

## REVISION OF THE ORTHOPTERAN GENUS TRIMERO- TROPIS.

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The subject of the present paper is a moderately homogeneous group of species belonging to the subfamily *Oedipodinae* stirps *Oedipodites* Saussure, which is distinguished from other *Oedipodinae* by having the outer distal spine of the posterior tibiae remote from the apical spurs and the ocelli adjacent to the eyes. *Trimerotropis* belongs to a group of genera conveniently if not naturally separated from the rest of the stirps by having the median carina of the pronotum cut by two transverse sulci. It may be separated from the North American genera which share this character by the following key:

### ANALYTICAL KEY TO TRIMEROTROPIS AND ALLIED GENERA.

- a<sup>1</sup> Three-fourths or more of the cells of the distal half of the middle field of the tegmina regularly quadrilateral, arranged in a single row on either side of spurious longitudinal veins (Plate XXI, fig. 3 S). Inner edge of the fuscous band, if present, within or at least not far beyond the middle of the wing.
- b<sup>1</sup> Intercalary vein nearly straight and about the middle of the median area distally (Plate XXI, fig. 6), or if much in advance of the middle distally with one row of cells on either side (Plate XXI, fig. 3 I). Scutellum of the vertex (without the central foveole) never much longer than broad and generally broader than long. Median carina of the pronotum cut by the principal sulcus about the middle, rarely the metazone may be as much as one and a half times as long as the prozone.
- c<sup>1</sup> Antennae longer than the posterior femora, swollen and strongly depressed. Frontal costa at its widest point above the ocellus narrower and at the vertex very much narrower than the greatest width of the antennae. *Psimidia* Stål.
- c<sup>2</sup> Antennae filiform.
- d<sup>1</sup> Posterior angle of the lateral lobes of the pronotum never broadly rounded, but extended backward and downward so that the lower margin is somewhat straight and meets the posterior margin at an acute angle. Cranium between the eyes without transverse carinae.
- e<sup>1</sup> Head swollen and not strongly elevated above the disk of the pronotum. Eyes not very prominent, and even in the male plainly shorter than the genal groove. Cranium between the eyes broader than their diameter seen from above.

f<sup>1</sup> Intercalary vein considerably or much in advance of the middle of the median area distally, with a single row of cells on either side. Coloration of the wings and tegmina very like *Hippiscus* (Plate XXI, fig. 3). Size, medium or large. Posterior femora unusually slender.

*Metator* new genus.

f<sup>2</sup> Intercalary vein but little in advance of the middle distally, bordered by several rows, at least posteriorly, of irregular cells. Coloration of tegmina similar to *Conozoa* (Plate XXI, fig. 5) or *Derotnema* (Plate XXI, fig. 6), but never recalling *Hippiscus*. Posterior femora not unusually long. Size, small or medium. . . . . *Mestobregma* Scudder.

e<sup>2</sup> Head not at all swollen but very strongly elevated above the disk of the pronotum. Cranium between the eyes much less than their diameter seen from above. Eyes very prominent, in the male, at least, longer than the genal groove. Median carina of the pronotum linear except in front of the first sulcus. Wings transparent, rosaceous at the base, hyaline beyond with no trace of a fuscous band. . . . . *Trepidulus* new genus.

d<sup>2</sup> Posterior angle of the lateral lobes of the pronotum broadly rounded and not extended backward and downward so as to make the lower margin straight. Cranium between the eyes with a transverse carina. Crest of the prozone of the pronotum very high and strongly bilobate or bidentate . . . . . *Derotnema* Scudder.

b<sup>2</sup> Intercalary vein decidedly curved distally where it is much in advance of the middle of the median area (Plate XXI, fig. 1 I), which is occupied almost entirely by a reticulation of irregular cells. Scutellum of the vertex as long as and generally longer than broad. Median carina of the pronotum cut by the principal sulcus much in front of the middle so that the metazone is at least one and a half times as long as the prozone.

c<sup>1</sup> Pronotum with the median carina cristate on the metazone or at least as high as on the prozone. Tegmina with two solid dark spots alternating with two light spots, the former about the end of the first and second quarters, the latter just beyond, all confined to the anterior half of the tegmina (Plate XXI, fig. 5). Posterior angle of the lateral lobes of the pronotum extending downward so as to make the lower border nearly straight . . . . . *Conozoa* Saussure.

c<sup>2</sup> Pronotum with the median carina linear or slightly cristate on the metazone but generally less elevated than on the prozone. Posterior angle of lateral lobes of the pronotum well rounded or with a downward projecting tooth.

d<sup>1</sup> Radiate veins (branches of second and third A) of the anal field of the wings not swollen, so that they are not much larger medianly than near the base . . . . . *Trimerotropis* Stal.

d<sup>2</sup> Radiate veins much swollen, so that they are much stronger medianly than near the base (Plate XXI, fig. 4); wings short and broad and frequently strongly lobate on the outer border (Plate XXI, fig. 4).

*Circotettix* Scudder.

a<sup>2</sup> Less than half of the cells of the distal half of the middle field of the tegmina regularly quadrilateral. Inner edge of the fuscous band much beyond the middle of the wing . . . . . *Hydrotettix* Scudder.

*Trimerotropis* may be briefly defined as follows: Head of moderate size, slightly exceeding the prozone in width, but always exceeded by the metazone, which is considerably expanded. Antennæ filiform, of variable length. Eyes rarely equal to the genal groove. Frontal

costa contracted below the ocellus and at the vertex. Sulcate always below and sometimes above the ocellus. Scutellum of the vertex never much shorter and generally longer than broad, usually plainly sulcate with or without a median carina. Central foveolæ generally distinctly separated from the frontal costa and the scutellum of the vertex. Lateral foveolæ distinct and triangular. Pronotum with the disk only moderately wrinkled on the prozone and quite smooth on the metazone, except for granulations. Median carina cristate or rarely only a raised line on the prozone, less elevated on the metazone, especially posteriorly; cut by the principal sulcus much in advance of the middle, so that the metazone is from one and a half to more than twice as long as the prozone, and by the first sulcus behind the middle of the prozone. Shoulders well marked, but lateral carinae usually absent except occasionally on the front of metazone and prozone. Process of the metazone acute, right, or obtuse-angular with the sides sinuate, arcuate, or straight. Lateral lobes with the posterior border straight or slightly sinuate and nearly vertical, lower border sinuate anteriorly and arcuate posteriorly, with the posterior angle well rounded or less commonly with a dentation extending downward.

Tegmina plain; isabelline or maculate; in the last case the spots are annular or solid and pretty evenly scattered over the whole surface or much more frequently arranged in three well-marked groups, one each at the end of the first and second quarters and one on the distal third. The first two are generally much better defined than the last and may become solid bands, as in *Hadrosettia*. The intercallary vein is curved forward distally, where it is always much closer to  $M$  than to  $Cu$  (Plate XXI, fig. 1, *I*). Area  $M$  is filled with a reticulation of irregular cells.  $R_s$  has from two to five branches, separated by spurious veins, which are bordered on either side by quadrilateral cells, which become irregular and smaller near the middle of the tegmina.  $M_{1 \& 2}$  and  $M_{3 \& 4}$  are present without branches.  $Cu_1$  has one or two anterior accessory branches. Wings sometimes hyaline, but usually colored yellow, green, or blue at the base, hyaline at the apex, with a fuscous band between, varying in width from one-eighth to two-thirds the length of the wing. This fuscous band may include more or less completely the whole outer part of the wing, and it always has a submarginal spur which extends inward toward the base, and it is generally continued around the posterior margin to or toward the posterior angle.  $R_s$  is always present, and has one or two branches (Plate XXI, fig. 2).  $M_{1 \& 2}$  and  $M_{3 \& 4}$  are present and embranched, as in the tegmina.  $Cu_1$  and *1st*  $\Delta$  are simple. *2d*  $\Delta_1$  is unusually prominent, and runs near the middle of the second lobe, where it is accompanied by *2d*  $\Delta_s$ , which has one slender branch occupying the first interpleural groove and one strong branch, which forms the axis of the third fold and is the second interpleural ridge, as the branches of *2d*  $\Delta$  form the

remaining interpleural ridges (Plate XXI, fig. 4, *R* and *G*). None of these radiate veins are especially prominent nor enlarged medianly, as in *Circotettix* (Plate XXI, fig. 4). The posterior femora are moderately developed, with outer face plain or banded and the inner face and lower sulcus black, with one or two light bands on the apical half; or by the fading of the black these markings are modified and may be wanting, especially in the lower sulcus. Posterior tibiae with eight to ten spines on the outer side.

The genus was established by Stål<sup>1</sup> and fully defined first by Saussure.<sup>2</sup> The genus as here defined includes a considerable number of species which have usually been referred to *Comozoa*. This transfer has been necessary in order to retain this genus, which is still scarcely separable from *Trimerotropis*, but useful, as it contains a few forms widely different from typical forms of the latter genus. The *Hyalina* group of *Trimerotropis* may be considered the connecting link between these genera. Near the other end of this series in the linear arrangement I have adopted the *Fallax* group form, a transition to *Circotettix*, which is distinguished from *Trimerotropis* chiefly by the structure of the wings. The *Terana* group forms a transition to *Derotmena* and the *Citrina* group to *Hadrotettix*.

The genus is confined to the continents of North and South America, and its characteristic habitat is the semiarid regions of the West, though a few species are found east of the Mississippi River. These species, however, are restricted to the sandy shores of rivers or ocean to the bare ground of roads, or to barren, rocky hillsides.

Of the 54 species enumerated 24 are new. Sixteen species are confined to California, as follows: *hyalina*, *rebellis*, *albolineata*, *porrecta*, *coquilletti*, *caliginosa*, *albescens*, *kochelei*, *thalassica*, *californica*, *pacifica*, *pilosa*, *fallax*, *conspersa*, *variegata*, and *pseudofasciata*. Three others are confined to the Pacific coast within the United States—*caeruleipes*, *bifasciata*, and *similis*. Three are found east of the Mississippi—*maritima*, *saratilis*, and *citrina*. The last mentioned extends from the Rocky Mountains to Maryland. The first mentioned is restricted to the Atlantic coast and the shores of the Great Lakes, and *saratilis* is found in northwest Arkansas and southern Illinois. Five species are not found within the limits of the United States. These are *tolteca*, *ochraceipennis*, *pallidipennis*, *lauta*, and *collaris*. The remaining species, 27, belong to the Rocky Mountain States. *Monticola* extends from Colorado into Mexico, and *pistrinaria* from Texas into Mexico. *Cincta* ranges from California to Texas. *Terana* ranges from Texas to New Mexico; *cristata* from Lower California to Salt Lake Valley, Utah; *latifasciata* from Utah to Washington; *caeruleipennis* from California to Wyoming. Three species, *salina*, *agres-*

<sup>1</sup> Recension Orthopterorum I, 1873, pp. 118, 134.

<sup>2</sup> Prodrromus Oedipodiorum, 1884, p. 166.

*tis*, and *praecleara*, are confined to Nebraska; three also, *umbilata*, *modesta*, and *melanoptera*, to New Mexico; two, *fratercula* and *campestris*, to Wyoming.

Through the kindness of Dr. S. H. Scudder and Prof. Lawrence Bruner I have been able to identify positively all the species described by these gentlemen except *Trimerotropis thalassica* Bruner. Of the comparatively few species described by Saussure and other European students of the order, though the types have been inaccessible, identification has in nearly all cases been satisfactorily made through collections made in the localities from which these species were first described. For this and other material, which has been the most important aid I have received, I am greatly indebted to Dr. Bruner. I am also under great obligations to the authorities of the U. S. National Museum for free access to its collections upon which this paper is based, and for materials placed in my hands for use in the preparation of this paper. I am similarly indebted to the Leland Stanford Junior University.

I have made no attempt to give complete synonymy of the species, but have usually contented myself with references to papers containing specific descriptions.

In naming the veins I have adopted Redtenbacher's terminology as modified by Comstock, as a study of the tracheation and venation of *Orthoptera*, on which I have been engaged for several months, has convinced me that it is possible to determine with almost complete certainty what these homologies are, and it is desirable from every standpoint that one system of names should be employed in all the orders. It should be noted, however, that while the homology of the main veins and branches is established to my satisfaction, there is still uncertainty about the homology of the branches in some cases, and I have thought best to enumerate the branches of  $R_s$  in the tegmina as simply accessory branches instead of the primitive forks which some of these branches should represent. In speaking of the regions of the tegmina and wing, to which it is convenient to refer in diagnoses, I have divided these organs into three fields, as follows: "Anterior," in front of  $R_1$ ; "middle," between  $R_1$  and *1st A*; "posterior," behind *1st A* (Plate XXI, fig. 4). The term area has been applied to the part of a field immediately posterior and adjacent to a vein or a named branch, and it bears the name of this vein or branch, as, for example: Area  $M$  lies behind  $M$  in the basal half of the tegmina or wing, while area  $M_1$  lies between  $M_1$  and  $M_3$  in the distal half of the wing or tegmina (Plate XXI, figs. 1 and 2). Spurious veins, as  $I$ , and unnamed veins (Plate XXI, fig. 3,  $I$  and  $S$ ) do not give names to the areas which they precede.

The term "cell" retains the meaning, given to it in the other orders, of a portion of the tegmina or wing bounded by veins or veinlets.

The term interplical ridge has been applied to the summit of the radial convexities of the wing and interplical groove the bottom of the alternating concavities. (Fig. 4, *R* and *G*.) For convenience the branches of *2d* and *3d A* in Plate XXI the wing have been referred to as radiate veins.

In indicating the relationship of *Trimerotropis* to the allied genera it has been necessary to characterize two new genera. *Metator* is based upon *Mestobregma pardalina* Saussure and will probably include *Mestobregma maculosa* Saussure. *Trepidulus* has for its type a new species from San Bernardino, California (Coquillett collection), which may be called *Trepidulus rosaceus*.

KEY TO THE SPECIES OF TRIMEROTROPIS.

