 88, 185

Cicindela mexicana KLUG, 1834, Jahrb. Insectenk., p. 31.

Cicindela decostigma CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 3, *Cicindela* no. 8 (Zimapan, Hidalgo).

The individuals in a sample of this subspecies from Tamaulipas are uniformly larger and darker than in a series from San Luis Potosi, but the area between will probably show intergrades. It differs from the other two subspecies by not having the elytral markings expanded along the margin, and the size is larger and more robust.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Hidalgo*: Zimapan (1). *San Luis Potosi*: Pujal (2), May 19, 1952; Tamazunchale (1), July 17, 1946. *Tamaulipas*: Eighteen miles northeast of Victoria (1), 11 miles north of Victoria (4), May 22, 1952; Rio Corona, December 17, 1941; 27 miles north of Ciudad Mante (2), June 18, 1949, 300 feet; Villagran (3), June 7, 1951; Padilla (1), May 17, 1952. *Veracruz*: La Gloria Cardel (not located), August 22, 1937. *Nuevo Leon*: Rio Potosi, south of Montemorelos (1), May 23, 1952.

Cicindela klugi Dejean

Text figures 89, 186

Cicindela klugii DEJEAN, 1831, Species général des coléoptères, vol. 5, p. 263.

Cicindela douei CHENU, 1840, Mag. Zool., Paris, pl. 45.

This monotypic species is sometimes confused with *C. roseiventris* Chevrolat but can be distinguished by its longer, more linear shape, by the fact that the apices of the elytra are evenly rounded, and the elytra in the females are not expanded at the basal third. At Lake Tezcoco, E. G. Smyth collected them on moist alkali flats around the lake.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Distrito Federal*: Lake Tezcoco, August 26, 1923, October 14, 1923; Mexico City, August 26, 1923; Guadalupe, July, August 25. *Mexico*: Toluca, June. *Hidalgo*: Tula.

Cicindela carthagena Dejean

Text figure 20

This is one of the more interesting of the complicated polytypic species in the New World, and the interpretation of its pattern of subspeciation is difficult. For many years *haemorrhagica* has been considered to be a subspecies of *carthagena*, but it now appears that two very closely related species are in-

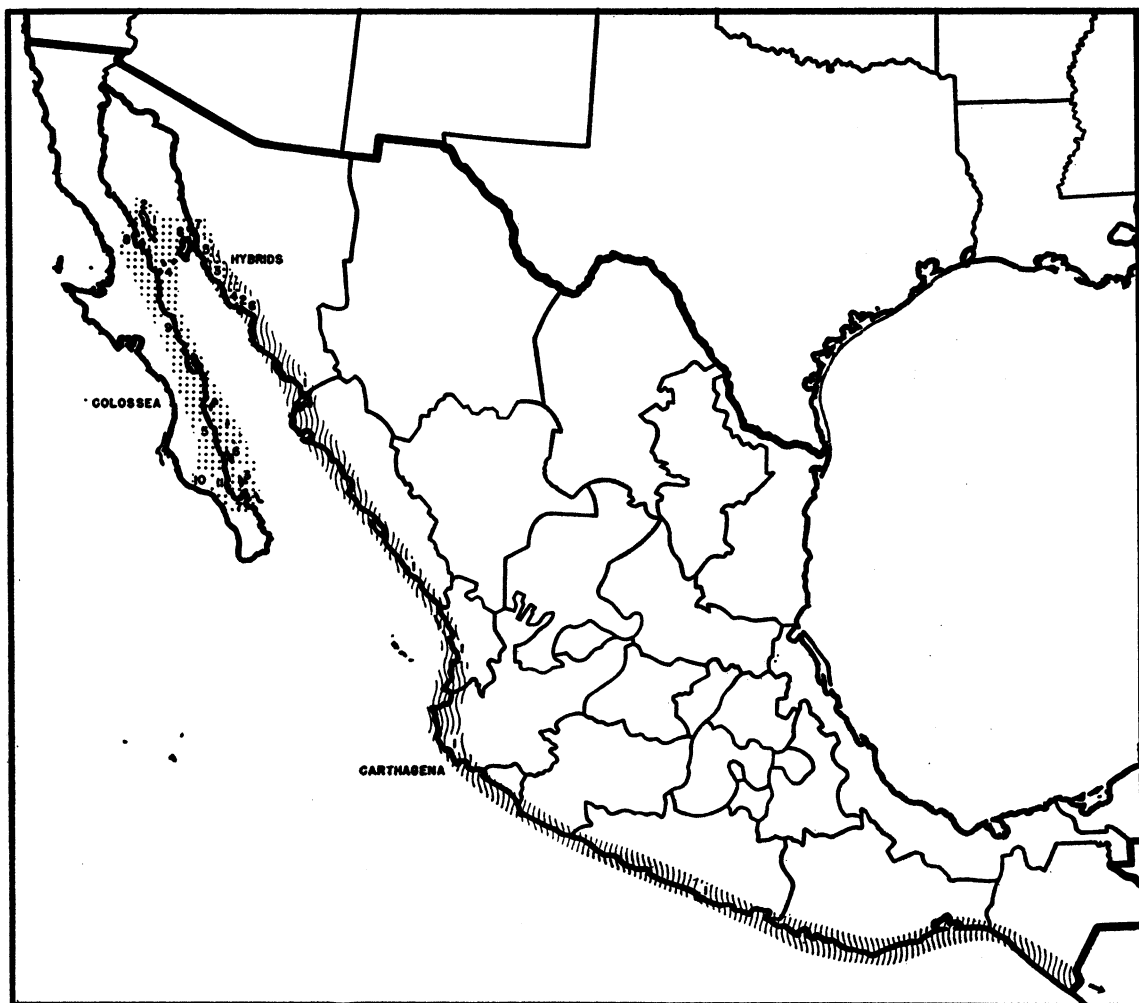


FIG. 20. Distribution of *Cicindela carthagena* Dejean.

involved and occur sympatrically in Baja California. *Cicindela carthagena* ranges in distribution from Colombia, South America, up the west coast of Central America to as far north in Mexico as Miramar Beach, Guaymas, Sonora. Throughout this area there is little variability in structure, color, or markings. Samples from Tastiota; San Carlos Bay, 16 miles west of Guaymas; Alcatraz Island, Kino Bay, Sonora, are intermediate between *carthagena* and *colossea* and are here considered to be hybrids. In the area immediately north of Kino Bay at Desemboque and the northern end of Tiburon Island the samples are *colossea*, which was described originally from Baja

California. Although considerable effort was made to collect *carthagena* north of Desemboque, Sonora, and *colossea* north of Angel de la Guardia Island, Baja California, no specimens were taken, and it is assumed that they do not occur around the northern end of the Gulf of California. However, at Algodones along the Colorado River in Baja California the Vauries took two specimens of *haemorrhagica*, a subspecies of which occurs with *colossea* in southern Baja California.

Nowhere in the distribution of *carthagena* or *colossea* is there a tendency for either the thoracic under surface or the entire upper surface to become completely black, the markings are always complete and evident,

the females have the elytra abruptly expanded at the basal third, and the apical third of the elytral margins are strongly spinose. In *haemorrhagica* the color varies from black to cupreous red, the elytral markings may be complete and distinct or entirely lacking, the females have the elytra only slightly expanded at the basal third, and the apical third of the elytral margins are either weakly spinose or smooth. A study of the male genitalia (penis only) shows a close relationship between *carthagena* and the more eastern samples of *haemorrhagica*, and those of *colossea* are almost identical with those of *carthagena* from Sonora. There is some difference in the genitalia of the southern California *haemorrhagica* and still further divergence in the Baja California *miniscula* which is quite different from the sympatric relative *colossea*.

One might account for the sympatric occurrence of *miniscula* and *colossea* in Baja California on the basis of a double invasion of that area by a single species (Cazier, 1948). However, the writer is more inclined now to regard *haemorrhagica* as a species distinct from *carthagena* although very closely related morphologically. At least in Baja California the two are reproductively isolated, the population variability is entirely different, and most of the individuals in each population can be separated morphologically from those of the other. In both *carthagena* and *haemorrhagica* there is an increase in size from south to north, so that we find the small *haemorrhagica* (*miniscula*) occurring with the large *carthagena* (*colossea*). In Mexico *carthagena* is represented by two subspecies, *carthagena* and *colossea*, and *haemorrhagica* by two subspecies, *haemorrhagica* and *miniscula*.

GENERAL DISTRIBUTION: South and Central America, Mexico.

HYBRID DISTRIBUTION: Hybrids between *carthagena* and *colossea* were taken in the following localities: *Sonora*: Tastiota (3), July 18, 1952; San Carlos Bay, 16 miles west of Guaymas (4), July 25, 1952; Alcatraz Island (Pelican Island), Kino Bay (5), July 14, 1952.

KEY TO THE SUBSPECIES OF *Cicindela carthagena* DEJEAN

Color cupreous brown, elytral markings wide *colossea*

Color dark brown or greenish black, elytral markings narrow. *carthagena*

***Cicindela carthagena carthagena* Dejean**

Text figures 90, 187

Cicindela carthagena DEJEAN, 1831, *Species général des coléoptères*, vol. 5, p. 229.

Cicindela carthagena hentziana W. HORN (*nec* Leng), 1926, in Junk, *Coleopterorum catalogus*, vol. 1, p. 289.

Cicindela carthagena hentzi W. HORN (*nec* G. Horn), 1926, in Junk, *Coleopterorum catalogus*, vol. 1, p. 289.

Panama specimens of this subspecies vary from 10 to 11 mm. in length, becoming gradually larger going north, until in Sinaloa and southern Sonora the samples range from 10 to 15 mm. The markings and color remain virtually unchanged throughout this distribution. It occurs on the west coast and prefers saline situations either along the ocean front or along streams (pl. 11, fig. 2).

TYPE LOCALITY: Colombia: near Cartagena.

GENERAL DISTRIBUTION: *Oaxaca*: Salina Cruz, September, July 9-17, 1947. *Guerrero*: Acapulco (1). *Jalisco*: Tenacatita Bay (1), October 20, 1947. *Nayarit*: San Blas (1), July 20, 1951, August 5, 1947. *Sinaloa*: Playa Camaron (1), Mazatlan (1), February to May 9, 1949, sea level. *Sonora*: Agiabampo (1), April 20, 1949, sea level; Guaymas (2), September 10, 1938; Miramar (2), Guaymas, July 25, 1952; Cochore Beach, Empalme (6), July 26, 1952. Central America: Guatemala, Nicaragua, Panama, Honduras, Canal Zone.

***Cicindela carthagena colossea* W. Horn**

Text figures 91, 188

Cicindela carthagena colossea W. HORN, 1926, *Ent. Blatter*, vol. 4, p. 169.

This subspecies is known in Baja California, from four islands on the western side of the Gulf of California, and from Tiburon (northern end) and Desemboque in Sonora. It probably made its way into Baja California by means of the islands in the Gulf. Cazier (1948) reported its occurrence at San Carlos Bay, Sonora, but this record is now known to be incorrect. The record was based on a large female that resembled females of *colossea* in size, but since that time large

samples have been collected in middle Sonora, which are known to be hybrids between *carthagensis* and *colossea*. Habitat shown in plate 10, figure 2.

TYPE LOCALITY: "Insel San José."

GENERAL DISTRIBUTION: *Sonora*: Desemboque (7), July 7, 1952; Tiburon Island (8), north end, July 10, 1952. *Baja California*: Point Refugio, Gulf of California, Angel de la Guardia Island (1), June 29, 1921; Granite Island (2), Gulf of California, Angel de la Guardia Island, May 2, 1921; Espiritu Santo Island (3), Gulf of California, May 31, 1921; San Francisquito Bay (4), Gulf of California, May 10, 1921; Agua Verde (5), May 26, 1921; San Jose Island (6), Gulf of California, June 10, 1921; La Paz (7), June 29, 1919; Loreto, May 19, 1921; Angeles Bay (8), Gulf of California, May 7, 1921; 12 miles south of Santa Rosalia (9), June 27, 1938; Venancio (10), July 17, 1938; Escondido Bay (11), June 14, 1921; Bahia de Los Angeles (8), September 5, 1951.

***Cicindela haemorrhagica* LeConte**

KEY TO THE SUBSPECIES OF *Cicindela haemorrhagica* LECONTE

Population with elytra greenish black; medium sized. *haemorrhagica*
Population with elytra primarily black; small sized. *miniscula*

***Cicindela haemorrhagica haemorrhagica* LeConte**

Text figures 92, 190

Cicindela haemorrhagica LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 171.

Cicindela haemorrhagica var. *pacifica* SCHAUPP, 1884, Bull. Brooklyn Ent. Soc., vol. 6, p. 106 (San Diego, California).

Cicindela woodgatei CASEY, 1913, Memoirs on the Coleoptera, vol. 4, p. 40 (Jemez Springs, New Mexico).

Cicindela pacifica var. *nevadiana* CASEY, 1924, Memoirs on the Coleoptera, vol. 11, p. 16 (Las Vegas, Nevada).

This subspecies is widely distributed in the western portion of the United States and at present is known from Mexico only in the northern portion of Baja California. It will undoubtedly be taken in saline situations in northwestern Sonora. (See discussion under *carthagensis*.)

TYPE LOCALITY: California: San Diego.

GENERAL DISTRIBUTION: *Baja California*: El Rosario, September 1, 1951; 15 miles west of Bahia de los Angeles, September 5, 1951; Algodones, June 28, 1952.

***Cicindela haemorrhagica miniscula* Cazier**

Text figures 93, 191

Cicindela carthagensis miniscula CAZIER, 1948, Amer. Mus. Novitates, no. 1382, p. 12.

There is considerable doubt as to the validity of this subspecies, and more material from Baja California is necessary before a definite conclusion can be made. The original series was primarily black and small in size, but subsequent small collections from middle Baja California have consisted primarily of individuals that resemble *haemorrhagica*. This population was most certainly derived from *haemorrhagica* as a southward extension into Baja California where it occurs sympatrically with *carthagensis colossea*.

TYPE LOCALITY: Baja California: Twelve miles south of Santa Rosalia, June 27, 1938.

GENERAL DISTRIBUTION: *Baja California*: Venancio, July 7, 1938; Mulege, May 14, 1921; San Jose del Cabo; 12 miles south of Santa Rosalia, June 27, 1938; Santa Rosa; San Evaristo.

***Cicindela beneshi* Arangua**

Text figures 94, 189

Cicindela beneshi ARANGUA, 1930, Rev. Chilena Hist. Nat., vol. 33, p. 504.

This species is apparently most closely related to *carthagensis* Dejean but can be distinguished from it by the dark-colored abdomen and by having the transverse portion of the middle lunule narrowed. In a series of over 1900 specimens, taken at La Coya, Sonora, there is little variability except in color. Most of the series are cupreous brown, but they grade gradually into green and blue. This species inhabits ocean beaches and at times can be found swarming in very large numbers.

