

Article XII.—THE SPECIES OF *BRACHYACANTHA* OF NORTH  
AND SOUTH AMERICA.

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INTRODUCTION.

This genus of the family Coccinellidæ was established in 1842<sup>1</sup> by Chevrolat to contain those species which have the upper surface glabrous, the front tibiæ provided with a short spine or tooth, as indicated by the name, and the number of abdominal segments visible beneath six in the female and (at least apparently) seven in the male.

In the Gemminger and Harold catalogue the following specific names are cited as having been proposed long before the genus was erected:

- Coccinella dentipes* Fab., 1801, Syst. El., I, p. 381.
- “ *erythrocephala* Fab., 1787, Mant., I, p. 61.
- “ *bistripustulata* Fab., 1801, Syst. El., I, p. 383.
- “ *felina* Fab., 1775, Syst. Ent., p. 87.
- “ *ursina* Fab., 1787, Mant., I, p. 61.
- “ *bisquinquepustulata* Oliv., 1808, Ent., VI, p. 1053.

Of these names, *erythrocephala* is cited in error as pointed out by Weise; *felina* is the older name for the insect later named *decempustulata* by Melsheimer, and *bisquinquepustulata* is a synonym of *ursina* as pointed out by Horn. The remainder are still in common use. There were, then, four species described before the time of Thomas Say, who added *albifrons* to the list in 1824. Then came almost simultaneously the descriptions of Mulsant in France and of Melsheimer in this country. The work of

<sup>1</sup> The name appears first in the Dejean Catalogue (1837), spelled *Brachiacantha* but, as no description accompanies the name, the spelling of 1842, when the genus was first described is followed.

Mulsant (Species des Coléoptères Trimères Sécuripalpes) was published in 1851, although the preface is dated Dec. 29, 1848. The names proposed by Melsheimer in 1847 are not mentioned in Mulsant's work and some of the species covered by those names are redescribed by Mulsant, whose names therefore become synonyms. In 1858 and 1859 Dr. Leconte added two names; in 1873 and 1874 G. R. Crotch added several; in 1876 Kirsch described the Peruvian *propria*; and in 1878 E. A. Schwarz described *querceti* from Florida. In recent years further additions have been made by Gorham, Weise, Schaeffer, Nunnenmacher and Casey — the last named giving a synopsis of all the species inhabiting the United States — so that a total of 57 names is now before us. To review and combine these scattered descriptions, with such additions as the material now available permits, is the object of this paper.

The material used includes the collection of the American Museum of Natural History and that of the U. S. National Museum, in both of which specimens from the *Biologia Centrali-Americana* material are found. It is a pleasure to acknowledge the kindness of Dr. L. O. Howard, chief of the Bureau of Entomology, and of Mr. E. A. Schwarz in connection with the loan from the National Museum. Outside of such Museum material the private collections of Mr. Charles Schaeffer, including a co-type of *arizonica*; of Mr. F. W. Nunnenmacher, including a cotype of *blaisdelli*; of Dr. A. Fenyes, including many Mexican species; and of Dr. A. Sicard, including most of the South American species, have been loaned for study and grateful acknowledgment of the favor is here expressed. Useful specimens have also been obtained from Messrs. Louis H. Joutel, Warren Knaus, R. H. Wolcott, William T. Davis, H. F. Wickham, and Geo. Reineck which have contributed to the completeness of the series examined. In connection with the drawings, acknowledgment should be made of the help of Col. Thomas L. Casey in furnishing sketches of the maculation of the species described by him and details of their abdominal structure, and of Mr. John A. Grossbeck to whose skill is due the satisfactory drawings of the details of the external anatomy and to whose trained powers of microscopic observation is due the accurate representation of the claws.

Dr. Frank E. Lutz has been kind enough to read the entire manuscript and has given many valuable suggestions in the course of its preparation for the press, by which some errors and oversights have been detected.

#### HABITS AND LARVÆ.

The larva of *Brachyacantha* has been described by Prof. John B. Smith (1886) and, very recently, more completely by Prof. W. M. Wheeler (1911) who gives a figure of a group of larvæ, covered with the characteristic

waxy secretion which, he says, may result from their feeding on organisms which contain large quantities of substances that are readily convertible into wax. The adult larva, covered with the waxy tufts, measures about 10 mm., but after these have been dissolved in chloroform, the body is only 6-7 mm. long, and is of a whitish or pinkish yellow color, with short and feeble legs, small head and obese, elliptical abdomen; each segment has a deeply impressed line in the middle of its dorsal surface; the body is covered with delicate flexuous hairs. The larva pupates within the larval cuticle and the imago emerges about a month later. The species under observation by Prof. Wheeler was *4-punctata*, a specimen having been sent to me for identification. In the case of the larvæ described by Prof. Smith in 1886 the species was said to be *ursina* and the waxy secretion was described as exuding in long strings, giving the larva the appearance of being covered with cotton or hoar frost.

In both instances the larvæ were found in ant-nests, moving slowly about or resting among the root-coccids and root-aphids so abundant during the spring months in the nests of yellow *Lasius* often found under large stones. The Coccids and Aphids, of which the winter eggs are said to be brought by the ants into galleries excavated around roots, feed upon the roots when hatched, secreting meanwhile the waxy substance which is acceptable to the ants. The coccinellid larvæ in turn, are assumed to feed upon the Aphids, or their eggs; and, from the nature of their food, they also become covered with a similar waxy secretion.

The imago is usually found in miscellaneous sweeping or beating of vegetation.

#### DESCRIPTION OF THE GENUS.

Making a few corrections and additions (which are printed in italics) to the descriptions heretofore published gives the following characters for the genus:

Upper surface glabrous; six visible ventral abdominal segments in the female and apparently seven in the male *of which the last is really a dorsal segment*; anterior tibiæ spinose externally at about basal two-fifths *and with a double edge beyond the spine, variously modified*; fourth joint of maxillary palpi strongly securiform; eyes well developed, very finely faceted and emarginate *by the overlapping lobes of the epistoma*; antennæ short, 11-jointed, the base not concealed by the epistoma; legs rather short and stout, tarsal claws with a large internal, subquadrate or pointed tooth; metacoxal plates attaining the first suture or very nearly, extending along the latter for some distance, then curved strongly forward but scarcely attaining the base externally; epipleuræ foveate for the tips of the hind femora, very narrow, more or less horizontal; epistoma truncate or feebly arcuately emarginate, *and expanded*

into small lateral lobes which overlap the emargination of the eyes; body very convex; abdomen of male variously modified, usually depressed at middle with the segments variously excavated or bicuspid.

The sexes may be distinguished by the presence of seven apparent ventral segments in the male, six in the female; by the male usually having more pale color on the head, the front of the thorax and at the humeral angle of the elytra; and by the special modification of the ventral segments in the male. In one group of the species inhabiting the United States this modification takes the form of two elevated cusps at the posterior margin of the third segment with the fourth and fifth segments depressed. In another group there are no cusps but the fourth and fifth segments are excavated and in a third group there is no depression or excavation. In all that I have examined the fifth segment in the male is always emarginate on its posterior margin and frequently the depression of the segments is arcuately limited in front and the modified parts are impunctured and shining. These sexual characters, which have been mentioned by some authors, especially Weise and Gorham, but have not heretofore been described in detail for all the species, afford valuable characters for grouping the species.

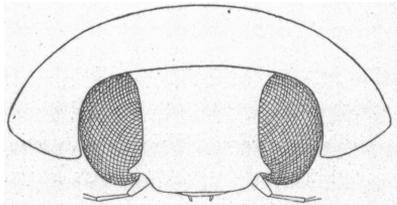


Fig. 1. Head and thorax of *Brachyaecantha bistrispustulata*, showing the emargination of the eyes by the lobes of the epistoma and the insertion of the antennæ.

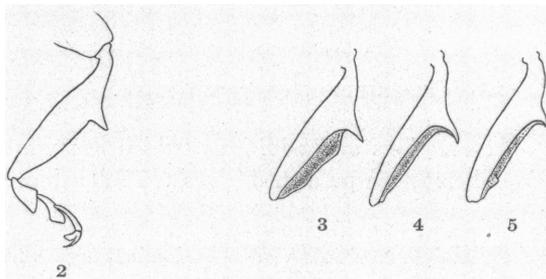


Fig. 2. Front leg of *B. dentipes*, showing in profile the tooth of the tibia and the basal tooth of the claw.

Fig. 3. Front tibia of *B. decora*, inclined to show the excavation beyond the tooth and the back margin of same arcuately expanded.

Fig. 4. Front tibia of *B. dentipes* with the back margin of the excavation simple.

Fig. 5. Front tibia of *B. arizonica* with the supplementary subapical tooth.

The form of the anterior tibia and the position and form of its spine are variable and are useful guides in separating the species. The legs are

contractile. The femur is deeply grooved for the reception of the tibia. The tibia is also deeply grooved for the reception of the tarsus but only beyond the spine. The existence of this groove necessarily implies a double edge externally to the grooved part of the tibia, one edge in front and one behind the cavity. In many species these edges are simple, parallel and exactly alike, but in others they differ. In *arizonica* as described by Schaefer, the tibia has an extra spine near its apex that, viewed from the rear, seems nearly as large as the regular spine. This extra spine will be found more or less developed in all the *ursina* group. In *bistripustulata* and all its allied species the posterior edge is arcuately expanded so that the tibia seems thickest at the middle as described by Mulsant, but sufficient magnification shows the anterior edge to be quite simple, and the swelling to be confined to the lamina-like expansion of the posterior edge. The spine itself varies in size, in curvature and in position. It also appears to vary



Fig. 6. Claws of *B. dentipes*, showing the subquadrate basal tooth, still more enlarged in Fig. 6a. The claw itself is thicker than the tooth which under high magnification appears as a thin process from the lower surface of the claw. Under the microscope the tooth is not in the same plane as the claw's upper surface.

more than it actually does, according to the position in which the insect is held, for which reason little use has been made of its variations. The form of the claws and of the large basal process or tooth is shown in the figures.

The ornamentation of the elytra is exceedingly variable being constant only in series collected at one time and place and not always even then. As far as the species occurring in the United States are concerned three types of elytral ornamentation can be traced; viz: three pale spots on black ground, five pale spots on black ground, and irregular markings. It requires some imagination, however, to connect all the variations that occur with the group in which they are placed. The groups are indicated by the form of the tibia and of the male abdomen rather than by the markings.

The above refers to the species occurring in the United States. Southward still other modifications of abdomen and other patterns of ornamentation occur. In the Mexican *pygidialis* all the ventral segments except the

first are depressed in the male and each elytron bears four yellow spots; in a Costa Rican species, *aperta*, all the segments except the first, are depressed and provided with cusp like elevations, and the elytra are marked with dark lines on a pale ground. In them, as in our species, strong differences in pattern of ornamentation seem to be correlated with equally strong differences in structure, particularly of the male abdomen. The ornamentation being the more subject to individual and geographical variation the structures described seem to be the safer guides for separation of species.

The genitalia of the Coccinellidæ are seldom found protruding in cabinet specimens. In examining many specimens for secondary sexual characters, only two have been found with the male organs extruded and from one of these the figures have been drawn by Mr. Grossbeck. They are similar to the figures and descriptions given by Verhoeff (1893, plate 3; and 1895) but differ in some respects. The central organ, which he calls "penis plus siph," is apparently composed of two portions: the basal stouter, the apical longer and thinner. The apical portion, which he calls siph, appears

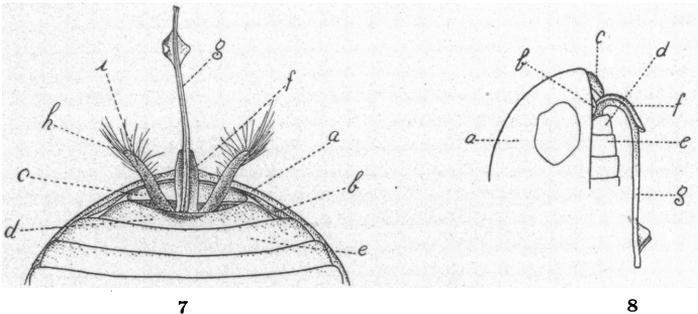


Fig. 7. Extruded genital organs of *B. 4-punctata* ♂ including:

- a = edge of elytra seen from beneath
- b = edge of dorsal segment
- c = so-called seventh ventral segment
- d = sixth ventral segment
- e = fifth ventral segment
- f + g = penis + siph (using Verhoeff's nomenclature)
- h = cirrus (using Verhoeff's nomenclature)
- i = paramera " " "

Fig. 8. Side view of the genitalia of *B. 4-punctata* with the paramera removed; the same lettering is used as in preceding figure.

to be unusually developed in Coccinellidæ. The lateral view, as shown in Figure 8, makes the basal portion look more like a sheath, partially surrounding the apical portion, than do any of Verhoeff's drawings, made from dissections. The pair of lateral organs, called "paramera" by Ver-

hoeff, are stout, slightly arcuate and divergent when extruded and bear at their extremity a copious brush of hair which is called "cirrus." These paramera in Verhoeff's drawings, representing them within the body, are directed forward. When extruded, they are directed backward, in the same direction as the central organ, as if they were reversed in position. The entire apparatus issues from the body behind the sixth ventral segment and between it and the so-called seventh ventral segment, which therefore appears to be really a dorsal segment, so deflexed as to assume the appearance of a ventral segment.

#### DISTRIBUTION AND GEOGRAPHICAL VARIATION.

The distribution of the species of the genus *Brachyacantha*, so far as known, seems to be wholly American and the genus seems to be especially developed in Mexico and Central America. There we find the largest number of species, and those that inhabit the United States being nearly all represented in Mexico and none being represented in the far north or in Europe and Asia, we may conclude our species have spread from Mexico and Central America, undergoing slight modifications as they became exposed to colder climates. That this dispersal has been recent may be inferred from the scarcity of species west of the Sierra Nevada, only two having been described (from California and Nevada). If this inference is correct, the varied forms of ornamentation may be regarded as a recent and perhaps ephemeral result of changed environment.

In the case of *bistripustulata*, which barely enters the United States but extends southward to Brazil, only slight changes have taken place. In the case of *dentipes* which is abundant in the warmer parts of our country and rare in Illinois, Virginia and perhaps other northern regions, the pale color is reduced to small spots, the increase in black pigment apparently following the influence exerted by cold and moisture as in the species of *Hippodamia* and *Coccinella*. The numbers of specimens examined is, however, too small to make this certain. In the case of *ursina*, which appears to be rare in Mexico and only uncertainly represented southward by the Peruvian *propria*, we have a species which is widely distributed in the United States and exhibits many geographical variations in ornamentation. Thus *congruens* is the name applied to the race inhabiting the southern Alleghanies (in which region many peculiar forms of Coleoptera, like *Michthysoma* and *Dasycerus* are found); *stellata*, the name applied to a race living west of the Alleghany Mountains; *utella*, the name applied to a race inhabiting the region immediately east of the Rocky Mountains, and

*sonorana*, to a closely allied Mexican form. These races are not strongly differentiated, even in maculation. They certainly seem to have resulted from the influence of new environment upon the species as it emigrated from the south.

The total number of species is thirty-nine. Of these,

- 4 are found in Central and Eastern United States and Canada;
- 1 is confined to Florida;
- 3 are confined to the plains east of the Rocky Mountains;
- 2 are confined to California and Nevada;
- 7 occur in Mexico or in United States near the Mexican boundary;
- 12 are confined to Central America;
- 8 are confined to South America; and
- 2 extend from United States to South America.

From another point of view:

- 18 species occur north of Mexico;
- 19 species occur in Mexico and Central America; and
- 10 species occur in South America.

As a whole, the genus is best represented in the warmer parts of the American continent. Few records are so far known of the occurrence of *Brachyacantha* in the West Indies; *bistripustulata*, which occurs from Brownsville, Texas, to South America, is abundant in Jamaica.