- A*<sup>1</sup>. Tegmina plain isabelline, not banded and with spots not segregated into groups extending across the wing. Frontal costa<sup>1</sup> sulcate as strongly above as below the ocellus, its carinae continuous with the carinae of the vertex. Pronotum with the disk flat. Area of the cubital forks narrow and with few exceptions occupied wholly or in part by a single row of quadrate cells. Wings always long with the disk greenish yellow or hyaline throughout. Posterior tibiae never blue.
- Agonozoa*, new subgenus.
- a*<sup>1</sup>. Lateral lobes of the pronotum with a dentation on the posterior part of the lower border.
- b*<sup>1</sup>. General color pale testaceous, very plain. Wings transparent without a trace of a fuscous band. Tegmina without bands and with a very few spots restricted almost entirely to the middle field. Posterior femora light on the inner face with the usual black bands obsolete ..... *HYALINA* GROUP.
- hyalina*, new species
- b*<sup>2</sup>. General color isabelline. Wings with a definite fuscous band, or at least with plain indications of such a band in the infuscated nerves of the region usually occupied by the band. Pronotum with a definite stripe extending along the sides of the disk, or at least with the edges lighter than the middle.
- TEXANA* GROUP.
- e*<sup>1</sup>. Prozone of the pronotum bilobate when seen from the side. Median carina a raised line on the metazone.
- d*<sup>1</sup>. Process of the metazone acute angulate. Metazone twice as long as the prozone. Fuscous band of the wings broad. Posterior tibiae dull orange ..... *texana* Bruner.
- d*<sup>2</sup>. Process of the metazone obtuse angulate. Metazone not more than one and three-quarter times as long as the prozone. Posterior tibiae obscure greenish.
- e*<sup>1</sup>. Smaller, male 15 mm., female 22 mm. long. Crest of the prozone divided into dentiform lobes ..... *rebellis* Saussure.
- e*<sup>2</sup>. Larger, 19 to 23 mm., female 27 to 30 mm. long. Crest of the prozone divided into rounded lobes.

<sup>1</sup> *Trimerotropis coquilletti* has the frontal costa mostly solid above the ocellus.

*f*<sup>1</sup>. Posterior lobe of the crest of the prozone plainly not so high as it is long. Posterior femora very distinctly banded on the outer face, lower sulcus light-colored with two black bands.

*albolineata* Bruner.

*f*<sup>2</sup>. Posterior lobe of the crest of the prozone as high as it is long. Posterior femora indistinctly banded on the outside, lower sulcus black with two light bands . . . *cristata*, new species.

*c*<sup>2</sup>. Prozone of the pronotum not bilobate when seen from the side and barely intersected by the sulcus, and therefore straight and barely perceptibly notched. Median carina cristate on the metazone and nearly as high as on the prozone. . . *porrecta*, new species.

*a*<sup>2</sup>. Lateral lobes with no dentation on the posterior part of the lower border, or if there is a blunt tooth present, the fuscous band is weak or interrupted and the pronotum has no definite stripe along the lateral edges of the disk nor is the middle darker than the lateral borders. . . . . MARITIMA GROUP.

*b*<sup>1</sup>. Area of the cubital forks of the tegmina occupied by more than one row of irregular cells.

*c*<sup>1</sup>. Wings with the median and cubital areas about equal. Larger, male 26 mm., female 34 mm. long. North American. . . *maritima* Harris.

*c*<sup>2</sup>. Wings with the median and cubital areas very unequal. Smaller, male 22 mm., female 28 mm. long. Chilean.

*ochraceipennis* Blanchard.

*b*<sup>2</sup>. Area of the cubital forks of the tegmina narrow, occupied by a single row of subquadrate cells. Lower sulcus of the posterior femora black with a single preapical light band.

*c*<sup>1</sup>. Median carina on the metazone somewhat cristate. Fuscous band of the wings indicated only by infuscated veins, or at most incomplete and continued on the posterior margin less than half way to the anal angle; spur extending more than half way to the base . . . . . *gracilis* Thomas.

*c*<sup>2</sup>. Median carina on the metazone distinct but merely a raised line. Fuscous band of the wings distinct and uninterrupted, continued on the posterior border much more than half way to the anal angle; spur extending less than half way to the base.

*coquilletti*, new species.

*A*<sup>2</sup>. Tegmina fasciate, with solid well-defined bands reaching at least half way across the wing from the anterior margin, or by the segregation of annular spots, fascia sometimes faint on account of the slight contrast between them and the ground color. Rarely the tegmina are not fasciate, then they are evenly maculate with fuscous annuli and the wings are broad with the apical half fuscous or fuliginous. Frontal costa generally sulcate above the ocellus for a short distance only, below the vertex rounded and punctate. Pronotum with the disk usually elevated and subtectiform on the prozone. Area of the cubital forks broad, occupied by several rows of irregular cells. . . . . TRIMEROTROPIS subgenus.

*a*<sup>1</sup>. Wings with the disk yellow or green, never blue, and never without a fuscous band or cloud.

*b*<sup>1</sup>. Hind tibiae never blue. Tegmina with the basal and median bands solid, approximately equal to each other and to the light bands just beyond with which they alternate, and confined to a little more than the anterior half. . . . . CINETA GROUP.

- e*<sup>1</sup>. Front of the head with two black bands extending between the eyes, one above and one below the basal joint of the antennae.  
*cincta* Thomas.
- e*<sup>2</sup>. Front of the head with no black bands extending between the eyes.  
*juliana* Scudder.
- b*<sup>2</sup>. Hind tibiae frequently blue. Tegmina not as in the alternative.
- c*<sup>1</sup>. Tegmina<sup>1</sup> fasciate through the uneven distribution of maculations or by well-defined clouds or bands. If the tegmina are the first kind then the outer half of the wing is not infuscated and the lower sulcus of the hind femora is not black with a single preapical light band.
- d*<sup>1</sup>. Posterior tibiae blue..... CAERULEIPES GROUP.
- e*<sup>1</sup>. Lateral lobes of the pronotum with the posterior angle rounded, without a downward projecting tooth. Disk of the wings greenish or yellow.
- f*<sup>1</sup>. Lower sulcus of the posterior femora black with a single preapical light band.
- g*<sup>1</sup>. Wings with the apical half hyaline, neither fuscous nor fuliginous except at the extreme tip. Bands of the tegmina plainly formed by the aggregation of smaller maculations.  
*caeruleipes* Scudder.
- g*<sup>2</sup>. Wings with the apical half fuliginous and fuscous, nowhere entirely hyaline. Basal and median bands solid and well defined, at least on the anterior half.
- h*<sup>1</sup>. General color light, punctate with fuscous. Tegmina conspicuously fasciate and punctate with fuscous. Disk of the wings semiopaque, yellowish green, beyond mostly fuscous.  
*tessellata*, new species.
- h*<sup>2</sup>. General color fuscous, nearly plain. Tegmina plain fuscous with two pale bands. Wings with the disk transparent greenish yellow, beyond mostly fuliginous.  
*caliginosa*, new species.
- f*<sup>2</sup>. Lower sulcus black with two light bands on the apical half, or (through the fading of the fuscous base) light with one preapical black band.
- g*<sup>1</sup>. Ground color white. Tegmina white with three narrow black bands. Scutellum of the vertex very shallow with a very indistinct median carina ..... *albescens*, new species.
- g*<sup>2</sup>. Ground color brown or gray, never white, and with only the basal and median bands well defined.
- h*<sup>1</sup>. Scutellum of the vertex with a median carina. Posterior field of the tegmina not plain, with spots or fascia.
- i*<sup>1</sup>. Bands of the tegmina not weakening posteriorly, in the posterior field not broken up into spots. Scutellum of the vertex no longer than broad, even in the male.  
*bifasciata* Bruner.
- i*<sup>2</sup>. Bands of the tegmina weakening posteriorly, in the posterior field broken up into spots. Scutellum of the vertex (male) or a little (female) longer than broad.  
*ferruginea*, new species.

<sup>1</sup> *Trimerotropis agrestis* with a broad fuscous band and red hind tibiae must be included here, though the tegmina are almost destitute of spots.



- h*<sup>2</sup>. Scutellum of the vertex deeply sulcate, with no median carina. Posterior field plain, without spots or fascia. *koebleri* Bruner.
- e*<sup>2</sup>. Lateral lobes of the pronotum with the posterior angle furnished with a minute, downward projecting tooth. Disk of the wings sea-green. *thalassica* Bruner.
- d*<sup>2</sup>. Posterior tibiae red or orange.
- e*<sup>1</sup>. Lateral lobes of the pronotum without a tooth on the posterior part of the lower border.
- f*<sup>1</sup>. Scutellum of the vertex moderately broad, but plainly less than the short (male) or long (female) diameter of the eye. Posterior femora with the disk of the inner face yellow or red, with three black bands, one apical, one preapical, and one median. The latter may extend, as a stripe, toward the base, but the immediate base is very rarely black. Rarely the whole inner face may be suffused with fuliginous, obscuring the markings. *CITRINA* GROUP.
- g*<sup>1</sup>. Disk of the metazone of the pronotum plainly lighter than the prozone, generally reddish brown in color, and smooth, except for a few large, scattered, generally black granules. Posterior femora chiefly red on the inner side.
- h*<sup>1</sup>. Lower sulcus, as well as the inner face, chiefly red, with no fuliginous suffusion obscuring the fuscous bands or spots. *monticola* Saussure.
- h*<sup>2</sup>. Lower sulcus of the posterior femora black or fuliginous. Median carina slight but distinct. *campestris* Bruner, manuscript.
- g*<sup>2</sup>. Disk of the metazone not as in the alternative.
- h*<sup>1</sup>. Median and basal bands of the tegmina solid and not plainly formed by the grouping of spots.
- i*<sup>1</sup>. Bands of the tegmina conspicuous.
- j*<sup>1</sup>. Process of the metazone acute.
- k*<sup>1</sup>. Median carina of the scutellum of the vertex distinct. *bruneri*, new species.
- k*<sup>2</sup>. Median carina wanting. *fasciata*, new species.
- j*<sup>2</sup>. Process of the metazone decidedly obtuse. *praecleara*, new species.
- i*<sup>2</sup>. Bands of the tegmina dim. Color testaceous, plain. Metazone with its process acute. *modesta* Bruner.
- h*<sup>2</sup>. Median and basal bands of the tegmina obviously made up of fuscous annuli. Process of the metazone obtuse. *citrina* Scudder.
- f*<sup>2</sup>. Scutellum of the vertex equaling the short (male) or long (female) diameter of the eye. Posterior femora with the disk of the inner face black with one or two light bands on the apical half. Fuscous bands of the wings at least one-fourth the length of the wings in width. *LATIFASCIATA* GROUP.
- g*<sup>1</sup>. Posterior femora with two light bands on the inner face. Process of the metazone obtuse angulate with the tip rounded.
- h*<sup>1</sup>. Median carina of the scutellum of the vertex wanting. Median carina of the metazone of the pronotum elevated and very distinct. *latifasciata* Scudder.
- h*<sup>2</sup>. Median carina of the scutellum of the vertex distinct. Median carina of the pronotum nearly obsolete on the metazone. *laticincta* Saussure.

- g*<sup>2</sup>. Posterior femora with one light band on the inner face. Process of the metazone of the pronotum acute angular with the tip sharp.
- h*<sup>1</sup>. Basal half of the wings yellow.
- i*<sup>1</sup>. Outer half of the wings infuscated ..... *tolteca* Saussure.
- i*<sup>2</sup>. Outer half of the wings not wholly infuscated, but the apical hyaline part nearly as broad as the fuscous band.  
*pirinaria* Saussure.
- h*<sup>2</sup>. Basal one-sixth of the wings yellow, apical one-sixth hyaline, remaining two-thirds occupied by the fuscous band.  
*melanoptera*, new species.
- e*<sup>2</sup>. Lateral lobes of the pronotum with a tooth on the posterior part of the lower border ..... CALIFORNICA GROUP.
- f*<sup>1</sup>. Tegmina conspicuously banded, or at least with the fuscous punctations well separated into three groups.
- g*<sup>1</sup>. Pronotum with a light stripe on either side of the disk. Fuscous band of the wings narrow, about one-seventh of the length of the wing in width ..... *californica* Bruner.
- g*<sup>2</sup>. Pronotum quite plain on the disk. Fuscous band of the wings broader, one-sixth or one-fifth the length of the wing in width.
- h*<sup>1</sup>. Metazone of the pronotum twice as long as the prozone, with the process acute angulate ..... *strenua*, new species.
- h*<sup>2</sup>. Metazone of the pronotum once and a half as long as the pronotum with the process obtuse angulate.  
*montana* Bruner, manuscript.
- f*<sup>2</sup>. Tegmina with scarcely a trace of the usual bands, but with a few scattered spots on the basal half, the rest almost plain.  
*agrestis*, new species.
- d*<sup>3</sup>. Posterior tibiae yellow-green or brown.
- e*<sup>1</sup>. Lateral lobes of the pronotum with a tooth on the posterior part of the lower margin ..... PACIFICA GROUP.  
*pacifica* Bruner.
- e*<sup>2</sup>. Lateral lobes of the pronotum without a tooth. Tegmina distinctly or conspicuously banded, except sometimes in dark colored specimens where the contrast may be slight; fascia large and, though irregular in shape, semisolid and something more than aggregations of fuscous spots. Wings yellow or greenish yellow at the base with a distinct fuscous band. Posterior femora with the disk of the inner face black with two light bands ..... VINCLATA GROUP.
- f*<sup>1</sup>. Lower sulcus of the posterior femora light, with one preapical black band, or black, with two light bands, one preapical and one median, the latter not merely interrupting the black on the edges of the sulcus, but in the bottom as well.
- g*<sup>1</sup>. Fuscous band in its usual position in the middle of the wing. Spur extending less than half way to the base. General color dark fuscous brown, permitting little contrast in the bands of the tegmina.
- h*<sup>1</sup>. Metazone scarcely more than one and a half times as long as the prozone. Fuscous band of the wings very broad, occupying nearly one-third the length of the wings.  
*salina* Bruner, manuscript.

- h*<sup>2</sup>. Metazone twice as long as the prozone. Fuscous band rather narrow, occupying no more than a sixth or seventh of the length of the wings ..... *similis* Scudder.
- g*<sup>2</sup>. Fuscous band entirely beyond the middle of the wing, making the length of the disk equal to the width. Fuscous spur extending more than half way to the base. Bands of the tegmina contrasting strongly with ground color and very conspicuous..... *pallidipennis* Burmeister.
- f*<sup>2</sup>. Lower sulcus of the posterior femora black, with one preapical light band.
- g*<sup>1</sup>. Posterior tibiae yellow or greenish, never brown.
- h*<sup>1</sup>. Pronotum unusually short, not (male), or a very little (female) longer than wide. Size small, less than 20 mm. (male) or about 25 mm. (female) ..... *collaris*, new species.
- h*<sup>2</sup>. Pronotum not unusually short, considerably longer than wide even in the female.
- i*<sup>1</sup>. Fuscous band very narrow and interrupted; spur acute, extending more than half way to the base. Process of the metazone acute. Size small, 20 mm. (male), 25 mm. (female).  
*fratercula*, new species.
- i*<sup>2</sup>. Fuscous band broad, or when narrow distinct and uninterrupted.
- j*<sup>1</sup>. Metazone twice as long as the prozone with the process acute. Wings long, barely less than twice as long as wide. Fuscous band narrower, at most not exceeding one-sixth the length of the wing. Lower sulcus of the posterior femora with the black not almost severed by the median light band ..... *vinulata* Scudder.
- j*<sup>2</sup>. Metazone less than one and three-quarter times as long as the prozone, with the process rectangular. Wings shorter, being considerably less than twice as long as wide. Fuscous band equal in width to a fourth or a fifth the length of the wing. Lower sulcus of the posterior femora with the black almost severed by the median light band.  
*saxatilis*, new species.
- g*<sup>2</sup>. Posterior tibiae brown with a pale subbasal annulus. Size small. Wing very broad, less than one and one-half times as long as broad ..... *pilosa*, new species.
- c*<sup>2</sup>. Tegmina thickly punctuate with evenly scattered fuscous annuli, contrasting little with the fuscous background and not, or very rarely, collected into groups forming bands. Wings broad with the outer half infuscated or fuliginous; rarely only the tip of the apical part and the veins beyond the fuscous band are infuscated ..... FALLAX GROUP.
- d*<sup>1</sup>. Posterior tibiae blue, with a light subbasal annulus or at least a brownish spot on the exterior face.
- e*<sup>1</sup>. Tegmina evenly maculate with, at the most, faint traces of bands. Process of the metazone acute angulate, at least in the male.  
*fallax* Saussure.
- e*<sup>2</sup>. Tegmina plainly fasciate by the unequal distribution of fuscous annuli. Process of the metazone obtuse-angulate even in the male.  
*nubila*, new species.
- d*<sup>2</sup>. Posterior tibiae not blue and without a pale subbasal annulus.