TYPE LOCALITY: Mexico: Sonora: Rocky Point, July, 1929.

GENERAL DISTRIBUTION: *Sonora*: Bahia de San Jorge, May 29, 1947; La Choya, June 12, 1952, and August 16, 1952.

Cicindela sommeri Mannerheim

Text figures 21, 95, 192

Cicindela sommeri MANNERHEIM, 1837, Bull. Soc. Imp. Nat. Moscou, vol. 10, no. 2, p. 12.

Cicindela ruricola GISTL, 1837, Systema insectorum, vol. 1, p. 28 (Mexico).

Cicindela ferrugata PUTSEYS, 1845, Mem. Soc. Roy. Sci. Liège, vol. 2, p. 366.

This Neotropical monotypic species has been recorded from the United States, and several old specimens are labeled "San Diego." However, no additional specimens have been taken in recent years, and it is a doubtful record and the specimens probably came from northern Sonora. So far as known

fera and this species are the only ones in which the elytral lunules are orange or red. In the Sonora samples the lunules are a deep reddish orange, whereas most of those from farther south are orange. In a few specimens the lunules appear to be iridescent and change color depending on the direction of the light. This species occurs primarily along sandy banks of rivers, small rocky streams, and is usually associated with *fera* (pl. 10, fig. 1).

TYPE LOCALITY: Oaxaca.

GENERAL DISTRIBUTION: *Sonora*: Pitiquito (1), July 4, 1952; El Gavilan (2), July 19, 1952; Hermosillo (2), July 19, 1952; Santa Rosa Ranch (3), north of Navojoa, August 2,



FIG. 21. Distribution of *Cicindela sommeri* Mannerheim.

1952. *Sinaloa*: Palmaritas (1); Presidio River near Union (2), September 26, 1918, Camino Real de Piaxtla (3), May 3, 1949, 200 feet; Quelite (4), May 6, 1949, 100 feet; Villa Union (2), May 11, 1949; Rosario, March; Rosario (5), Rio de Buluarte, May 12, 1949, 150 feet; 4 miles east of Coyotitan (3), May 5, 1950, 500 feet; La Noria (4); Mazatlan (6). *Nayarit*: Ten miles northeast of San Blas (1), May 18, 1949, 150 feet; 3.5 miles northwest of Las Varas (2), November 11, 1950; 9 miles east of Las Varas, November 16, 1952. *Jalisco*: Atenquique (1); environs of Guadalajara (2), 1901; 2 miles southwest of La Resolana (3), November 20, 1950; Barranca de Atenquique (1). *Colima*: Colima (1); Vulcan de Colima (1); Manzanillo (2), February 5, 1946. *Michoacan*: Seventeen miles south of Apatzingan (1), December 1, 1950. *Gerrero*: Xalitla (1), June 16, 1946; Iguala (2), August; Mexcala (3), June 3, 1946, June 29, 1951; Rio Balsas (4), August 5; Acapulco (5). *Morelos*: Tetecala, November 6, 1922; Pointe de Ixtla (1), August; Yautepec (2). *Puebla*: Chiautla (1); Puebla (2), July 30, 1950. *Oaxaca*: Oaxaca (1), July 8, 1949, September 20 and 24, 1923; Tehuantepec (2), July 16, 1947; Salina Cruz (2), July 9-17, 1947.

Cicindela praecisa Bates

Text figures 96, 193

Cicindela praecisa BATES, 1890, Trans. Ent. Soc. London, p. 488.

This monotypic species appears to be closely related to *viridisticta* Bates, and in the small series from Morelos there is little variability. The basal lunule is lacking, the middle band does not reach the margin and is often recurved at the tip, and the apical lunule is represented only by the ante-apical spot. In color it varies from almost black to dark reddish brown and in a few specimens the head and pronotum are purplish. The average size is slightly larger than in *viridisticta*.

TYPE LOCALITY: Guerrero: Chilpancingo.

GENERAL DISTRIBUTION: *Morelos*: Pointe de Ixtla, August 11, *Guerrero*: Rio Balsas, August. *Colima*: Vulcano de Colima.

Cicindela specularis Bates

Text figure 97

Cicindela specularis BATES, 1890, Trans. Ent. Soc. London, p. 500.

Although Bates (1890) compares *specularis* with *praecisa* Bates, it appears to be more closely related to *viridisticta* Bates. Most of the differences given by Bates would be applicable to *viridisticta*, including the smooth lateral elytral margins, the non-serrate elytral apices, and the bluish black under surface. No specimens have been available for study so it is retained as a distinct species. It differs from both *viridisticta* and *praecisa* by having black humeral and middle lunules.

TYPE LOCALITY: Guerrero: Omilteme, 8000 feet.

Cicindela viridisticta Bates

Text figure 22

Only two subspecies of this species have been recognized previously (*viridisticta* Bates and *interjecta* W. Horn), but large samples taken in Durango show that *arizonensis* Bates also belongs to this species as was proposed originally by Bates (1884) and subsequently by W. Horn (1935). Although most of the specimens from Durango are *arizonensis*, a few have the side elytral margins dark and smooth as in *interjecta*. Samples from Zacatecas will probably show a higher percentage of intermediates between these two subspecies. The intermediates between *viridisticta* (Oaxaca) and *interjecta* (Jalisco), which may be an intermediate, will probably be taken in Guerrero or Michoacan. They are known to inhabit alfalfa fields along irrigation ditches, shaded paths, and river bottoms where the grass is short and sparse. They are usually rather difficult to see and catch, but at San Juan del Rio they were found in great abundance and took wing very reluctantly even though the day was hot. They were collected by the means of placing the net edge on the ground and herding them into it with the free hand (Spieth, 1950, fig. 32).

GENERAL DISTRIBUTION: United States, Arizona; Mexico.

HYBRID DISTRIBUTION: *Durango*: San Juan del Rio (1), July 30, 1947, 5200 feet; Durango City (2), August 14, 1947, 6200 feet; Nombre de Dios, August 6, 1951.

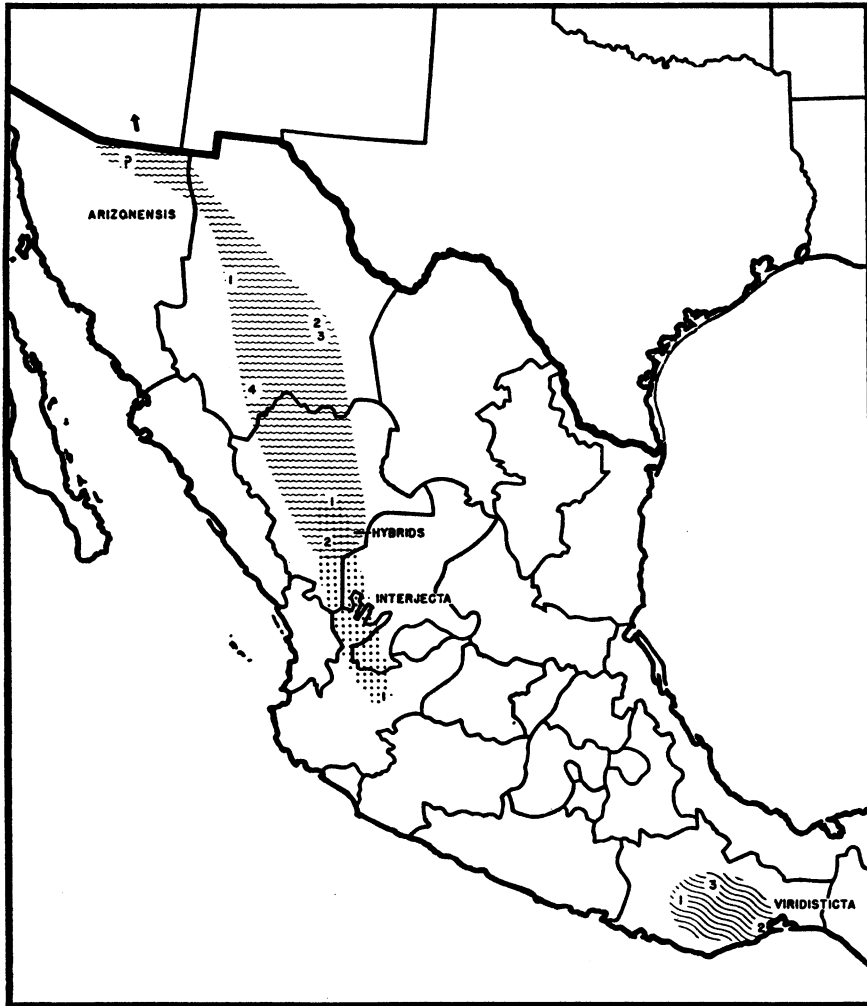


FIG. 22. Distribution of *Cicindela viridisticta* Bates.

KEY TO THE SUBSPECIES OF *Cicindela viridisticta* BATES

- 1. Lateral elytral margins punctate and colored the same as dorsal surface except for being less alutaceous *arizonensis*
Lateral elytral margins almost impunctate and not colored the same as the dorsal surface, usually dark brown or black 2
- 2. Lateral elytral dark smooth band widened medially; elytral foveae indistinct . . . *viridisticta*
Lateral elytral dark, smooth band not widened medially; elytral foveae distinct . . . *interjecta*

***Cicindela viridisticta viridisticta* Bates**

Text figure 98

Cicindela viridisticta BATES, 1881, Biologia Centrali-Americana, Coleoptera, vol. 1, pt. 1, p. 14.

No specimens of this subspecies have been available for study.

TYPE LOCALITY: Oaxaca: Yolotepec (1), Tehuantepec (2), Villa Alta (3).

***Cicindela viridisticta arizonensis* Bates**

Text figures 99, 194

Cicindela viridisticta var. *arizonensis* BATES, 1884, Biologia Centrali-Americana, Coleoptera, vol. 1, pt. 1, suppl. p. 260.

Samples of this subspecies taken in Arizona and northern Mexico are remarkably uniform in structure, color, and markings and are apparently rather stable as far south as Durango where they begin to show the characteristics of *interjecta*.

TYPE LOCALITY: United States: Arizona. Mexico: Sonora.

GENERAL DISTRIBUTION: *Sonora*: Northern. *Chihuahua*: Matachic (1), July 7, 1947; Delicias (2), July 11, 1947, 4150 feet; La Cruz (3), July 13, 1947; 63 miles west of Santa Barbara (4), July 20, 1947, 5500 feet.

***Cicindela viridisticta interjecta* W. Horn**

Text figures 100, 195

Cicindela viridisticta interjecta W. HORN, 1935, Pan-Pacific Ent., vol. 11, no. 2, p. 65.

Two specimens of this subspecies are somewhat darker in color than typical *arizonensis* and the smooth lateral black band extends from the humeral angles to the anterior portion of the apical lunule. This population may eventually be shown to be a hybrid between *viridisticta* and *arizonensis* when adequate samples from intermediate localities are available for study.

TYPE LOCALITY: Jalisco: Guadalajara (1), December 3, 1903.

GENERAL DISTRIBUTION: No additional localities known.

***Cicindela argentata* Fabricius**

This polytypic species is represented in Mexico by one subspecies which is supposed to range from Mexico to Panama. Mexican specimens agree very well with those from British Honduras, whereas two specimens from Panama are quite distinct and may represent a distinct subspecies, possibly *nebulosa* Bates from Nicaragua. Additional collecting is necessary before the southern limit of *hemichrysea* Chevrolat can be established.

GENERAL DISTRIBUTION: Mexico, Central and South America.

HYBRID DISTRIBUTION: No hybrid areas are known in Mexico.

***Cicindela argentata hemichrysea* Chevrolat**

Text figures 101, 196

Cicindela hemichrysea CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 6, species no. 129, *Cicindela* no. 14.

Cicindela inspersa CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 6, species no. 130, *Cicindela* no. 14 (Mexico).

Cicindela cyanosparsa CHAUDOIR, 1852, Bull. Soc. Imp. Nat. Moscou, vol. 25, no. 1, p. 23 (Yucatan).

This is one of the smallest of all Mexican tiger beetles, and relatively few specimens have been available for study. The elytral markings vary from being almost complete to almost absent, but none of the Mexican and British Honduras specimens examined have had any indication of the black infuscated areas prevalent in the Panama specimens.

TYPE LOCALITY: Mexico.

GENERAL DISTRIBUTION: *Sinaloa*: Venedio, June 19-27, 1918. *Veracruz*: Tuxpan; Cordoba, August and December; Tuxtla; Playa Vicente; Jalapa; Bosque de Pacho; San Rafael Jicaltepec; Tapachula, May. *Yucatan*: Tixkokob, July 5, 1952; Cordillera Mayapan, July 8, 1952; Uxmal, July 25, 1952. *Chiapas*: Finca Santa Marta, July 31, 1950. *San Luis Potosi*: Huichihuyan, 20 miles north of Tamazunchale, May 19, 1952. Central America: Guatemala, Panama, British Honduras.

***Cicindela wickhami* W. Horn**

Text figures 102, 197

Cicindela wickhami W. HORN, 1903, Deutsche Ent. Zeitschr., p. 182.

This rather uncommon monotypic Sonoran element is variable in color and markings, but this variability appears not to be correlated with the distributional pattern in any way. The color varies from cupreous red to brilliant green, the basal elytral lunule may or may not be indicated by two small spots at the extremes, and the middle lunule is sometimes obsolete. In Sinaloa it occurs sympatrically without intergrading with the closely related *hemichrysea* Chevrolat. Habitat shown in plate 12, figure 1.

TYPE LOCALITY: Arizona: Tucson.

GENERAL DISTRIBUTION: United States: Arizona. *Sonora*: Guaymas, April, 1903; Rio Mayo, July 15, 1935; Yaqui-Tal, 1927; Minas Nuevas, August 7, 1952; Obregon, July 29, 1952; Santa Rosa Ranch, north of Navojoa, August 2, 1952; Hermosillo, July 19, 1952. *Sinaloa*: Venedio, July 23-27, 1918. *Baja California*: Cape San Lucas.

***Cicindela debilis* Bates**

Text figures 103, 198

Cicindela debilis BATES, 1890, Trans. Ent. Soc. London, p. 509.

Cicindela debilis segnis E. D. HARRIS, 1913, Jour. New York Ent. Soc., vol. 21, no. 1, p. 69 (Sonoita, Arizona); new synonym.

The varietal name *segnis* was proposed for bright green specimens taken in Arizona. Series from both Arizona and Durango, Mexico, are now available and show that the populations from both extremes of the distribution exhibit the same variability in color, although the bright green does tend to predominate in Arizona and the dark green to almost black in Durango. However, there are numerous individuals from each area that are inseparable from those from the other, and there seems to be no purity in the geographical populations. Also, there is little or no difference in size and elytral sculpturing as stated by Harris (1913). The population variability in the percentage of green and dark individuals is probably clinal in form, and it can be expected that samples from the intervening area in Chihuahua will exhibit the intermediate stages in the percentage of colors. In view of the lack of geographical purity at the extremes in the distribution and therefore the lack of convenience in retaining the name *segnis*, it is placed in synonymy.