#### SYNOPSIS OF SPECIES AND VARIETIES.

The modification of the male abdomen is the basis of the following synopsis, supported by the more obvious differences in maculation. The following types of modification are known:

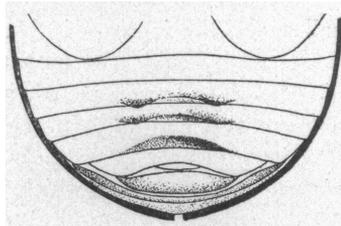


Fig. 9. Abdomen of *B. bistripustulata* ♂ showing the bicuspid third segment.

I. The posterior margin of the third ventral segment instead of being a simply broadly arcuate line becomes elevated on each side of the middle. The elevations may be slight as in *aymardi* or developed into prominent

cusps, overlapping the fourth segment and bent outward from the abdomen as in *bistripustulata* (Fig. 9). The fourth and fifth segments may be similarly modified but to a much less degree. For brevity, this form is indicated in the synopsis by the term "third segment ♂ bicuspid."

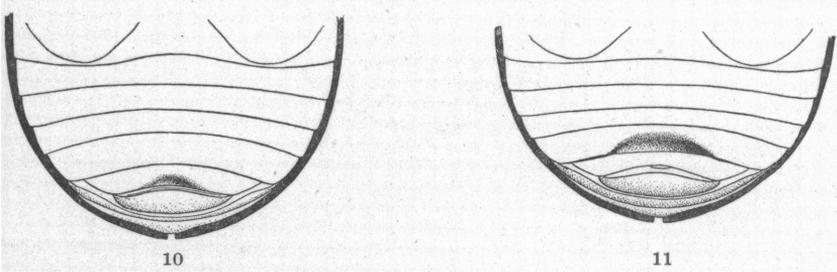


Fig. 10. Abdomen of *B. ursina* ♂ showing the third segment simple, the fifth excavate.

Fig. 11. Abdomen of *B. albifrons* showing the same structure as in *ursina* but still more developed.

II. The fifth segment of the abdomen may be more or less deeply excavated. The excavation is usually like an elongate, curved fovea, abruptly limited and extending transversely across the middle third (or less) of the segment. A similar, but lesser, excavation of the fourth and sixth segment often accompanies it. It is well developed in *ursina* (Fig. 10) and reaches its maximum in *albifrons* (Fig. 11) where the entire hind part of the middle third of the fifth segment is replaced by a deep pit and the sides of the posterior margin are slightly produced over the sixth segment. For brevity this modification is called "fifth segment ♂ excavated" in the synopsis.

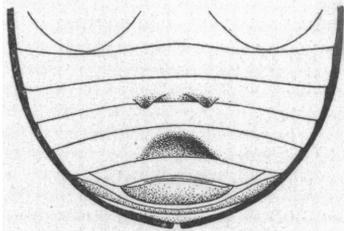


Fig. 12. Abdomen of *B. dentipes* ♂ showing the bicuspid third segment and excavate fifth segment.

III. Both of these modifications occur in the ♂ of *dentipes* (Fig. 12).

IV. In all the preceding modifications the second segment remains simple. In the Mexican *pygidialis* (Fig. 13) the second, third, fourth and fifth segments are depressed at middle and a more or less similar modi-

fication may be observed in *aperta*, *fenestrata*, and other southern species. The depression may be gently curved and not abruptly limited or it may,

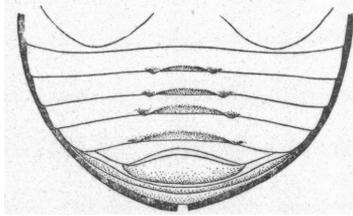


Fig. 13. Abdomen of *B. pygidialis* ♂ showing four segments modified to form a shallow longitudinal fossa.

as shown in the figure, be limited by a raised margin and slightly tuberculate at either side. The available material has not been sufficient to study all the variations assumed by this modification. For brevity it is called "longitudinal fossa" in the synopsis.

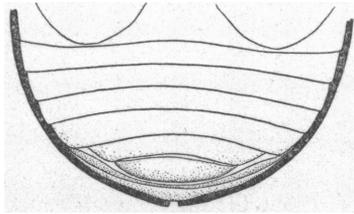


Fig. 14. Abdomen of *B. lepida* ♂ showing none of preceding modifications.

V. There are a few species like *lepida* (Fig. 14) and *querceti* in which there are no such modifications of the abdominal segments. In such the male is known by its having seven visible segments beneath.

There are a few species of which the males are undescribed and not represented in the material. Fortunately all have such peculiar markings that they are easily recognized. To avoid ambiguity I have placed them at the beginning of the synopsis.

There is no uniform pattern of maculation in *Brachyacantha*. Many species have five pale spots on each elytron, some have three instead of five; these spots, in some varieties, become confluent; in others, become partly obliterated by extension of dark pigment. There are also species with patterns of maculation composed of four spots, or not composed of spots at all; these in the synopsis are described as "unusual." The same term is applied to the juxta-scutellar pale spots of the pronotum observed in a few species and to the pale spot on the pygidium of *B. pygidialis*.

*Males unknown.*

- Upper surface ivory white; a large common discoidal orbicular patch black, just cutting the base of the pronotum and extending to two-thirds the length of the elytra. 2.5 mm. Ecuador . . . . . **buckleyi** Cr. (p. 294)
- Upper surface black; head, anterior portion of pronotum, and six spots on each elytron, of which the three outer are connected with pale margin, yellow. 2.5 mm. Salvador . . . . . **duodecimguttata** n. sp. (p. 294)
- Upper surface pale; head, broad median vitta on pronotum dilated behind, margins of elytra and an abbreviated line on each, black. 3.5 mm. Bolivia. . . . . **bilineata** Weise. (p. 295)
- Upper surface black; front angles and very narrow front margin of pronotum, also humeral, subapical and faint discal marks on elytra, pale. 1.6 mm. Sapucay, Paraguay . . . . . **trimaculata** n. sp. (p. 295)
- Upper surface black; front angles of pronotum, humeral lunule and an irregular vitta on elytra, dilated externally at middle, pale. 2.2 mm. Sapucay, Paraguay. . . . . **sicardi** n. sp. (p. 295)

*Males known; ornamentation not as above described.*

- Abdomen ♂ with 3d segment bicuspid, 4th and 5th segments excavated or simply depressed;
- Anterior tibiæ with the margin arcuately expanded beyond the spine; each elytron with at most three pale spots besides the humeral spot (except in *tau*);
- Abdomen ♂ with the 4th and 5th segments depressed not excavated; form nearly circular . . . . . *Group 1.* (p. 289)
- Abdomen ♂ with the 4th slightly, 5th segment deeply excavated; form broadly oval. . . . . *Group 2.* (p. 290)
- Anterior tibiæ with the margin simple beyond the spine; elytra pale with a black pattern;
- Abdomen ♂ with the 4th and 5th segments depressed, not excavated. . . . . *Group 3.* (p. 291)
- Abdomen ♂ with 5th segment abruptly excavated, 4th less deeply excavated, 3d not bicuspid; anterior tibiæ not expanded at middle, swollen more or less at apex (with supplementary spine near apex in *arizonica*); each elytron with at most five spots including the humeral spot; (pale with black markings in *albifrons*). . . . . *Group 4.* (p. 291)
- Abdomen ♂ without bicuspid margin to 3d segment and without abrupt excavation on fifth segment;
- Abdomen ♂ with a longitudinal fossa; markings of pronotum and elytra unusual (see p. 288) . . . . . *Group 5.* (p. 293)
- Abdomen ♂ like that of ♀ except for the emarginate 5th segment and extra or 7th segment. Maculation unusual (see p. 288) . . . . . *Group 6.* (p. 293)

*Group 1.*

Abdomen ♂ with third segment bicuspid at posterior margin; 4th segment feebly imitating the form of the third; 5th segment slightly depressed and polished at middle, emarginate at posterior margin; 6th segment arcuately strongly depressed;

none excavated. Anterior tibiae with double margin of which one side is arcuately expanded beyond the spine. Each elytron marked with three large pale spots besides the small humeral spot of male; form very broadly oval, almost circular.

The only species occurs from Brownsville, Texas southward to Brazil and is 3.0 to 4.5 mm. . . . . **bistripustulata** Fab. (p. 296)

The variations in its maculation have caused the following varieties to be named. Each elytron with three large, entirely separate spots besides the humeral spot, sometimes lacking . . . . . *typical*.

Marginal spot connected with humeral . . . . . var. *guttata* Weise.

Marginal spot more or less broadly connected with discal. . . . . var. *decora* Csy.

Marginal spot broadly connected with humeral and discal spots. Quiché, British Honduras . . . . . var. *quichiana* n. var.

Marginal spot broadly connected with the subapical spot. Rincon Antonio, Oaxaca, Mexico . . . . . var. *obscura* n. var.

All the spots connected . . . . . var.  $\beta$  Mulsant.

Size much reduced, spots as in typical form . . . . . var. *minor* n. var.

#### Group 2.

Abdomen ♂ with third segment bicuspid at posterior margin; 4th segment with a shallow transverse excavation, curved at either extremity; 5th segment with a similar excavation, but much deeper and more definitely limited; 6th segment similar to 4th. Anterior tibiae expanded at middle nearly as in Group 1. Each elytron marked with an interrupted fascia before the middle and a subapical spot, but the fascia may be divided or lacking and the subapical spot may disappear, and, as in *tau*, the pale color of these markings may coalesce. Form broadly oval, subparallel at sides.

Pronotum black with at most pale anterior margin and angles in ♂;

Elytra with antemedial fascia, broadly interrupted at suture, narrow or broad, complete or divided, and subapical spot, 3.5 to 5.2 mm. Ontario to Texas, Virginia to Arizona; Costa Rica . . . . . **dentipes** Fab. (p. 300)

The fascia complete, narrow . . . . . *typical*.

The fascia divided into two small spots on each elytron. Virginia . . . . . var. *separata* n. var.

The fascia broad, covering one third of the elytron. 5.2 mm. Kansas. . . . . var. *socialis* Csy.

Size much reduced, markings as in typical *dentipes*. Costa Rica. . . . . var. *americana* n. var.

Elytra marked only with a broad fascia interrupted at suture. 4.5 mm. Texas, Arizona, Mexico . . . . . **subfasciata** Muls. (p. 302)

Elytra without the fascia, marked only with a subapical spot.

Subapical spot rounded. 5 mm. Texas, Costa Rica.

**quadrillum** Lec. (p. 303)

Subapical spot extending along the posterior third of side margin. 3.6 to 4.2 mm. Mexico to Venezuela . . . . . **erythrura** Muls. (p. 302)

Elytra with the fascia and the subapical spot more or less confluent. 4.5 to 5.0 mm. Nevada, California . . . . . **blaisdelli** (p. 304)

Pronotum pale with irregular black basal mark in ♂, extended through the middle to apex in ♀;

Elytra pale with black basal fascia, suture black, with or without other black spots. 4.7 mm. Nebraska, Montana . . . . . **tau** Lec. (p. 305)

*Group 3.*

Abdomen ♂ with the third segment bicuspid, the succeeding segments only slightly depressed; anterior tibiæ not expanded at middle, simple beyond the spine; elytra pale with the suture and with or without other marks, black, coalescent in *conjuncta*.

Elytra pale with black sutural border feebly expanded at one fourth the length, and black margin covering laterally only the epipleuræ and little wider at apex. 5.0 mm. Mexico . . . . . **westwoodii** Muls. (p. 305)

Elytra pale with sutural border, a common sutural spot near the base, a subhumeral spot and a larger subapical spot, black. 4.5 mm. Mexico.

**aymardi** Gorham (p. 307)

Elytra pale with sutural border, wider at apex, and three small spots, one subhumeral, two close together, transverse behind the middle, black. 6.0 mm. Mexico.

**cryptocephalina** Gorham (p. 307)

Elytra with black markings greatly extended so as to leave only five pale spots, two covering the entire base and forming posteriorly a festooned border, two, transverse about the middle, one subapical. 3.5 mm. Mexico. **conjuncta** Muls. (p. 306)

[Note: Larger series of the species included in group 3 may necessitate reducing some to varietal rank.]

*Group 4.*

Abdomen ♂ with the third segment simple, not bicuspid, at most feebly depressed; 4th segment more or less excavated; 5th segment usually deeply, abruptly excavated, the excavation transverse and curved backwards at ends; 6th segment similar. Anterior tibiæ not expanded at middle but with a more or less well defined swelling or a supplementary spine at apex. Each elytron at most with five pale spots, including the humeral spot, any of which may become confluent or may be in part lacking.

Form very broadly oval, elytra black with all five spots present . . . . . 1.

Form very broadly oval, spots indistinctly outlined, or partly or wholly confluent, leading in extreme cases to pale elytra . . . . . 2.

Form very broadly oval, some of the spots lacking . . . . . 3.

Form broadly oval, sides subparallel, elytra pale with black markings, which may become so expanded as to leave pale spots . . . . . 4.

1. Elytra black with five distinct pale spots on each; the humeral spot always small.

2 to 3.6 mm. U. S. and Mexico . . . . . **ursina** Fab. (p. 309)

The basal spot on the margin;

The basal spot semicircular, the black area of the pronotum biarcuately limited in the ♂ . . . . . *typical*.

The basal spot nearly circular. 1.9 to 2.1 mm. Indiana.

*var. stellata* Csy.

The black area of the pronotum truncately limited in ♂. 2.1 to 3.6 mm. North Carolina . . . . . *var. congruens* Csy.

The basal spot very narrowly separated from the margin; basal, humeral, marginal and discal spots at the corners of an oblong rectangle (not a square as in typical *ursina*);

- Spots of usual size. 3.6 mm. Utah . . . . . var. *uteella* Csy.  
 Spots very small. 3 mm. Chihuahua . . . . . var. *sonorana* Csy.  
 Similar to *ursina* but with all the spots very large and distinctly outlined.  
 2.7 mm. Brownsville, Texas . . . . . **testudo** Csy. (p. 312)  
 Similar to *testudo* but without the humeral spot and with the marginal spot  
 between the basal and the discal in distance from the base. 3 mm. Mexico.  
 . . . . . **octostigma** Muls. (p. 311)  
 Similar to *ursina* but much smaller. 1.5 to 2 mm. United States.  
 . . . . . **felina** Fab. (p. 312)  
 Basal spot wider than long, forming a pale line along the base. *typical*  
 Basal spot normal, markings as in typical *ursina*. 15 mm. Pennsylvania.  
 . . . . . var. *10-pustulata* Mels.
- 1a. Elytra black with five pale spots, one basal, one humeral, one round behind  
 the middle, one marginal semiorbicular, one large transverse subapical. 2 to 3 mm.  
 Peru . . . . . **propria** Kirsch (p. 313)  
 1b. Elytra black with five distinct pale spots on each, the humeral spot large and  
 extending along the side margin but not connected with the marginal spot. 2 to  
 2.75 mm. Paraguay and Brazil . . . . . **australe** n. sp. (p. 313)
2. Elytra black with the five spots indistinctly outlined, or partly confluent, or  
 wholly confluent forming pale elytra; or with the marginal spot broken into two  
 small spots or wholly lacking; the confluence of the humeral and basal spots  
 apparently always resulting in the base of the elytra being pale;  
 Outline of spots always indistinct, partial or complete confluence usual; supple-  
 mentary spine at apex of tibia of usual size. 2.5 mm. Texas, Louisiana.  
 . . . . . **bollii** Cr. (p. 314)  
 Outline of spots more distinct; marginal spot lacking, small or broken; humeral  
 and basal spots usually confluent, confluence of other spots infrequent;  
 supplementary spine at apex of tibia very large, nearly equal to regular spine.  
 2.5 to 3.0 mm. Arizona . . . . . **arizonica** Schffr. (p. 314)
3. Elytra black with one or more of the usual spots lacking except in *flavifrons*  
 where even the discal spot may be represented by a very small dot;  
 The basal spot only lacking;  
 Form broadly oval, tibial spine long and slender. 2.5 to 3 mm. North-  
 eastern United States . . . . . **indubitabilis** Cr. (p. 315)  
 Form more oblong, tibial spine short and blunt;  
 Marginal and discal spots parallel and both a little behind the middle.  
 3 mm. Colorado . . . . . **fenyesi** n. sp. (p. 316)  
 Discal spot oblong, in front of the middle and of the marginal spot.  
 3 mm. Santa Fe, Mex. . . . . **mexicana** n. sp. (p. 316)  
 Discal spot very small or lacking, humeral and marginal also often absent;  
 form nearly circular. 22 to 3.5 mm. Eastern United States.  
 . . . . . **4-punctata** Mels. (p. 316)  
 The humeral spot absent in ♀, present in ♂ (*basalis* Mels.) and distinct  
 from basal spot . . . . . *typical*  
 The humeral spot present in ♀ as well as in ♂, in the latter sex confluent  
 or nearly so with the basal spot. 2.2 mm. . . . . var. *confusa* Muls.  
 The marginal, as well as basal and subapical spots, always present. The  
 discal spot occasionally discernible but always very small. 2.6 mm.  
 . . . . . var. *flavifrons* Muls.