- e*<sup>1</sup>. Portion of the wing beyond the fuscous band either fuscous or fuliginous, spur reaching half way to the base.  
*conspersa*, new species.
- e*<sup>2</sup>. Portion of the wing beyond the fuscous band hyaline, spur reaching two-thirds the distance to the base . . . *variegata*, new species.
- a*<sup>2</sup>. Wings entirely hyaline without fuscous band and colored disk, or the latter blue with the fuscous band distinct or indicated by infuscated nerves and cells. Fascia of the tegmina never solid but obviously made up of fuscous annuli often imperfectly segregated.
- b*<sup>1</sup>. Fuscous band present. Disk blue. Posterior tibiae blue, with a light sub-basal annulus . . . . . CAERULEIPENNIS GROUP.
- c*<sup>1</sup>. Prozone of the pronotum strongly elevated and bilobate. Disk of the wings faintly tinged with blue. Fuscous band narrow and indistinct . . . . . *caeruleipennis* Bruner.
- c*<sup>2</sup>. Prozone of the pronotum very little elevated and scarcely bilobate. Disk of the wings deep blue. Fuscous band broad and distinct.  
*cyaneipennis* Bruner.
- b*<sup>2</sup>. Fuscous band wanting. The wing entirely hyaline. Posterior tibiae obscure greenish or brown. Posterior femora with the disk of the inner face black with two light bands on the apical half. Lower sulcus light with one preapical black band.  
AZURESCENS GROUP.
- c*<sup>1</sup>. Scutellum of the vertex broad, scarcely longer than broad and about equal in width to the diameter of the eye as seen from above. Process of the metazone acute . . . . . *azureseus* Bruner.
- c*<sup>2</sup>. Scutellum of the vertex narrow, plainly longer than broad and much less than equal in width to the diameter of the eye as seen from above.
- d*<sup>1</sup>. Process of the metazone rounded. Basal fuscous band distinct from the fuscous points of the immediate base. Larger, male more than 20 mm. long . . . . . *pseudo fasciata* Scudder.
- d*<sup>2</sup>. Process of the metazone sharp. Basal fuscous band of the tegmina not distinct from the spots of the immediate base. Smaller, male less than 20 mm. long . . . . . *lauta* Scudder.

#### HYALINA group.

Testaceous, entirely plain except for a few spots on the tegmina. In size and appearance much resembling *Conozoa behrensi*, but with most of the characteristic features of that genus weakened or wanting. It, however, forms the connecting link between that genus and *Trimerotropis*. Scutellum of the vertex wide, about equal to or not much less in width than the short diameter of the eye; median carina very slight. Pronotum with the metazone one and a half times as long as the prozone, with the process very obtuse angulate; lateral lobes with a strong tooth on the posterior part of the lower border. Posterior femora with the inner face light, with the usual dark bands much weakened or wanting.

*TRIMEROTROPIS HYALINA*, new species.

Robust, pale testaceous, almost plain, with a few scattered spots in the middle field of the tegmina occupying the usual position of the fuscous bands; anterior and posterior fields plain except for exceedingly faint spots near the base.

Scutellum of the vertex moderately deep, with faint median carina, as wide as the short diameter of the eye which is considerably shorter than the genal groove. Pronotum with the prozone elevated, median carina high and strongly bilobed; metazone one and a half times as long as the prozone, with the disk smooth and the process strongly obtuse angulate, its sides straight and tip rounded; lateral carinae obsolete, except upon the front of the metazone and prozone; lateral lobes with a strong tooth on the posterior part of the lower border. Wings entirely transparent and faintly tinged with yellow; fuscous band entirely wanting, and none of the veins or veinlets are infuscated except at the extreme tip of the wing. Posterior femora with the disk of the inner face pale, with scarcely a trace of fuscous band, lower sulcus pale, outer face testaceous, obscurely fasciate. Posterior tibiae obscure yellow.

Length of body, female, 30 mm.; length of tegmina, 30 mm.; length of posterior femora, 18 mm.

*Type*.—Cat. No. 5370, U.S.N.M.; one female, California. Determined by Uhler as *Trimerotropis pseudofasciata*, to which it is not very closely related. In size, general proportions, and color (except for the very different tegmina and wings) it resembles *Conozoa*, to which it is much more closely related than *Trimerotropis cincta* and *juliana* are.

## TEXANA group.

Size medium, color dark gray varied with yellow or white, with broad light stripes (sometimes indistinct but always traceable) extending from the eyes along the edge of the disk to the posterior border of the pronotum, no definite bands on the tegmina, but some indication of these in their usual position; veins in the apical portion infuscated and generally bordered with fuscous which extends out on the cross veins. Head considerably or much elevated. Frontal costa sulcate above the ocellus as well as below with the carinae continuous with those of the vertex; scutellum of the vertex deeply sulcate, somewhat (female) or considerably (male) longer than broad, the length being increased by the inclusion of the median foveolae which are well impressed; lateral foveolae equally distinct; antennae in the male about equaling the posterior femora. Pronotum with the disk flattened and lateral carinae absent at least between the sulci; median carinae cristate at least on the prozone; metazone with its disk smooth; lateral lobes

with a tooth on the lower posterior border. Tegmina with the last branch of the radial sector distant from the fork by about one-fourth (female) or one-third (male) the length of the sector; medial and cubital forks fused for a short distance; intercalary vein separated apically from the median by once (male) or several times (female) its own width; area of the cubital forks narrow. Wings moderately long, but distinctly less than twice as long as broad, with a distinct moderately broad fuscous band at least a sixth of the length of the wings in width continued on the posterior border not more than half-way; spur extending about halfway to the base; apex clear with the tip more or less infuscated, the fuscous markings showing a tendency to follow the main veins.

This group includes four closely allied species which show in the markings and structure a distinct tendency to *Derotmemia*.

#### TRIMEROTROPIS TEXANA Bruner.

*Conozoa texana* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 65.—TOWNSEND, Insect Life, VI, 1893, p. 30.

Slender, especially in the male, with various shades of brown and white commingled, a whitish spot in the middle of the lateral lobes of the pronotum and a rather indistinct yellowish stripe extending from the principal sulcus above the white spot downward in a curve to the base of the mandibles. Scutellum of the vertex narrow with no (male) or a distinct (female) median carina; eye equal to (male) or distinctly less than (female) the genal groove. Pronotum with the median carina only slightly cristate and bilobate on the prozone, scarcely more than a raised line, equal throughout on the metazone; lateral carinae entirely wanting except on the anterior of the metazone of the female; metazone twice as long as the prozone with the process acute, its margins straight and tip sharp. Tegmina mainly isabelline, but with a distinct lightening in those areas usually occupied by the light bands. This is more apparent and conspicuous on the anterior field. Wings opaque yellowish green at the base, with a rather broad, distinct fuscous band; apex hyaline with fuscous margining the principal veins more or less on the first and second lobes. Posterior femora with the disk of the inner face and the lower sulcus black with two light bands on the apical half, outer face three black bands, the two proximal ones oblique; posterior tibiae dull orange with a light subbasal annulus.

Length of body, male 22 mm., female 27 mm.; length of tegmina, male 24 mm., female 30 mm.; length of posterior femora, 12.5 mm.

One male (type), El Paso, Texas, G. W. Dunn, collector; one female, Las Cruces, New Mexico, Townsend, collector; Bruner collection.

**TRIMEROTROPIS REBELLIS** Saussure.

*Conozoa rebellis* SAUSSURE, Add. Prodr. Oedip., 1888, p. 60.

This species is unknown to me, as I have not been able to identify it satisfactorily among the species I have examined, and the types are inaccessible. Saussure's description is appended.

Slender, compressed, fulvous, varied with fuscous and white. Antennae rather long and slender. Head narrow, compressed. Facial costa subparallel, sulcate. Scutellum of the vertex pear-shaped, narrow, with the apex foveolate. Lateral foveolae triangular, not elongate. Pronotum anteriorly attenuate and granulate. Prozone rather strongly cristate, when seen from the side strongly bidentate or bilobate, as in the genus *Trachyrhacis*. Metazone scarcely rugulose, in the female transverse, obtuse angulate, carinate, with the lateral carinae acute. Lateral lobes with the lower angle led into a tooth with margin behind the angle arcuate. Tegmina narrow, peculiarly sprinkled with fuscous, everywhere fuscopunctulate; costal margin with a fuscous spot at the base and in the middle; middle field with three to four elongate fuscous spots, the last frequently fading near the radial vein. Basal half densely reticulate; intercalary closely approaching the median vein; apical part quadrate reticulate. Wings sulphur yellow at the base, with the fuscous band not continued upon the posterior margin, anteriorly scarcely narrowed and sending toward the base an incomplete stripe; anterior margin beyond the band black. Apical part hyaline, reticulate with fuscous or with fuscous lines and spots. Outer posterior margin somewhat sinuate. Posterior femora with three black bands on the inner and the outer face; white on the lower part of the outer face. Posterior tibiae bluish. Cheeks and sides of the pronotum fasciate or spotted with white; pronotum sometimes with five fuscous stripes and the meso and metapleura with two white stripes.

Length of body, male 15 mm., female 22 mm.; length of tegmina, male 18.5 mm., female 22 mm.

California (Bruner collection, No. 9727).

**TRIMEROTROPIS ALBOLINEATA** Bruner.

*Conozoa albolineata* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 66.

A graceful and slender species, recalling the male of *Syrhula admirabilis*. In addition to the markings common to the group which are all present in increased strength in this species, it has three parallel fuscous stripes on the occiput, one behind each eye extends across the upper edge of the lateral lobes of the prozone, two fuscous preceded by two white stripes on the meso and metathorax and a white stripe running along the genal groove, and this followed by a fuscous streak. Head more strongly elevated than in any species of the genus, in this and many other respects strongly resembling *Derotmena*.

Eyes as long (female) or a little longer (male) than the genal groove; antennae long in both sexes, scarcely exceeding the posterior femora. Pronotum with the disk moderately high and bilobate on the prozone, linear on the metazone; lateral carinae nearly obsolete even on the metazone and front of prozone, metazone one and a half (male) or one and

three-quarter (male) times as long as the prozone, process very obtuse-angulate, sides straight and tip sharp. Tegmina with the middle and posterior fields nearly entirely infuscated, anterior field yellow or whitish with a single basal spot of fuscous at the point of greatest width near the base. Wings as in other species of the group.

Posterior femora with three or four dark bands on a light ground on the inside, lower sulcus light with two dark bands, exterior face very distinctly marked with alternate white or light and fuscous oblique bands. Posterior tibiae, obscure greenish. Length of body, male 19 mm., female 28 mm.; length of tegmina, male 19 mm., female 29 mm.; length of posterior femora, male 10 mm., female 15 mm.

One male, Los Angeles, California, Coquillett, collector. One male, Los Angeles, California, Koebele, collector, Bruner collection. Numerous specimens, Ontario, California, June, Snodgrass, collector. Museum of Stanford University.

#### TRIMEROTROPIS CRISTATA, new species.

Closely related to *Trimerotropis tarana*, from which it may be distinguished by the following characters:

Color as in that species, but with a reddish tinge sometimes replacing fuscous gray. Scutellum of the vertex deep, with a distinct median carina; eyes decidedly shorter than the genal grooves. Pronotum with the median carina very strongly cristate on the prozone, and equally distinctly bilobate, the first lobe being one-half and the second fully as high as long; on the metazone a slight but distinct raised line. Lateral carinae present only on the front of the metazone; the latter little more than once and a half as long as the prozone, with the process strongly obtuse-angular, the margins straight, and the tip rounded. Tegmina with the light area prevailing in the anterior and posterior fields and about equaling the dark in the middle field. Wings as in that species, but transparent and faintly tinged with yellowish green on the disk, with the fuscous band narrower and scarcely at all continued on the posterior border toward the base. Posterior femora as in that species, but with the black deeper and more extensive on the inner face and lower sulcus, and less distinct on the outer face. Posterior tibiae obscure yellow, with no subbasal annulus. Length of body, female, 26-29 mm.; length of tegmina, 27-28 mm.; length of posterior femora, 13½ mm.

One female, San Julio, Lower California, Charles D. Haines, collector, April; one female, 4,300 feet, Salt Lake Valley, Utah, August 1 to 4, Bruner collection.

This species has been mistaken for *Conozoa sulcifrons*, but it is very unlike that species as I recognize it, and certainly does not answer to Saussure's description.



**TRIMEROTROPIS PORRECTA**, new species.

Similar to *Trimerotropis texana*, but smaller and distinct in the following respects:

Pronotum with the median carina very strongly cristate on the metazone as well as the prozone, in this respect agreeing well with *Conozoa*, on the latter not lobate and hardly perceptibly intersected, in this particular agreeing with *Spharageman*; lateral carinae entirely obsolete: anterior margin strongly angulate; metazone one and a half times as long as the prozone, with its disk rugose with elongate granulations, process of the metazone acute angulate, the margins slightly sinuate and tip sharp. Tegmina rather evenly infuscated with dusky annuli in the middle and posterior fields, with a light indefinite stripe along the anal vein; anterior field almost entirely occupied by two broad distinct fuscous bands, each preceded by a small quadrate yellow spot. Wings as in the preceding species. Posterior femora as in *texana*. Posterior tibiae yellow without a pale annulus. Length of body, male, 18 mm.; length of tegmina, 20 mm.; length of posterior femora, 10 mm.

One male. California, Koebele, collector, Bruner collection. This species has also been mistaken for *Conozoa sulcifrons*, doubtless on account of the uninterrupted crest of the prozone. It does not, however, at all resemble that species, and is a consistent member of the *texana* group, though it is difficult to determine its nearest relative on account of the peculiar structure of the pronotum.