A series of 29 specimens was collected in a dry sandy field overgrown with weeds. The specimens appeared to be more numerous along the margins where there were rocks mixed with the sandy soil. They were easily captured and flew only short distances when disturbed. Paul D. Hurd, collecting in the same area four years later, found them running rapidly over the semi-moist ground, and no amount of irritation would induce them to fly.

TYPE LOCALITY: Ciudad in Durango.

GENERAL DISTRIBUTION: *Durango*: Nombre de Dios, August 13, 1947, August 5-6, 1951; Cerro Mercado. *Coahuila*: Saltillo, July. United States: Arizona and New Mexico.

***Cicindela nephelota* Bates**

Text figures 104, 199

Cicindela nephelota BATES, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 9, p. 319.

This very distinct monotypic species has little or no resemblance to any other species in Mexico but is probably distantly allied to *clarina* Bates.

TYPE LOCALITY: Mexico: Durango: Durango City.

GENERAL DISTRIBUTION: No additional localities.

***Cicindela pusilla* Say**

This species has been divided into at least four recognizable subspecies, only one of which is known to occur in Mexico. No Mexican specimens have been examined by the writer.

GENERAL DISTRIBUTION: United States. Mexico: Baja California.

***Cicindela pusilla lunalonga* Schaupp**

Text figures 105, 200

Cicindela lunalonga SCHAUPP, 1884, Bull. Brooklyn Ent. Soc., vol. 6, p. 122.

This subspecies has a very extensive distribution in the western United States where it is extremely variable.

TYPE LOCALITY: California: Sierra Nevada.

GENERAL DISTRIBUTION: *Baja California*: San Pedro Martir Mountains.

***Cicindela schauppi* G. Horn**

Text figures 106, 201

Cicindela schauppi G. HORN, 1876, Trans. Amer. Ent. Soc., vol. 5, p. 240.

No Mexican specimens of this monotypic species have been examined, but W. Horn (1897) records one specimen from Mexico. In the United States it is rather widely distributed in Texas and is also known from Oklahoma. It is collected at light and also in areas of limestone outcroppings, and along roads but not necessarily in the vicinity of standing water.

TYPE LOCALITY: Texas: Corsicana.

GENERAL DISTRIBUTION: *Nuevo Leon*: Monterrey.

***Cicindela circumpicta* La Ferté**

Three subspecies of this species are known in the United States, but only one has been taken in Mexico and is recorded herein for the first time. The species occurs in alkaline

situations either along the sea coast or on inland salt lakes and marshes.

GENERAL DISTRIBUTION: United States: Widespread throughout the central and south central states. Mexico: Tamaulipas.

HYBRID DISTRIBUTION: No hybrid populations are known from Mexico.

***Cicindela circumpecta circumpecta* La Ferté**

Text figures 107, 202

Cicindela circumpecta LA FERTÉ, 1841, Rev. Zool., Paris, vol. 4, p. 39.

Three specimens from Mexico are the same as specimens from the Texas coast that are green with cupreous reflections. Collected along the margins of an ocean inlet.

TYPE LOCALITY: Texas.

GENERAL DISTRIBUTION: *Tamaulipas:* El Mante, June 4, 1935; La Pesca, May 17, 1952.

***Cicindela californica* Ménétries**

Text figure 23

A great deal of material has become available since the writer (1948) published an account of the tiger beetles of Baja California, and the distributional and relationship picture of this species must be changed in several respects. *Cicindela praetextata*, which has

been listed as a subspecies of *californica* for many years, is now known to be a distinct species. It inhabits the Colorado River drainage system and, except for the Salton Sea, does not occur around saline lakes or marshes. With the building of the canal that connects the Colorado River with the Salton Sea, or more probably during one of the periods when the Colorado River flowed directly into the Salton Sea, it was apparently able to establish itself at Salton Sea where it occurs sympatrically with *mojavi* without apparent interbreeding. At present *praetextata* is not known from Mexico but will probably be found along the banks of the Colorado River in Sonora or Baja California.

Cicindela californica occurs along the shores of the Gulf of California and around alkaline lakes and streams in the interior. In 1948 three subspecies were known. However, since that time additional studies have been made, and it appears that the species is represented by five, or possibly six, subspecies, three of which are known from Mexico.

GENERAL DISTRIBUTION: United States: Southwestern states. Mexico: Sonora, Sinaloa, Baja California.

HYBRID DISTRIBUTION: At the present time no hybrid populations are known from

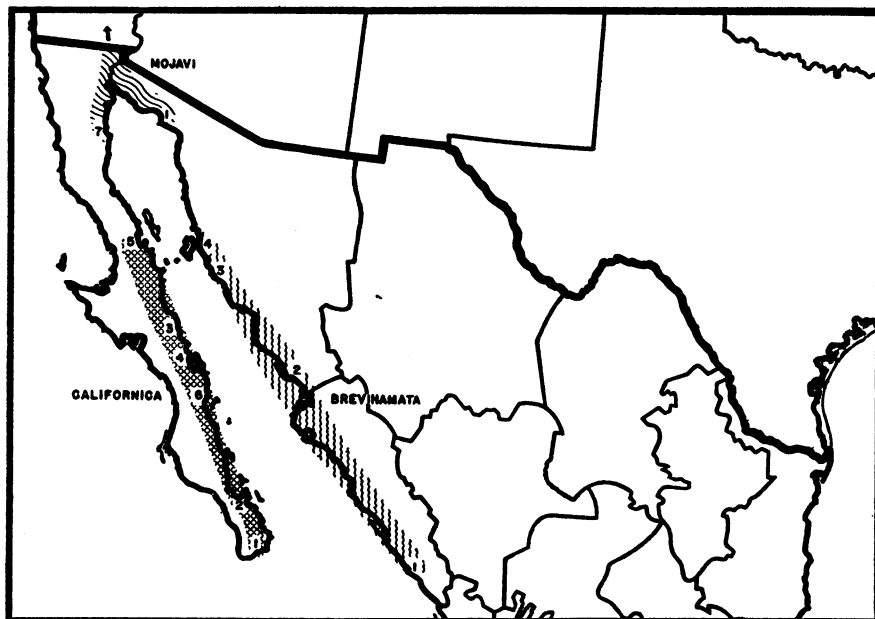


FIG. 23. Distribution of *Cicindela californica* Ménétries.

Mexico, but they may eventually be found in the area between Angeles Bay and San Felipe in Baja California and between Desemboque and La Choya in Sonora.

KEY TO THE SUBSPECIES OF *Cicindela californica* MÉNÉTRIÉS

1. Apical and middle lunules widely or narrowly separated along the margin . . . *californica*
Apical and middle lunules narrowly or broadly united along margins 2
2. Elytral lunules narrow, not confluent internally *brevihamata*
Elytral lunules broad, usually confluent internally *mojavi*

Cicindela californica californica Ménétries

Text figures 108, 203

Cicindela californica MÉNÉTRIÉS, 1844, Bull. Acad. Imp. Sci. St. Petersburg, Cl. Phys. Mat., vol. 2, p. 51.

This subspecies is known only from Baja California and occurs along the beaches and salt marshes on the Gulf of California side of the peninsula.

TYPE LOCALITY: California.

GENERAL DISTRIBUTION: *Baja California*: San Jose del Cabo (1); La Paz (2); 12 miles south of Santa Rosalia (3), June 27, 1938; Coyote Cove (4), Conception Bay, June 29, 1938; Angeles Bay (5), Gulf of California, June 26, 1931; Loreto (6), October.

Cicindela californica brevihamata W. Horn

Text figures 109, 205

Cicindela californica brevihamata W. HORN, 1908, Ent. Wochenblatt, p. 209.

This subspecies resembles *californica* more closely than do any of the others, and the only difference seems to be in the elytral pattern. In all the Baja California specimens the apical lunule is separated from the middle lunule along the margin, whereas in 155 specimens from Sonora and Sinaloa these lunules are united along the margin. No specimens of *brevihamata* have been taken north of Kino Bay, Sonora, and its preferred habitat is occupied by *mojavi* at La Choya. Although no specimens were taken on the island of Tiburon it seems fairly certain that *brevihamata* or *californica* crossed the Gulf of California at this point rather than around the northern end. Evidence to favor this con-

clusion is presented under the discussion of *carthagena* and *sinaloae*. It is a coastal, salt-marsh subspecies, and the large Sonora samples were collected by jack-lighting at night.

TYPE LOCALITY: Sinaloa: Mazatlan.

GENERAL DISTRIBUTION: *Sonora*: Yavaros (2), July 31, 1952; Tastiota (3), July 18, 1952; Kino Bay (4), July 14, 1952; Guaymas, October 16, 1951. *Sinaloa*: Mazatlan (1); Venedio.

Cicindela californica mojavi Cazier

Text figures 110, 204

Cicindela californica mojavi CAZIER, 1937, Pan-Pacific Ent., vol. 13, no. 3, p. 116.

This subspecies is herein recorded from Mexico for the first time, and the variability in the sample from Sonora is almost identical with that in samples from California. Most of the individuals have the elytral lunules broadly confluent, but in a few the inner portion of the middle lunule is evident but much broader than in either *californica* or *brevihamata*. Most of the specimens are cupreous brown, but a few are greenish and similar to the holotype from Saltdale, California. They were collected around a coastal salt marsh and on the adjacent beach. Some were taken during the day, but most of them came to light at night.

TYPE LOCALITY: California: Saltdale.

GENERAL DISTRIBUTION: *Sonora*: La Choya (1), September 1, 1946; June 12, 1952; August 16, 1952. *Baja California*: San Felipe (7), June 15, 1952.

Cicindela trifasciata Fabricius

Text figure 24

This widely distributed polytypic species can be separated into two subspecies in North America, both of which occur in Mexico. In some cases it is difficult to determine individuals, since in some areas in which *ascendens* LeConte is found there are occasional light green specimens inseparable from *sigmoidea* LeConte. When considered from a population viewpoint, however, the two names evidently represent distinct subspecies. So far as observed, the populations of *sigmoidea* never contain individuals that can be confused with *ascendens*.

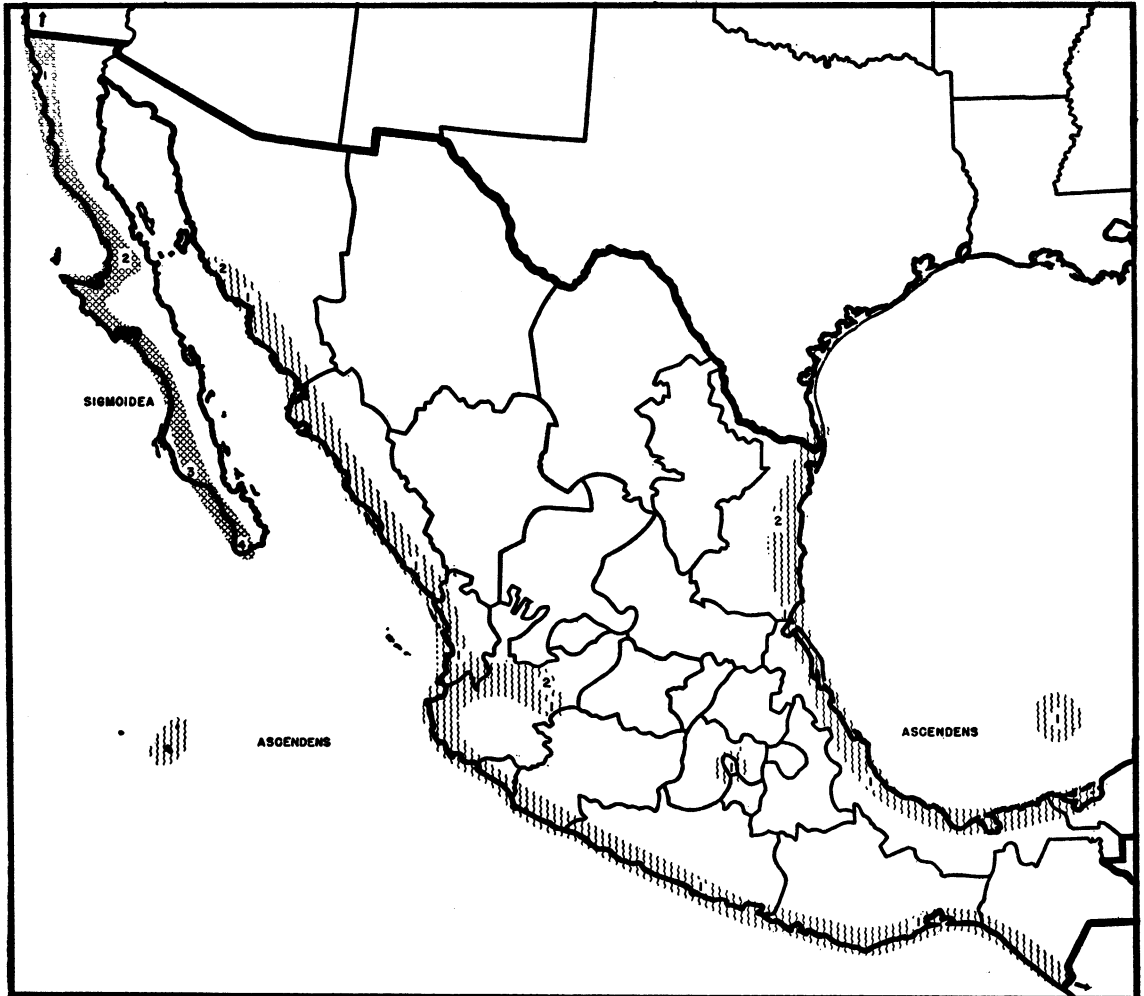


FIG. 24. Distribution of *Cicindela trifasciata* Fabricius.

It occurs primarily on the sandy beaches and salt marshes of the sea coast but also occurs inland along rivers, small alkaline ponds, and lakes.

GENERAL DISTRIBUTION: United States, Mexico, West Indies, Central and South America.

HYBRID DISTRIBUTION: No hybrid populations are known from Mexico, but they will almost certainly be found either on the coast in Sonora or on the northeast coast of Baja California.

KEY TO THE SUBSPECIES OF *Cicindela trifasciata* FABRICIUS

Color black or greenish black *ascendens*
 Color light green throughout *sigmoidea*

***Cicindela trifasciata ascendens* LeConte**

Text figures 111, 206

Cicindela ascendens LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 172.

Cicindela tortuosa LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 172 (Georgia and Louisiana); name preoccupied by *tortuosa* Dejean, 1825.

Cicindela serpens LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 173 (Key West, Florida).

Since the appearance of a paper by the author (1948), in which a small sample from Mazatlan, Sinaloa, was indicated as belonging to *sigmoidea*, a series of some 369 specimens from this locality have been collected

and indicate that it should be considered *ascendens*. Although a few of the specimens are greenish, they are still separable from the light green specimens of *sigmoidea* from California and Baja California, and the sample as a whole does not seem to be hybrid. This species is apparently able to cross from coast to coast in central Mexico in the vicinity of Mexico City where it is found inland along rivers and lakes.