4. Form broadly oval, sides subparallel; abdomen male with 4th segment slightly excavated, fifth segment very deeply arcuately excavated, the excavation reaching nearly to anterior margin of the segment, the sides of the posterior margin on each side of the excavation broadly curved and produced over the sixth segment;

Elytra pale, suture bordered with black and two discal spots black. 4 to 4.5 mm. Montana, Nebraska, Colorado and Kansas . **albifrons** Say (p. 320)

Elytra pale, suture bordered with black which expands at one fourth and three fifths and two discal spots black more or less connected with each other and the expansions of the sutural border. 4.1 mm. Colorado.

**illustris** Csy. (p. 320)

Elytra pale, suture bordered with black and two discal spots of which the anterior is connected with the suture. 3.7 mm. California . **pacificus** Csy. (p. 321)

[Note: Intergrading specimens almost justify reducing *illustris* to a variety of *albifrons*.]

#### Group 5.

Abdomen ♂ without the bicuspid posterior margin of 3d segment or excavation of 5th segment but with a longitudinal fossa extending variously from the second segment to the apex of the abdomen. Ornamentation of pronotum or pygidium peculiar in each species as follows:

Pronotum black with the sides broadly flavous and two discoidal oval spots also flavous. 3.25 mm. Mexico to Panama . . . **fenestrata** Gorham (p. 322)

Pronotum pale whitish testaceous with a black broad arrow mark. 4 mm. Costa Rica . . . . . **cachensis** Gorham (p. 322)

Pronotum yellowish white with a black V-shaped mark. 3.3 mm. Costa Rica. **aperta** Weise (p. 323)

Pronotum black at base, pale in front. Pygidium black with an orange spot. 4.5 mm. Mexico . . . . . **pygidialis** Muls. (p. 323)

#### Group 6.

Abdomen of ♂ without any special modification.

Elytra black;

Each elytron marked with a subquadrate humeral and a rounded subapical spot orange red. 2 to 2.75 mm. Florida . . . . . **querceti** Sz. (p. 324)

Elytra pale;

Elytral markings including a common sutural vitta often expanded about the middle into a large rounded spot;

Pronotum with pale area in front with four indents from black area;

Elytra with discal spots distinct from sutural vitta. 2.5 to 3.6 mm.

Mexico and Costa Rica . . . . . **lepida** Muls. (p. 324)

Discal spots connected with sutural vitta. Guatemala.

var. *confluens* n. var.

All black markings reduced, no common sutural spot. Costa Rica.

var. *reducta* n. var.

Pronotum ♀ black with sides narrowly pale; elytra with two discal spots, a narrow sutural margin and a large round common spot black. 3.6 to 4.8 mm. Brazil . . . . . **sellata** Muls. (p. 325)

Pronotum ♀ black with sides and front margin narrowly pale; elytra as in *sellata*. 3-4 mm. Argentine and Paraguay. **bruchi** Weise (p. 326)

## DESCRIPTIONS AND NOTES.

Following will be found the bibliography of each species and its varieties, accompanied by copies of the original descriptions and such notes as seem necessary to amplify the characters given in the synopsis, with particular references to the distribution as far as known. In some instances, on account of scanty material, little can be added to the original description given by the author of the species.

*Males unknown.*

**B. buckleyi** *Crotch.*

1874. Revision of the Coccinellidæ, p. 210.

The original description is "rounded, sub-depressed, punctuation coarse and rather close, pectus and ventral segments in the middle black, legs and upper surface ivory white; a large common discoidal orbicular patch black, just cutting the base of the thorax and extending to two-thirds the length of the elytra." Fig. 76.<sup>1</sup>

Length: 2.5 mm.

Habitat: Ecuador (type locality), Cayenne.

Figure 76 is drawn from a specimen from Cayenne loaned by Dr. A. Sicard.

**B. 12-guttata** n. sp.

Broadly oval; black above and beneath with the head, anterior portion of pronotum and six spots (of which the three outer are connected with the pale margin) on the elytra yellow. Beneath, the legs, epipleuræ, sides of prothorax and head are yellow. Entire upper surface finely rather distantly punctate. Head entirely pale; pronotum black at base, pale in front and at sides, the black area covering  $\frac{2}{3}$  of the base, biarcuately sinuate and divided by a pale narrow line almost reaching the base; elytra black, shining, with humeral and basal spots, marginal and discal spots, posterior marginal and subapical spots all approximately equal in size, and a complete narrow pale margin extending from humerus to suture at apex and connecting the three external spots. Anterior tibiæ, with the usual tooth, large and straight, the outline of the tibia beyond the tooth straight. Male unknown. Fig. 90.

Length: 2.5 mm.

Habitat: Izalco, Salvador. One female collected by Fred'k Knab.

Type in U. S. Nat. Museum.

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<sup>1</sup> For Figures see pp. 330, 331.

**B. bilineata** *Weise*.

1902, Deutsche Ent. Zeits., p. 170.

The original description reads:

"Breviter-ovalis, subtus nigra, pedibus testaceo-flavis, supra albido-flava, vertice, vitta lata media postice dilatata prothoracis, scutello, marginibus elytro singulo lineaque, postice abbreviata, nigris; capite thoraceque dense, elytris minus crebre sed parum fortiter punctulatis.— Long. 3, 5 mill. Bolivia."

"Die Mittelbinde des Halsch. nimmt an der Basis mehr als die mittleren beiden Viertel ein, verengt sich davor schnell in concavem Bogen jederseits auf  $\frac{1}{3}$  der Breite und lauft dann mit annahernd parallelen Seiten bis in die Nahe des Vorderrandes, wo sie ungefahr so breit als die Stirn ist. Jede Decke ist schwarz umsaumt und mit einer schwarzen Langslinie cerschen. Der Nahtsaum dicht beim Schildchen, das aufser Drittel des Basalsaumes und der Seitensaum sind sehr schmal, feiner als die ubrigen Theile des Saumes. Die Langslinie ist etwa so breit als der innere Theil des Basalsaumes, zieht von diesem aus uber die Schulterbeule bis  $\frac{2}{3}$  der Lange nach hinten, ist den Seiten, denen sie nicht ganz parallel lauft, bedeutend mehr genahert als der Naht und hinter der Schulter an der Aussenseite in einem weiten und sehr sanften Bogen kaum merklich ausgerandet. Die Bauchlinien bilden einen flachen Bogen, welcher ein ganzes Stuck den Hinterrand des ersten Segmentes beruhrt."

This species I have not been able to see, hence no figure can be given.

**B. trimaculata** n. sp.

Black; legs, front angles and extremely narrow front margin of pronotum yellow; elytra with humeral spot yellow, small discal spot nubulously reddish, larger, subapical slightly transverse spot reddish. The humeral spot extends with narrow equal width to one fifth the length of the outer margin. The discal spot is very indistinctly outlined. The subapical spot is definitely outlined, narrowly separated from apical margin and parallel thereto, more widely separated from the lateral margin and from the suture, irregularly rounded in front. The discal and subapical spots are reddish, the humeral is yellow. The surface above is finely punctulate, the punctures separated by more than their own width; beneath more coarsely punctate. The spine of the anterior tibia is small, beyond it the edge of the tibia is irregular. Male unknown. Fig. 91.

Length: 1.6 mm.

Habitat: Sapucay, Paraguay, collected by W. F. Foster in March.

Type in U. S. Nat. Museum.

**B. sicardi** n. sp.

Black; legs, front angles of pronotum, humeri and broad irregular elytral vitta, dilated before the middle and involving more than half the surface, yellow. The humeral spot extends along the base to outer fifth and along the lateral margin to basal fourth and is arcuately limited within. The elytral vitta commences at the base, extending from near the scutellum to the middle of the base, extends thence

broadly and with nearly parallel sides to about the middle of the elytra where it expands, almost reaching the margin, but remaining more distant from the suture; at four fifths it is again contracted and its apical extremity is narrowly separated from the margin, apex and suture. Upper surface finely punctulate, punctures separated by more than their own width; beneath a little more coarsely punctate. Tooth of anterior tibia small, tibia otherwise simple. Male unknown. Fig. 92.

Length: 2.2 mm.

Habitat: Sapucay, Paraguay, collected by W. F. Foster in February.

Type in U. S. Nat. Museum.

Dedicated to Dr. A. Sicard of St. Malo, France, in recognition of his work on the Coccinellidæ of Madagascar.

#### GROUP 1.

Abdomen ♂ with third segment bicuspid, fourth and fifth not excavated; form nearly circular; anterior tibiæ with the margin arcuately expanded beyond the spine; each elytron with three pale spots (besides the humeral spot) separate or variously connected. All the specimens in which these characters occur seem to me, being separable only by modifications of a uniform color pattern, to represent varieties of *bistripustulata*.

#### **B. bistripustulata** Fab.

1801, Systema Eleutheratorum I, p. 383. Muls. 1851, p. 528; Weise, 1904, p. 361; Casey, 1899, p. 119;

*B. 9-pustulata* Klug. Dej. Cat. 3 ed. p. 458 (♀);

*B. erythrocephala* Gorham, 1899, p. 188; Crotch, 1874, p. 211.

Black, shining; thorax with broad yellow or red margin, each elytron with three yellow or red spots, two about the middle, one behind them, subapical. Body beneath black, legs red. In the males there is more pale color than in the-females, the head, the anterior margin of the thorax and the meso-epimera are pale and there is a small humeral pale spot on the elytra. The tooth of the front tibia is large and slightly curved and the posterior margin of the groove behind the tooth is arcuately expanded. The sexual modification of the ♂ abdomen affects the third, fourth and fifth segments. The third is broadly, arcuately emarginate, the emargination limited on either side by a small elevation, all the edge of the emargination being polished. The emargination of the fourth segment is equally wide but not so deep and it is not conspicuously elevated. The fifth is broadly simply emarginate and all three are depressed through the centre.

Length: 3.0-4.5 mm.

Habitat: Brownsville, Texas, southward throughout Mexico, Central America and South America to Obidos, Brazil; also Jamaica. Gorham gives many localities in Mexico and British Honduras, Guatemala, Nicaragua, Costa Rica, Panama, Colombia, and Peru.

Original description: "143. C. coleopteris atris, nitidis: punctis sex rubris, thoracis margine rufo. Habitat in America meridionali. D. Smidt. Mus. D. de Schestedt. Media. Caput rufescens. Thorax ater, nitidus, margine late rufo. Elytra atra, nitida, punctis tribus rufis 2. 1. Corpus nigrum pedibus rufis."

Great differences exist in maculation. In typical *bistripustulata* (Figs. 81 ♂, 82 ♀) the spots of the elytra are (*vide* Mulsant, who inspected the type preserved in the Copenhagen Museum) orange yellow (♀) or pale yellow (♂) arranged two in a transverse line, the internal subrounded and covering from the internal sixth to about three fifths; the external, a little smaller, almost a triangle with the base narrowly separated from the outer margin; the third and largest of all sub-orbicular, subapical, at least as near the suture internally as the first named spot, and almost reaching the external margin, a little more distant from the apical margin. The type localities are South American: Colombia for *bistripustulata* and Carthagena for Klug's unpublished *9-pustulata*. In the many specimens examined (about 150) the typical form seems to come from the more southern regions.

The following varieties have been found.

*guttata* Weise, Stett. Ent. Zeit., 1885, p. 231.

*decora* Casey, Journ. N. Y. Ent. Soc., VII, 1899, p. 119.

*quichiana* n. var.

*obscura* n. var.

*minor* n. var.

β Mulsant, Spec., 1851, p. 528.

### B. *bistripustulata guttata* Weise.

1885, Stett. Ent. Zeit., p. 231.

Original description: "Nicht nur bei dieser, sondern auch bei den meisten anderen Arten besitzen die Männchen ganz bestimmte Geschlechtsauszeichnungen, die noch nicht gehörig berücksichtigt worden sind. Im allgemeinen gilt für die ganze *Hyperaspis*-Gruppe die Regel, dass das ♂ einen Ueberschuss von der gelben Farbe der Zeichnung erhalten hat, der sich am Kopfe, an der Mittelbrust, den Beinen und oft in einer Humeralmakel zeigt; wichtiger ist die verschiedene Bildung der Abdominalringe."

"Beim ♂ der vorliegenden Art ist der dritte Bauchring angefährl im mittleren Fünftel in eine schwach nach hinten gerichtete Querleiste ausgezogen, die in der Mitte am niedrigsten ist; die folgenden Segmente besitzen einen mit der Querleiste gleichbreiten bogenförmigen schwachen ausschnitt, in welchem der Hinterrand niedergedrückt, zugleich, glänzender ist als die höheren Seitentheile. Erst diese Bildung gab mir die Gewissheit, in einer *Brachyacantha* von Cauca in Columbien (Staudinger) die ich für eine von *bistripustulata* verschiedene Art hielt, nur eine Varietät zu besitzen welche den Namen *guttata* verdient. Bei derselben ist Makel 1, vor der Mitte am Seitenrande, stets gestreckt, länger als breit und nie quer, wie beider in Mittel und Nordamerika häufigen Stammform, Makel 2 ander Naht, selten Klein und rund, sondern meist gross und länglich, Makel 3 endlich ist nie so stark quer wie beiden mexikanischen Exemplaren, länglicher, und reicht weiter nach vorn. Ausserdem zeigt Makel 1 das Bestreben, sich in die Länge auszudehnen (bei den ♂ ist sie deshalb nicht selten mit der Kleinen Basalmakel unter der Schulterbeule verbunden), während dieselbe Makel der Stammform sich der Quere nach verbreitert und häufig mit Makel 2 verbindet. Das ♀ hat nur einen schmalen dunklen Saum am Vorderrande des Kopfschildes."

This variety (see Fig. 83) differs especially in the form of the marginal spot which instead of being small and triangular is extended along the margin until in the ♂ it nearly or quite meets the small humeral spot. It was described from Cauca in Columbia.

### B. *bistripustulata decora* Casey.

1899, Journ. N. Y. Ent. Soc., VII, p. 119.

Original description: "Elytra never conspicuously pale or maculate at base, each with two transversely confluent pale spots before the middle and a subapical spot, the confluent pale spots very nearly separated; male with a pale oblique humeral spot which is absent in the female; head pale in the male, the pronotum pale, with a large and abruptly defined median black area from the base to apical fifth or sixth, deeply emarginate at each side; female with the head pale, sometimes narrowly darker at the edges, the pronotum similarly colored, the margins of the black area less sharply defined as usual and extending nearly to the apical margin. Length 2.9-3.7 mm.; width 2.1-2.8 mm. Texas (Brownsville)."

The author adds "*bistripustulata* (= *erythrocephala*) is represented by *decora*." This description is apparently drawn from a limited series. In a large series the confluence of the anterior spots is very variable. Sometimes they form a perfect band, recalling *dentipes*. Sometimes they are completely separated as in specimens from Brownsville which it is difficult to separate otherwise from *decora*. This variety was apparently known to Mulsant who called it *var a*. See Fig. 85.