**MARITIMA** group.

Size, medium or large; color, dull brown, plain or isabelline with no bands on the tegmina, and spots when present showing no tendency to arrange themselves in bands. Scutellum of the vortex about as broad as long, in the males apparently somewhat longer by the inclusion of the median foveolæ; frontal costa distinctly and strongly sulcate above the ocellus, its lateral carinae often continuous with those of the vertex; eyes about equal (male) or much less (female) than the genal grooves; antennae long but not exceeding the posterior femora even in the male. Pronotum with the median carina slightly cristate on the prozone; disk flat with the shoulders well marked and the lateral carinae not entirely wanting; metazone about twice as long as the prozone, lateral lobes with the margins well rounded or if a slight tooth is present then plainly sinuate on the anterior half. Tegmina long. Wings with the fuscous band narrow, distinctly less than one-sixth the length of the wings in width. Posterior tibiae obscure.

This group includes three well-marked species, each of which, in addition to characteristics possessed in common with the others which recall *Conozoa*, varies independently in that direction. *Maritima*, for

instance, in some specimens, has the lateral lobe very nearly as in that genus. *Cocquilletti* has the areas of the cubital forks so simplified that it contains only about four quadrilateral cells at one end, the rest being hyaline without cross veins. *Grocilis*, in some specimens, has the median carina cristate on the metazone and as high as that of the prozone. Each of these, then, has a character belonging (but not peculiar) to *Conozoa*, as I have defined it, but, since they vary independently, each has two characters of *Trimerotropis* to the one of *Conozoa*. If these three species, then, should be included in *Conozoa*, nearly one-half of the characters I have been able to find to characterize that genus would become nearly useless. If we further take away the characters of *Conozoa* which they lack, the pattern of tegmina and the elongate scutellum, we should have nothing left peculiar to the group but the "lateral carinae well developed" and the "frontal costa sulcate above the ocellus." But the first group culminates in a species in which the lateral carinae of the prozone are completely broken down, so that nothing would be left peculiar to the group but "frontal costa sulcate," and this will hardly do to found a genus on. But it would not only be impracticable to retain these groups (and they are too closely related to include one and not the other), but it would be illogical. *Tertua* and *hyalina* have been varying in different directions, and each is much more nearly related to a typical *Trimerotropis*, like *caruleipes*, than it is to the other. These groups, then, must be retained in *Trimerotropis*, or at least removed from *Conozoa*, and, while not as distinct as genera should be, they may be considered to form a subgenus.

#### TRIMEROTROPIS MARITIMA Harris.

*Locusta maritima* HARRIS, Rept. Ins. Inj. to Veg., 1841, p. 178.

*Oedipoda maritima* UHLER, Treat. Ins. Inj. to Veg., 1862, p. 178.—SCUDDER, Mat. Mon. N. Am. Orth., 1862, p. 472.—S. I. SMITH, Rept. Ent. Com., 1872, p. 373.—THOMAS, Acrid. of N. Am., 1873, p. 124.

*Trimerotropis maritima* STÅL, Recen. Orth., 1, 1873, p. 135.—SCUDDER, Dist. of Ins. in N. H., 1874, p. 378.—THOMAS, Ninth Rept. Ent., Ill., 1880, p. 113.—SAUSSURE, Prodr. Oedip., 1884, p. 172.—FERNALD, Orth. of New Eng., 1887, p. 45.—DAVIS, Ent. Am., V, 1889, p. 81.—MCNEILL, Psyche, VI, 1891, p. 64.—J. B. SMITH, Bull. 90, N. J. Agr. Exp. Sta., 1892, p. 34.—MORSE, Psyche, VII, 1894, p. 105.—BLATCHLEY, Can. Ent., XXVI, 1894, p. 218.—BEUTENMÜLLER, Bull. Am. Mus. Nat. Hist., VI, 1894, p. 299.—BLATCHLEY, Proc. Ind. Hort. Soc., 1896, p. 21; Can. Ent., XXX, 1898, p. 61.

Size medium or large, color isabelline and plain on the front and sides of the head, the lower part of the sides of the thorax and abdomen as well as the legs more or less white. Scutellum only moderately infuscate with the sides considerably elevated and continuous with the carinae of the frontal costa; median foveolæ almost obsolete, lateral foveolæ well impressed, antennæ long. Pronotum with the median carina low and scarcely cristate even on the prozone, lateral carinae

very variable either obsolete, except on the front edge of the prozone or more or less developed throughout; metazone about twice as long as the prozone with the disk smooth and the process obtuse angulate, its margins slightly sinuate and tip sharp; lateral lobes with the posterior angles rounded, or with a slight tooth, but then the lower margin is strongly sinuate anteriorly. Tegmina isabelline without bands, sometimes faintly clouded on the basal half; last branch of the radial sector distant from the fork only a little less than half the length of the sector; intercalary vein distant apically from the median by more than (male) or several times (female) its width; cubital and median forks free or united by a cross vein; area of cubital forks filled by several rows of irregular cells. Wings long, twice as long as wide with the apex attenuated; disk faintly yellow with a fuscous band of variable width, but never as much as one-sixth the length of the wing, continued but a little way on the posterior border, spur extending about half way to the base; apex hyaline. Posterior femora pale on the inside, with traces of three dark bands, lower surface pale, outer side without distinct bands. Posterior tibiae obscure sometimes with a white sub-basal cloud on the outer side.

Length of body, male, 24 mm., female, 34 mm.; length of tegmina, male, 25 mm., female, 35 mm.; length of posterior femora, male, 13 mm., female, 17 mm.

Atlantic States, from Virginia northward and along the shores of the Great Lakes west to Illinois.

#### TRIMEROTROPIS OCHRACEIPENNIS Blanchard.

*Oedipoda ochraceipennis* BLANCHARD, in Gay, Hist. Fisic de Chile, Zool., VI, 1851, p. 77.

*Oedipoda cinerescens* BLANCHARD, in Gay, Hist. Fisic de Chile, Zool., VI, 1851, p. 78.

*Oedipoda placida* STÅL, Freg. Eng. Resa, Ins. Orth., 1860, p. 344.

*Trimerotropis placida* STÅL, Recen. Orth., I, p. 134.—SAUSSURE, Prodr Oedip., 1884, p. 172.

I have been unable to recognize this species among any of the forms I have seen. I append Saussure's description:

Very similar to *Trimerotropis maritima*, but smaller, with the head and pronotum rugulose; vertex rugulose; lateral foveole elongate or triangular. Pronotum densely punctate; crest of the prozone rather prominent and strongly bilobate, with the lobes inclined backward; disk of the metazone granulate, distinctly carinate. Tegmina fusco-trifasciate. Wings with the disk sulphurous, with a narrow arcuate fuscous band composed of separate clouds, vanishing upon the posterior margin; two posterior areas (median and cubital) of the anterior lobe very unequal. Posterior femora a little swollen, banded—var—*a*, axillary vein of the tegmina confluent with the anal; *b*, fuscous band of the wing continuous (*Ochraceipennis* Blanchard); *c*, fuscous band in separate spots (*Sigmatipennis* Blanchard).

Length, male, 22 mm.; female, 28 mm.; tegmina, male, 26 mm., female, 31 mm.

In coloration very similar to *Trimerotropis maritima*, but smaller, and distinct from that in the different venation of the wings.

Saussure in his conspectus of the species of *Trimerotropis* includes this in the groups having blue (*maritima* is also in this group, so his blue probably means any color but red, the other alternative) hind tibiae.

Chile, South America, Saussure.

TRIMEROTROPIS GRACILIS Thomas.

*Edipoda gracilis* THOMAS, Geol. Surv. Terr., 1871, p. 461; Acrid. of N. Am., 1873, p. 121.

*Trimerotropis gracilis* SAUSSURE, Prodr. Edip., 1884, p. 171.

Size medium or large; color dull grayish brown. Scutellum with the median carina slight but distinct. Pronotum with the median carina somewhat cristate on the metazone; lateral carinae distinct, except between the sulci. Metazone scarcely twice as long as the prozone, with the process slightly obtuse or acute angulate, the margins straight and the tip sharp. Tegmina plain, except for an indefinite cloudiness basally and irregular and broken linear infuscations of the principal veins and their branches; last branch of the radial sector distant from the fork one-third (male) or one-fourth (female) the length of the sector; intercalary vein separated apically from the median by scarcely more than its own width; cubital and median veins free or connected by a short cross vein; area of the cubital forks narrow, occupied, basally at least, by a single series of quadrate cells. Wings long, twice as long as wide, scarcely attenuate at the apex; disk faintly greenish yellow, followed by a narrow fuscous band much broken and indistinct, often indicated by a darkening of the veins merely, continued for a very short distance on the posterior border, spur extending much more than half way to the base; apex hyaline, with the extreme tip sometimes slightly infuscated, but generally all the veins and cross veins are darkened. Posterior femora black, with two light bands on the apical half; lower sulcus black, with one light preapical band; outer surface plain or obsoletely banded. Posterior tibiae brown, without any subbasal annulus.

Length of the body, male, 21 mm., female, 24 to 30 mm.; length of the tegmina, male, 22 mm., female, 25 to 30 mm.; length of posterior femora, male, 10½ mm., female, 12 to 14 mm.

One male, one female, Birch Creek, Idaho, August; one female, Salt Lake Valley, Utah. Bruner collection; One female, Salmon City, Idaho, August. The U. S. National Museum contains specimens from Douglass, Wyoming; Yellowstone, Montana and Colorado. Colorado, Saussure.

*TRIMEROTROPIS* COQUILLETTI, new species.

Size medium. Color dark brown, nearly plain, since the punctations are so small and dense as to serve merely to darken the general color without being themselves conspicuous.

Scutellum of the vertex with a distinct median carina; median foveolæ deeply and lateral foveolæ very lightly impressed. Pronotum with the prozone elevated somewhat and the median carina cristate and slightly bilobate; lateral carinæ obsolete on the metazone, visible on the front margin of the prozone; metazone a little less than twice as long as the prozone and rugulose with a few scattered larger granulations; margins of the obtuse-angulate process straight, the tip rounded. Tegmina very long, with the entire middle field unspotted except narrowly along the margins and hyaline on the outer half, yellow on the inner; anterior field infuscated by the presence of numerous maculæ on the basal third beyond with a single not very regular series of fuscous spots of varying sizes extending along and on either side of the principal veins; posterior field thickly maculate with fuscous points at the base beyond infuscated and impunctate; last branch of the radial sector distant from the fork almost half the length of the sector; intercalary vein separated distally from the median by its own width; area of the cubital forks hyaline at the base for half its length without cross veins, beyond with a few cross veins. Wings very long, distinctly more than twice as long as wide, with the apex greatly attenuated, so that the posterior margin is subparallel with the anterior. Disk light yellow, with a narrow distinct fuscous band extending along the posterior margin nearly to the anal angle, with a spur reaching half way toward the base; apex hyaline. Posterior femora with the disk of the inner face black with two white bands, lower sulcus black with one; outer face with one pale preapical preceded by a fuscous band.

Posterior tibiæ obscure yellow. Length of body (female), 26 mm.; length of tegmina, 30 mm.; length of posterior femora, 14 mm.

*Type*.—Cat. No. 5371, U.S.N.M.; one female. San Bernardino County, California. Coquillett collection.

The species is named in honor of the distinguished entomologist Dr. D. W. Coquillett.

## CINCTA group.

In the pattern of the wings and in the flatness of the disk of the pronotum transitional to *Conozoa*.

Frontal costa sulcate for a short distance above the ocellus; scutellum of the vertex moderately sulcate, about as wide as long (female), or considerably longer (male) because of the inclusion of the median

foveola; eyes about equal (male) or a very little less (female) than the genal groove; antennae slightly exceeding (male) the posterior femora. Pronotum with the disk flat and the shoulders well marked even on the prozone, and lateral carinae present on the anterior of the metazone and in front of the first sulcus, broken or entirely wanting between, and on the posterior part of the prozone; median carina moderately elevated and bilobate on the prozone with the anterior lobe much greater than the posterior; process of the metazone obtuse angulate with the sides straight and the tip sharp; lateral lobes with the posterior angle rounded. Tegmina with the median and basal dark bands solid and well defined, extending across the anterior and middle fields, the former sometimes faintly visible on the posterior field also; the light bands just beyond the dark ones about equal to each other and to the dark bands; apical third with fuscous annuli in somewhat regular series along either margin with a few scattered ones on the area between which has the principal and the adjoining veinlets darkened; extreme base punctate with fuscous; posterior field impunctate or most obscurely punctate; area of the cubital forks broad and filled with several series of polygonal cells in the female, in the male narrower, but the cells are in about two series; median and cubital forks not fused, free or united by a cross vein; intercalary vein separated from the median toward its tip by a distance several times (female) or at least once (male) its own width. Wings narrow, with the disk pale-greenish yellow, with the fuscous band narrow and ill-defined on the outside, shading off into fuliginous but disappearing for the most part in the subapical area, the tip again becoming infuscated or remaining clear, continued on the exterior margin less than half way to the anal angle. Spur long, extending more than half way to the base. Posterior femora with the disk of the inner side black with two light bands on the apical half; lower sulcus pale or more or less suffused with fuscous, with one black band before the pale preapical band.

#### TRIMEROTROPIS CINCTA Thomas.

*Edipoda cincta* THOMAS, Proc. Acad. Nat. Sci. Phila., 1870, p. 80; Geol. Surv. Wyo., 1870, p. 275.

Probably none of the other references to *Edipoda*, *Mestobregma*, or *Trimerotropis cincta* belong here. Thomas probably confused three, if not four, species under this name, one *Mestobregma* and three *Trimerotropis*. See *Trimerotropis vinculata* and *sacatilis*. Size medium, color dark and nearly plain except for two distinct, narrow, black bands which extend across the face, one just above and the other just below the insertion of the antennae. These bands unite at the eye and extend as a narrow stripe from the posterior margin of the eye, across the

head, and along the upper margin of the lateral lobes of the pronotum; on the head, behind the eye, it is accompanied by a narrow, yellowish stripe just above it. Scutellum with the median carina slight but rather distinct. Pronotum with the disk of the metazone roughened with rather numerous, short, linear granulations. Posterior tibiae very variable, either obscure or red with a brownish basal cloud or livid with a distinct, subbasal, pale annulus, or brown without cloud or annulus.

One female (type) (*Edipoda cincta*) Thomas, southeast Colorado, Texas, and New Mexico, 1869, U. S. National Museum; one female, Colorado; one male, 1 female, Pine Ridge, Nebraska, July (types of *Conozoa silvicola* Bruner), Bruner collection.

This species is unique, so far as my experience goes, in having such variable coloring of the tibiae and in the black facial bands. The male from Pine Ridge has red tibiae; the female from the same locality, plain brown ones; the female from Colorado, livid ones with a complete ring and the tips with the color obscure, and a brown cloud on the outside.

#### TRIMEROTROPIS JULIANA Scudder.

*Trimerotropis juliana* SCUDDER, App. JJ. Ann. Rept. Chief of Eng., 1876, p. 514.