TYPE LOCALITY: Georgia.

GENERAL DISTRIBUTION: *Tamaulipas*: Tampico (1); Tres Palos (2), May 15, 1952. *Veracruz*: Veracruz (1). *Oaxaca*: Salina Cruz (1), September, July 9-17, 1947, August 7, 1923; Tehuantepec (1), July 16, 1947. *Distrito Federal*: Guadalupe (1), July, August, 1907; Mexico City (1), August 26, 1923, October 14, 1923; Penon (1); Lake Tezcoco (1), August, 1923. *Mexico*: Texcoco (1), August. *Campeche*: Arcas Islands (1), August 29, 1952. *Jalisco*: Lake Chapala, 4 miles west of Ajijic (1), November 7, 1950; 9 miles east of Guadalajara (2), June 16, 1949, 5200 feet; Ajijic, Lake Chapala (1), May 24, 1948. *Nayarit*: Los Corchos, 20 miles west of Santiago Ixcuintla (1), May 14, 1949, sea level. *Sinaloa*: Playa Cameron, Mazatlan (1), May 9, 1949, sea level; Mazatlan (1), March 1, 1918; Revilla Gigedo Islands. *Guerrero*: Acapulco (1). *Sonora*: Cochore Beach, Empalme (1), July 26, 1952; Tastiota (2), July 18, 1952.

***Cicindela trifasciata sigmoidea* LeConte**

Cicindela sigmoidea LECONTE, 1851, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 172.

This subspecies extends into the United States along the coast of southern California, and in Mexico is now known only from Baja California, where it occurs principally along the coast except at one locality 45 miles north of San Ignacio in the Vizcaino Desert.

TYPE LOCALITY: San Diego.

GENERAL DISTRIBUTION: *Baja California*: Ensenada (1), August 5, 1934; 45 miles north of San Ignacio (2), July 27, 1938; Venancio (3), July 17, 1938; Cape San Lucas (4).

***Cicindela gabbi* G. Horn**

Text figures 112, 207

Cicindela gabbi G. HORN, 1866, Proc. Acad. Nat. Sci. Philadelphia, vol. 18, p. 395.

Thus far no subspecies of this Sonora element have been described. Several long series taken in four different localities in Sonora show that this population is somewhat different than that inhabiting southern California. In the Sonora samples there is no reduction in the elytral maculations, and the color is cupreous brown. The southern California series vary from being almost completely immaculate to fully maculated, and the basic color is green. This change in population variability will probably be found to be clinal when adequate samples from Baja California are available. A sample from La Choya contains a few specimens that appear to be intermediate between those from California and those from Yavaros in southern Sonora. It occurs in alkali flats or salt marshes along the coast, either in open areas or among the salt grasses.

TYPE LOCALITY: California: Wilmington (San Pedro).

GENERAL DISTRIBUTION: *Baja California*: San Ignacio, June 26, 1938; Bahia de los Angeles, September 5, 1941. *Sonora*: La Choya (La Cholla), September 1, 1946, June 12, 1952, August 16, 1952; Miramar, Guaymas, July 25, 1952; Yavaros, July 31, 1952; Kino Bay, July 14, 1952; Tastiota, July 18, 1952. *Sinaloa*: Mazatlan.

***Cicindela macrocnema* Chaudoir**

Text figure 25

This widespread polytypic species has been divided into three subspecies, as follows: *kinbergi* Boheman from Ecuador, *obliquans* Chaudoir from Panama and Nicaragua, and *macrocnema* Chaudoir from Mexico and Nicaragua. *Cicindela chevrolati* Bouchard was the name proposed for the Panama variants which have the white elytral markings largely confluent. Although this same individual variability is present in two or three specimens in several large samples from Mexico, it has not been shown to be of population significance until the present paper. The name *kino* is herein proposed for the northernmost Sonora population of *macrocnema*. The available specimens of *obliquans* are darker and have the inner portion of the apical lunule more recurved than most of the Mexican *macrocnema*. They appear to be very closely related, however, and more collecting must be

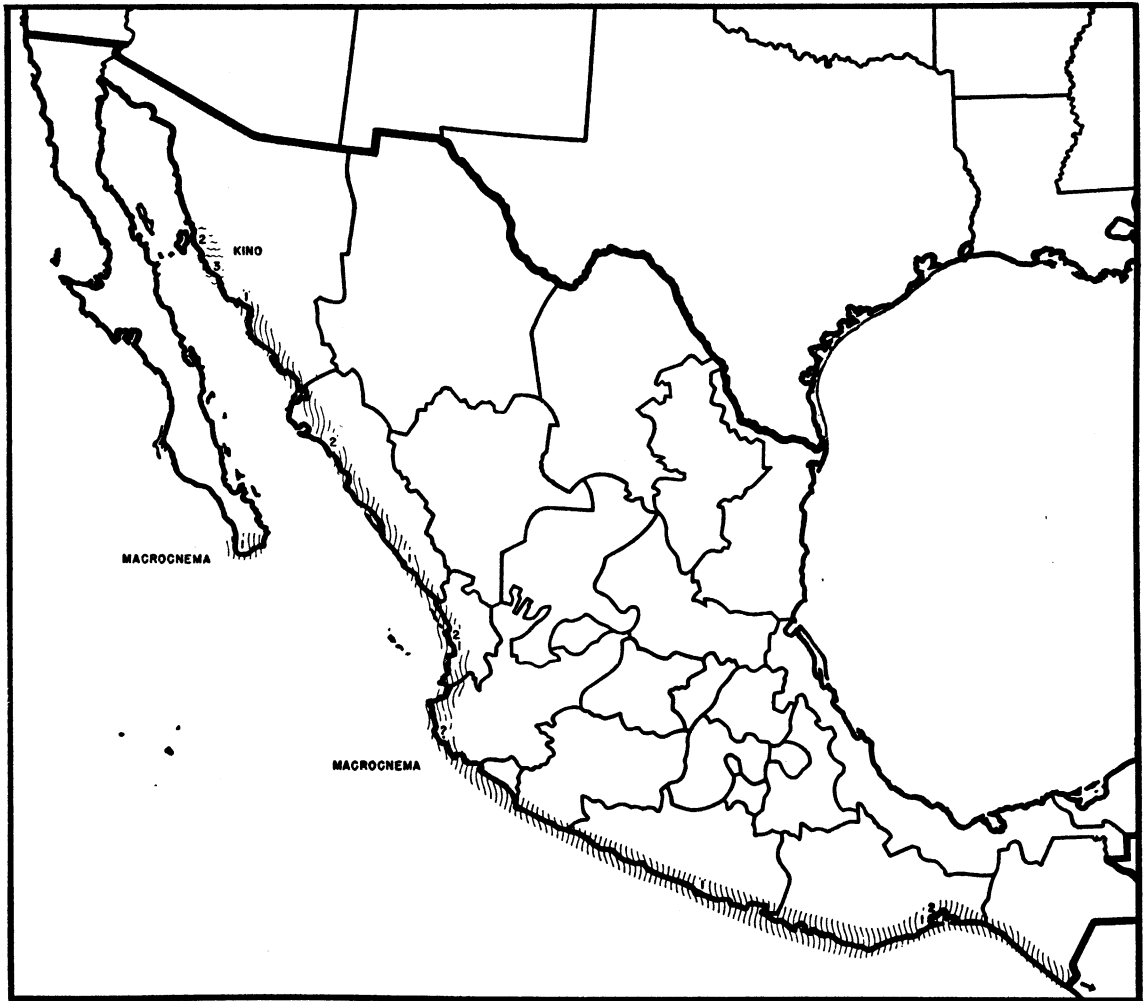


FIG. 25. Distribution of *Cicindela macrocnema* Chaudoir.

accomplished in Central and South America before the populations can be properly analyzed. It is collected along the sea shore.

GENERAL DISTRIBUTION: Mexico, Nicaragua, Panama, Ecuador.

HYBRID DISTRIBUTION: No hybrid populations have been available for study, but they will probably be found in Central America, Colombia, and along the sea coast between Empalme and Tastiota in Sonora.

***Cicindela macrocnema macrocnema* Chaudoir**

Text figures 113, 208

Cicindela macrocnema CHAUDOIR, 1852, Bull. Soc. Imp. Nat. Moscou, vol. 25, p. 15.

Cicindela macrocnema batesi W. HORN, 1894,

Deutsche Ent. Zeitschr., p. 111.

Cicindela macrocnema albina W. HORN, 1894, Deutsche Ent. Zeitschr., p. 240.

There is considerable individual variability in samples taken in various localities in Sinaloa and Nayarit. The apical lunule may or may not be connected to the middle band along the margin, the inner apical portion of the middle band is connected with the inner portion of the apical lunule in some specimens and in a few all the markings are broadly confluent. The majority of the specimens have all the lunules narrowly connected along the margin with the inner projections distinct and separated from each other.

TYPE LOCALITY: Guerrero: Acapulco.

GENERAL DISTRIBUTION: *Baja California*: San Lucas (1), not examined. *Sonora*: Cochore Beach, Empalme (1), July 26, 1952; August 11, 1952. *Sinaloa*: Tonalá; Mazatlan (1), April 12, 1918, and February 17, 1918; San Benito (2); Playa Camaron, Mazatlan (1), May 9, 1949, sea level. *Nayarit*: San Blas (1), April 18, 1949, August 6, 1947, July 20, 1951, sea level; San Blas Beach (1), October 4, 1950; Salina Cruz, August 7, 1923; Los Corchos (2), 20 miles west of Santiago Ixcuintla, May 14, 1949; 10 miles south of Santiago Ixcuintla (2), May 15, 1949, 100 feet; Tonalá. *Guerrero*: Acapulco (1). *Oaxaca*: La Ventosa (2), February 16, 1952; Salina Cruz (1). *Jalisco*: San Blas, Guatemala.

Cicindela macrocnema kino, new subspecies

Text figures 114, 209

Similar to *macrocnema* but differing in having the elytral lunules very broad or so confluent that only a narrow sutural band of pigmented area remains. The color is cupreous brown rather than black or dark green as in *macrocnema*.

TYPE MATERIAL: Holotype male and allotype female collected at Kino Bay (2), Sonora, Mexico, July 14, 1952 (Charles and Patricia Vaurie). Three hundred and eighteen paratopotypes and 43 paratypes from Tastiota (3), Sonora, Mexico, July 18, 1952.

This subspecies differs from the Panama *chevrolati* by being more robust and by having the elytral margins more expanded. In the Panama population the individuals with the expanded lunules appear to comprise only a small percentage of the total, whereas all the specimens of *kino* are more widely marked than the typical *macrocnema*. The names *albina* and *batesi* represent the widely marked individual variants in the Central American population. Several specimens in the populations of *macrocnema* taken on the west coast of central Mexico have the markings expanded, but the color is dark green or black, and they are considered to be but individual variants.

Cicindela leuconoe Bates

Text figures 115, 210

Cicindela leuconoe BATES, 1890, Trans. Ent. Soc. London, p. 508.

In a series of 24 specimens from Michoacan, all but two specimens have the elytral lunules

narrow and widely separated internally. Two specimens have the lunules wide and narrowly separated internally, almost as in two specimens from Guerrero and several from Colima. The markings appear to be variable and at present no distinct subspecific populations are known. It is known only from the western sea coast of central Mexico.

TYPE LOCALITY: Michoacan: Manzanillo. Guerrero: Acapulco.

GENERAL DISTRIBUTION: *Guerrero*: Acapulco, June 22, 1936. *Michoacan*: Playa Azul, December 3, 1950. *Colima*: Manzanillo; Colima; Vulcan de Colima. *Jalisco*: Tenacatito Bay, November 20, 1937. *Oaxaca*: Salina Cruz, August 7, 1923.

Cicindela chlorocephala Chevrolat

Although Chevrolat received his specimens from Tacotalpa, Tabasco, which is a considerable distance inland, they were probably collected along the east coast since all additional records for both subspecies have been coastal. Only one of the two subspecies is known from Mexico at the present time, but it is likely that the Texas *smlythi* E. D. Harris will be found in the area between Veracruz and Brownsville, Texas, when that region has been more thoroughly collected. *Cicindela smlythi* differs from *chlorocephala* by being slightly smaller and by having the elytral lunules broader.

GENERAL DISTRIBUTION: Mexico: Veracruz; ?Tabasco. United States: Texas.

HYBRID DISTRIBUTION: No hybrid populations have been available for study, but they will probably be found in Tamaulipas or northern Veracruz.

Cicindela chlorocephala chlorocephala Chevrolat

Text figures 116, 211

Cicindela chlorocephala CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 2, *Cicindela* no. 6.

There is little variability in the specimens from Veracruz, but only a small series has been available for study. It occurs on sandy beaches along the Gulf Coast.

TYPE LOCALITY: "Tacotalpa" (Tabasco).

GENERAL DISTRIBUTION: *Veracruz*: Alvarado, June 3-4, 1947; Tlacotalpan; San Carlos; Veracruz, May 18, 1946, and August 17, 1947.

Cicindela dorsalis Say

This polytypic species has been divided

into four geographical subspecies, only one of which has been previously recorded from Mexico. Ten names have been rather indiscriminantly used for the various populations of *dorsalis*, nine of them were applied to forms in the United States, and one, *castissima* Bates, for a Mexican island sample. Population studies made throughout the distribution in the United States validate the use of four of these names. The Texas and western Louisiana population was described as *venusta* La Ferté, the Florida west coast, Alabama, and Mississippi population as *saulyi* Guérin, the Florida east coast north to New Jersey population as *media* Leconte, and the Maryland to Massachusetts population as *dorsalis* Say. A sample of the Texas *venusta* was collected at La Pesca, Tamaulipas, Mexico. This subspecies is small and is fully maculated. A series of eight specimens from Santiago, Cuba, is inseparable from the Florida west coast samples of *saulyi* which are medium sized and range from immaculate to fully maculated in most samples. Seven of the eight Cuba specimens have the elytra nearly white, and one has the pigmented markings faintly indicated. The description and illustration given by Bates for *castissima* indicate that the Arcas Island, Mexico, sample belongs to the Cuba and Florida population. Additional samples from Mexico will no doubt help to clarify this distributional picture. The species is confined to the sea coast or shores of large rivers that are influenced by tides.

GENERAL DISTRIBUTION: United States: Massachusetts to Texas. Cuba, Mexico.

HYBRID DISTRIBUTION: No hybrid populations are known from Mexico, but they may be present along the east coast.

KEY TO THE SUBSPECIES OF *Cicindela dorsalis* SAY

Elytra with well-marked lunules . . . *venusta*
Elytra without lunules, pigmented area confined to sutural margins *saulyi*

Cicindela dorsalis saulyi Guérin-Ménéville

Text figures 118, 213

Cicindela saulyi GUÉRIN-MÉNEVILLE, 1840, Rev. Zool., Paris, vol. 3, p. 37.