### B. *bistripustulata quichiana* n. var.

The two transverse spots are large and connected by a narrow isthmus, the outer being extended anteriorly and broadly united with the humeral spot in both sexes. The subapical spot is also large, rounded on its inner face, angulate externally. See Fig. 84.

Length, 3.75 mm.

Habitat, Quiché, British Honduras.

Two specimens, male and female. The type is in the U. S. Nat. Museum, cotype in my own collection. The label states that it was found on corn and beans.

### B. *bistripustulata minor* n. var.

In this variety the size is much reduced, the markings are entirely separate as in typical *bistripustulata*. It resembles *decora* Casey but *decora* is larger and the anterior spots are connected. It differs remarkably from the South American *bistripustulata* in size.

Length, 2.25 mm.

Habitat, Brownsville, Texas. (Chas. Schaeffer.)

**B. bistrípustulata obscura n. var.**

Broadly oval; black above, reddish beneath with the head, sides of pronotum and marginal, discal and apical spots obscurely red and all connected. Beneath the insect is entirely reddish except the sterna. Punctuation above fine and close, surface dull. Head entirely red; pronotum with sides reddish for about one third the width, angulately within; epipleurae entirely reddish, marginal and discal spots equally in front of middle, obscurely connected; marginal spot also broadly connected with apical, leaving only a small semicircular black space on the margin behind the middle; apical spot large, oval, emarginate in front, reaching the side margin and approaching but not reaching the suture. Anterior tibiae with a strong curved spine near the middle beyond which the outline is arched, nearly repeating the structure in *bistrípustulata*. Male unknown. Fig. 80.

Length, 3.5 mm.

Habitat: Rincon Antonio, Mexico, one female collected by Frederick Knab. Type in U. S. Nat. Museum.

Inspection of males may necessitate, treating this as a species, but in their absence the characters seem to be so nearly those of *bistrípustulata* as to indicate varietal rank.

*Var. β.* Mulsant is described as having the transverse spots confluent and connected with the subapical spot. This was not found in the material studied though some specimens approached it.

[*Note.*—*Coccinella erythrocephala* Fab. Ent. Syst., I, p. 289. Original description: "C. coleopteris atris: punctis rubris sex, capite thoracisque margine pallida rufescentibus. Habitat Kiliae. Corpus C. 6-punctulata multo minus, Caput, thoracis margo, pedesque pallida rufescentia. Elytra atra, nitida punctis tribus rubris 2.1. Abdomen nigrum."

The description in Mantissa Insectorum 1787 is identical.

Weise in D. E. Z., 1904, p. 361, says: "The application of this name to the Mexican *bistrípustulata* should be rectified. Mulsant redescribed the typical ♂ in 1846 and recognized it as a European insect. Later Kraatz (B. E. Z., 1874) again called attention to this point. Crotch however followed neither Mulsant nor Kraatz. *Coccinella erythrocephala* Fab. = *Hyperaspis Fabricii* Muls. belongs to *Oxynychus* Lec. with simple claws, and is widely distributed in Siberia, Caucasus and Hungary but has not yet been found in Germany."

The locality "Kiliae" (Kiel) is probably an error.

Mulsant (Ann. Soc. Linn. Lyon, I, p. 198) makes *erythrocephala* a synonym of *bistrípustulata* and says that, according to Dr. Schaum and the type at Kiel, it is not the insect which served as the type of his *Hyperaspis fabricii*.]

## GROUP 2.

Abdomen of ♂ with third segment bicuspid at posterior margin, fifth segment excavated. In *bistrípustulata* (Group 1) and its varieties the third segment is bicuspid; in *ursina* (Group 4) and allied species the fifth segment

is excavated; but it is only in the species of this group that both segments are modified in the same insect. Other supporting characters are: anterior tibiae expanded at middle nearly as in first group, form broadly oval, subparallel at sides, less completely circular in outline; elytral markings in typical *dentipes* an interrupted fascia before the middle and a subapical spot, in the other species various modifications of these marks, as indicated below, which however never exceed three spots on each elytron and never duplicate the large rounded spots of the preceding group.

### B. *dentipes* Fabr.

Systema Eleutheratorum, I, 1801, p. 381.—Oliv., 1808, p. 1051, t. 7, f. 110; Ency. meth., t. 6, p. 1051, 98, pl. 7, fig. 110.—Muls., 1851, p. 525.—Crotch, 1873, p. 378.—Gorham, 1899, p. 186, 1899.—Casey, 1899, p. 120.—Say, 1835, p. 202.

Original description: "C. coleoptris atris: fascia interrupta punctisque duobus rufis, tibiis anticis acute dentatis. Habitat in Carolina. Mus. D. Bosc. Maiuscula. Caput fulvum, margine postice atro. Thorax ater, nitidus, margine laterali late, antice tenuissime fulvo. Elytra atra, nitida: fascia media ad suturam abbreviata, punctoque postice fulvis. Pedes antici flavi, tibiis extus acute dentatis; postici flavi, femoribus nigris."

Length: 4.75 to 5.25 mm.

Habitat, including varieties: Ont., Ill., Va., N. C., Ga., Fla., La., Ky., Kan., Tex., Mex.; Gorham gives Jalapa, Atoyac and Chilpancingo in Mexico, and Temax in No. Yucatan.

The following varieties have been found:

*socialis* Casey, 1899, l. c. Kansas.

*separata* n. var. Va., Ill., Ind., Mo., N. C.

*americana* n. var. Costa Rica.

The strongest characteristic of *dentipes* is the form of the male abdomen, the third segment being more evidently bicuspid than in any other species while the fifth segment is as strongly excavate as in any species of the *ursina* group. This combination is found in all the forms I have treated as varieties of *dentipes* and plainly indicates their close relationship. In the other species of this group the combination is present but in a more feebly developed form and, in conjunction with the more divergent markings, indicates their more distant relation to *dentipes*.

The head is black with a small vertical pale spot in ♀ which becomes more extended in the ♂ and leads to an entirely pale head in var. *socialis* ♀. The thorax is black with the side margin entirely pale in ♀, the pale color extending angulately into the black disc. The pale color is more extended in the male and in the variety *socialis* leaves only an irregular basal black spot as shown in Fig. 24. The legs are flavous with the posterior femora darker.

The maculation of the elytra differs in the varieties as follows:

*B. dentipes* (typical form), Fig. 22, has a transverse band in front of the middle, interrupted at the suture and a subapical spot, red, as in the original description "fascia interrupta punctisque duobus" and "fascia media ad suturam abbreviata, punctoque postice fulvis."

Var. *socialis*, Figs. 23 ♀ and 24 ♂, has the transverse band much wider, a third as wide as the length of the elytra and the subapical spot very large.

Var. *separata*, Fig. 20, has the transverse band reduced to two small spots and the subapical spot very small.

Var. *americana* has the transverse band and subapical spot as in typical *dentipes* but the insect is very much reduced in size.

All the above are more oblong than *bistripustulata* and its varieties and differ, as described, in male characters and in maculation. Gorham says that the more oblong forms of this species pass insensibly into *bistripustulata* but by separating the specimens by the male characters this difficulty disappears as all the oblong specimens prove to be *dentipes*.

The range of this species extends much farther north than that of *bistripustulata* and less in the southerly direction, Costa Rica being apparently its southern limit. As *bistripustulata* shows a tendency to break into varieties at the northern and southern limits of its distribution, so this species also exhibits the variation called *separata* in the north and that called *americana* in the south; *socialis* appears to be confined to Kansas.

### **B. dentipes socialis Casey.**

1899, Journ. N. Y. Ent. Soc., VII, p. 119.

Original description: "Elytra never conspicuously pale or maculate at base, each with two transversely confluent pale spots before the middle and a subapical spot, the spots very broadly confluent, forming a fascia slightly emarginate on both sides, the fascia a third as wide as the length of the elytra, broadening within, broadly truncate opposite the suture; subapical spot very large, extending along the limb, the marginal bead black; head in the female pale throughout, the pronotum very broadly and intero-angulately pale at the sides. Length 5.2 mm.; width 3.6 mm. Kansas."

The author adds: "The species from *socialis* to *dentipes*, probably including *tau* and *quadrillum*, which I have not examined, may be considered as subspecies of the *dentipes* type." Figs. 23 and 24. I have seen no female with the head pale throughout. The figures show specimens in my collection.

### **B. dentipes separata n. var.**

Elongate oval, black, with the head partly or wholly, the sides of the thorax, and in ♂ the anterior margin also, and three elytral spots (one marginal, one discal

in front of the middle and one subapical) reddish yellow. This variety possesses all the structural characters of *B. dentipes* but differs in the reduction of the markings of the elytra to three small spots. Length; 4.25 mm.

Habitat: Virginia.

Type in my collection with which I associate other specimens from Ill., Ind., Mo. and N. C. Figs. 20 and 21.

### ***B. dentipes americana* n. var.**

Elongate oval, sides subparallel, smaller and a little narrower than *B. dentipes*, the structure of which this insect reproduces on a reduced scale. Black with the head, the sides of the thorax (and the anterior margin also in ♂), a fascia in front of the middle of the elytra, broadly interrupted at the suture, and a subapical spot on each elytron reddish yellow.

Length: 3 mm.

Habitat: Pacayas, Costa Rica.

Described from a small series in the American Museum of Natural History. Fig. 86.

### ***B. subfasciata* Muls.**

1851, Species, p. 527. Crotch, 1874, p. 211. Gorham, 1899, VII, p. 187.

The original description, abridged, is: "Obtusément ovulaire. Elytres noires, ornées chacune d'une bande d'un rouge jaune au d'un jaune rouge, couvrant du deuxième au quatrième cinquième environ du bord externe, transversalement étendue jusqu'au cinquième interne de la largeur.

"Patrie: le Mexique (collect. Dupont; Muséum de Paris)."

Length: 4.5 mm.

Additional localities: Nogales Ariz.; Texas; Cordoba, Mexico.

Each black elytron has an orange band extending from the outside margin for two thirds the width of the elytron. No subapical spot. The other characters are substantially those of *dentipes* and Gorham treats *subfasciata* as a color variety of *dentipes*. In the total absence of intergrades and in view of the different shape of the band and of other comparative differences this treatment does not seem to be entirely justified.

♂ Head pale. Prothorax black, margined in front and at sides with pale.

♀ Head black. Prothorax black, margined on each side with pale, sometimes missing. Figs. 30.

### ***B. erythrura* Muls.**

1851, Spec., p. 530. Crotch, 1874, p. 211. Gorham, 1899, p. 187. (Fig. 29.)

Original description, abridged: "Obtusément ovulaire. Elytres noires, ornées postérieurement d'une bordure d'un rouge jaune, couvrant environ le quart de la longueur, mais graduellement détachée de la suture d'arrière en avant."

"Corps obtusément ovulaire ou presque en carré long et plus étroit en devant; convexe; pointillé; luisant, en dessus. Tête, antennes et palpes d'un rouge jaune ou d'un rouge orangé. Prothorax émousé au-devant de l'écusson; noir, parée de chaque côté d'une bordure d'un rouge orangé; la région noire, couvrant la moitié médiane de la base, irrégulièrement rétrécie, nébuleuse et peu nettement limitée sur les côtés et en devant, atteignant à peine ou n'atteignant pas le bord antérieur. Elytres obliquement et obtusément tronquées chacune à l'extrémité; noires, parées à leur partie postérieure d'une bordure d'un rouge orangé, de largeur uniforme, couvrant le dernier tiers du bord externe, égale au quart environ de la longueur du côté interne, graduellement détachée d'arrière en avant de la suture, dont elle reste distante du quart de la largeur à son angle antéro-interne. Dessous du corps noir sur les médi et postpectus, et sur les parties médianes de l'antepectus et du premier arceau ventral, d'un rouge jaunâtre ou testacé sur le reste. Pieds d'un rouge ferrugineux ou tirant sur le jaune."

Length: 3.6 to 4.2 mm.

In addition to the type locality (Mexico) it is found in Yucatan, Costa Rica, Guatemala, and Venezuela.

The black elytra are ornamented behind with an orange border, covering about one fourth of the length, but gradually detached in front of the suture, from which it remains distant a quarter of its width at its antero-internal angle. Fig. 29 represents a specimen doubtfully referred to this species, of which it has been difficult to obtain sufficient examples. The orange border covered by the original description is in the specimen figured only imperfectly developed. Beyond the maculation I know of nothing to differentiate this species which Gorham regards as a color variety of *dentipes*.

Head, antennæ and palpi are reddish yellow. The thorax is black with orange side margin, the black area being nebulously outlined and scarcely reaching the front margin. The pale head, entirely pale legs, apical spot of elytra reaching posterior margin will separate this species from *quadrillum* in which the head is black (with pale spot in ♂), the femora dark and the apical spot of elytra always distant from margin.

### ***B. quadrillum* Lec.**

1858, Proc. Ac. Phil., p. 89. Crotch, 1873, p. 378; 1874, p. 211. Gorham, 1899, p. 186.

Original description: "Ovalis valde convexa, nigra nitida, dense punctulata, thorace macula magna laterali rotundata elytris, altera subreniformi subapicali flavo-rufis ornatis; antennis palpis pedibusque flavo-rufis, femoribus infuscatis."

Length: 5 mm.

Habitat: New Braunfels, Texas (type locality).

More regularly oval than *B. dentipes*; it differs from that species by the black head and by the anterior spots of the elytra being wanting, leaving

only a subapical orange red spot (Fig. 28). The other characters are similar to those of *dentipes*. There are no intergrading specimens known and no good reason appears for treating this name except as that of a valid species, unless it may prove to merge into *erythrura*, which was described in 1851 and would therefore have priority.

♂ Head with a pale spot, thorax with sides broadly pale, pale space angulate internally, anterior margin very narrowly pale, elytra sometimes with a minute humeral pale spot as well as the large subapical reddish spot. Ventral segments as in *dentipes* except that the cusps of the third segment are closer together.

♀ Head entirely black, thorax with sides less broadly pale, elytra never with humeral spot. For differences between this and *erythrura* see under that species.

### B. *blaisdelli* Nunn.

1909, Ent. News, p. 132.

Original description: "Oblong, not very convex. Head, yellow in the ♂, black in the ♀ and with a large yellow spot placed vertically, shining, finely but thickly punctured with very shallow punctures. Thorax of ♂, black, slightly more heavily punctured than the head, a broad yellow patch laterally, and with front and side margins lined with a narrow pale or whitish yellow band. Thorax of ♀, black, punctured as in the male, with a broad yellow patch laterally but with light marginal band only found on the side margins and ending abruptly at the front angles. Elytra, black, shining, the punctures the same as on the thorax. Each elytron with a fascia and a sub-apical spot. The fascia is placed in front of the middle, is narrowest at its outer part where it touches the margin, but on the inner edge, is dilated into an irregular rounded blotch which does not quite reach the suture and which gives off a spur that runs parallel with the suture until it joins the sub-apical spot thus forming a sort of vitta. The confluence of the spur with the sub-apical spot is found in the ♀ but not in the ♂. Under side of thorax yellow; not strongly punctured; of body black; femur, dark; knees, tibia, and tarsi testaceous. L. .18 to .20 in. inch.; w. .12 to .15."

Habitat: Goldfield, Nevada (type locality); Mesa Grande, Sonoma Co., Cal.; and Napa, Cal. Specimens from Willis, Texas, and from Arizona are, for the present, associated with this species.

In this species and in *tau*, while the characteristic form and sexual characters of *dentipes* are preserved in a but slightly modified form, the maculation, by more or less complete confluence of the pale spots, is greatly altered. In typical *blaisdelli* as shown in Fig. 31, drawn from a cotype kindly furnished by Mr. Nunnenmacher, the transverse band is very wide and connected with a humeral pale spot in front and with a very large subapical spot behind. In specimens from Arizona and Texas the pale color becomes even more extended thus approaching the next species.