*Trimerotropis fontana* THOMAS, Proc. Dav. Acad. Nat. Sci., 1, 1876, p. 271.—BRUNER, Third Rept. U. S. Ent. Com., 1885, p. 57; Rept. U. S. Com. Agr., 1885, p. 307.—SAUSSURE, Add. Prodr. *Ædip.*, 1888, p. 171.

This species is remarkably similar to *Trimerotropis cincta* Thomas, from which it is apparently different in the entire absence of the black bands of the face and in the broader vertex which in that species is scarcely, in this much more than half the short diameter of the eye.

One female (determined by Scudder), American Fork Canyon, 7,500 feet, August 5; one female, Salt Lake Valley, Utah, 1878, Bruner collection; one female, Spring Lake, Utah (probably one of the three type specimens of *Trimerotropis fontana*, U. S. National Museum. Common in Yellowstone Valley, Montana, Bruner.

#### CAERULEIPES group.

Species of small or medium size with the ground color generally dark, and when light not much varied with fuscous on the head and pronotum, but with the basal bands of the tegmina present and either semisolid and more or less conspicuous, or if obviously composed of smaller maculations then distinct by reason of their contrasting colors and the thorough segregation of the spots.

Scutellum moderately wide but not exceeding the short diameter of the eye even in the male and never wider than long; median carina never entirely absent but frequently indistinct. Pronotum with the

prozone only slightly elevated and the median carina barely bilobate, on the metazone linear; metazone from one and a half to scarcely twice as long as the prozone; lateral lobes without a tooth. Tegmina with the area of the cubital forks occupied by several rows of polygonal cells; intercalary vein apically not more distant from the median vein than by its own width. Wings with the disk green or greenish yellow, the fuscous band narrow and interrupted, or if broader weak or interrupted along the radiate veins or wanting, in this case the apical half is wholly fuliginous and fuscous. When present continued never more than halfway to the anal angle. Spur when present elongate, extending more than halfway to the base. Posterior femora with the inner face black with two lighter bands on the apical half. Posterior tibiae blue with the extreme base black preceded by a pale annulus.

#### TRIMEROTROPIS CAERULEIPES Scudder.

*Trimerotropis caeruleipes* SCUDDER, 2d Rept. U. S. Ent. Com. App. II, p. 27, 1880.

Size small or medium; dark brownish cinereous, much, though not conspicuously, varied with fuscous maculations; scutellum considerably longer than broad (male), with the median carina exceedingly faint; lateral and median foveolæ deeply impressed; eye of the male slightly longer than the genal groove. Pronotum with the metazone about twice as long as the prozone; shoulders well defined with a trace of the lateral carinae on the front as well as at the front margin of the prozone; disk of the metazone with a few scattered larger granulations; process of the metazone rectangular or slightly obtuseangular with the sides straight and the apex barely rounded. Tegmina with the bands composed of fuscous spots and annuli arranged into a distinct basal and median band, on the apical third, scarcely forming a band, but extending along either margin; radial sector with the last branch distant from the fork about one-half (male) the length of the sector; median and cubital forks not fused. Wings long and narrow with the disk pale green, the fuscous band narrow, interrupted and scarcely continued toward the anal angle; spur distinct, extends more than halfway to the base; apex pale with the extreme tip more or less infuscated. Posterior femora with the lower sulcus black, except for a single preapical light band; outer face with the indistinct preapical pale band preceded by two and followed by one not very conspicuous fuscous bands.

Length of body, male, 18 to 21 mm.; female, 25 mm.; length of tegmina, male, 19 to 22 mm., female, 26 mm.; length of posterior femora, male, 10 to 11½ mm., female, 12 mm.

One male, without locality; one male, Marble Valley, Eldorado County, California, Bruner collection; one male and two females, Portland, Oregon; Sissons, California. Scudder.



## TRIMEROTROPIS TESSELATA, new species.

*Trimerotropis coeruleipes* TOWNSEND, Ins. Life, VI, 1893, p. 31.

Similar to *Trimerotropis coeruleipes* in the structure of the head and pronotum and very closely related to it. The following points of difference may serve to distinguish it.

Size medium, with unusually slender tegmina and wings; color, ash with a slight suffusion of brown on the top of the head and pronotum, and base of the tegmina much and strongly varied with fuscous.

Head as in that species, except that the vertex is more prominent, forming a right angle (seen from the side) with the front, the tip of the angle slightly rounded instead of a decidedly obtuse angular. Pronotum with the process of the metazone very strongly obtuse angulate, with the margins straight and the tip sharp. Tegmina very long and slender and decidedly falcate at the tip, cinereous, with very conspicuous fuscous bands at the end of the first, second, and third quarters, each of these solid and well defined on the anterior and middle field, punctate on the posterior field; beyond the third fuscous band is a series of large, distinct, triangular spots on either margin, with a very few equally distinct and well-defined spots in the middle area; light bands unspotted, except the basal one, which has a few fuscous punctations; radial sector with its last branch not more distant from the fork than a third (male) of the length of the sector. Wings long and narrow, the length slightly exceeding twice the width; apex slightly attenuated; disk nearly opaque light green with a yellowish tinge, with the outer half entirely infuscated, less deeply preapically; the fuscous border is continued along the posterior margin a little less than half way to the anal angle, spur extending distinctly more than half way to the base. Posterior femora with a faint preapical light band, but the fuscous bands inconspicuous. Hind tibiae pale blue, with the subbasal pale annulus inconspicuous.

Length of body, male,  $21\frac{1}{2}$  mm.; length of tegmina,  $24\frac{1}{2}$  mm.; length of posterior femora, 12 mm.

One male, Turkey Tanks, Arizona, July 17, Bruner collection. This is the species probably which is mentioned by Townsend<sup>1</sup> under the name of *coeruleipes*.

## TRIMEROTROPIS CALIGNOSA, new species.

This species is very closely related to the two preceding species, but is strikingly different in color.

Size, medium; color, very dark fuscous, almost black, except for the well-defined and distinct light bands on the tegmina, and the lighter ground color of the posterior femora.

Head as in the two preceding species, with the vertex not quite so

<sup>1</sup>Insect Life, VI, p. 31.

prominent as in the last, and the median carina more distinct, especially in the posterior part of the scutellum and on the occiput; antennæ distinctly attenuate at the tip. Pronotum with the disk of the metazone supplied with rather numerous linear granulations; process of the metazone decidedly obtuse angulate, with the margins straight and the tip sharp. Tegmina long and slender, entirely infuscated, or at least fuliginous, except the usual light bands beyond the first and second quarters, which are well defined and distinct, but scarcely light enough to be conspicuous, the outer much narrower. By transmitted light the usual punctations at the extreme base and on the apical third can be seen; last branch of the radial sector distant from the fork a third or less (male), or a quarter (female). Wings with the disk transparent, tinged with olivaceous green, the outer half transparent but faintly fuliginous, with the extreme tip and, in some specimens, clouds in the region of the fuscous band slightly infuscated. Posterior femora with a light preapical band, followed by one and preceded by two rather distinct fuscous bands. Posterior tibiæ steel blue, with a very distinct whitish subbasal annulus.

Length of body, male, 22 mm., female, 28 mm.; length of tegmina, male, 23½ mm., female, 29 mm.; length of posterior femora, male, 12 mm., female, 14 mm.

*Types*.—Cat. No. 5372, U.S.N.M.; two males, Los Angeles County, California; one female, California.

This form may be but a variety of the last, but its strikingly different coloration and the unusual wings forbid my placing it there.

TRIMEROTROPIS ALBESCENS, new species.

Size small, color white, sparsely punctate with black on the pronotum and conspicuously banded with black on the tegmina and posterior femora.

Scutellum moderately sulcate, considerably longer than broad, with a very indistinct median carina; median and lateral foveolæ well impressed; eyes more than equal (male) to the genal groove. Pronotum with traces of the lateral carinae on the front part of the prozone and metazone, the latter one and a half times as long as the former; disk of the metazone with a very few larger granulation; process rectangular, with the sides straight and the tip sharp. Tegmina, like the body, white, with the basal band narrow and nearly solid, the median and third bands narrow and obviously made up of maculations, but very conspicuous; beyond the third fuscous band a few groups of fuscous annuli; all the white bands very broad and impunctate, except the basal, with a few dusky points, and an oblique black dash just beyond the edge of the pronotum when the tegmina are closed; last branch of the radial sector distant from the fork more than one third (male) the length of the sector; median and cubital forks not

fused, but free. Wings with the disk light yellow, nearly transparent, bordered by a few fuscous clouds representing the fuscous band, apex hyaline. Posterior femora with the lower sulcus white except for a narrow stripe on the basal half and a band preceding the preapical light spot; exterior face white, except for a very distinct fuscous band preceding the preapical light band and a few faint clouds representing the other bands. Posterior tibiae blue with the base black, followed by a distinct white annulus.

Length of the body, male, 18 mm.; length of the tegmina, 19 mm.; length of the posterior femora, 9 mm.

*Type*.—Cat. No. 5373, U.S.N.M.; one male, Los Angeles, Coquillett, collector.

#### TRIMEROTROPIS BIFASCIATA Bruner.

*Trimerotropis bifasciata* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 70.

Size, small or medium; color, plain brown with a reddish tinge, with conspicuous dark solid bands on the tegmina. Scutellum but little longer than broad, moderately sulcate, with distinct, though slight, median carina; median and lateral foveolæ deeply impressed. Pronotum with no trace of lateral carinae at the anterior margin of the prozone; metazone about once and a half as long as the prozone, the disk with a few indistinctly larger granulations; process of the metazone very strongly obtusangulate, with the margins slightly arcuate and the tip sharp. Tegmina with two solid conspicuous bands at the end of the first and second quarters, subequal in width and much narrower than the preceding lighter areas, but about equal to the light band following the second fuscous band, apical third with indistinct annuli arranged in about four groups on either margin, with a few intermediate ones; last branch of the radial sector distant from the fork about one-fourth (male) the length of the sector; median and cubital forks not fused, but free or united by a short cross vein. Wings moderately long, plainly less than twice as long as wide, with the apex very slightly attenuate; disk semitransparent, faint greenish, with a narrow somewhat interrupted fuscous band, scarcely extending upon the posterior margin, spur reaching more than halfway to the base, apex hyaline without fuscous spots. Posterior femora with the lower sulcus black, with two light bands on the apical half; exterior face with a light preapical band preceded by one fuscous band. Posterior tibiae blue, with a rather wide, pale subbasal annulus.

Length of body, male, 21½ to 25 mm., female, 26½ mm.; length of tegmina, male, 20 to 25 mm., female, 25 mm.; length of posterior femora, male, 10½ to 13½ mm.; female, 13 mm.

One male, type, without locality, Bruner collection; one male, Tehama County, California, U. S. National Museum; one male, one female, Spokane, Washington, Los Angeles, Coquillett; collector, Bruner.

## TRIMEROTROPIS FERRUGINEA, new species.

Size, small or medium; color, cinereous, varying to reddish-brown, rather indistinctly punctate and blotched on the head and pronotum, with the tegminal bands well defined, nearly solid and conspicuous; scutellum deeply sulcate, once and a half (female) or twice (male) as long as broad, with the median carina slight, but moderately distinct; median and lateral faveolæ moderately well impressed; eyes equal to (male) or a little shorter (female) than the genal groove. Pronotum with the lateral carinæ indistinctly present on the front of the prozone and less frequently on the front of the metazone, disk of the latter with rather numerous larger granulations; process of the metazone obtusangulate, with the margins straight and the tip sharp. Tegmina rather short and somewhat tapering, with the median and basal bands solid on the anterior and middle fields, more or less broken and interrupted on the posterior field; first and second light bands about twice as wide as the third and as the included fuscous band, the basal light band only, punctate with fuscous; apical third with the usual fuscous annuli and punctations rather numerous, but only moderately distinct and irregularly grouped; last branch of the radial sector distant from the fork a little more than one-fourth of the length of the sector; median and cubital forks not fused, free or united by a cross vein.

Wings moderately wide, but attenuate at the tip; disk faint greenish-yellow, with a narrow or rather broad but interrupted fuscous band continuing halfway or less toward the anal angle, with the spur extending distinctly more than halfway to the base. Posterior femora with the lower sulcus light below, with one dark band, more or less infuscated on the basal half, leaving two bands; outer face with a light preapical band preceded and followed by a moderately distinct fuscous band. Posterior tibiæ blue-black at the base, with a pale subbasal annulus.

Length of body, male, 17 to 21 mm., female, 28 mm.; length of tegmina, male, 20 to 23 mm., female, 28 mm.; length of posterior femora, male, 9 to 11 mm., female, 14 mm.

One male and one female, Soda Springs, Idaho; one female, Cœur d'Alene, Idaho, Wickham, collector; one male and one female, Heckla, Wyoming; one female, Madison River, National Park, Wyoming; one male (9500) American Fork Canyon, Utah, August 2 and 3, 1877, Bruner collection.

## TRIMEROTROPIS KOEBELEI Bruner.

*Conozoa koebelei* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 67.

This species is closely related to *Trimerotropis bifasciata*, and still more closely to *Trimerotropis ferruginea*. If the latter should prove to be only a variety of the former this would then undoubtedly be, though

at first glance they seem to have little in common, as far as color is concerned. It appears to differ from *ferruginea* as follows: Size smaller, color distinctly cinereous, with no suggestion of reddish-brown; tegmina with the posterior field cinereous or whitish, entirely impunctate, the usual bands therefore limited to the anterior half, or at least to the anterior and middle fields; scutellum as in that species, but median carina wanting or extremely faint.

Length of body, male, 17 mm., female, 25 mm.; length of tegmina, male, 18 mm., female, 25 mm.; length of posterior femora, male, 10 mm., female, 14 mm.

One male (type), Placer County, California, September, Bruner's collection; one male and one female, Placer County, California, September, and San Francisco, California, U. S. National Museum.

If I had not very much restricted *Conozoa* I should still be compelled to remove this species from that genus, as it has none of the characters of that genus except the coloration of the tegmina, and that is quite as suggestive of the pattern peculiar to *Trimerotropis*.

#### TRIMEROTROPIS THALASSICA Bruner.

*Trimerotropis thalassica* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 72.

I am unacquainted with this species and unable to place it with certainty, but it apparently belongs to the group *Ceruleipes*. I give Bruner's description somewhat abbreviated where the characters given are common to the group:

About the size of *Trimerotropis vinculata* Scudder, varying in color from dark to griseo-testaceous, with the colored portion of the wings sea-green; wings and tegmina but dimly banded; posterior tibiae deep cerulean, with basal annulus of dirty whitish.

Head, when seen from in front, as broad above as below, a little longer than common with the species of the genus; the eyes rather large and prominent, separated above by the flat (female) or slightly sulcate (male) vertex; pronotum somewhat smoother than usual, the anterior lobe but gently raised above; the median carina faint and rather equal; posterior angle slightly acute (male), about a right angle (female).