Cicindela castissima BATES, 1884, Biologia Centrali-Americana, Coleoptera, vol. 1, pt. 1, suppl., p. 260, pl. 13, fig. 1 (Arcas Islands).

If the present interpretation of the Mexi-

can representatives of this subspecies is correct, the distributional picture is an interesting one since the Arcas Island sample is more closely related to the Cuba sample than to the Texas *venusta*, which extends south along the northeast coast of Mexico. At present it seems likely that the subspecies originated in Cuba, jumping possibly to Yucatan, although it is not known from there, or directly to the Arcas Islands which are in the Gulf of Mexico, off the coast of Campeche.

TYPE LOCALITY: Florida: Pensacola.

GENERAL DISTRIBUTION: Arcas Islands.

Cicindela dorsalis venusta La Ferté

Text figures 117, 212

Cicindela venusta LA FERTÉ, 1841, Rev. Zool., Paris, vol. 4, p. 37.

This subspecies is herein recorded from Mexico for the first time. The series of 12 specimens does not differ from large Texas samples, all specimens being small and fully maculated. They were collected on the ocean beach about 2 miles east of La Pesca.

TYPE LOCALITY: Texas.

GENERAL DISTRIBUTION: *Tamaulipas*: La Pesca, May 17, 1952.

Cicindela curvata Chevrolat

Text figures 119, 214

Cicindela curvata CHEVROLAT, 1834, Coléoptères du Mexique, fasc. 2, *Cicindela* no. 5.

This monotypic species is collected along the beaches of the Gulf Coast and is often taken with *chlorocephala* Chevrolat. There is little variability in the markings except that occasional specimens lack the descending internal portion of the humeral lunule. The color varies from brown to green.

TYPE LOCALITY: None given.

GENERAL DISTRIBUTION: *Veracruz*: Veracruz, August 16; same locality, August 17, 1947; San Carlos; Misantla; Alvarado, June 3-4, 1947.

Cicindela auraria Klug

This Central and South American species has been considered a distinct monotypic element as has the Mexican *euryscopa* Bates. A study of a short series of *auraria* from Colombia and three topotypes of *euryscopa* has shown that they belong to the same

species, but the two populations are somewhat different, and *euryscopa* is therefore retained as a Mexican subspecies. They occur along the ocean beaches and lagoons.

GENERAL DISTRIBUTION: Mexico, Venezuela, Colombia, Panama.

KEY TO THE SUBSPECIES OF
Cicindela auraria KLUG

Color dark olive green; middle and apical elytral lunules narrowly united along margin

. *euryscopa*

Color cupreous green; all elytral lunules usually broadly united along margin *auraria*

Cicindela auraria euryscopa Bates

Text figures 122, 217

Cicindela euryscopa BATES, 1890, Trans. Ent. Soc. London, p. 506.

In the three topotypes of this species available for study there is little variability, and it appears to be only distantly related to any of the other Mexican species.

TYPE LOCALITY: Sinaloa: Mazatlan.

GENERAL DISTRIBUTION: No additional localities are known.

Cicindela pamphila LeConte

Text figures 123, 218

Cicindela pamphila LECONTE, 1873, Proc. Acad. Nat. Sci. Philadelphia, vol. 25, p. 321.

This monotypic species is herein recorded from Mexico for the first time, and the short series from Tamaulipas differs in no way from large Texas samples. They were collected along the shores of an ocean inlet about one mile east of La Pesca.

TYPE LOCALITY: Texas.

GENERAL DISTRIBUTION: *Tamaulipas*: La Pesca, May 17, 1952.

Cicindela hamata Audouin and Brullé

This species is divided into four subspecies, two from the United States and two from Mexico. It is usually found on saline flats or along the sea shore.

GENERAL DISTRIBUTION: United States. Mexico: Veracruz; Yucatan.

HYBRID DISTRIBUTION: No hybrid populations have been examined, but they will undoubtedly be found in localities between

Veracruz and Brownsville, Texas, and Veracruz and Yucatan.

KEY TO THE SUBSPECIES OF *Cicindela hamata*
AUDOUIN AND BRULLÉ

Elytral markings distinct and separated internally, pigmented areas green *hamata*

Elytral markings usually indistinct, broadly coalescent internally, pigmented areas cupreous red, punctures green *pallifera*

Cicindela hamata hamata Audouin and Brullé

Text figures 120, 215

Cicindela hamata AUDOUIN AND BRULLÉ, 1839, Arch. Mus. Hist. Nat., Paris, vol. 1, p. 132.

Cicindela cristoforii CHEVROLAT, 1841, Mag. Zool., Paris, ser. 2, vol. 3, p. 15, *Cicindela* no. 26 (probably at Oaxaca).

Cicindela reichei CHAUDOIR, 1843, Bull. Soc. Imp. Nat. Moscou, vol. 16, p. 689 (Mexico).

Cicindela apicalis CHAUDOIR, 1843, Bull. Soc. Imp. Nat. Moscou, vol. 16, p. 691 (Mexico).

This subspecies can be separated from the Texas *hamata monti* Vaurie by its smaller average size, narrower elytral markings, and the fact that the middle lunule is not confused, although the longitudinal portion may have an internal projection. This species normally occurs on saline flats along the sea shore or on the shore itself. Höge supposedly collected it at Villa Lerdo, Durango, and there are specimens of *sperata* labeled as *hamata* in collections. There is also reason to doubt the accuracy of this record, since all others for *hamata* are coastal.

TYPE LOCALITY: "Mexique."

GENERAL DISTRIBUTION: *Veracruz*: Veracruz, August 16, December; same locality, May 18, 1946.

Cicindela hamata pallifera Chaudoir

Text figures 121, 216

Cicindela pallifera CHAUDOIR, 1852, Bull. Soc. Imp. Nat. Moscou, vol. 25, p. 17.

Cicindela canosa G. HORN, 1892, Ent. News, vol. 3, p. 26.

The broadly coalescent elytral markings and reddish color of the pigmented areas give this subspecies the appearance of being very different from *hamata*, but structurally the two are nearly identical. In 14 specimens from Puerto Cuyo there is every gradation in the elytra from being almost immaculate to fully

maculated, with the basal and median lunules distinct but broadly connected along the margin. Short series from Chelen and Progreso show less variability, and most of the specimens are primarily white or with very faint indications of the median and basal lunules.

TYPE LOCALITY: "Jucatan."

GENERAL DISTRIBUTION: *Yucatan*: Progreso, July 29, 1952; Chelen, July 29, 1952; Puerto Cuyo, August 24, 1952.

Cicindela sperata LeConte

Although two subspecies of this species are now recorded from Mexico, it is probable that eventually the Texas *inquisitor* Casey will be found in the area adjacent to southern Texas. *Cicindela marutha* Dow and *rubicunda* E. D. Harris have been considered in the past as being subspecies of *sperata*. Recent observations and collections made in the United States have shown that two species are involved. They are sympatric throughout much of their distribution, yet there is no apparent hybridization, and they can be separated from each other by several characters. *Cicindela marutha* and *rubicunda*, on the other hand, occur together in most localities and produce evident hybrids and must therefore be considered one species. *Cicindela sperata* is found most commonly along the banks and mud flats along rivers and occasionally around seepage from springs and water tanks and also in alkaline mud holes and lakes.

GENERAL DISTRIBUTION: United States: California, Arizona, New Mexico, Texas, Utah. Mexico.

Cicindela sperata sperata LeConte

Text figures 124, 219

Cicindela sperata LeConte, 1857, Trans. Amer. Phil. Soc., vol. 11, p. 50.

In Mexico this subspecies was collected along the banks of an irrigation ditch and along the rocky and sandy shore of a small stream. One specimen labeled "Pte de Ixtla" is of questionable authenticity and is omitted from the general distribution.

TYPE LOCALITY: "Rio Grande, at various places."

GENERAL DISTRIBUTION: *Chihuahua*: Ciudad Juarez 15 miles east of Parral, July

15, 1947, 5500 feet; Parral, July 16, 1947; Delicias, July 11, 1947, 4150 feet; 6 miles northeast of Meoqui, September 5, 1950; Chihuahua City. *Coahuila*: Torreon, July 23. *Durango*: Lerdo, July 23, Durango City. *Tamaulipas*: Nuevo Laredo.

Cicindela sperata vauriei, new subspecies

Similar in most respects to *C. sperata* LeConte but differing in color which is dark reddish brown. In all 26 specimens the humeral lunule is either represented by an inner and outer spot or these spots are narrowly connected. In nine specimens the inner portion of the apical lunule is reduced and in six is represented only by a small inner spot. All lunules are either separated or very narrowly connected laterally. Length, 11.5–13 mm.; width, 4.5–5 mm.

TYPE MATERIAL: Holotype male, allotype female, and 15 paratopotypes collected at Hermosillo, Sonora, Mexico, July 19, 1952, by C. and P. Vaurie, after whom the species is named. Eight paratypes from Pitiquito, Sonora, Mexico, July 4, 1952, and one paratype from near Cocorit, Rio Yaqui, Sonora, Mexico, July 29, 1952, all collected by C. and P. Vaurie.

Nowhere throughout the range of *sperata*, in Mexico or the United States, is there a tendency either towards the reduction of the elytral maculations or towards a dark reddish brown color. Samples from northern Arizona show a trend towards being reddish, but these samples are fully maculated and more brilliant than in *vauriei*. The nearest known samples of *sperata* were taken in Cochise County and Yuma, Arizona. Habitat shown in plate 10, figure 1, the legend of which should read "Habitat of *Cicindela . . . obsoleta santaclarae*. . . ."

Cicindela marutha Dow

Cicindela sperata marutha Dow, 1911, Ent. News, vol. 22, p. 272.

Cicindela sperata rubicunda E. D. HARRIS, 1911, List of the North American Cicindelidae in the Harris collection, p. 55.

For many years *marutha* and *rubicunda* E. D. Harris were thought to be subspecies of *sperata* LeConte, but studies of material from the United States indicate that they represent distinct species, with *rubicunda* a color variant and a synonym of *marutha*. It has

been found that the two species, *marutha* and *sperata*, can be separated by differences in the male genitalia and the elytral punctuation. *Cicindela sperata* is most commonly found along rivers and small streams, whereas *marutha* most commonly occurs in arid country away from rivers but around seepage from springs and cattle watering tanks and around alkaline lakes. Each species invades the typical habitat of the other in a number of localities, but when this happens there appears to be no interbreeding, and therefore no hybrids appear in the populations.

In seven United States localities from which series of *marutha* are available, both red and green forms are found, in six localities only the green form has been taken, and in three only the red form is known. In the Mexican samples in one locality (Samalayuca) are 18 greens, eight reds, and two hybrids; at Villa Ahumada are four reds and five greens, and at 92 kilometers north of Chihuahua City there is only one green.

TYPE LOCALITY: New Mexico: Fort Win-gate.

GENERAL DISTRIBUTION: *Chihuahua*: Samalayuca, June 24, 1947, and August 7, 1950; Laguna de el Riataso, Samalayuca, August 7, 1950; Villa Ahumada, June 28, 1947; 92 kilometers north of Chihuahua City, June 30, 1947.

***Cicindela nevadica nevadica* LeConte**

Text figures 125, 220

Cicindela nevadica LECONTE, 1875, Trans. Amer. Ent. Soc., vol. 5, p. 159.

This species is herein recorded from Mexico for the first time and although five subspecies are known in the United States only *nevadica* has been collected in Mexico. The La Choya, Sonora, specimens are not unlike the typical forms from Nevada and California in most respects, although the elytral lunules are wider and resemble those of *olmosa* which occurs in Texas and New Mexico. The basic color is green and not red as in the Arizona *tubensis*. Two specimens were collected along the banks of a salt marsh behind the beach.

TYPE LOCALITY: Nevada.

GENERAL DISTRIBUTION: *Sonora*: La Choya, June 12, 1952.

***Cicindela lepida* Dejean**

Text figures 126, 221

Cicindela lepida DEJEAN, 1831, Species général des coléoptères, vol. 5, suppl., p. 255.

Although this species has a very extensive distribution in the United States, no valid subspecies have yet been discovered. It is herein recorded from Mexico for the first time. It is found on light-colored sand along the ocean, rivers, lakes, or dry desert sand dunes such as those east of Samalayuca or White Sands, New Mexico. It is either on open sand or may be taken among vegetation growing on sand hills or around sand "blow-outs."

TYPE LOCALITY: "America septentrionale."

GENERAL DISTRIBUTION: *Chihuahua*: Samalayuca, June 24, 1947.

***Cicindela togata togata* La Ferté**

Text figures 127, 222

Cicindela togata LA FERTÉ, 1841, Rev. Zool., Paris, vol. 4, p. 40.

A short series from Mexico differs in no respect from long series collected in Texas. Four specimens were collected on the shores of an ocean inlet about one mile east of La Pesca, Tamaulipas.

TYPE LOCALITY: Texas.

GENERAL DISTRIBUTION: *Tamaulipas*: Tampico; La Pesca, May 17, 1952.

***Cicindela belfragei belfragei* (Sallé)**

Text figures 128, 223

Dromochorus Belfragei SALLÉ, 1877, Ann. Soc. Ent. France, ser. 5, vol. 7, Bull. Séances, January 10, 1877, p. viii.

This species has been divided into two subspecies, but only *belfragei* Sallé occurs in Mexico and is herein recorded for the first time. *Cicindela pilatei* Guérin-Méneville is known only from Louisiana and eastern Texas. This species is crepuscular in most but not all of its distribution and is most commonly collected on black loamy ground or sodded fields and is usually found in dry areas some distance away from water.