**B. tau Lec.**

1859, Col. of Kansas, p. 28. Crotch, 1873, p. 378; 1874, p. 212. Gorham, 1899, p. 182.

Original description: "rotundato-ovalis, convexa, supra rufo-flava, nitida dense subtiliter punctulata, thorace basi subinfuscato, elytris fascia basali ad humerum, abbreviata, sutura anguste, guttisque utrinque duabus paulo pone medium nigris, margine externo pone maculas, apicalique nigro, subtus nigra, antennis, palpis, pleuris pedibusque flavis. Long. 19." [4.5 to 5.0 mm.]

One specimen, Fort Riley: John Xantus Esq. The head and sides of the thorax are paler than the rest of the upper surface."

Additional localities: Nebraska and Montana.

In this species, with the form of *dentipes* and similar sexual characters, are found the widest departure from the *dentipes* markings. In the male the head and thorax may be entirely pale except for a basal black spot on the latter; or in the male sometimes and in the female usually the yellow side margin of the thorax may cover one third its surface with an irregular internal margin; the head seems to be always entirely pale in the male. The elytra always have a broad black basal fascia connected with a black sutural stripe, the remainder of the elytra yellow immaculate or enclosing a discal and a post median lateral black spot. In the specimens examined there is much individual variation but all agree in the complete confluence of the markings so that the elytra are more yellow than black.

## GROUP 3.

This group contains a few Mexican species in which the third segment beneath in the male is bicuspid somewhat as in the first group. The species of this group are smaller, the maculation is of an entirely different pattern and the front tibia is simple beyond the tooth. The four species included are very similar except in maculation. This is known to be variable throughout the Coccinellidæ and the series in Dr. Fenyés' collection of the species of this group shows it to be especially so here. The probability of further collections completely uniting them is great, but the material at present available is insufficient. I have therefore retained as distinct species the following, to be separated as indicated in the Synopsis.

**B. westwoodii Muls.**

1851, *Species des Coléoptères Trimères Sécuripalpes*, p. 520. Crotch, 1874, p. 211. Gorham, 1899, p. 185, pl. X, fig. 17.

*bipartita* ♀ Muls., l. c., p. 521.

The original description, in part, gives the following characters: Obtusely oval,

elytra orange red, with sutural and marginal border, black. The sutural feebly expanded at about one quarter, the marginal covering scarcely more than the epipleuræ becomes wider behind. Body beneath black, tibiæ and tarsi yellow.

Head ♂ orange red, labrum darker, ♀ black; thorax ♂ orange red, paler at sides, with a basal black blotch covering two thirds of the base, feebly rounded in front; ♀, black with only the anterior angles pale. (Fig. 69.)

Length: 3.6 to 5.0 mm.

Habitat: Mexico (type locality), Vera Cruz, Guanajuata (Gorham).

*B. bipartita* ♀ Muls., l. c., p. 521 is regarded by Gorham as a synonym of *westwoodii* ♂. Mulsant's description is almost identical with his description of *westwoodii* except as to length, which he gives as 3.6 mm. for *bipartita* and 5.0 mm. for *westwoodii*: "Brièvement ovales. Elytres d'un rouge jaune, parées d'une bordure suturale et d'une périphérique, noires, ne couvrant que le rebord, un peu moins étroites à l'angle sutural. Patrie: le Mexique (collect. Chevrolat, Dejean)."

The differences he gives in the more minute description are those which commonly mark the sexes in this genus.

### **B. conjuncta** Muls.

1851. Species des Coléop. Trim. Sécuri., p. 536. Crotch, 1874, p. 212. Gorham, 1899, p. 188, fig. 20, plate X.

From original description: "Ovale. Elytres noires, parées chacune de cinq taches jaunes: deux, couvrant toute la base et forment postérieurement une bordure bifestonnée: deux, en rangée transversale vers la moitié de la longueur: l'interne, orbiculaire, voisine de la suture: l'externe, semi-orbiculaire, liée au rebord externe: la cinquième, en ovale transversal, subapicale."

♂ Tête flave. Prothorax paré en devant d'une bordure flave, étroite et un peu inégale. Epimères du médipectus et pieds, flaves. ♀ Tête jaune avec l'épistome et parfois la partie inférieure du front, noirs ou obscurs. Prothorax sans bordure flave en devant. Epimères du médipectus, noires. Pieds d'un flave rouge, avec la majeure partie des cuisses, à compter de leur base, noire."

Length: 3.5 mm.

Habitat: Mexico (type locality), Costa Rica (Gorham).

This species differs from the preceding in the elytral markings which comprise five black spots, two covering the entire base and forming a festooned border behind; two about the middle of the elytra, the inner orbicular near the suture, the outer semi-orbicular united with the narrow black margin observed in *westwoodii*; the fifth oval, subapical. The spots may be increased in size as shown in Figure 72 (copied from Gorham) and an equivalent reduction would make a form identical with *westwoodii*. No such reduction has been observed, but the variations found in a series of *aymardi* suggest the possibility of its being discovered. Gorham compares this species with *pygidialis* but does not describe the ♂ characters. Mulsant places it between *pygidialis* and *confusa* (= *4-punctata*).

**B. aymardi** Gorham.

1899, *Biologia Cent. Amer.*, VII, p. 186, pl. x, fig. 18.

Original description: "Nigra; capitis fronte maculisque duabus magnis transversis ad angules anticos prothoracis flavis; elytris rufis, sutura tenuiter, macula communi suturali juxta basin, et duabus alteris discoidalibus, una subhumerali, una majore subapicali, nigris. Long. 4.5 mm. ♀. Hab. Mexico, Parada (Sallé)."

It has also been found at Atlixco, Mex., June (Fenyés).

Gorham says further that it is "clearly allied to *B. westwoodii* but larger than that species and differs, moreover, in the large yellow mark on the anterior angles of the thorax. This mark occupies the whole angle, and extends along the side almost to the base, it is prolonged obliquely into the disc, leaving the front margin black. The body beneath is black, the tibiæ and tarsi yellow." The difference in size is not important, especially as Mulsant gives 5.0 mm. as the length of *westwoodii*. The color of the thorax, which Gorham described from the ♀ varies in the sexes and individually. Figures 65 ♂ and 64, 66 and 67 ♀ ♀ show the variations observed in the series from Atlixco in the Fenyés collection. I have retained *aymardi* as distinct on account of its elytral maculation, consisting of narrow sutural border, joined to a common sutural spot near the base and two or three other discal spots, one subhumeral and one or two subapical, not being exactly duplicated in any other species, but I suspect that larger series may unite this also with *westwoodii*.

**B. cryptocephalina** Gorham.

1899, *Biologia Cent. Amer.*, VII, p. 186, pl. x, fig. 19.

Original description: "Nigra; elytris sanguineis, sutura tenuiter, punctisque tribus nigris, uno subhumerali, duobus pone medium transversim approximatis, nigris Long. vix 6 mm. ♀ Hab. Mexico, Ventanas in Durango (Höge)."

Gorham adds: "Entirely black, with the exception of the elytra, which are of a rich blood-red colour, with the suture (narrowly at the base, more widely at the apex), and three small spots on each, black. This fine species cannot be confounded with *B. aymardi*, as it is larger, the head and thorax are wholly black, and the elytral markings are different. The single specimen obtained by Höge is the only one I have seen. It is apparently a female." The elytral markings he describes as narrow sutural border and three spots black, one subhumeral, two behind the middle transversely approximate. I have retained this also as distinct in the absence of intergrading specimens but, in view of its being described from a single female and its validity resting upon size, entirely black thorax and absence of the common sutural spot of *aymardi*, I expect it may ultimately be united with that insect. Fig. 71.

## GROUP 4.

This group contains a large number of species in which the fifth segment of the abdomen ♂ is excavated while the third segment is simple or nearly so. The anterior tibia is toothed as usual and in addition is swollen or feebly toothed at apex. The maculation is variable but may be considered as including five pale spots on each elytron, modified in some species by disappearance or confluence of certain spots. Four sections are indicated by these variations in maculation and supported by minor differences in structure, viz:

- 1, Five pale spots distinctly limited;
- 2, Five pale spots indistinctly outlined or partly or wholly confluent, leading in extreme cases to pale elytra;
- 3, Five pale spots reduced in size as an unusual form or one or more lacking as a usual form, leading to forms in which only two of the five spots remain; and
- 4, Confluence so complete as to leave pale elytra with irregular black markings.

The first form may be regarded as the typical form in this group. It is shown in *ursina*.

The second form retains the broadly oval form of *ursina* but it is accompanied by the greatest development of the apical supplementary tooth of the anterior tibia.

The third form is exhibited in several species of diverse form some being decided more elongate than *ursina*. The material here included is not as homogeneous as elsewhere.

The fourth form is exhibited by *albifrons* and allied species. The body is more elongate than in *ursina* and the excavation of the 5th segment ♂ reaches its maximum.

The distribution of the species of this group is entirely Mexican and northward except *propria*, described from Peru, which is incorporated unseen from the description of Kirsch, and *australe* from Paraguay and Brazil. The species of the first section occur all over the U. S. except the Pacific slope and in Mexico, exhibiting slight but fixed modifications in maculation in the different regions into which they penetrate. The species of the second section are confined to the warmer southwestern regions and are remarkable for the great amount of individual variation they exhibit. The third section contains two heterogeneous elements, the one exemplified in *mexicana* and *fenyesi* confined to the lower Sonoran region, the other represented by *4-punctata* and *indubitabilis* distributed in the northeastern parts of the United States and Canada. The fourth section comprising *albifrons*, *illustris* and *pacifica* is especially developed in the region, immediately east of the Rocky Mts. *Pacifica* is unknown outside of the Casey

collection and it is possible that the locality label (Sta. Monica, Cal.) is erroneous. It seems to be unknown to all the California collectors with whom I have corresponded.

### **B. ursina Fab.**

1787, *Mantissa Insectorum*, p. 61; 1792, I, p. 291. Mulsant, 1851, p. 532. Crotch, 1873, p. 378; 1874, p. 211. Gorham, 1899. Casey, 1899, p. 120.

*bisquinquepustulata* Oliv., 1808, Ent., VI, p. 1053.

Original description: "C. coleopteris atris; punctis decem albis, capite thoracisque margine antice albis. Habitat America boreali Mus. D. Hunter. Parva, nitida. Caput album oculis nigris. Thorax ater, nitidus margine antice sinuato albo. Elytra atra punctis quinque albis 2, 2, 1. Corpus nigrum pedibus albis."

Length: 2.0 to 3.6 mm., the males in this species being often much smaller than the females.

Habitat: Northeastern United States and Northern Mexico. The localities represented in the abundant material examined include Manitoba, Mass., Conn., N. Y., N. J., Pa., Va., N. C., S. C., Fla., O., Ky., Ill., Mich., Wis., Neb., Colo., Ks., N. Mex., and Mexico. Gorham gives also Lake Superior and Texas in U. S.; and Ciudad and Ventura in Durango, Mexico.

The following varieties have been described.

*stellata* Casey, *l. c.*, p. 117. Ill., Mo., Ky.

*congruens* Casey, *l. c.*, p. 117. N. C., Northern Ga.

*uteella* Casey, *Can. Ent.*, XL, p. 413. Utah.

*sonorana* Casey, *Can. Ent.*, XL, p. 412. Durango, Ariz., N. Mex.

The variety *stellata* seems to be confined to the Middle West, the variety *congruens* to the mountains of North Carolina and Georgia, and the varieties *uteella* and *sonorana*, which are not very distinct, to the Sonoran region.

This species from its wide distribution in the most settled parts of our country is well known to all collectors. It is difficult to separate from *felina* (= *10-pustulata* Mels.) but if the sexes are separated first the difficulty will in great part disappear. The males have the fifth ventral segment plainly excavated and have more pale color on the head thorax and humerus. When the sexes are separated it will be found that the smallest males of *ursina* are as large as the largest females of *felina*, while the males of *felina* are much smaller still. Comparing sex with sex *ursina* is considerably the larger insect. Specimens will be found that are very close in markings but usually the basal spots are more rounded in *ursina*, more elongate transversely in *felina*. The apex of the elytra is more sinuate in *felina*. Mulsant regarded these small specimens as small *ursina*. He did not recognize the description of *felina* and did not know that Melsheimer was describing *10-pustulata* while he was finishing his monograph, so that in his work no separate mention occurs of the smaller species. Crotch and Casey

both treat the two as distinct. I am led to follow their course not only because of the constant difference in size but because the excavation of the ♂ fifth abdominal segment seems stronger in *felina* than in *ursina* instead of weaker, as it should be in proportion to the reduced size were they identical.

The varieties described by Casey are separated as indicated in the synoptic table. Copies of his descriptions will be found below. The markings of *ursina* ♂ are shown in Fig. 33, ♀ in Fig. 32; of *stellata* in Fig. 34, of *congruens* in Fig. 35, of *uteella* in Fig. 36.

### B. *ursina stellata* Casey.

Original description: "Elytra pale at base, or each with a pale spot near the middle of the basal margin; elytra each with five clearly defined and isolated pale spots, two basal, two in a transverse line very near the middle and one subapical, the humeral constant in both sexes; elytral spots generally separated from each other by more than their own dimensions; basal spot almost fully circular, only slightly truncated by the basal margin; body small, elongate-oval, piceous brown in color; head and subquadrate sides of the pronotum flavate in the female; elytra finely but strongly, sparsely punctate, polished, the spots nearly equal, moderately large, the subapical largest and the humeral smallest; under surface piceous; legs pale throughout. Length 1.9–2.1 mm.; width 1.3–1.45 mm. Indiana."

"The species from *stellata* to *bolli* are more or less close derivatives of the *ursina* type."

### B. *ursina congruens* Casey.

Original description: "basal spot never much more than semi-circular broadly truncated by the basal margin; male with the two median lobes broadly and rectilinearly truncate, the dividing spur of the apical pale margin short and very minute or obsolete, body more broadly oval than in *ursina* and more variable in size, finely punctate; spots small, variable in size and form among themselves, the subapical usually the more conspicuous. Length 2.1–3.6 mm.; width 1.6–2.75 mm. North Carolina (Asheville)."

*Congruens* is one of the names included in the author's sentence, "The species from *stellata* to *bolli* are more or less close derivatives of the *ursina* type."

### B. *ursina uteella* Casey.

Original description: "The following species is allied to *ursina*. Form elongate-oval, very convex, polished, minutely, rather sparsely punctate, black; female with yellow spots as in *ursina*, and nearly as large, except that the two medial are relatively more distant from the two basal, so that, instead of forming a square as in *ursina*, they form a slightly elongate rectangle; pale side margin of the prothorax much less broadly dilated anteriorly. Length 3.6 mm.; width, 2.3 mm. Utah (Milford Wickham)."

Specimens lately received from Mr. Norman Criddle indicate that this variety, which Mr. Criddle found in Manitoba, may occur throughout the region immediately east of the Rocky Mountains.

### **B. ursina sonorana** Casey.

Original description: "A subspecies of *uteella* may be defined as follows: Form still narrower than in *uteella*, ellipsoidal, polished, black, very minutely, decidedly sparsely punctulate; female with spots nearly as in *uteella* but much smaller, except that the rectangle formed by the basal and slightly post-medial spots is still more elongated and the humeral spot is reduced to a small dot; the basal spots differ in being very small, nubilous and wholly detached from the margin. Length, 3.0 mm.; width, 2.0 mm. Mexico (Colonia Garcia, Chihuahua), Townsend."

The author adds: "I have not examined the males in either of these forms, which differ profoundly from *ursina* in their narrower, more elongate outline, and more especially, in the very fine and sparser punctures."

### **B. octostigma** Muls.

1851, *Species des Coléop. Trim. Sécuri*, p. 539. Crotch, 1874, p. 212. Gorham 1899, VII, p. 188.

Original description: "Ovale. Elytres noires, parées chacune de quatre taches subarrondies, assez grosses, d'un jaune flave; trois, presque également très-rapprochées de la suture; la postérieure de celle-ci, apicale: une, liée au rebord externe, du quart à la moitié de la longueur, en quinconce avec les deux juxta-saturales antérieures."