#### CITRINA group.

Color various shades of brown, usually inclining to red, with plain traces of the usual tegminal bands present, well defined if faint or with strongly contrasting colors if the spots are imperfectly segregated. Scutellum of the vertex at most moderately sulcate, broad, very rarely a little longer than broad, usually as broad as long, plainly less than the short (male) or long (female) diameter of the eye. Pronotum with the median carina low, even on the prozone, and not always bilobed (when seen from the side); lateral carinae absent, except a trace on the anterior of the prozone; metazone very rarely as little as once and a half, usually twice, as long as the prozone; lateral lobes without a tooth at the lower posterior angle; tegmina with the intercalary vein

separated from the median by scarcely (male) or considerably (female) more than its width; area of the cubital forks broad and occupied by more than one row of polygonal cells. Wings with the disk yellow or greenish yellow, and the fuscous band distinct but never in width equaling one-third the length of the wing. Posterior femora having the basal half of the disk of the inner face never entirely black (rarely the whole inner face may be suffused with fuliginous, so that the usually lighter areas are almost as dark as the black ones), but with a light area of greater or less extent at the base, so that the usual appearance is light, with three black bands, one on the knee, one at the middle, and one between; the basal one, as it increases in size, assumes the appearance of a stripe, which, however, never reaches the base. Frequently the light area is suffused with red. Posterior tibiæ red, rarely with a distinct subbasal annulus, but always with some trace of a yellow or brownish cloud on the exterior face.

TRIMEROTROPIS MONTICOLA Saussure.

*Trimerotropis monticola* SAUSSURE, Prodr. CEdip., 1884, p. 170; Add. Prodr. CEdip., p. 63, 1888.

Color reddish or grayish brown, thickly and rather conspicuously maculate, with fuscous cheeks and front of the head generally livid and less maculate. Size medium. Scutellum moderately sulcate, a very little longer (male) or shorter (female) than broad, with the median carina very indistinct or wanting; median and lateral faveolæ only moderately impressed; eyes small, distinctly (male), or considerably (female) shorter than the genal groove. Pronotum with the median carina slightly cristate on the prozone and bilobed; metazone rather more than once and a half as long as wide, with the disk smooth, and a few scattered larger granulations; process of the metazone strongly obtuse-angular, with the sides straight and scarcely rounded. Tegmina short and broad, with the basal bands not solid, but showing some evidence of being composed of fuscous points; maculations on the apical third about as thick and scarcely less distinct in the middle than along the margins of this area; extreme base never entirely free from fuscous points. Wings broad, about one and three-fourths times as long as broad, with the tip very little attenuate and sinuate behind the second lobe; disk greenish or citron yellow, with a moderately broad and very distinct fuscous band, varying in width from a sixth to a fourth the length of the wing, continued upon the posterior border plainly less or decidedly more than halfway to the anal angle, spur extending a little more or less than halfway to the base; apex hyaline, with rarely a few fuscous points. Posterior femora rather distinctly banded on the outside; inner face yellow, more or less suffused with red, with three black bands, the basal largest; lower sulcus yellow or red, with one indistinct subapical black band. Posterior tibiæ bright

red or yellow flushed with red, with an inconspicuous basal yellow cloud, confined to the outer side.

Length of body, male 21 to 25 mm., female 25 to 27 mm.; length of tegmina, male 24 to 25 mm., female  $27\frac{1}{2}$  to 30 mm.; length of posterior femora, male 11 to  $12\frac{1}{2}$  mm., female 13 to 14 mm.

**TRIMEROTROPIS CAMPESTRIS** Bruner, Manuscript.

This species is probably nothing more than a variety of *Trimerotropis pallidipennis*, from which it apparently does not differ except in the structure and color of the posterior tibiae; the marked infuscation of the top of the head and the prozone being repeated with almost, if not quite, as much distinctness as in that species. The posterior femora are unusually slender, with the black bands of the inner face small, but all the markings obscured by a fuliginous suffusion which extends upon the lower sulcus. I have two females from the Bruner collection, both marked "type," which differ considerably in size, markings of the tegmina, and the width of the fuscous band, but they agree in structural points and especially in the hind femora. The smaller one has the fuscous points very imperfectly gathered into bands.

Length of body, female, 24 to 28 mm.; length of tegmina, 25 to 27 mm.; length of posterior femora, 11 to 14 mm.

One male and one female, Pine Bluffs, Wyoming; Bruner collection.

**TRIMEROTROPIS BRUNERI**, new species.

*Hadrotettix gracilis* BRUNER manuscript.

Reddish brown, not strongly punctate with fuscous but very conspicuously banded on the tegmina and posterior femora; head, and less commonly the lateral lobes of the pronotum in front of the principal sulcus, pallid; pronotum with a longitudinal whitish stripe on the upper part of the lateral lobes, extending from the middle sulcus to the front margin; below this, near the middle of the lobes, a second but smaller quadrate spot of a similar color. Scutellum of the vertex somewhat (male) or not (female) longer than wide (if the very slightly impressed median faveolæ are included as a part of the scutellum, the proportion of length to breadth will be considerably increased); median carina present and more or less distinct; eyes decidedly shorter than the genal grooves even in the male. Pronotum with the median carina very low, not bilobate on the prozone; anterior margin decidedly angulate; metazone about twice as long as the prozone, its disk evenly and very finely granulate; process of the metazone decidedly acute-angled, with the margins straight and the tip a little rounded. Tegmina, more especially in the male, narrowed considerably and regularly from the basal band to the apex; basal and median bands very distinct and solid, with the base rouged without fuscous puncta-

tions and the apex with the usual scattered punctations, usually rather faint and more distinct on either margin than in the middle. Wings broad,  $1\frac{3}{4}$  times as long as broad, with the apex not attenuate; fuscous band moderately broad, at least a sixth as wide as the length of the wing and very distinct, continued along the posterior margin more than halfway to the anal angle; spur short, extending toward the base about one-third of the distance. Posterior femora unusually heavy, with the inside yellow, more or less suffused with red, and crossed by three black bands, the basal sometimes much reduced; outer side crossed transversely by one distinct subapical band, a continuation of the one on the inner surface; lower sulcus red, crossed by the same subapical band. Posterior tibiae bright red, with an indefinite subbasal yellow cloud on the outer face only.

Length of body, male 21 to 26 mm., female 23 mm.; length of tegmina, male  $21\frac{1}{2}$  to 25 mm., female 22 mm.; length of posterior femora, male 11 to 13 mm., female, 13 mm. Two males, Hot Springs, South Dakota; one male and one female, Cheyenne, Wyoming, Bruner collection; one male and one female, Chadron, Nebraska; one male and one female, Hot Springs, South Dakota, Stanford University collection.

While this species resembles *Hadrotettix trifasciata* so strongly in coloration as to readily be mistaken for it, in generic characters it is allied in every particular to *Trimerotropis*, where the latter genus differs from the former. The distinct sulcation of the scutellum of the vertex, with a plain median carina, the slender though long antennae, the presence of distinct shoulders on the prozone of the pronotum, the relatively long tegmina, which does not have a third band as well defined as the second, but the usual group of annular spots, the comparatively little thickened tegmina, which are not densely coriaceous beyond the outside of the basal band and which have quadrate cells much within the basal branch of the radial sector, in the character of the fuscous band which is quite trimerotropine and extremely different from that of *Hadrotettix*, which lies entirely beyond the middle, so that the disk is longer than wide, and has a long continuation upon the posterior margin which is greater in length than the transverse portion of the band. And finally in the coloration of the inside of the posterior femora, which seems to me to be one of the most trustworthy guides to relationship because it is not subject to natural selection. These in *Hadrotettix* are deep indigo blue, extending entirely over the inner face (including the upper sulcus, which is not true of a single *Trimerotropis*), interrupted by one broad, whitish band. If this species and one other, which is more like *Hadrotettix*, not to mention other species which are structurally, though not in coloration, nearer to it, are retained in that genus there would not remain a single salient character to distinguish the genus. For these reasons I have felt it



necessary to transfer Bruner's *Hadrotettix* to *Trimerotropis*, and as *gracilis* is preoccupied I have given it the name of the distinguished author.

**TRIMEROTROPIS FASCICULA**, new species.

In color or size very similar to *Trimerotropis bruneri*, from which it is distinguished by the following characters:

Scutellum of the vertex moderately sulcate as in that species with lateral carinae quite as distinct but longer and narrower and without a trace of the median carina. Pronotum as in that species with the metazone having the disk furnished with minute linear granulations. Tegmina with the two basal bands not so regular and well defined. Wings with the fuscous band narrower, the spur reaching halfway to the base and the continuation on the posterior border not extending more than half way to the anal angle. Posterior femora as in that species, but without any red suffusion and with the basal stripe elongate nearly to the base, sometimes the whole inner face is suffused with fuliginous, more or less obscuring the usual markings. A variety has the pronotum scarcely longer than broad with the process of the metazone decidedly obtuse angulate. The wing band is a little broader.

Length of body, male 18 mm., female 26 mm.; length of tegmina, male 19 mm., female, 26 mm.; length of posterior femora, male 10½ mm., female 14 mm.

One male and one female, Arizona or New Mexico; one female, Silver City, New Mexico; Bruner collection.

This species is very closely related to *Trimerotropis bruneri* and may not be specifically different from it.

**TRIMEROTROPIS PRÆCLARA**, new species.

Similar in size and structure to *Trimerotropis citrina*, but with the tegmina very distinctly marked, the basal and median bands solid and well defined.

The scutellum is slightly broader than in that species, with the median carina slight but distinct. The pronotum has the median carina not cristate on the prozone and scarcely bilobate when viewed from the side. The tegmina have the fuscous annuli of the apical third for the most part aggregated into a single group, which forms the third band, the basal area within the basal band is suffused with purple or brown with a few darker punctations. The posterior femora have the basal band elongate and extending nearly to the base, the light area being more or less suffused with red, the lower surface is reddish, somewhat obscured with a fuliginous suffusion and crossed by a single subapical band, the outer face has a single transverse, rather distinct, subapical band. The posterior tibiae are bright red, with a faint yellowish cloud on the outside near the base.

Length of body, male 24 mm., female 26 mm.; length of tegmina,

male 30 mm., female 28 mm.; length of posterior femora, male 13 mm., female 14 mm.

One male and one female, Salt Lake, Utah; Sidney, Nebraska; Bruner collection.

**TRIMEROTROPIS MODESTA** Bruner.

*Trimerotropis modesta* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 72.

Closely related to *Trimerotropis citrina*, but easily separated from that species by the following characters: Color, yellowish brown, nearly plain, on account of the extreme faintness of the darker maculations. Scutellum quite as deeply sulcate as in that species, and with no more trace of median carinae. Pronotum with the metazone nearly twice as long as the prozone, with the process acute-angled, the sides slightly sinuate, and the tip rounded. Tegmina yellowish brown and plain, except for the narrow and very inconspicuous basal and median bands, and the faintest traces of the apical band in a few faintly fuscous annuli near the anterior margin. Wings as in that species with the band slightly narrower and its posterior extension much shorter, reaching less than halfway to the anal angle. Posterior femora with the basal stripe rather long, the lower sulcus yellow, crossed by the subapical band and the outer face crossed by the same bands more or less distinct. Posterior tibiae red, with an indistinct yellow cloud at the base on the outer side.

Length of body, female, 26½ mm.; length of tegmina, 27 mm.; length of posterior femora, 14 mm.

One female, Silver City, New Mexico, Bruner's type.

The species is based upon two females from the locality given above, and it has not been reported elsewhere.

**TRIMEROTROPIS CITRINA** Scudder.

*Trimerotropis citrina* SCUDDER, U. S. Geol. Surv. Terr., II, 1876, p. 265.—SAUSSURE, Prodr. Oedip., 1884, p. 169.

Size medium or large, with the bands of the tegmina obviously mere aggregations of fuscous rings, which are, however, well separated into the usual bands; otherwise the body, head, and limbs are very thickly covered with fuscous punctations which cause the insects to very closely resemble the sand surfaces which they frequent.

Scutellum very little longer than broad, moderately sulcate, with scarcely a trace of the median carina; median foveolae a little more plainly impressed than the lateral generally, but neither are very distinct; eyes as long (male) or a very little (female) shorter than the genal groove. Pronotum with the median carina barely cristate even on the prozone and just perceptibly bilobate; anterior margin not distinctly angulate; metazone but little more than once and a half as long as the prozone, its disk rather coarsely and nearly evenly granulate; process

of the metazone decidedly obtuse angular, with the margins straight and the tip rounded. Tegmina longer and showing little contrast in color. Wings moderately long, being one and three-quarter times as long as broad; disk greenish yellow or pale citron with the fuscous band broad, the width being from one-fifth to one-fourth the length of the wing, continued upon the posterior margin much more than half way to the anal angle, spur short, extending less than halfway to the base; apex hyaline without any fuscous cells. Posterior femora with the inside yellow, crossed by three fuscous bands and sometimes a fourth fuscous cloud near the base, lower sulcus yellow, with the subapical fuscous band distinct, the median ones usually less distinct but always present, outer face with mere traces of the usual bands. Posterior tibiae red, with an indefinite cloud of lighter color near the base extending across the lower as well as the outer face. Length of body, male, 20 to 23 mm., female, 30 to 32 mm.; length of tegmina, male, 27 to 28 mm., female, 32½ to 35 mm.; length of posterior femora, male, 11 to 12 mm., female, 15½ to 16 mm.

One male, Maryland, Pergande collector, U. S. National Museum; one male and one female, Carrizo Springs, Texas, A. Wadgymer collector, Bruner collection; numerous specimens from northwest Arkansas in my own collection; Denver, Colorado, July 10, Red River of the North, Kennicott collector; Dallas County, Texas, June 6, Ball collector, and Texas, Belfrage collector, June, July, October, and November, Scudder; Texas and Colorado, Saussure; Nebraska, Bruner. This species, in its dull isabelline color, resembles *Trimerotropis maritima*, and is easily mistaken for it where the two occur together. That it should be found as far east as Maryland is somewhat unexpected, but since it is common in northwest Arkansas there is no reason why it should not be found in the mountainous districts of Kentucky, Tennessee, the Virginias, and Maryland.

#### LATIFASCIATA group.

Color dull brown with slightly contrasting maculations. Size medium or large. Frontal costa more or less sulcate with the carinae vanishing before reaching the clypeus; scutellum of the vertex about as wide as long, very moderately or scarcely sulcate, equaling in width the short (male) or long (female) diameter of the eye, which is slightly (male) or much (female) shorter than the genal groove. Pronotum with the median carina low even on the prozone and not bilobate when seen from the side; metazone nearly or quite twice as long as the prozone; lateral lobes without a tooth. Tegmina with the bands well defined but rather faint and rarely obviously made up of annuli or punctations; area of the cubital forks broad with several series of polygonal cells; intercalary vein separated from the median by little (male) or considerably (female) more than its width. Wings

ample with the fuscous band broad or very broad, at least more than a fifth the length of the wing. Posterior femora mostly black on the disk of the inner face, with one or two light bands. Posterior tibiae red with a yellowish cloud at the base on the outer side.