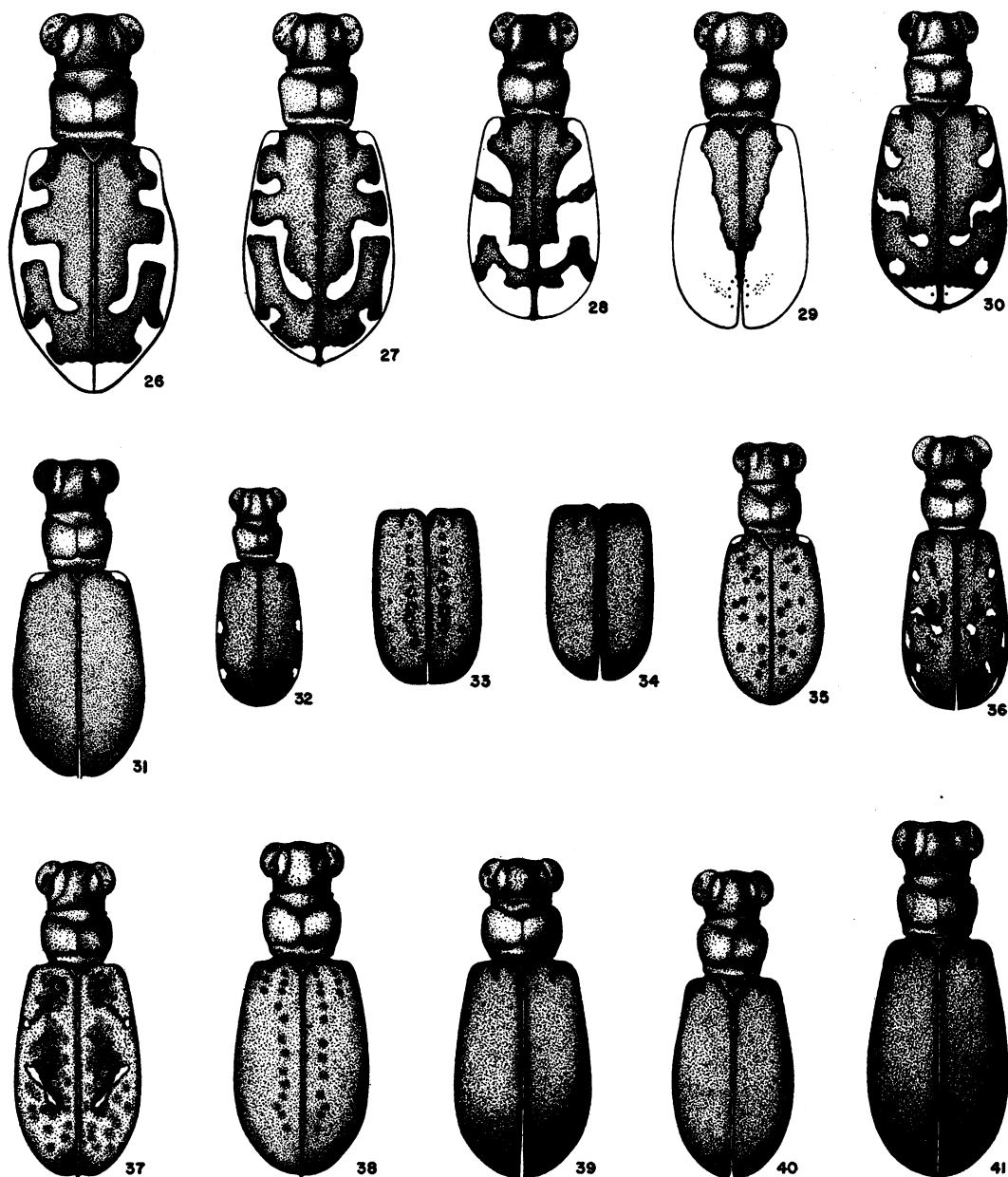
TYPE LOCALITY: Texas: Dallas and Wasco, on the banks of the Trinity River.

GENERAL DISTRIBUTION: *Tamaulipas*: Thirty-four miles south of Nuevo Laredo, June 20, 1949, 400 feet.

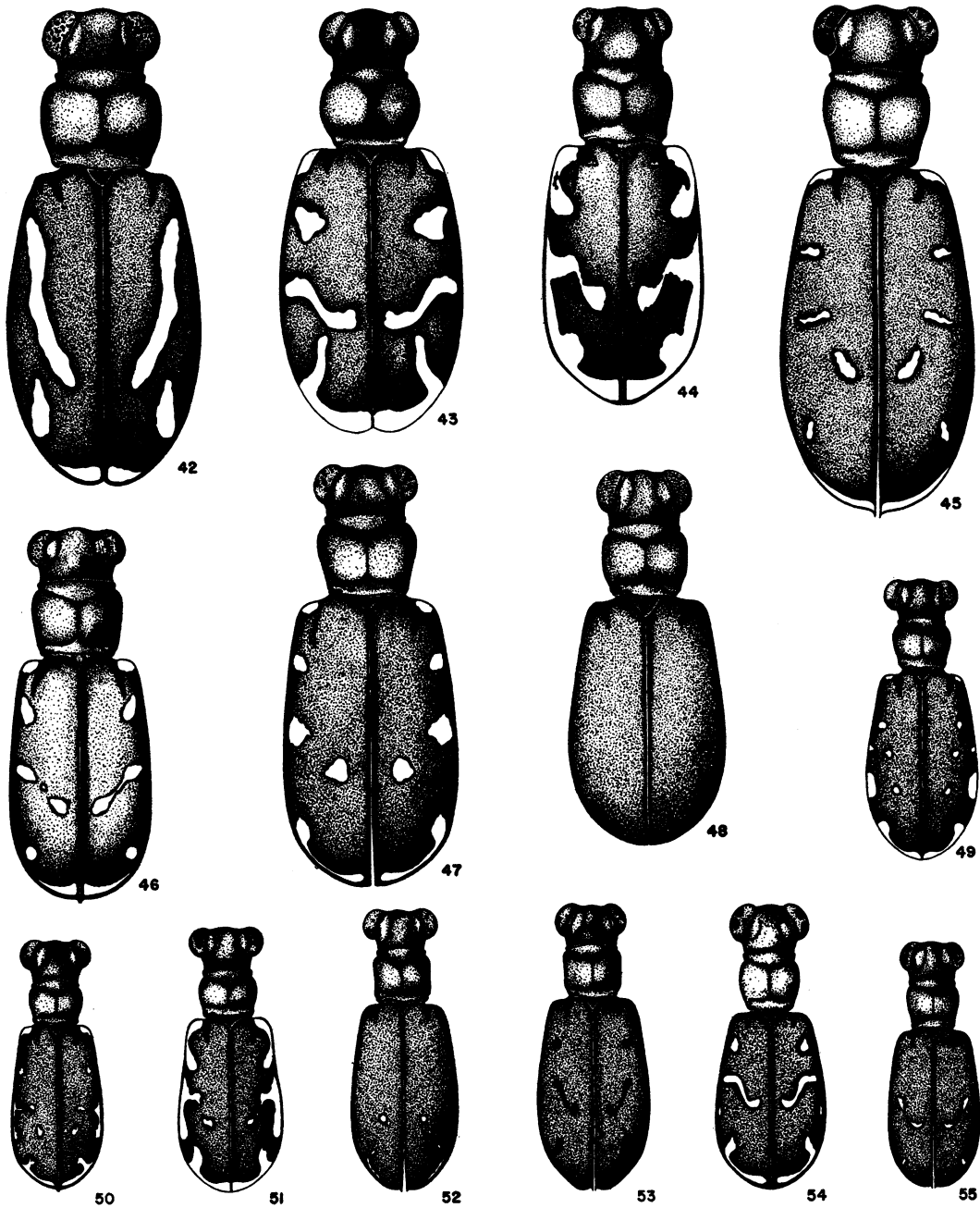
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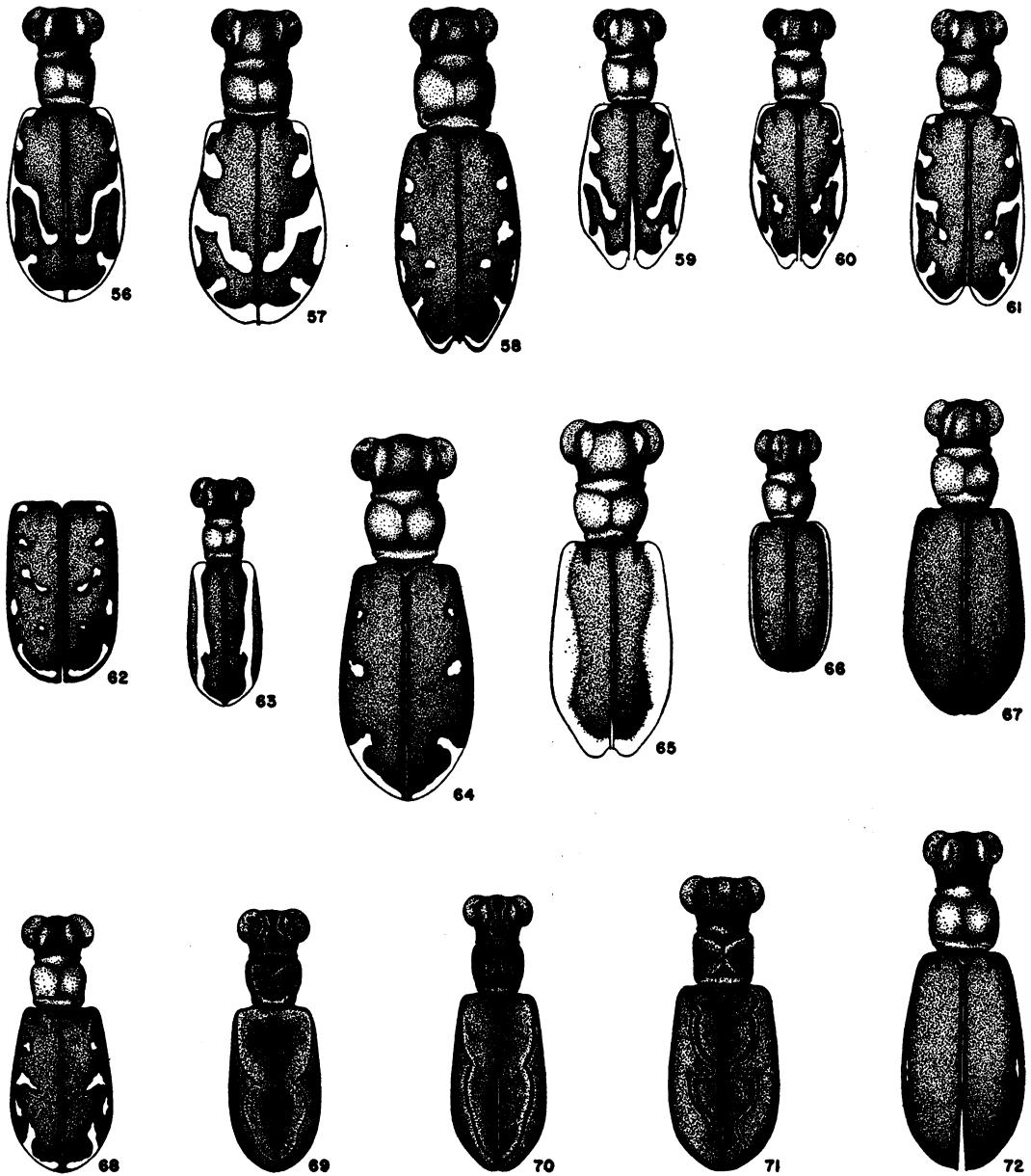
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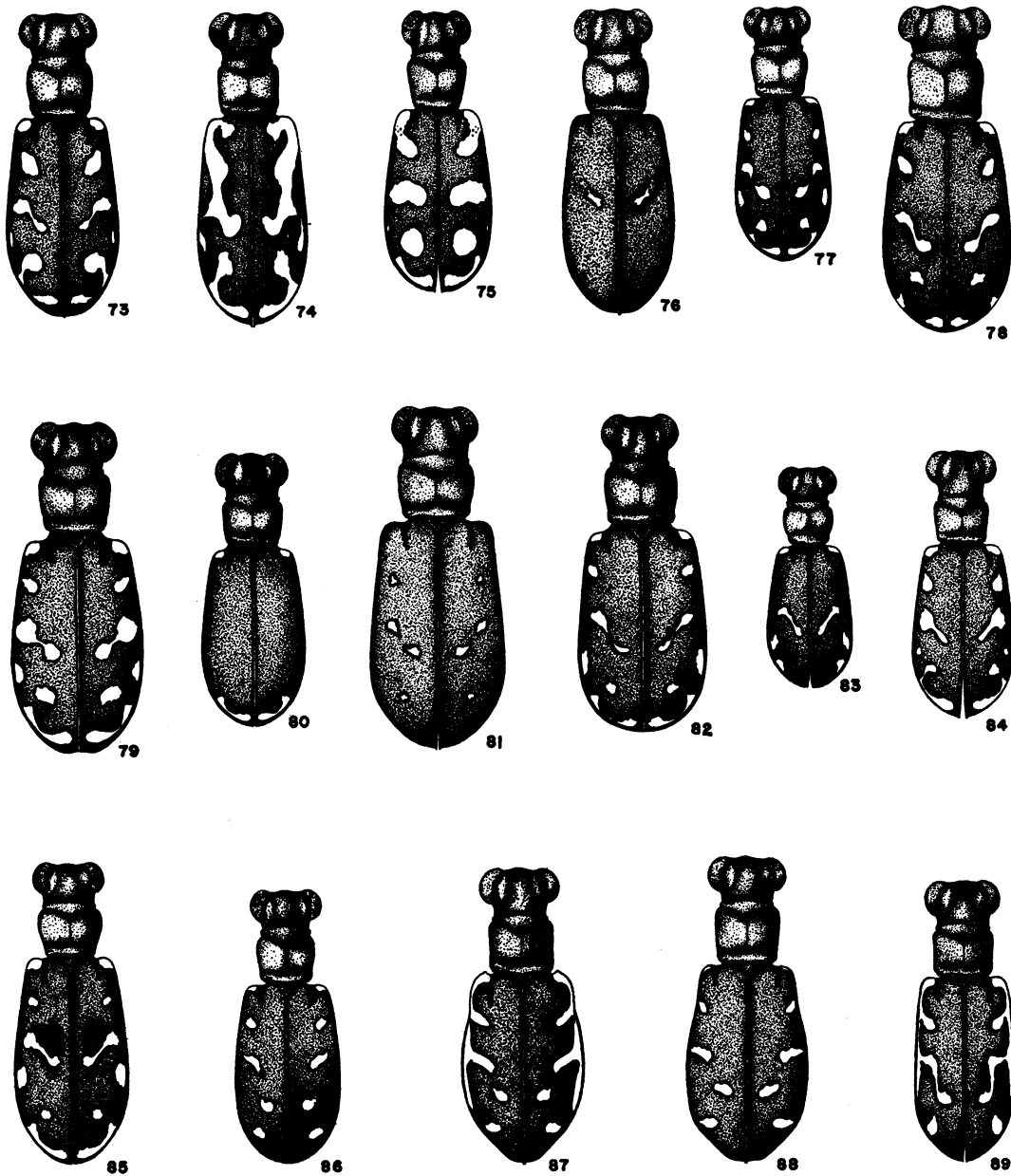
FIGS. 26-41. Dorsal views. 26. *Cicindela hirticollis ponderosa*, female. 27. *C. hirticollis gravida*, male. 28, 29. *C. latesignata parkeri*, male and female. 30. *C. oregona*, female. 31. *C. pimeriana*, male. 32. *C. chrysippe*. 33. *C. smaragdina*. 34. *C. ioessa*. 35. *C. aterrima*, male. 36. *C. rugatilis*, male. 37. *C. semicircularis*, female. 38. *C. nigrocoerulea*, female. 39. *C. euthales*, male. 40. *C. nigrilabris*, male. 41. *C. hornii scotina*, female.