"♂ Tête flave. Prothorax noir, paré en devant et sur les côtés d'une bordure d'un jaune pâle; la region noire, couvrant les deux tiers médiaires de la base, bidentée en devant, c'est-à dire obliquement avancée du sixième externe de la base jusqu'au cinquième antérieure, vers la partie correspondante au bord interne des yeux, entaillée sur la ligne médiane jusqu'à la moitié de la longueur. Elytres ornées ordinairement d'une petite tache flave, obtriangulaire, humérale. Epimères du médipectus et pieds, flaves."

"♀ Tête jaune ou d'un jaune flave, avec l'épistome et parfois la partie inférieure du front, noirâtres ou obscurs. Prothorax noir, paré de chaque côté d'une bordure flave, étendue en devant jusqu'à la sinuosité postoculaire, couvrant le sixième externe de la base, curvilinéairement ou anguleusement dilatée au côté interne. Epimères du médipectus, noirs. Elytres non parées d'une tache flave humérale. Pieds jaunes; cuisses d'un jaune rougeâtre."

Length: 3.0 mm.

Habitat: Mexico (type locality) Chiriqui, Mexico, Guatemala and Panama (Gorham).

This species is similar to *testudo* Casey in its rounded outline, shining surface and large spots but differs in the humeral spot being absent in ♀ and very small ♂ and in the marginal spot being nearer the base, about half way between the basal and discal spots instead of being nearly parallel with the latter as in *testudo*. Fig. 44.

**B. testudo** Casey.

1899, Jour. N. Y. Ent. Soc., VII, p. 118.

Original description: "Elytra each with five clearly defined and isolated pale spots, two basal, two in a transverse line very near the middle and one subapical, the humeral constant in both sexes; spots relatively larger, whitish, separated by their own diameter or less; form elliptical, the spots, excepting the humeral, subequal in width and isolated at about their own diameter or a little less; head and subquadrate side spot of the pronotum pale in the female, the surface finely rather closely punctate and fully three-fourths longer along the median line than at the sides; elytra finely, sparsely punctate, piceous-black; legs pale. Length 2.7 mm.; width 2.0 mm. Texas (Brownsville)."

This, according to the author, is a "more or less close derivative of the *ursina* type." It is smaller, more shining and with more rounded, clearly defined pale spots than *ursina*. By the descriptions it seems to be very close to *octostigma* but I have retained it as distinct because of the presence of the humeral spot, which is lacking in the Mexican species and the different position of the marginal spot. As shown by the figures these differences make *testudo* an easily distinguished species. Fig. 45.

**B. felina** Fab.

1775, Syst. Ent., p. 87; 1787, I, p. 61; 1792, I, p. 290.

Original description: "C. coleopteris atris; punctis sex albis corpore globoso." Entomologica System. I, p. 290, 1792 felina. 113. C. coleopteris atris: punctis sex albis, corpore globoso. Habitat in America boreali Dom. Drury. Parva, tota globosa. Caput album, immaculatum. Thorax albus macula baseos nigra. Elytra atra punctis tribus lineolaque parva baseos albis."

Length, 1.5 to 2.0 mm. = .06 to .08 inch.

Habitat: Amer. bor. (type locality) Mass., Vermont, N. Y., N. J., Penn., Md., D. C., Va., N. C., Mich., Ky., Ill., W. Va., Neb., Mo., La., Texas.

The description of Fabricius covers a form of this species which is unusual in collections and caused Mulsant and Crotch to pass the name as unrecognized. It calls for elytra black with three small spots white and a small basal white line. This line results from the usual basal spot being transversely elongate as in many specimens from the mountains of N. C. Most of the specimens in collections belong to Melsheimer's variety *10-pustulata*.

For the differences between this species and *ursina* see under that species. *Fulvopustulata* Mels., lacking the humeral spot, is not exactly represented by any specimen I have seen. Its description is here copied for comparison when necessary.

Proc. Ac. Nat. Sci., Phila., III, 1847, p. 178. "Deep black above; front, lateral margins of the thorax, and four spots on each elytron, fulvous; tibiae and tarsi testaceous.

"1 l. long. Pennsylvania.

"Deep black, shining, densely and very minutely punctured: head with a large yellowish or fulvous frontal spot; labrum and antennae, testaceous: thorax with a

large whitish spot on each of the lateral margins, contracted on the posterior angles: elytra, each with four pale fulvous spots, placed 1.2.1; anterior spot occupies the inner basal angle; posterior one is placed a little before the apex, nearly equidistant from the suture and the lateral edge; beneath and femora, dull ferruginous: tibiæ, tarsi, and apex of the femora testaceous; tooth of the anterior tibiæ, small. Resembles somewhat *ursina* Fab. but is smaller than that species, and differs in the elytral spots."

It has been treated heretofore as a synonym and the absence of any specimens in the extensive material studied leads me to suppose it to be based on an accidental or apparent absence of one of the usual spots and follow previous authors in treating it as a synonym.

The following variety is the form commonly found in collections:

**B. felina 10-pustulata** *Melsh.*

Proc. Ac. Nat. Sci., Phila., III, 1847, p. 179.

Original description: "Black; head, lateral thoracic margins and ten elytral spots fulvous; feet testaceous yellow.  $\frac{3}{4}$  l. long. Pennsylvania.

"Shining black: head indistinctly punctulate, yellowish-fulvous: eyes black; antennæ, palpi and feet yellowish: thorax punctured like the head, with the lateral margins fulvous; scutellum comparatively large: elytra distinctly and densely punctulate, each with five roundish fulvous spots, placed 2, 2, 1; the terminal spot is confluent with the apical edge: beneath black; pleuræ and epipleuræ testaceous yellow. Var. A. As in the type, with the head and thorax entirely black."

**B. propria** *Kirsch.*

1876, Deutsche Ento. Zeits., XX, p. 119.

According to the author is shortly oval, black beneath, yellow above, head yellow ♂, black ♀ with a vertical yellow spot; prothorax male with a basal black spot, quadridentate in front, female black yellow at sides; elytra black with five yellow spots, the first juxta-scutellar, the second humeral, triangular, the third rounded behind the middle, the fourth semiorbicular at the middle of the side margin, the fifth large transverse and subapical. Similar to *ursina* but differs in the position of the third and fourth spots, the former standing behind the middle, near the suture, the latter at the middle of the side margin, often confluent with the triangular humeral spot.

Length: 2.0 to 3.0 mm. = .08 to .12 inch.

Habitat: Peru.

I have not seen this species and it is placed in Group 4 on account of the similarity of the markings and the comparison with *ursina* made by the author.

**B. australe** n. sp.

Closely allied to *B. ursina* but smaller, more circular in outline, more convex, more shining and finely punctulate; and with the humeral spot of the elytra extending along the side margin.

Head black ♂ ♀; thorax black ♂ with the sides and narrow front margin yellow, the black area arcuately limited in front without any indentation, black also ♀ with the front angles yellow; elytra black with five yellow spots, one basal, juxtascutellar, semicircular, one humeral running down the side margin, arcuately limited within, one at the middle of side margin, circular, one slightly behind it, behind the middle, near the suture, oval, one subapical, slightly transverse, all further apart than their own diameter. Underside black, legs fusco-testaceous. ♂ with fifth segment excavate at middle of posterior margin.

Length: 2.0–2.75 mm.

Habitat: San Bernardino, Paraguay, Oct. 1, Bonito Prov. Pernambuco, Brazil, Jan. 17, where it was collected on cotton. Described from 2♂, 3 ♀, types in Nat'l Museum.

### **B. bollij** *Crotch.*

1873. Trans. Amer. Ent. Soc., p. 379. Gorham, 1899, p. 188, Casey, 1899, p. 118.

Original description: "♂ Convex, rounded sub-globose, black, shining, legs and head yellow; thorax broadly yellow in front and on the sides (the black color bilobed in front); elytra feebly punctate, each with five ill-defined yellow spots (two basal, two medial, one sub-apical, free); the two basal ones are partially confluent as are also the two marginal ones. L. .10 inch. Var.—Spots suffused. Dallas, Texas."

It is found also at Vowell's Mills, La.

This species is subject to individual variation by which the two basal spots become confluent, on the two marginal spots, or in extreme cases, all the spots, leading to pale elytra with a sutural dark design as shown in Fig. 43.

♂ head pale; thorax pale with a black basal mark covering nearly all the base and extending over about half the surface, bisinuately outlined in front.

♀ head pale; thorax black with pale side margins.

The abdominal characters of *ursina* are practically reproduced in this species. Figs. 42 and 43.

### **B. arizonica** *Schffr.*

1908, Jour. N. Y. Ent. Soc., XVI, p. 125.

Original description: "Slightly smaller and more rounded than *ursina*, similarly marked, but without median spot on lateral margin and with basal spots always confluent. Head pale in the male; pale at middle, black at apical margin and infuscate at sides in the female. Thorax black, apical margin and a large triangular spot at sides pale in the male, in the female the apical margin very narrowly and a narrow subtriangular spot at apex, which extends slightly below middle, pale. Elytra black, two basal spots on each side, large and always broadly confluent, a large rounded, discal spot near suture and large apical spot nearer the margin than suture yellowish or reddish. Punctuation of thorax and elytra as in *ursina*. Under side of body black; legs pale in the male; femora piceous, tibiae and tarsi pale in the female.

Anterior tibiae with the usual tooth near base, and in addition a smaller, but more obtuse one near apex. Abdomen in the male as in *ursina*, but the fifth and sixth segments more depressed.

"Huachuca Mts., Arizona."

"This species varies a good deal in the extent of the elytral spots. All the spots may unite more or less and gradually extend over the entire surface, leaving only the suture and apex broadly, the side margin narrowly and a spot on the humeral callus black. This species differs principally from *ursina* and *testudo* by the very large and always broadly confluent basal spots, the absence of the median marginal spot on each elytron, the bidentate anterior tibiae, and in addition from *ursina* by the shorter and more rounded form."

Length: 2.5 to 3.0 mm.

Additional localities are: Chiric. Mts., Arizona (U. S. Nat. Museum); and Matamoros and Cuernavaca, Mexico.

In this species the usual five spots occur on the elytra, the basal spots usually confluent, the marginal spot often broken into two small spots or lacking. The spots are more clearly defined than in *bollii* and there is less tendency to complete confluence which does nevertheless occur as shown in Fig. 41. There is much individual variation as in the preceding and as shown in Figs. 37 to 41, but the form of the anterior tibia with its additional apical tooth is a constant character separating this species.

### ***B. indubitabilis* Crotch.**

1873, Trans. Amer. Ent. Soc., p. 379, Casey, 1899, p. 120.

Original description: "Very close to *B. ursina* in size and coloring, the punctuation is finer and the elytra have no trace of the two basal spots; the two medial spots are distinctly before the middle and not on it as in *B. ursina*; the posterior spot is small. L. .12 inch [usually smaller]. ♂ head, sides (broadly) and front margin of thorax yellow, a sharp yellow tooth projects from the centre of the margin. ♀ head black, with an obsolete orange spot. Illinois."

Other localities: Mich., Penn., N. J., N. Y., Md., D. C. and Iowa.

This species is comparatively rare in collections and doubtless occurs in other parts of northeastern U. S. for which I have no records. This species resembles *ursina* in form and markings and the male has similar modification of the ventral segments though more feeble. It differs superficially in the smaller size, finer punctuation and in the reduced size of the spots and structurally in the long and slender tooth of the anterior tibia. Crotch in his original description says the two basal spots are always missing, the two medial spots are in front of the middle and the subapical spot is small. Some variation has been observed in maculation and the characteristic features of the species seem to rest rather on the form of the tooth of the anterior tibia than on the always reduced maculation. Fig. 56 ♂; 57 ♀.

**B. fenyési** n. sp.

Broadly oval, black above and beneath with the head, sides of pronotum, humeral, marginal, discal and subapical spots red. In the male, the anterior margin of pronotum is also red. Beneath, the antennæ, anterior tibiæ and all the tarsi are reddish. Head pale in both sexes, slightly infuscate before the labrum, finely punctate; pronotum black, finely punctate, shining, ♀ sides red as far as the eye in front, red space growing narrower posteriorly and ending just before the hind angle, ♂ with the red sides joined by a narrow anterior marginal border; elytra black, finely distantly punctate, shining with four red spots, viz: humeral, small ♀ larger ♂, small marginal just before the middle, larger discal just behind the middle, and subapical, all bright red. Anterior tibiæ with tooth in usual position but small, tibiæ beyond the tooth simple. Sexual modification of ♂ abdomen confined to 5th segment which is deeply emarginate and depressed. (Fig. 88.)

Length: 3 mm.

Colorado (Muckanawago, Gunnison and Glenwood Springs, July).

Dedicated to Dr. A. Fenyés of Pasadena, Cal., in recognition of many favors.

**B. mexicana** n. sp.

Broadly oval, black above and beneath with the head, broad side margin of pronotum, humeral, marginal, discal and subapical spots of elytra yellow. Beneath the tibiæ tarsi and mouth parts are also yellow. In the male the head is entirely pale and the anterior margin of pronotum is pale; in the female there is only a pale spot on the head and the pronotum is black except for the pale side margins. Head finely closely punctate, pronotum and elytra finely more distantly punctate. Humeral spot of elytra moderate ♂, very small ♀, marginal spot in front of the middle, discal spot elongate in front of the middle and in front of the marginal spot, subapical spot large equally, distant from margin and suture. Anterior tibiæ with the usual spine but not prominent and closer to the base than usual. Abdomen ♂ with 5th segment simply emarginate and flattened at middle; 3d and 4th segments also slightly flattened. Fig. 89.

Length: 3 mm.

Habitat: Santa Fé, Mexico collected by R. H. Hay, Nov. 7. Type ♂ in Nat. Museum. With which I associate two females from Atlixco, Mexico (May) in which the discal spot is less elongate.

**B. 4-punctata** Mels.

1847, Proc. Ac. Nat. Sci. Phila., III, p. 178.

*basalis* ♂ Mels., *l. c.*, p. 179; Crotch, 1873, p. 378; 1874, p. 212; Casey, 1899, p. 118;

*diversa* Muls., *l. c.*, p. 538.

Broadly rounded, polished, rather sparsely punctulate. Male with the head pale, the prothorax pale with a basal black area extending to lateral eighth, approximately bilobed in the middle, extending to apical fourth or fifth or all black except narrow anterior border; female with the head black, the front sometimes nubilously

pale in V-shaped design, the thorax black throughout, except a very narrow margin about the apical angles. Maculation of the elytra variable as follows:

Basal and subapical spot, Fig. 52, *4-punctata* ♀.

Humeral and basal spots not connected, subapical spot (*basalis*), fig. 55, *4-punctata* ♂.

(*diversa* ♂ ♀ synonymous with above).

Humeral and basal spots connected or nearly connected, subapical, Fig. 54, *confusa* ♂.

(In *confusa* ♀ the humeral spot is small).

Humeral, basal, marginal and subapical spots, and sometimes even a minute discal spot, fig. 53, *flavifrons*.

Length, 2.2 to 3.5 mm.

Habitat, Atlantic States, Canada and Massachusetts to Florida and inland to Illinois.

By the elytral maculation alone, the last variety would link this species with *ursina*. Besides the more rounded form and polished surface there is a constant difference in the form of the ♂ abdominal segments. While the group character, the excavation of the fifth segment, is preserved it is in a much more feeble condition and this species therefore approaches those of the last group in that respect.

There is not a little individual variation in color in the varieties cited and the reader must expect some specimens that will not fall precisely within either description.

The distribution of this species, as far as known, extends from Mass. (Canada according to Wickham) southward to Fla. and through Miss. and La. and in Pa., W. Va., Ohio, Ky., and Ill. It seems to be abundant in the southern Atlantic States.

Its variations are sufficiently indicated in the synoptic table and in the original descriptions given below. Its strong characteristic is the repetition of the structural characters of *ursina* with the disappearance of the discal and other spots more or less completely evident. Rarely in var. *flavifrons* even the discal spot is faintly represented.