**TRIMEROTROPIS LATIFASCIATA** Scudder.

*Trimerotropis latifasciata* SCUDDER, App. II, 2d Rept. U. S. Ent. Com., 1880, p. 26.

Yellowish brown, plain except for the moderately distinct tegminal bands; size large, robust.

Frontal costa sulcate above the ocellus for a very short distance, above rounded; scutellum of the vertex broader than long (female) scarcely sulcate without a trace of the median carina; median and lateral faveolae lightly impressed. Pronotum with the median carina coarse and strong, barely cut by the first sulcus, so that, seen from the side, the crest recalls the genus *Arphia*; metazone less widened posteriorly than usual, with disk finely and evenly granulate, with the process obtuse angular, the sides straight, and the tip rounded. Tegmina with the median and basal bands directly transverse, very narrow, and well defined; the apical band composed of four narrow transverse groups of annuli, the two basal ones extending nearly across the tegmina. Wings moderately ample and rather broad, the length being nearly one and three-quarter times the width; apex very slightly attenuate; fuscous band broad, being a little less than one-fourth of the wing in width, continued along the posterior border to the anal angle, spur very short, reaching less than a third of the way to the base. Posterior femora yellow, more or less suffused with red on the inner face with three black bands, the median one not larger than the subapical and widely separated from the base; lower sulcus reddish yellow with one subapical black band, outer face with the subapical fuscous band rather distinct. Posterior tibiae orange red with a yellow sub-basal cloud on the exterior.

Length of body, female, 3½ mm.; length of tegmina, 32 mm.; length of posterior femora, 16½ mm.

One female, 4,300 feet, Salt Lake Valley, Utah, August 1-4, 1877; determined by S. H. Scudder. Two females, Wallula, Washington, September 1; Lake Point, Utah, August 14.

The species is apparently a rare one, as it seems to have been reported by no one else except Bruner, and his specimens, I think, belong to *Trimerotropis laticincta*.

**TRIMEROTROPIS LATICINCTA** Saussure.

*Trimerotropis laticincta* SAUSSURE, Prodr. Cédip., 1884, p. 169.

Large and robust, with very ample wings; color reddish brown, with moderately distinct and broad tegminal bands.

Scutellum shallowly sulcate, with a slight but rather distinct median carina. Pronotum with the metazone finely granulate with a few

widely scattered short linear granulations; process of the metazone obtuse angulate, with the lip much rounded; a trace of the lateral carinae on the front part of the metazone and prozone. Tegmina ample with basal and median bands wide, especially on the posterior border, both showing some evidence of being made up of annuli, but well defined; bands of the apex faint and composed of annuli, which are segregated into about four subordinate groups, the basal being much the largest.

Wings very ample, the width two-thirds of the length with the apex attenuate somewhat; fuscous band very broad, being about one-third the length of the wing in width, continued upon the posterior margin nearly to the anal angle. Spur very short, extending less than one-fourth of the way to the base; apex hyaline, without fuscous spots. Posterior femora plain without, on the inner side black with two light bands on the apical half; lower sulcus red with one subapical fuscous band. Posterior tibiae red.

Length of body, female, 33 mm.; length of tegmina, 34 mm.; length of posterior femora, 15 mm.

One female, New Mexico, Marsh collection, Bruner collection. Texas, Boll collector, Saussure. Nebraska, Bruner.

As Saussure says, it is similar to *Trimerotropis citrina*, but it is easily distinguished by its very ample wings, which appear to be wider than the ordinary type of wing in this genus by the whole width of the anterior lobe. The species from Nebraska, referred by Dr. Bruner to *Trimerotropis latifasciata*, probably belongs here, as the New Mexican female is certainly not *Trimerotropis latifasciata*.

#### TRIMEROTROPIS TOLTECA Saussure.

*Edipoda tolteca* SAUSSURE, Rev. et Mag. Zool., XI, 1861, p. 397.—THOMAS, Acrid. of N. Am., 1873, p. 215.

*Trimerotropis tolteca* SAUSSURE, Prodr. *Edip.*, 1884, p. 169.

I have not seen this species, but it appears to fall into this group and to be not very closely related to *Trimerotropis monticola*. Its distinctness seem to be assured by the fact that the outer half of the wing is infuscated. For the sake of completeness I append a translation of Saussure's description of the species:

Fuscous gray, rough. Head somewhat prominent, vertex rather broad between the eyes, with the scutellum subpolygonal, not longer than broad. Lateral foveole subelongate with the apex rounded. Facial costa broader on the front (female), narrower at the vertex and bifoveolate. Pronotum densely punctate and granulate, with the disk of the prozone (female) furnished with slightly elevated oblique carinae in front of the anterior sulcus. Disk of the metazone rough with the lateral carinae somewhat distinct, process acute angular with the margin punctate with black, median carina slight but nevertheless elevated anteriorly near the sulcus (on which account the crest of the pronotum, seen from the side, appears to be trilobate). Tegmina extending as far as one-third the length of the posterior tibiae, shorter than in allied species, colored throughout and obsoletely banded. Wings with the apex

more obtuse, the basal half sulphurous, the rest infuscated. Posterior femora with the basal half broad with the margins dilated and sinuate beyond the middle as well as strongly narrowed, inner face black with the margins and a preapical band yellow; on the outer side the carinæ are punctate with black. *Variety a*, wings with the apical half with hyaline clouds. *Variety b*, disk yellow with an obsolete fuscous band. Length of body, male 17 mm.; female 30 mm.; length of tegmina male 18 mm., female 26 mm.

Mexico, in temperate and higher regions; Orizaba, Oaxaca.

#### TRIMEROTROPIS PISTRINARIA Saussure.

*Trimerotropis pistrinaria* SAUSSURE, Prodr. (Edip., 1884, p. 173.

Plain brown with the tegminal bands quite well defined and moderately distinct. Size medium to large.

Scutellum slightly sulcate with the median carina slight but visible, median and lateral foveolæ well impressed. Pronotum with the median carina very slight; metazone more than twice as long as the prozone, with the disk furnished with a few scattered quite large granulations; process of the metazone acute angular with the sides straight and the tip sharp. Tegmina with the median and basal bands about the same size with boundaries well defined and moderately broad, equaling the light space between; annuli of the apical third scattered. Wings moderately broad, being a little less than one and two-thirds times as long as broad; fuscous band very broad, being a little more than one-third the length of the wing in width, scarcely continued at all upon the posterior border; spur rather long, extending nearly halfway to the base. Posterior femora and tibiæ as in *Trimerotropis melanoptera*.

Length of body, male 22 mm., female 32 mm.; length of tegmina, male 25 mm., female 31 mm.; length of posterior femora, male 13 mm., female 16½ mm.

One male and one female, Zacatecas, Mexico, November, 1897, Bruner collection; Texas, Boll collector; Saussure.

As Saussure remarks, this species approaches *Hadrotettix*, but it is a true *Trimerotropis* in most of its structural characters, and entirely so as far as coloration is concerned.

#### TRIMEROTROPIS MELANOPTERA, new species.

Color plain dull brown with moderately distinct tegminal bands. Size, large. Scutellum moderately sulcate with slight but rather distinct median carina, median and lateral foveolæ unusually well impressed. Pronotum with the median carina very low; metazone twice as long as the prozone, smooth with a very few widely scattered larger granulations; process of the metazone acute angular with the sides straight and the tip square. Tegmina with the basal and median bands rather ill-defined and more or less distinct, the latter broader, the apical third is punctate with scattered annuli scarcely grouped into a band. Wings of moderate size, rather long but dis-

tinely less than twice as long as broad, fuscous band extremely broad so that it is two-thirds of the length of the wing in width, leaving but a narrow yellow strip on the inner margin four times as long as it is wide, and an equally narrow strip at the apex; spur none. Posterior femora with the disk of the inner face and the lower sulcus black with one subapical red band; outer side plain, except for a rather distinct light band. Posterior tibiae coral red with a trace of the usual subbasal cloud present on the outer side.

Length of body, male 26 mm., female 37 mm.; length of tegmina, male 29 mm., female 35 mm.; length of posterior femora, male 14 mm., female 18 mm.

One male and one female, Silver City, New Mexico; Bruner collection.

I know of no form nearly related to this that has such an extensive black area. It compares in this respect with *Dissosteira carolina*.

#### CALIFORNICA group.

Small, light-colored species, with the bands of the tegmina distinct or wanting, not merely faint on account of slight contrast between them and the ground color. Scutellum of the vertex moderately or strongly sulcate, much longer than wide, not exceeding in the width of the short (male) or long (female) diameter of the eye. Pronotum with the median carina rarely more than slightly cristate even on the prozone, but always more or less distinctly bilobate when viewed from the side; lateral carinae wanting even on the front part of the prozone, but the shoulders well marked on the metazone; the latter once and a half to twice as long as the prozone, with its disk smooth; lateral lobes with a tooth. Tegmina with the last branch of the radial sector from one-third to one-half the length of the sector from the forks; area of the cubital forks occupied by several series of polygonal veins; intercalary vein on the apical portion distant from the median not more than once its own width in either male or female; wings with the disk yellow and a moderately broad and distinct fuscous band; apex hyaline, very rarely with a slight suffusion of fuscous at the extreme tip. Posterior femora with two light bands on the apical half of the disk of the inner face, the basal half nearly entirely black or the area next the base light; outer face with one or more distinct dark bands; lower sulcus light with one or two dark bands. Posterior tibiae red, with a pale cloud next the base, most distinct on the outer side.

#### TRIMEROTROPIS CALIFORNICA Bruner.

*Trimerotropis californica* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 71.

Scutellum of the vertex deeply sulcate, with a very faint median carina; median and lateral foveolæ rather strongly impressed; eyes about equal (male) or a little less (female) than the genal groove;

Pronotum with the prozone considerably elevated and bilobate when seen from the side, the anterior being much longer than the posterior lobe; metazone about one and three-quarter times as long as broad, with the disk finely granulate and the process a little less or somewhat more than a right angle; lateral lobes with a large tooth. Tegmina with the basal band distinct and usually solid, preceded by a rouged area punctate with fuscous and followed by an unspotted light band wider than itself; median band never quite as well defined as the basal, but larger and subtriangular, broader on the posterior margin, followed by a light band narrower than the first; distal third occupied by rather numerous annuli, which imperfectly arrange themselves into three or more narrow, transverse bands. Wings narrow, about twice as long as wide, with the apex slightly attenuate; fuscous band rather narrow, not exceeding in width one-sixth the length of the wing, narrowed distinctly behind the spur, which extends more than half way to the base, continued upon the posterior margin less than half way to the base. Posterior femora with the disk of the inner face not entirely blackened by a stripe which extends nearly to the base; apical half light, with two black bands, the proximal one extending across the lower sulcus and across the outer face; the former has a faint fuscous band proximal to the first and the latter is usually furnished with one or two distinct bands in addition to the one already mentioned and the apical one. Posterior tibiae coral red, with the usual subbasal annulus.

Length of body, male 17 to 18 mm., female 24 mm.; length of tegmina, male 20 to 24 mm., female 24 mm.; length of posterior femora, male 8 to 12 mm., female 12 mm.

One male, Los Angeles, California, Coquillett, collector; U. S. National Museum. One male, Los Angeles, California, Coquillett, collector; Bruner collection. Two males, Ontario, California, Snodgrass, collector; Stanford University collection. One female, California, Wickham, collector; San Louis Valley, California; Bruner.

TRIMEROTROPIS STRENUA, new species.

Very closely related to *Trimerotropis californica*, from which it differs as follows:

Scutellum of the vertex broader; median carina distinct. Pronotum with the prozone very slightly elevated, tooth of the lateral lobes minute; process of the metazone decidedly acute angulate. Tegmina with the basal band very narrow, being three or four times as long as wide, distinct and well defined, median band and apical third as in that species, with the three light bands entirely unspotted and occupying twice as much space as the basal and median fuscous bands together. Wings with the fuscous band rather broad, occupying at least a fifth of the wing, continued on the posterior border rather more (male) or less (female) than half way to the anal angle. Spur short, extending



not more than one-third of the way to the base. Posterior femora with the disk of the inner face black, with two yellow bands on the apical half; lower sulcus yellow, with one subapical black band; outer face plain, with a single black transverse subapical band.

Length of body, male 21 mm., female 29 mm.; length of tegmina, male 18 mm., female 28 mm.; length of posterior femora, male  $11\frac{1}{2}$  mm., female  $12\frac{1}{2}$  mm.

One male and one female, Salt Lake Valley, Utah, September; Bruner collection.

This and the following species may be but varieties of an exceedingly variable species. This doubt can only be cleared up by more specimens from intermediate points.

TRIMEROTROPIS MONTANA Bruner, manuscript.

This species differs from both the preceding species, to which it is closely allied, in the following particulars:

Scutellum with the median carina nearly as distinct as the lateral. Pronotum with the metazone scarcely more than one and a half times as long as wide; process of the metazone strongly obtuse angulate; tooth of the lateral lobes minute. Tegmina about as in *Trimerotropis californica*. Wing about as in that species, with the band equally narrow, but the spur much shorter, extending not more than a fourth of the way to the base. Posterior femora with the inner face very similar to *Trimerotropis californica* and the outer like those of *Trimerotropis strenua*.

Length of the body, male 19 mm.; length of the tegmina, 22 mm.; length of posterior femora,  $9\frac{1}{2}$  mm.

One male, Boise City, Idaho; Bruner collection.

TRIMEROTROPIS AGRESTIS, new species.

Pale reddish brown, with the face and sides of the head whitish plain, with a few scattered spots on the tegmina, not showing any trace of the usual arrangement into three bands.

Frontal costa plainly sculcate above as well as below the ocellus; scutellum strongly sulcate, with the merest trace of a median carina, broad, almost equaling the long diameter of the eye in the female; eyes plainly (male) or much (female) shorter than the genal groove. Pronotum with the median carina more than usually distinct on the metazone, slightly cristate and plainly bilobate on the prozone; median carinae barely visible on the front part of both metazone and prozone; metazone nearly twice as long as the prozone, with the disk finely granulate and the process decidedly obtuse-angulate; lateral lobes with a large tooth, which causes the posterior lower angle to appear to be drawn downward. Tegmina entirely plain except for a few scattered spots, without a trace of the usual bands. Wings moderately broad, with a distinct and wide fuscous band, which is equal in

width to about one-fifth the length of the wing, continued upon the posterior border much more than halfway to the anal angle. Spur very short, extending less than one-fourth of the way to the base. Posterior femora with the whole inner face reddish, but more or less suffused with fuliginous, so that the three black bands are not easily distinguished; outer face plain, with a narrow light subapical band. Posterior tibiae red with the usual light subbasal cloud.