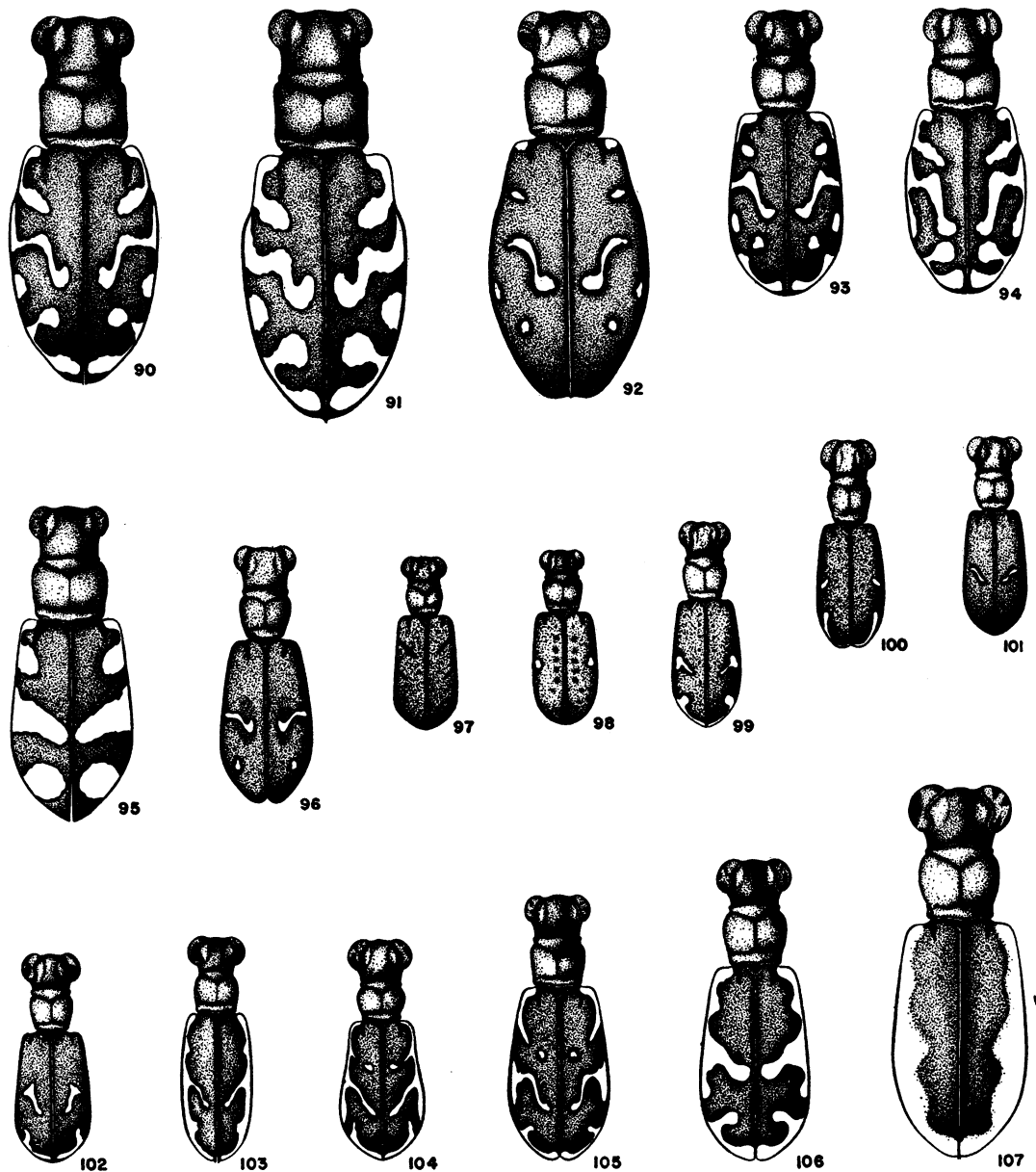
FIGS. 42-55. Dorsal views. 42. *Cicindela luteolineata*, female. 43. *C. craveri*. 44. *C. obsoleta latemaculata*, male. 45. *C. obsoleta vulturina*, female. 46. *C. obsoleta juvenilis*, female. 47. *C. obsoleta santaclarae*, male. 48. *C. thalestris*, male. 49. *C. punctulata chihuahuae*, female. 50, 51. *C. punctulata catharinae*, male and female. 52. *C. cyaniventris*, male. 53. *C. papillosa*, female. 54. *C. guerrerensis*, male. 55. *C. aeneicollis*, female.



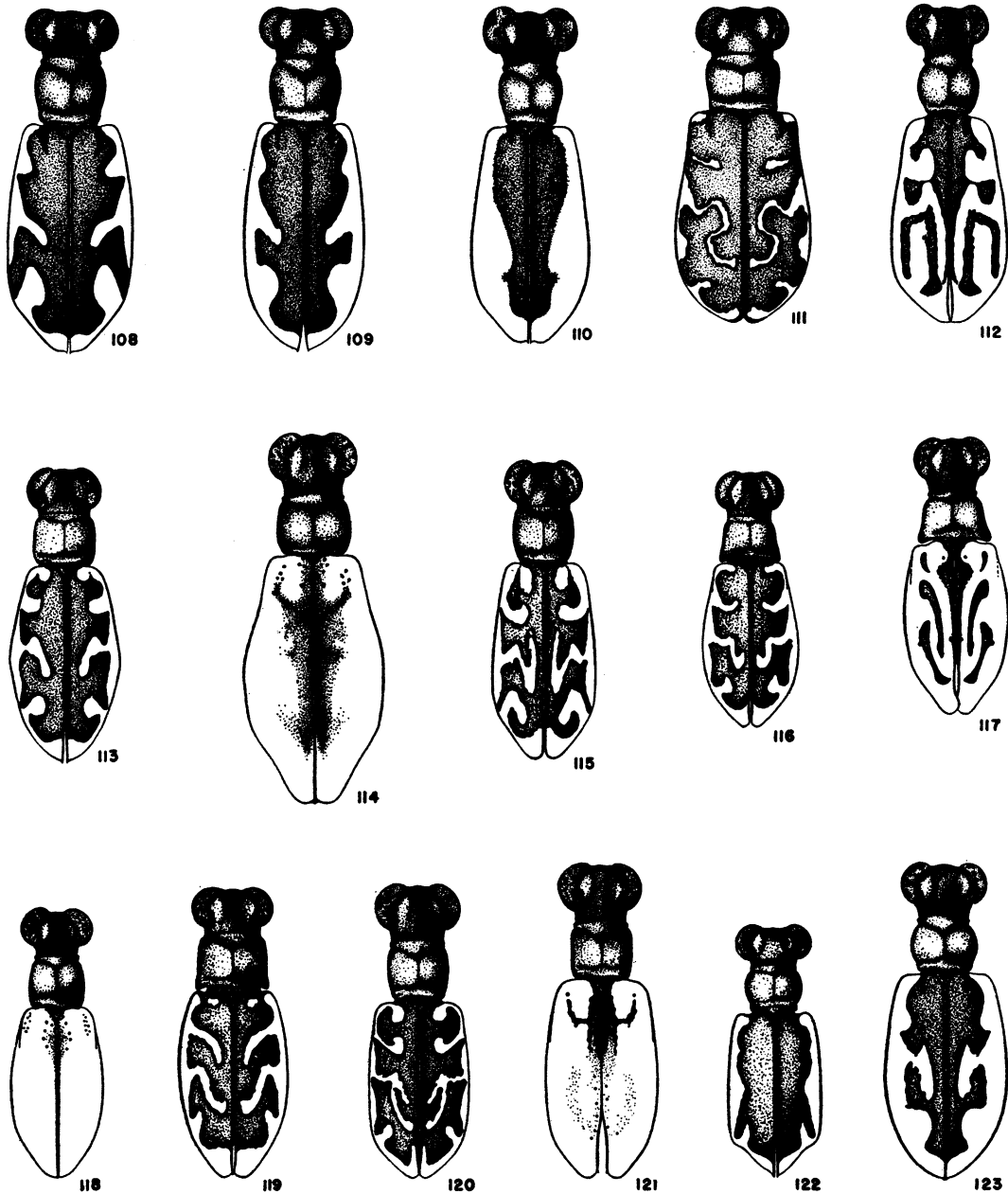
FIGS. 56-72. Dorsal views. 56. *Cicindela tenuisignata*, male. 57. *C. fera*, female. 58. *C. sinaloae digueti*, female. 59. *C. sinaloae schrammeli*, female. 60. *C. sinaloae sinaloae*, female. 61. *C. bradti*, female. 62. *C. nudata*. 63. *C. lemniscata rebaptisata*, male. 64. *C. severa severa*, female. 65. *C. rockefelleri*, female. 66. *C. hogei*. 67. *C. politula politula*, female. 68. *C. politula laetipennis*, male. 69. *C. radians*, male. 70. *C. aurora*, male. 71. *C. vasseleti*, female. 72. *C. phorphora*, male.



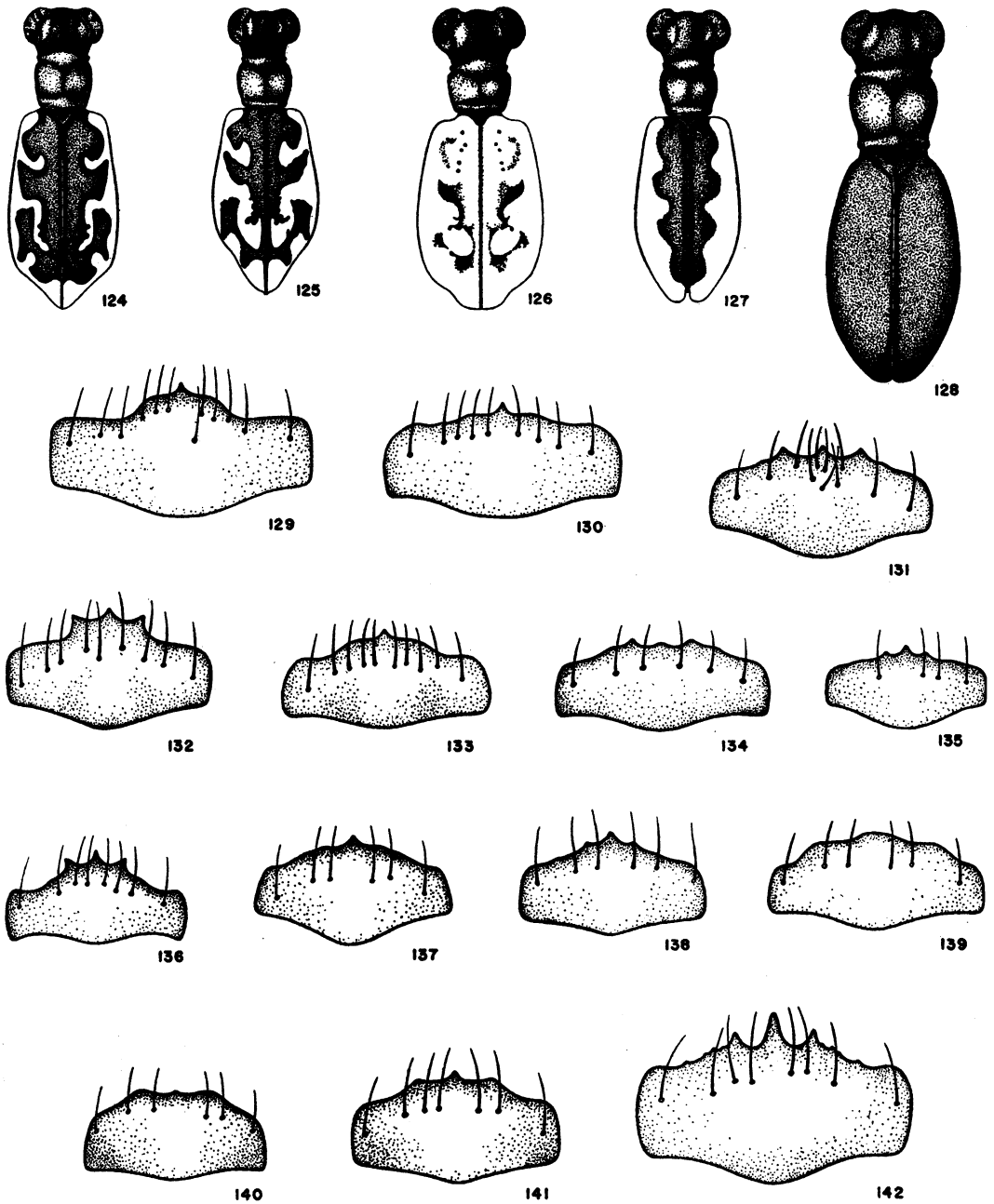
FIGS. 73-89. Dorsal views. 73. *Cicindela hydrophoba hydrophoba*, female. 74. *C. hydrophoba taretana*, female. 75. *C. hydrophoba quinquenotata*, male. 76. *C. hydrophoba atro-reducta*, female. 77. *C. sedecimpunctata sedecimpunctata*, male. 78. *C. sedecimpunctata sallei*, female. 79, 80. *C. rufiventris cumatilis*, female and male. 81. *C. rufiventris reducens*, female. 82. *C. flohri*, female. 83. *C. clarina*, male. 84. *C. dysentrica*, female. 85. *C. nebuligera*, female. 86. *C. flavopunctata*, female. 87. *C. roseiventris roseiventris*, female. 88. *C. roseiventris mexicana*, female. 89. *C. klugi*, male.



FIGS. 90-107. Dorsal views. 90. *Cicindela carthagensis carthagensis*, female. 91. *C. carthagensis colossae*, female. 92. *C. haemorrhagica haemorrhagica*, female. 93. *C. haemorrhagica miniscula*, male. 94. *C. beneshi*, female. 95. *C. sommeri*, male. 96. *C. praecisa*, female. 97. *C. specularis*. 98. *C. viridisticta viridisticta*, male. 99. *C. viridisticta arizonensis*, male. 100. *C. viridisticta interjecta*, female. 101. *C. argentata hemichrysea*, female. 102. *C. wickhami*, female. 103. *C. debilis*, male. 104. *C. nephelota*, female. 105. *C. pusilla lunalonga*, female. 106. *C. schauppii*, male. 107. *C. circumpecta*, male.