The male of *4-punctata* was called *basalis* by Melsheimer. (Proc. Ac. Nat. Sci. Phila., III, p. 179) and described as follows:

"Head, anterior and lateral margins of the thorax, four basal and two apical spots of the elytra, pale sulphureous: two thoracic spots, elytra and beneath, black.

"1½ l. long. Pennsylvania.

"Hemispheric, very minutely punctured, shining: head pale sulphureous: eyes similarly colored, with a dusky pupil, antennæ and feet color of the head: thorax color of the head, with two large subtriangular black basal spots, separated by a narrow dorsal line: elytra black, each with three large pale sulphureous spots, of which two are at base and one at apex: the inner basal spot is much larger than the humeral one; the apical spot is suborbiculate, and is placed nearer the edge than the suture; beneath blackish. Perhaps a variety of *felina* Fab."

The name he applied on page 178 (*4-punctata*) takes precedence of that on page 179. The following is his description of *4-punctata* taken from the female:

"Deep black; elytra with four fulvous spots; tibiæ and tarsi dull testaceous 1½ l. long. Pennsylvania.

"Deep black, shining, finely and densely punctured: head immaculate: antennæ dull testaceous: thorax immaculate: anterior angles obscurely piceous: scutellum triangular: elytra, each with a subrotund spot at base on the inner angle, and another similarly shaped and sized one a little before the apex, and nearer to it than to the suture, fulvous: beneath and femora, black: knees, tibiæ and tarsi, dull or dusky testaceous: prickle of the anterior tibiæ robust, prominent."

Mulsant described ♂ and ♀ under the name *diversa* and exactly reproduced Melsheimer's *basalis* and *4-punctata*. The following is a copy of the essential part of his description:

"Brièvement ovale. Elytres noires, parées chacune de deux taches d'un rouge orangé: la première, presque subcordiforme, couvrant les trois cinquièmes internes de la base, prolongée en se rétrécissant jusqu'au quart de la longueur: la deuxième suborbiculaire, subapicale, liée au rebord de la courbure postéro-externe, étendue jusqu'au tiers interne. Long 0<sup>m</sup>, 0036 (1½ l.).—Larg. 0<sup>m</sup>, 0029 (1¼ l.). Patrie: l'Amérique du nord. (Collect. Dejean type.)

"♂ Tête flave. Prothorax noir, paré de chaque côté d'une bordure flave, étendue en devant jusqu'à la sinuosité postoculaire, d'une largeur égale jusqu'au quart de la longueur, brusquement rétrécie de moitié dans ce point, et graduellement de là à l'angle postérieur; orné en devant d'une bordure également flave, assez étroite, liée par ses extrémités à chacune des bordures latérales. Elytres notées d'une petite tache humérale, flave, obtriangulaire. Epimères du médipectus, flaves. Pieds d'un flave roussâtre: cuisses intermédiaires en partie nébuleuses ou noirâtres: cuisses postérieures presque entièrement noires ou noirâtres.

"♀ Tête noire, marquée de quelques petites taches d'un jaune rougeâtre. Prothorax noir, paré aux angles de devant d'une bordure d'un jaune roussâtre, très étroite, étendue jusqu'à la sinuosité postoculaire d'une part, et jusqu'aux deux tiers des bords latéraux, de l'autre. Elytres sans tache humérale. Dessous du corps entièrement noir. Cuisses noires. Jambes et tarsi d'un roux jaunâtre ou d'un rouge flave: jambes postérieures en partie obscures. Obs. Quelquefois la tête et le prothorax sont entièrement noirs."

It will be noted that these descriptions practically cover the two sexes described by Melsheimer as *basalis* and *4-punctata*, his work being unknown to Mulsant, whose preface is dated Dec. 29, 1848, though his book was not published until 1851. Casey is, I think, clearly in error in citing *diversa* as ♀ of *4-punctata* and *confusa* as ♂ of the same species. I have shown that Mulsant described *both sexes* of *diversa* and the same is true of *confusa* which is actually a variety in which the female has a small humeral spot and the male has the two basal spots much extended and even sometimes united as described below.

It is true that Mulsant in a later paper (1856) says that *basalis* Mels. is to be used in place of *confusa* Muls., and *4-punctata* Mels. in place of *diversa* Muls.; but, as far as the name *confusa* is concerned, this is simply a mistake on the part of Mulsant and, for the variety called *confusa* in this paper, no other name can be used except that first given to this variety in question in 1851.

#### B. *4-punctata confusa* Muls.

1851, Species Trimeres Securipalpes, p. 537.

"Ovale. Elytres noires, parées chacune de trois taches jaunes: les première et deuxième, presque liées à la base: l'interne, semi-orbiculaire, couvrant les deux tiers de la largeur, prolongée jusqu'au cinquième de la longueur: l'interne plus petite, humérale: la troisième, suborbiculaire, subapicale, étendue du quart interne presque jusqu'à la courbure postéro-externe.

"Long 0<sup>m</sup>, 0022 à 0<sup>m</sup>, 0036 (1 à 1½ l.). — Larg 0<sup>m</sup>, 0017 à 0<sup>m</sup>, 0026 ( $\frac{3}{4}$  à 1¼ l.). Patrie: l'Amérique septentrionale. (Collect. Chevrolat, Dejean (type), Dupont, Leconte.)

"♂ Tête flave. Prothorax flave en devant et sur les côtés, noir à la base; la région noire, couvrant les deux tiers médiaux du bord postérieur, quadrifestonnée en devant, à festons médiaux avancés jusqu'au quart ou au cinquième antérieur, profondément divisés entre eux sur la ligne médiane. Epimères du médipectus et pieds, flaves.

"♀ Tête jaune, avec l'épistome et parfois la partie antérieure du front, noirs, obscurs ou nébuleux. Prothorax noir, paré de chaque côté d'une bordure jaune, étendue en devant jusqu'à la sinuosité postoculaire, ordinairement de largeur égale, jusqu'aux deux cinquièmes ou jusqu'à la moitié de la longueur, et rétrécie ensuite en ligne un peu courbe de là à l'angle postérieur, quelquefois rétrécie directement de la sinuosité à l'angle postérieur. Epimères du médipectus, noires. Pieds jaunes. Cuisses en partie noires, sur une étendue basilaire variable."

In the notes following the description Mulsant speaks of the narrow separation of the basal pale spots of the elytra and states that they are sometimes united, clearly indicating the variety for which I have retained the name *confusa*.

#### B. *4-punctata flavifrons* Muls.

1851. Species Trimeres Securipalpes, p. 531. The original description in part reads:

"Obtusément ovale. Elytres noires, parées chacune de trois taches subarrondies, jaunes ou orangées: la première, liée à la base dont elle couvre les trois cinquièmes internes: la deuxième, unie au bord externe du tiers aux quatre septièmes: la troisième, subapical, de moitié plus rapprochée du bord externe que de la suture.

"Long. 0<sup>m</sup>, 0026 à 0<sup>m</sup>, 0033 (1¼ à 1½ l.). — Larg. 0<sup>m</sup>, 0019 à 0<sup>m</sup>, 0022 ( $\frac{3}{4}$  à 1 l.). Patrie: l'Amérique septentrionale. (Collect. Dejean (type), Dupont.)"

This description covers a variety of *4-punctata* in which the marginal spot, as well as the two basal and the subapical spot is present and I have

included with it that form in which the discal spot is represented by a faint spot or tiny dot which would otherwise be nameless. The humeral spot is not mentioned in that part of Mulsant's description quoted but, later on he says the male has this spot in addition.

### B. albifrons Say.

1824, Journ. Acad. Nat. Sci. Phila., IV, p. 94. Mulsant, 1851, Species des Coléop. Trim. Sécuri., p. 1049. Crotch, 1873, Trans. Am. Ent. Soc., p. 378; 1874, Revision, p. 212. Gorham, 1899, Biologia, VII, p. 189. Casey, 1899, Jour. N. Y. Ent. Soc., VII, p. 119.

Original description: "Elytra yellow; suture and two spots on each, black; head and anterior part of the thorax whitish.

"Inhabits Missouri.

"Head yellowish: thorax black; anterior and lateral margins, and abbreviated line before, white: elytra, with the suture, tip, outer edge, and two spots, black; spots placed one near the humerus and the other behind the middle. Length less than one fifth of an inch.

"Taken on the Missouri by Mr. T. Nuttall."

Length: 4.0 to 4½ mm.

Other localities: Nebraska, Colorado and Montana.

In this and the two following species we have the most distant derivatives of *ursina*, if in their greatly modified form they may be so regarded. The form is more oblong, the excavation of the ♂ fifth ventral segment is more pronounced, the margin of the segment is produced over the succeeding segment and the maculation is so modified that its relation to that of *ursina* is hardly recognizable. In Say's description the elytra are yellow with the suture and two spots on each black, but enormous individual variation occurs and, as indicated in Fig. 46 to 49, the extension of the black pigment more or less completely unites the black spots with the suture producing a pattern closely approaching that of *illustris* (Fig. 50). The head is pale in both sexes; the pronotum, as usual, is paler in the ♂ (Figs. 46 and 48) than in the ♀ (Figs. 47 and 49). I am indebted to Prof. R. H. Wolcott for an opportunity of studying a series of about forty specimens of this species taken in Sioux Co., Nebraska, which with other material showed an astonishing series of variations.

### B. illustris Casey.

1899, Journ. N. Y. Ent. Soc., VII, p. 118.

Original Description: "Elytra with the basal and lateral margin pale and each with a discal pale spot; oblong-oval, black, the head and oblique sides of the pronotum angularly lobed within at the middle, pale in the female, the apical margin also very narrowly pale, the prothorax ⅔ longer at the middle than at the sides, finely,

sparsely punctate; elytra with a narrow rufo-flavate margin from the scutellum to the sides, narrowest at outer  $\frac{2}{5}$ , the lateral margin obliquely pale at the humeri, the pale side margin extremely narrow at basal fourth, then dilated to outer fourth at the middle opposite the discal pale spot, then narrowed at apical fourth, thence gradually expanded and extending transversely to within  $\frac{2}{3}$  of its apical width of the suture, receding somewhat from the side margin as in the *fimbriolata* group of *Hyperaspis*; punctures fine but strong, moderately sparse, closer near the base; under surface black throughout, the femora blackish, paler at apex. Length 4.1 mm.; width 3.0 mm. Colorado (Beaver Brook, 6000 feet elevation)."

I have repeated the original description verbatim. Fig. 50 is copied from a sketch kindly furnished by Col. Casey.

### **B. pacifica** Casey.

1899, Journ. N. Y. Ent. Soc., VII, p. 119.

Original description: "Elytra pale, each with two black spots, one anterior and one posterior; narrowly oval, with flavate pale areas anteriorly, reddish on the elytra, finely, not closely punctulate; male with the head pale, the pronotum black in a basal area between the basal angles, the anterior margin of which curves evenly from the basal angles to anterior third at lateral  $\frac{2}{5}$ , then feebly sinuate and then extending forward in two rounded lobes separated by a narrow deep fissure to apical fifth or sixth; scutellum black; elytra pale, the suture more or less broadly black from the scutellum to the apex, narrowly at the scutellum and for a short distance just behind the middle, the external marginal head also black, becoming broader at the apex and joining the sutural black area; anterior black spot obliquely oval, sending off a nubilous connecting isthmus to the sutural black area, the posterior spot smaller, at apical and outer third; under surface black throughout, the posterior femora in great part black, the intermediate less so. Length 3.7 mm.; width 2.4 mm. California (Sta. Monica)."

As in the case of the preceding species, I have repeated the original description of *pacifica* which I have not seen. Fig. 51 is copied from a sketch received from Colonel Casey, who has also in a letter given me the following details of the ♂ sexual characters; "of the *ursina* type except that the subapical impression of abdomen is feebler, in fact scarcely truncate, being more diffused or more properly flattened."

### GROUP 5.

This group includes four species, inhabiting Central America, peculiar alike in ornamentation and in abdominal structure in the males. In the preceding groups the sexual modification did not involve the second visible segment. In this group the second, third, fourth and fifth segments ♂ are involved. Each segment is arcuately depressed and the depression is limited on either side by a cusp approaching in form that of the first group.

The complete result is as if the entire abdomen were longitudinally grooved beneath. In respect of maculation, the pronotum is either broadly pale in front or bears pale discoidal marks or (*aperta*) is entirely pale with black V-mark; the elytral markings are five pale spots (in *fenestrata*), four pale spots (in *pygidialis*) or consist of dark markings on a pale ground in the other species; even the pygidium bears a reddish spot in *pygidialis*. The four species do not seem to be closely related between themselves.

### **B. fenestrata** Gorham.

1899, Biol. Cent. Amer., VII, p. 190.

Original description: "Breviter ovata, nigro-picea, nitida; capite, prothoracis lateribus late, et maculis duabus discoidalibus, elytrorum maculis quinque pedibusque, flavis. Long. 3.25 mm. Mas capite et prothoracis margine antico albido-flavis, abdomine medio fossulato. Hab. Mexico, Teapa in Tabasco (H. H. Smith); Costa Rica, Caché (Rogers); Panama, Volcan de Chiriqui, Bugaba (Champion)."

"Easily recognized by the thorax having two pale oval spots near the middle of the base, almost but not quite touching it. . . . the elytral markings are very pale yellow, almost white in some male examples. The fossa on the abdomen of the males is very distinct, and the middle of the metasternum is also impressed; the margins of the segments are raised in the middle and at the sides of the fossa almost tuberculate. The female has the head yellow, but the front of the thorax is pitchy-black. The specimens from Teapa diverge from the type in having the black mark on the thorax divided by a wedge-shaped spot in front. The Bugaba specimens have the dark markings of a pitchy-red colour." See Fig. 74.

### **B. cachensis** Gorham.

1899, Biol. Cent. Amer., VII, p. 190.

Original description: "Pallide albido-testacea, nitida, corpore subtus piceo; prothorace maculis tribus cuneiformibus conjunctis, una mediana, duabus basalibus, elytris sutura maculisque duabus in singulis, nigris. Long. 4 mm. ♂ Hab. Costa Rica, Caché (Rogers)."

"At first sight resembling *B. lepida*, but to be immediately distinguished from it or from any other *Brachyacantha* known to me by the marking of the prothorax which is like a broad-arrow , with the barbs lying on the V-shaped base. The suture has not a distinct spot (as it has in *B. lepida*), but is more widely pitchy-black immediately below the scutellum than at the apex. The legs are entirely pale testaceous. The male character of an impressed fossa along the middle of the abdomen is very distinct, but its sides are apparently not tubercular. A single specimen, in rather bad condition." Fig. 73.

**B. aperta** *Weise.*

1903, *Deutsche Ent. Zeits.*, p. 208.

Original description: "Breviter ovalis, sat convexa, flavo-albida, vitida, crebre punctulata, prothorace limbo basali utrinque dilatata maculaque apicali, litteram V formante piceis, scutello piceo, elytris subtilissime piceo-circumcinctis, singulo linea subflexuosa ramis tribus exserente picea. Long. 3, 3 mill.

"Costa Rica: Turrialba (Schild-Burgdorf)."

"Die dunkle Langslinie jeder Fld. beginnt an der Basis vor der Schulterbeule, läuft über diese hinweg bis hinter die Mitte und ist etwas vor der Mitte nach innen gebogen. Sie sendet 3 Queräste aus, 2 bis an den Seitenrand, der erste hinter der Schulter, schrag nach hinten und aussen, der zweite hinter der Mitte, bogenförmig, nach hinten geöffnet; der dritte Ast läuft in der Mitte nach innen bis in die Nähe der Naht, die er nicht erreicht. Der Zahn der Vorderschienen ist kurz und stark, die Klauen besitzen ein grosses zahnförmiges Anhängsel am Grunde."

The male has the longitudinal fossa well developed. See Fig. 75.

**B. pygidialis** *Muls.*

1851, *Species des Coléop. Trim. Securi.*, p. 534. Crotch, 1874, p. 212. Gorham, 1899, VII, p. 187.

Original description, abridged: "Ovale ou en ovale-oblong. Elytres noires, ornées chacune de quatre grosses taches jaunes: la première, basilaire, subcordiforme; la deuxième, en triangle, liée au rebord externe, du quart aux trois cinquièmes: la troisième juxta-suturale, subarrondie, du tiers aux trois cinquièmes: la quatrième, subterminale. Pygidium noir, noté d'une tache orangée."

Length: 4.5 mm.

Habitat: Mexico (type locality), also Jalapa and Orizaba in Mexico.

The male head is pale; thorax pale with black basal spot covering three fourths of the base, oblique at sides, arcuately emarginate in front; elytra black with five pale spots, two basal, confluent, one marginal in front of the middle, one discal at the middle, one subapical, all large rounded; thorax beneath and legs pale, abdomen and body black. In the female the thorax is black with the sides pale and a pale spot at middle; the elytra lack the humeral spot. Pygidium black, marked with an orange spot. The male abdomen is longitudinal fossulate as in the other species of the group but the edges of the fossa are not cuspid. See Fig. 79.

## GROUP 6.

This last group contains two heterogeneous sections which, however, agree in having the ♂ abdominal segments simple and devoid of any of

the special modifications noticed in the preceding groups. The first section contains, so far as known, only one species (*querceti*). It is confined to Florida. The material from the West Indies is, however, scanty in all tribes of Coccinellidæ and it is possible allied species may later be found in these islands. The elytra in *querceti* are black with a subquadrate humeral red spot and a rounded subapical spot of the same color, a type of marking not observed elsewhere in the genus. The second section contains the well known *lepida* and allied species ranging from northern Mexico (even Texas according to Gorham) to Paraguay. In them the elytra are pale with rounded spots of which one is often expanded to form a conspicuous rounded common sutural spot.

### B. *querceti* Sz.

1878. Proc. Am. Phil. Soc., XVII, p. 362.

Original description: "Rounded, convex, shining, black; head and thorax finely not densely, elytra somewhat more strongly punctured. Each elytron with a large, transverse humeral spot, which is obliquely truncate inside and leaves a very narrow basal margin black and with a smaller, rounded-oval spot at the outer apical angle not touching the margin, orange red. Side pieces of metasternum and sides of abdomen densely punctured, propleuræ and legs yellow, femora infuscate at base. Length 2-2.75 mm.; .08-.11 inch."

"♂ Head, front margin of thorax narrowly, anterior angles and side margin more broadly, epimera of mesosternum entirely whitish-yellow." (Fig. 58.)

"♀ Head black, or piceous in front, thorax black or with the front margin and front thorax black or with the front margin and front angles narrowly piceous-testaceous, epimera black or piceous." (Fig. 59.)

"var. *a.* Humeral spot small and narrow."

"var. *β.* Humeral spot interrupted at middle."

"Widely distributed in Florida; abundant on oak shrubs."

The second variety is seldom found in the collections I have seen.

### B. *lepida* Muls.

1851. Species des Coléop. Trim. Securi., p. 523. Dejean, 1837, p. 458. Crotch, 1873, p. 378; 1874, p. 210. Gorham, 1899, p. 185.

var. *a.* Gorham, *l. c.*, p. 185.

Original description: "Obtusément ovale; convexe. Elytres jaunes parées sur la suture d'une bordure suborbiculairement renflée du cinquième à la moitié, et dilatée des trois quarts aux neuf dixièmes de la longueur, et chacune de deux raches suborbiculaires, noires; l'antérieure, couvrant en devant le calus; l'autre, sur la même ligne longitudinale, de la moitié aux deux tiers de la longueur."

Length: 2.5-3.6 mm.

Habitat: Mexico (type locality); Texas (Crotch); Honduras; Guatemala; Costa Rica; Jalapa, Vera Cruz, and Tobasco, Mexico.

It is yellow with sternum, middle of ventral segments and base of femora black; thorax with the base broadly black, black area quadridentate in front; elytra with a black sutural border expanded into a common sutural spot and with two rounded spots, the first before the second behind the middle. The sutural border forms a recurved hook just in front of the apex.

The male and female markings are almost exactly alike — the female being a little darker on the head and beneath. The male can be distinguished by the 7th segment beneath and emarginate 5th segment. Fig. 60 ♂, Fig. 61 ♀.

Var. *a.* Gorham, spots rufo-piceous instead of black, may be based upon immature specimens, but it is not unusual to find individuals of the color described.

### **B. lepida confluens** *Weise.*

1898, Arch. für Naturg., LXIV, p. 237. var. *β.* Gorham, 1899, Biol. Cent. Amer., VII, p. 135.

Original description: "Elytris nigris, limbo laterali trifariam dilatato maculisque tribus in singulo elytro, 1, 1, 1 collocatis, flavis."

"Die schwarzen Makeln der Flügeldecken dehnen sich aus und verbinden sich miteinander, anfangs die beiden auf jeder Decke der Länge nach, sodann auch mit den beiden Nahtmakeln der Quere nach; dann bleibt ein schmaler Saum am Seitenrande, an der Basis, in der Mitte und vor der Spitze etwas erweitert, sowie eine Längsreihe von 3 Makeln auf jeder Decke gelb: Makel 1 am Basalrande, 3 in der Mitte, 3 vor der Spitze."

In this variety the spots are confluent so as to leave a pale margin internally with three disconnected spots. Fig. 62 represents an approach to it.

### **B. lepida reducta** n. var.

Same shape and color as *lepida* but with the black markings reduced to a narrow sutural border, not expanded and without the ante-apical recurved hook, and two discal spots in the same position as those of *lepida* but much smaller. The black basal area of prothorax is not quadridentate as in *lepida* but the apices of the central projections are represented by two detached spots.

Length: 2.5 mm.

Habitat: Pacayas, Costa Rica.

### **B. sellata** *Muls.*

1851, Species des Coléop. Trim. Securi, p. 522. Dejean, 1837, p. 458. Crotch, 1874, p. 210.

Original description, abridged: "Obtusément ovulaire. Elytres jaunes, parées d'une bordure suturale et d'une externe, noires: celle-ci, ne couvrant à peu près

que le rebord externe, un peu moins étroites postérieurement: ornées d'une tache commune, presque carrée, couvrant du cinquième aux trois cinquièmes de la suture, et chacune de deux taches subarrondies, également noires: l'antérieure, couvrant en devant le calus: l'autre, plus grosse, sur la même ligne longitudinale, entre cette dernière et le bord postérieur."

Length: 3.6-4.8 mm.

Habitat: Brazil (type locality).

The elytra are yellow with black sutural and external border, the latter covering hardly more than the epipleuræ but a little wider behind, and with a common sutural spot and two discal rounded spots, the first in front covering the callus, the second larger behind the first and between it and the apical margin.

♂ Head yellow. Thorax yellow with basal black area, covering two thirds of the base, bifestooned in front, or formed of two basal blotches rounded in front, connected with the base and with a little spot in front of the scutellum, which is yellow margined with black.

♀ Head black, labrum yellow. Thorax black, with yellow lateral border, reaching in front to the postocular sinuosity, obliquely limited in front, of uniform width behind to the hind angle. Scutellum black.

### B. bruchi Weise.

1902, Rev. Mus. La Plata, XI, p. 193.

"Obtuse ovalis, convexa, nigra, antennis, palpis maxillaribus articulo ultimo tarsisque testaceis, limbo laterali prothoracis elytrisque citrinis, his dense subtiliter punctulatis, limbo apicali, sutura, macula communi rotundata ante medium maculisque binis rotundatis in elytro singulo nigris.

"Mas: capite, limbo apicali prothoracis, utrinque late et parum profunde arcuatim emarginato, epimerisque intermediis citrinis, pedibus anticis testaceis."

"Brachyacanthæ sellatæ Muls. certe similis, prothorace alter signato, macula communi elytrorum minore, rotundata, al illa differt. Caput subtilissime punctulatum, vel nigrum, margine antico clypei rufescente (♀), vel citrinum (♂) antennis, mandibulis articuloque ultimo palporum testaceis. Prothorax capite paulo fortius, dense punctulatus, femina niger, antice subtiliter ferrugineo marginatus, limbo laterali citrino, intus late arcuatim emarginato; maris niger, limbo laterali et apicali citrinis, hoc sat lato, postice medio parum triangulariter,—utrinque magis angulatim dilatato. Scutellum nigrum, punctulatum. Elytra prothorace paulo subtilius punctulata, citrina, sutura anguste margineque apicali latius nigro-limbatis, margine laterali (basi excepta) angustissime infuscato vel nigro; macula communi ante medium, rotundata, haud vel leviter transversa, maculisque duabus in singulo elytro nigris; prima rotunda, subhumerali, pone basin supra marginem locata, secunda pone medium supra marginem, rotundata, primæ vix vel parum majore, leviter transversa, subobliqua. Corpore subtus nigrum, aut lateribus prosterni citrinis, tarsis testaceis, genibus tibiisque anticis interdum rufescentibus (♀), aut pedibus anticis, epimeris intermediis coxique omnibus testaceis femoribus tibiisque intermediis inferne parum rufescentibus." Fig. 87.

The original description of this species, of which I have not been able to see a series, is repeated verbatim. From this description and a specimen loaned by Dr. Sicard (from which Fig. 87 has been made) *bruchii* seems to be very close to *sellata*, differing in the pronotum of the female having the front margin as well as the sides narrowly pale and in the smaller common elytral spot.

[Note: *B. metator* Casey, Can. Ent., XL, p. 413, is stated by the author in a later publication (Can. Ent. XLII, p. 105) to be a *Hyperaspis* and is therefore here omitted.]

[Note. The following names are quoted by Mulsant as unpublished.

*B. agathina* Reiche i. litt. = *B. lepida*

*B. dorsalis* Chev. i. litt. = *B. lepida*

*B. designata* Chev. Dej. Cat. = *B. 4-punctata confusa*.

*B. erythrocephala* Bosc. Dej. Cat. = *B. 4-punctata flavifrons*.

*B. 5-maculata* Buquet, Dej. Cat. = *B. sellata*.

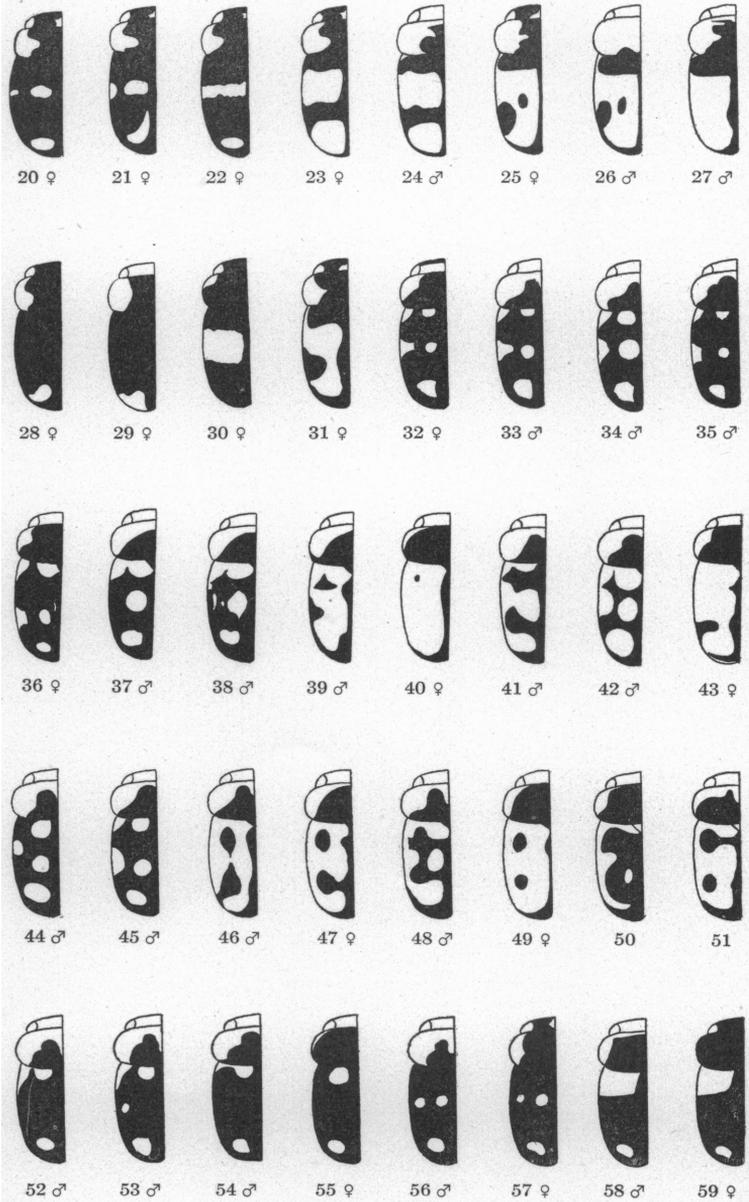
The last named was considered a variety by Buquet but placed as a synonym by Mulsant. The others were names that had been applied in the collections of the owners of the specimens and of which no descriptions had been published. Mulsant in many instances adopted such cabinet names but in these instances preferred to supply more descriptive names.]

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## EXPLANATION OF FIGURES 20-92.

The figures in the text (1-14) were first drawn by the author and afterwards redrawn by Mr. John A. Grossbeck, of the American Museum of Natural History, using a dissecting microscope. The hairs are omitted to avoid confusing the outlines of the parts of the legs.

The drawings of the elytra of the different species are to be understood as diagrams of the type of maculation and no attempt has been made to represent the size or varying shape or punctuation.

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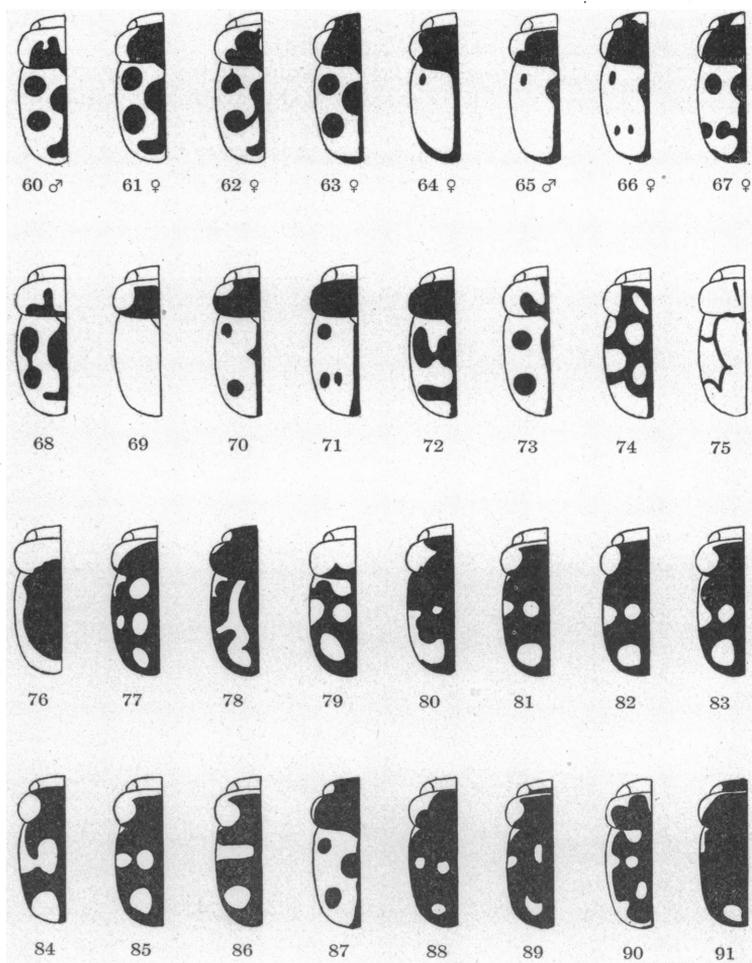


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