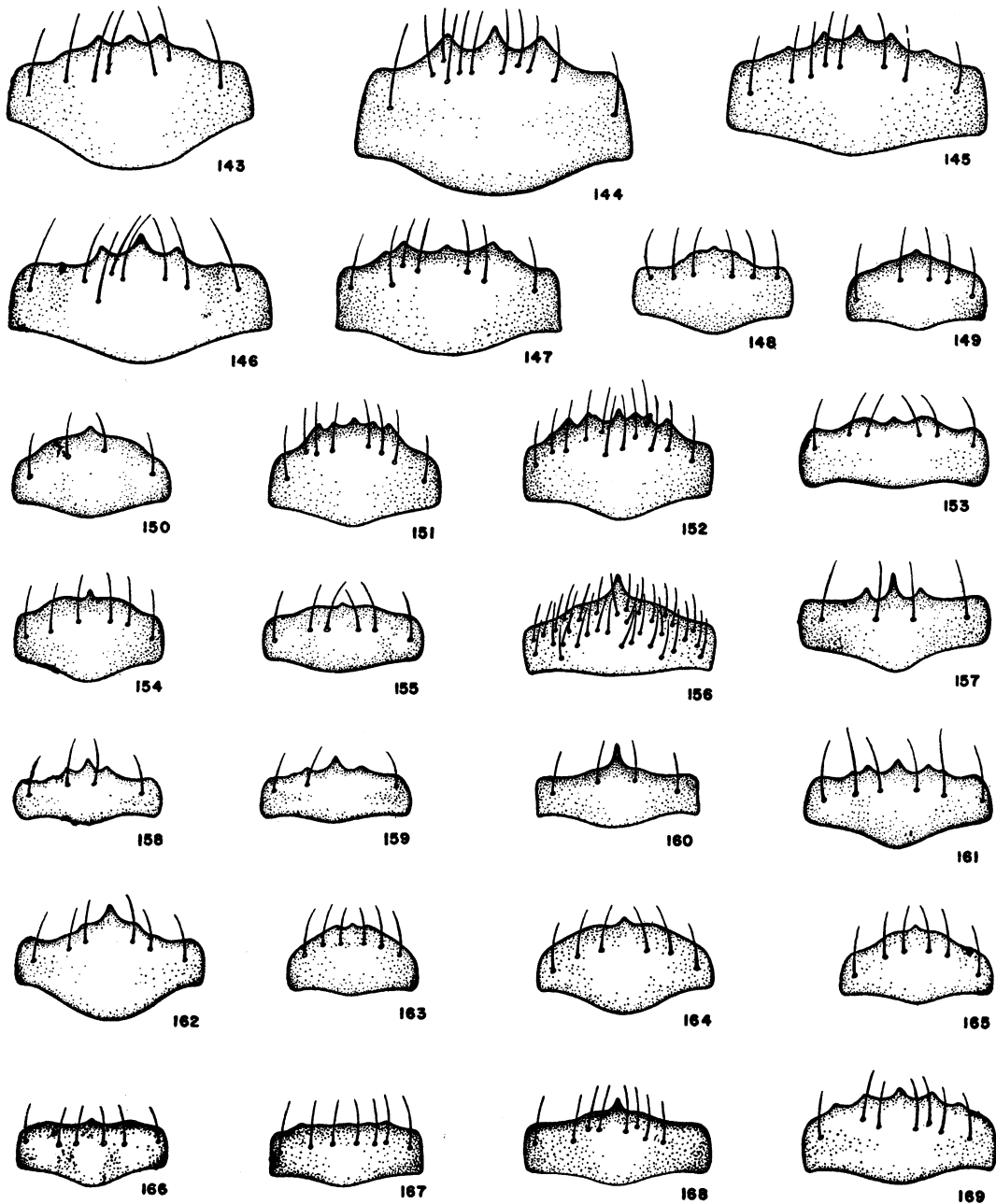


FIGS. 108-123. Dorsal views. 108. *Cicindela californica californica*, male. 109. *C. californica brevihamata*, female. 110. *C. californica mojavi*, male. 111. *C. trifasciata ascendens*, female. 112. *C. gabbi*, male. 113. *C. macrocnema macrocnema*, female. 114. *C. macrocnema kino*, female. 115. *C. leuconoe*, female. 116. *C. chlorocephala*, female. 117. *C. dorsalis venusta*, female. 118. *C. dorsalis saulcyi*, male. 119. *C. curvata*, female. 120. *C. hamata hamata*, male. 121. *C. hamata pallifera*, male. 122. *C. auraria euryscopa*, male. 123. *C. pamphila*, male.

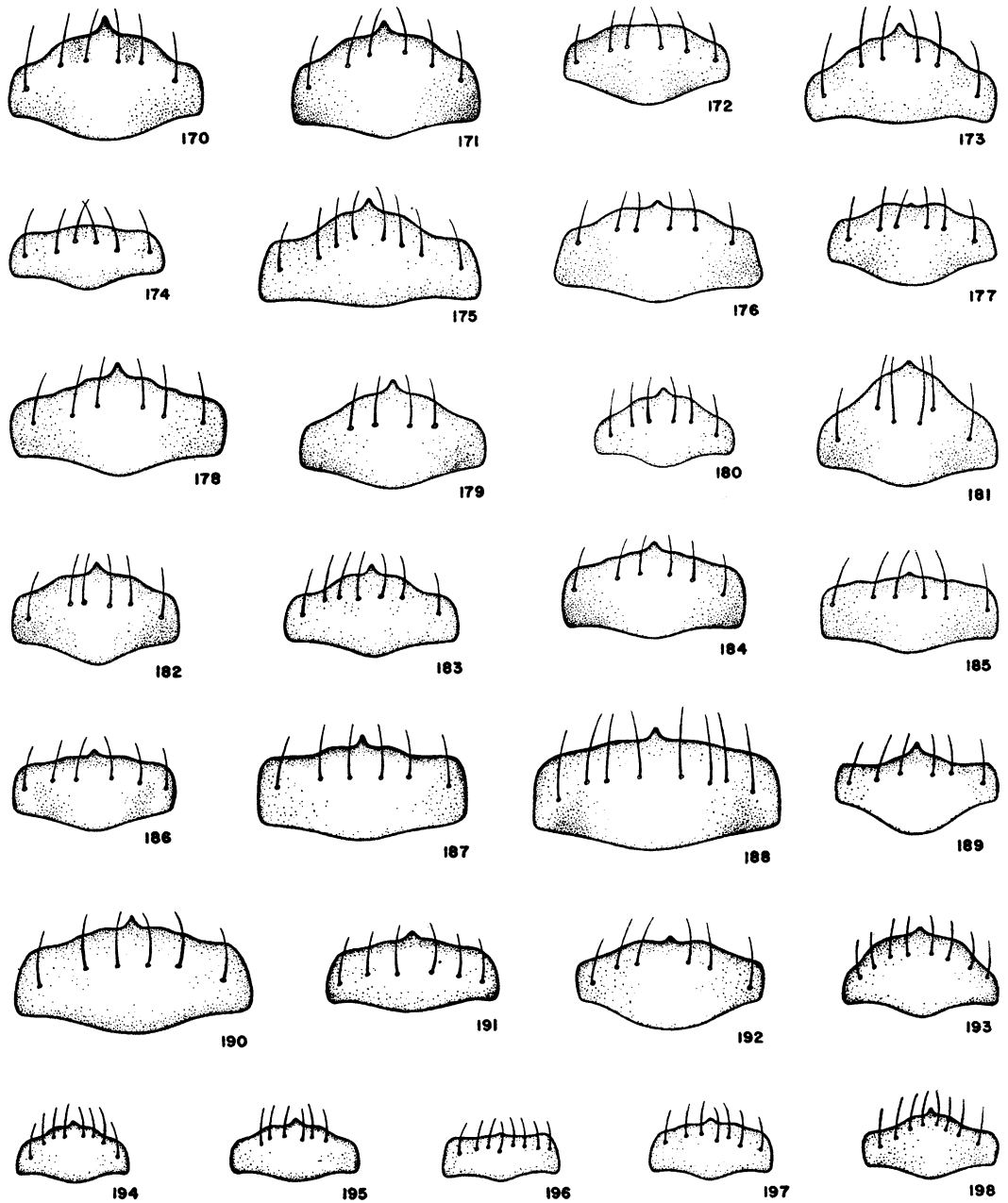


FIGS. 124-128. Dorsal views. 124. *Cicindela sperata*, male. 125. *C. nevadica*, male. 126. *C. lepida*, female. 127. *C. togata*, female. 128. *C. belfragei*, female.

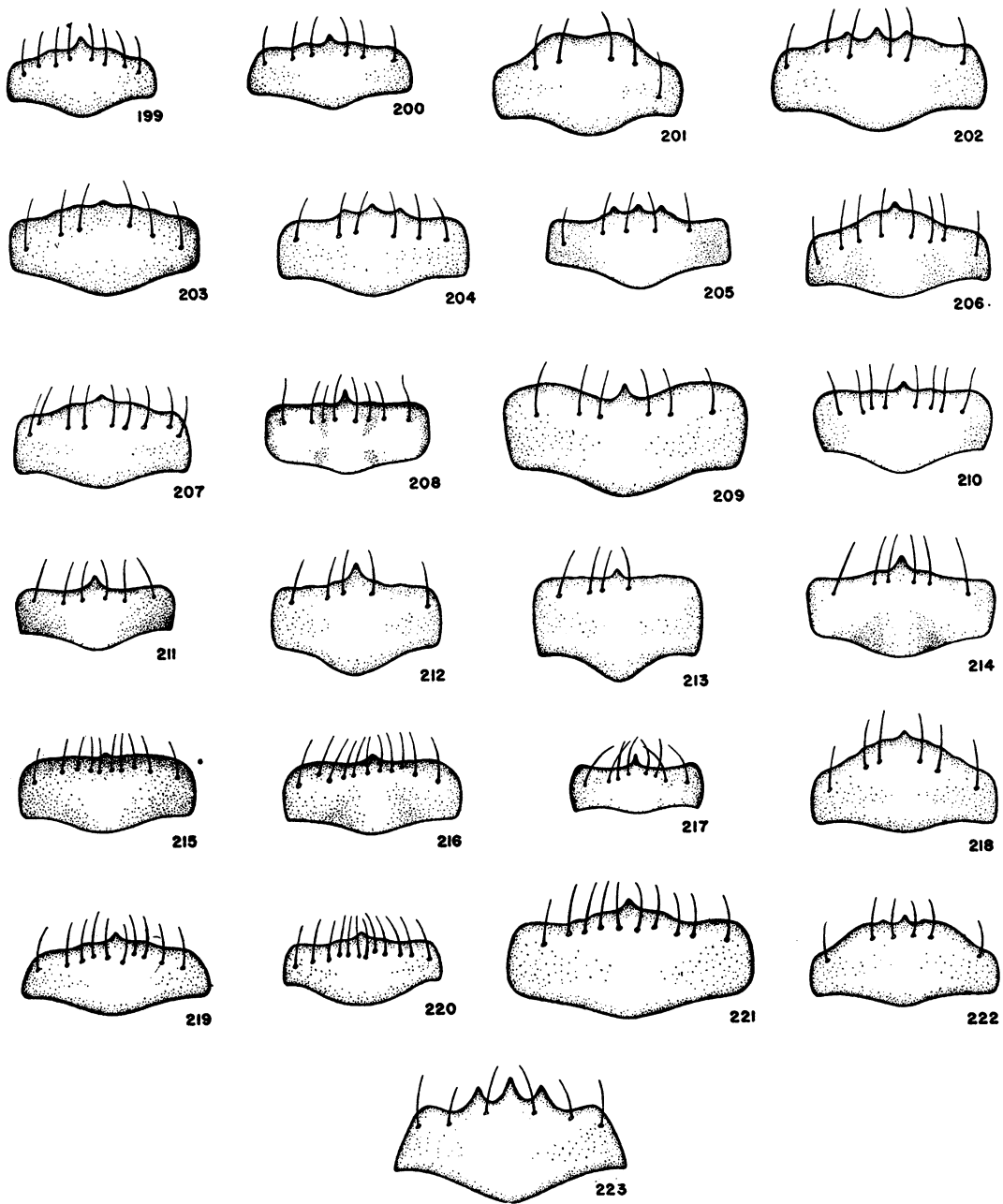
FIGS. 129-142. Labra. 129. *Cicindela hirticollis ponderosae*. 130. *C. hirticollis gravida*. 131, 132. *C. latesignata parkeri*. 133. *C. oregona*. 134. *C. pimeriana*. 135. *C. aterrima*. 136. *C. rugatilis*. 137. *C. semicircularis*. 138. *C. nigrocoerulea*. 139. *C. euthales*. 140. *C. nigrilabris*. 141. *C. hornii scotina*. 142. *C. luteolineata*.



FIGS. 143-169. Labra. 143. *Cicindela obsoleta latemaculata*. 144. *C. obsoleta vulturina*. 145. *C. obsoleta santaclarae*. 146. *C. obsoleta juvenilis*. 147. *C. thalestris*. 148. *C. punctulata chihuahuae*. 149, 150. *C. punctulata catharinae*. 151. *C. cyaniventris*. 152. *C. papillosa*. 153. *C. guerrerensis*. 154. *C. aeneicollis*. 155. *C. tenuisignata*. 156. *C. fera*. 157. *C. sinaloae digueti*. 158. *C. sinaloae schrammeli*. 159. *C. sinaloae sinaloae*. 160. *C. bradti*. 161. *C. severa severa*. 162. *C. rockefelleri*. 163. *C. lemniscata rebaptisata*. 164. *C. politula politula*. 165. *C. politula laetipennis*. 166. *C. radians*. 167. *C. aurora*. 168. *C. vasseleti*. 169. *C. phosphora*.



FIGS. 170-198. Labra. 170. *Cicindela hydrophoba hydrophoba*. 171. *C. hydrophoba taretana*. 172. *C. hydrophoba quinquenotata*. 173. *C. hydrophoba atro-reducta*. 174. *C. sedecimpunctata sedecimpunctata*. 175. *C. sedecimpunctata sallei*. 176, 177. *C. rufiventris cumatilis*. 178. *C. rufiventris reducens*. 179. *C. flohri*. 180. *C. clarina*. 181. *C. dysentrica*. 182. *C. nebuligera*. 183. *C. flavopunctata*. 184. *C. roseiventris roseiventris*. 185. *C. roseiventris mexicana*. 186. *C. klugi*. 187. *C. carthagena carthagena*. 188. *C. carthagena colossae*. 189. *C. beneshi*. 190. *C. haemorrhagica haemorrhagica*. 191. *C. haemorrhagica miniscula*. 192. *C. sommeri*. 193. *C. praecisa*. 194. *C. viridistricta arizonensis*. 195. *C. viridistricta interjecta*. 196. *C. argentata hemichrysea*. 197. *C. wickhami*. 198. *C. debilis*.



FIGS. 199-223. Labra. 199. *Cicindela nephelota*. 200. *C. pusilla lunalonga*. 201. *C. schauppi*. 202. *C. circumpicta*. 203. *C. californica californica*. 204. *C. californica mojavi*. 205. *C. californica brevihamata*. 206. *C. trifasciata ascendens*. 207. *C. gabbi*. 208. *macrocnema macrocnema*. 209. *C. macrocnema kino*. 210. *C. leuconoe*. 211. *C. chlorocephala*. 212. *C. dorsalis venusta*. 213. *C. dorsalis sauleyi*. 214. *C. curvata*. 215. *C. hamata hamata*. 216. *C. hamata pallifera*. 217. *C. auraria euryscopa*. 218. *C. pamphila*. 219. *C. sperata*. 220. *C. nevadica*. 221. *C. lepida*. 222. *C. togata*. 223. *C. belfragei*.