Length of body, male, 22 mm., female, 27 mm.; length of tegmina, male, 23 mm., female, 28 mm.; length of posterior femora, male, 11 mm., female, 13½ mm.

One male and one female, Sidney, Nebraska. Bruner collection.

This species is unique among the red-legged *Trimerotropis* for its plain tegmina.

PACIFICA group.

TRIMEROTROPIS PACIFICA Bruner.

*Trimerotropis pacifica* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 78.

Size medium, color light cinereous, with minute fuscous punctations scarcely visible to the naked eye and serving merely to darken the ground color, bands on the tegmina conspicuous.

Scutellum but little constricted above or below the ocellus, very moderately sulcate with the lateral carinae vanishing long before reaching the clypeus; scutellum much longer than wide, barely sulcate, with the median carina nearly as distinct as the lateral; eyes scarcely as long as the genal groove even in the male; antennae longer than usual in the genus, slightly flattened and distinctly attenuate at the tip. Pronotum with the anterior margin decidedly angulate; median carina not cristate even on the prozone, on the metazone, a raised line as distinct posteriorly as anteriorly; metazone with the disk smooth or very evenly granulate; the process acute-angular with the sides straight and the tip pointed; lateral carinae entirely wanting even on the anterior of the prozone; lateral lobes with a minute tooth on the lower posterior margin. Tegmina narrow, with the fuscous bands solid and contrasting strongly with the very light ground color; the usual annular spots wanting, almost entirely proximate to the basal band and restricted on the distal third to a series of groups along either margin, the first on the anterior margin being conspicuously larger; hyaline portion of the tegmina with quadrate cells, limited by a line extending obliquely across the tegmina about halfway between the median fork and the last branch of the radius; intercalary vein in its apical portion very close to the median, being separated from it by not more than its width; area of the cubital forks narrow, but filled with more than one series of polygonal cells. Wings narrow with the apex attenuated, twice as long as broad; disk dilute yellow, with the fuscous band interrupted below the spur, but otherwise distinct and

moderately broad, being about one-fifth of the length of the wing, continued on the posterior margin much less than halfway to the anal angle; spur long, extending more than halfway to the base; apex hyaline without fuscous cells. Posterior femora unusually long and slender, with the disk of the inner face mostly light colored, a stripe on the basal half, a band in the middle of the apical half, and the knee blackish. Posterior tibiae obscure whitish, unbanded.

Length of body, male,  $19\frac{1}{2}$  mm.; length of tegmina,  $22\frac{1}{2}$  mm.; length of posterior femora, 12 mm. One male, Los Angeles, California, Bruner collection.

The species was based upon a single male from Los Angeles. The only specimen I have seen is a male from this locality, marked type, but it differs quite remarkably from the measurements given by Bruner and is therefore probably not the specimen upon which the species was originally based.

#### VINCULATA group.

Frontal costa distinctly sulcate, with the carinae distinct to the central foveolæ, but rarely reaching the clypeus; above the ocellus usually less deeply sulcate than below, but never full and rounded; scutellum of the vertex moderately or deeply sulcate, only rarely not plainly longer than broad, with the median carina usually distinct; median and lateral foveolæ distinct; eyes never longer than the genal groove even in the males, plainly shorter in the females. Pronotum with the median carina barely cristate on the prozone, a raised line on metazone; the latter from one and three-fourths to twice as long as the former; lateral lobes without a tooth. Tegmina distinctly banded, with the bands at the ends of the first and second quarters plainly darker (except in deeply infuscated specimens), and though generally irregular and variable in shape and size, not a mere aggregation of annular spots, but solid or semisolid; spots proximal to the base, for the most part smaller than those on the apical third and few of them annular; light areas beyond the basal and median bands nearly or quite free from fuscous spots, the proximal one generally somewhat V-shaped and wider on the anterior margin; last branch of the radial sector distant from the fork about a third (female) generally more than a third (male) of the length of the sector; median and cubital forks never fused, but generally connected by a short cross vein; intercalary vein in its apical half separated from the median by scarcely more than its own width even in the females; wings yellow or greenish yellow at the base, with a distinct fuscous band; apex hyaline, rarely with any fuscous spots near the apex; second dividing vein joining the second anal vein much behind the middle. Posterior femora with the disk of the inner face black with two light bands on the apical half. Posterior tibiae obscure yellow or brown.

## TRIMEROTROPIS SALINA Bruner, manuscript.

Size, medium; color, dark fuscous brown, obscurely maculate. Frontal costa considerably constricted above and below the ocellus; scutellum very broad, being very little longer than broad in the female, slightly longer in the male, moderately sulcate, with the median carina scarcely distinct. Pronotum with the median carina scarcely cristate on the prozone and quite distinct on the metazone. The latter is not more than one and three-quarters times as long as the former and has the disk very evenly and finely granulate, with the process obtuse-angular, the sides straight, and the tip very plainly rounded. Tegmina broad, with the usual markings made little conspicuous by the dark ground color. Wings rather broad, being considerably less than twice as long as broad, with a broad fuscous band occupying not much less than a third the length of the wing, extending on the posterior border much more than halfway to the anal angle. Spur short, reaching less than halfway to the base; apical portion hyaline with a few fuscous spots. Posterior femora without fuscous bands externally; lower sulcus black, with two light bands on the apical half. Posterior tibiae obscure fuscous, with a faint subbasal annulus.

Length of body, male, 22 mm., female, 29 mm.; length of tegmina, male, 23 mm., female, 30 mm.; length of posterior femora, male, 12 mm., female, 14½ mm.

One male and one female, Salt Basin, Lincoln, Nebraska, Bruner collection. One male and one female in the collection of Stanford University.

This species is easily recognized by the broad fuscous band of the wings and the dark hind tibiae.

## TRIMEROTROPIS SIMILIS Scudder.

*Trimerotropis similis* SCUDDER, Second Rept. U. S. Ent. Com., App. II, 1880, p. 27.

This species is very closely related to both of the preceding. In the structure of the head and pronotum is not distinguishable from *Trimerotropis vinculata*. The wings are precisely similar with the fuscous band, narrow and distinct as in that species, and the apex unspotted, but the general color of the tegmina and body is quite distinct. The head, body, and limbs are nearly uniform dark brown. The tegmina have two fairly lighter bands in the usual position, one beyond the basal third and the other just beyond the middle of the wing and almost no visible spots anywhere.

Length of body, male, 22 mm., female, 28 mm.; length of tegmina, male, 24 mm., female, 27 mm.; length of posterior femora, male, 11 mm., female, 13 mm.

Wallula, Washington, Scudder; Washington, Bruner. I have examined two specimens from The Dalles, Oregon, from the Bruner collection.

**TRIMEROTROPIS PALLIDIPENNIS** Burmeister.

*Oedipoda pallidipennis* BURMEISTER, Handl., Ent., 11, p. 641.—THOMAS, Acrid. N. Am., 1873, p. 218.

*Oedipoda straminea* EHRLICHSON in Schomburgk, Fann. et Flor. Brit. Guyan., p. 582.  
*Trimerotropis pallidipennis* SAUSSURE, Prodr. Oedip., 1884, p. 171.

Size, small or medium; color, light brown; head, pronotum, and abdomen thickly punctate with minute fuscous spots, tegmina very conspicuously banded. Frontal costa less decidedly sulcate and broader than usual in this group with that part above the ocellus scarcely narrowed below the scutellum, which is very moderately sulcate with the median carina indistinct and but little longer than broad. Pronotum with the median carina strongly cristate with the lobes not very unequal on the prozone, and scarcely perceptible on the metazone which is very nearly twice as long as the prozone; metazone with the disk roughened with larger granulations, some of which are distinctly linear; process of the metazone a little greater than a rectangle, with the sides very slightly arcuate and the tip sharp. Tegmina very narrow and strongly falcate on the apical third, the usual bands similar to those of *Trimerotropis vinculata* in structure and position. Wings broader with the costal margin much more strongly arcuate, but with the apex quite as attenuate as in that species; disk greenish yellow, somewhat more transparent than usual and very large, the fuscous band being entirely beyond the center of the wing; fuscous band very narrow, but quite uninterrupted and very distinct, continued on the posterior about halfway to the anal angle, with the spur very long, extending two-thirds of the way to the base; apical portion unusually small, hyaline without spots. Posterior femora rather indistinctly banded on the outer face, the lower sulcus black with two lighter bands on the apical half. Posterior femora, obscure yellow with a faint lighter subbasal annulus.

Length of body, female, 27½ mm.; length of tegmina, 29 mm.; length of posterior femora, 12 mm.

One female Carcarana, Argentina, South America, Bruner's collection. The species is known to me only through a single specimen, but seems very distinct in the tegmina and wings.

**TRIMEROTROPIS COLLARIS**, new species.

Size small, color clay yellow, head and abdomen plain, pronotum moderately and tegmina always very conspicuously banded and spotted with fuscous. Scutellum narrow, deeply sulcate, with the median carina moderately distinct and elongate, being one and a half (female) or twice (male) as long as wide. Pronotum very short and broad, the length being equal to (female) or barely greater (male) than the width, with the median carina strongly elevated on the anterior of

the prozone and much depressed at the posterior border; metazone, with the disk, moderately smooth, with a few larger granulations, which tend to run into lines; the process strongly obtuse angulate, with the borders straight and the tip rounded. Tegmina narrow, long, and very conspicuously banded, as in bright-colored specimens of *Trimerotropis vinculata*. Wings very similar to that species, with the disk pale citron, instead of greenish yellow. Posterior femora distinctly or strongly banded externally, with the lower surface black with a single subapical light band. Posterior tibiæ obscure yellow, with an inconspicuous light subbasal annulus.

Length of body, male, 19 mm., female, 25½ mm.; length of tegmina, male, 24 mm., female, 27½ mm.; length of posterior femora, male, 11 mm., female, 13½ mm.

San Jose del Cabo, Mexico.

One male and one female from the collection of the California Academy of Sciences.

The species is easily distinguished from *Trimerotropis vinculata* by its small size and very short and broad pronotum.

#### TRIMEROTROPIS FRATERCULA, new species.

Size small, color light reddish brown, head livid, rest of the body and limbs thickly but not very conspicuously maculate with fuscous, tegmina conspicuously maculate. Frontal costa decidedly narrowed above and below the ocellus, the lateral carinae fading before reaching the clypeus; scutellum moderately broad and not narrower proportionally in the male than in the female; median carina scarcely distinct. Pronotum with the median carina scarcely cristate even on the prozone, very distinct on the metazone, seen from the side not bilobate; metazone nearly twice as long as the prozone; metazone with the disk finely granulate, many of the granulations exhibiting a tendency to run into lines; metazonal process acute-angled with the sides barely arcuate and the tip sharp. Tegmina broad with the usual bands distinct but more obviously composed of aggregations of small spots than usual in this group; area of the cubital forks filled with several series of polygonal cells even in the male; last branch of the radial sector nearer the fork than usual in the group, being distinct little more than one-fourth (female) or one-third (male) the length of the sector. Wings broad, being about one and three-fifths times as long as broad; disk light yellow with the fuscous band moderately broad and distinct but interrupted narrowly behind the spur, continued along the posterior margin decidedly less than halfway to the anal angle, with the spur long, extending rather more than halfway to the base; apical portion hyaline without fuscous spots. Posterior femora banded more or less distinctly exteriorly, lower sulcus black with one subapical light band. Posterior tibiæ obscure yellow, faintly clouded with brown

apically and on the basal half, where it is interrupted by a faint, light annulus.

Length of body, male, 18 mm., female, 25 mm.; length of tegmina, male, 20 mm., female, 25 mm.; length of posterior femora, male, 10 mm., female, 12½ mm.

One male and one female, Pine Bluffs, Wyoming. Bruner collection. Readily distinguished by its small size and the character of the wing and wing markings.

**TRIMEROTROPIS VINCULATA** Scudder.

*Trimerotropis vinculata* SCUDDER, Ent. Notes, V, 1875-76, p. 25; App. II, Second Rept. U. S. Ent. Com., 1880, p. 27, pl. xvii, fig. 11.—BRUNER, Bull. Wash. Coll., I, 1885, p. 134.

*Trimerotropis cincta* SAUSSURE, Prodr. Gédip., 1884, p. 171.

Size medium to large; color light or dark brown, much varied with fuscous; scutellum strongly sulcate, with the median carina about as distinct usually as the lateral, these divergent and plainly angulate opposite the front margin of the eyes; eyes as long as the genal groove in the male. Pronotum with the median carina moderately cristate; the anterior lobe of the crest of the prozone considerably longer than the posterior lobe; metazone nearly twice as long as the prozone, its disk finely granulate without any scattered larger granulations; process of the metazone slightly acute-angular, with the sides straight and the tip plainly rounded. Tegmina with the bands moderately or very distinct, the base being usually suffused with reddish brown which gradually becomes diluted farther from the base. The area of the cubital forks is never very broad, occupied by several rows of polygonal cells (female) or by one row (at least at the base) of subquadrate cells (male). Wings long, scarcely less than twice as long as broad, with the posterior margin nearly straight and parallel with the anterior, the apex drawn out and attenuated; disk, varying shades of yellow, sometimes tinged with blue; fuscous band very distinct and rather narrow, rarely as much as one-sixth the length of the wing, with the spur short, extending plainly less than halfway to the base, on the posterior margin crossing the eighth lobe and reaching much beyond the middle, rarely it fades scarcely beyond the middle. Posterior femora generally distinctly banded on the outer face; lower sulcus black with one light subapical band. Posterior tibiae obscure yellow without any distinct subapical light annulus.

Length of body, male, 22 to 24 mm., female, 29 to 30 mm.; length of tegmina, male, 25 to 28 mm., female, 30 to 33 mm.; length of posterior femora, male, 12 to 12½ mm., female, 14 to 15 mm.

Western North America, extending eastward to middle Nebraska, Kansas, and Texas, the edge of the Great Plain.

A common species not confined to barren ground, but common along roadsides and in dry, cultivated fields.

## TRIMEROTROPIS SAXATILIS, new species.

*Trimerotropis verruculata* THOMAS, Ninth Rept. Ent. Ill., 1880, p. 112.

Very similar to *Trimerotropis vinculata* and possibly not distinct from that species, but differing in the following particulars:

Scutellum broader; pronotum with the metazone not more than one and three-quarter times as long as the prozone, with the process rectangular. Tegmina, as well as the whole body and limbs, excepting the lower surface of the head and abdomen, extremely variable in color, the ground color being white, bluish green, or brown, generally very strongly varied with fuscous, but sometimes nearly plain by the suffusion of the ground color with fuscous. Wings shorter relatively as well as positively, being considerably less than twice as long as broad; fuscous band broader, being from one-fourth to one-fifth the length of the wing, extending along the posterior border much beyond the middle; apex hyaline, with many or few fuscous spots. Posterior femora with the lower sulcus black, crossed by two white bands on the apical half, the median not completely cutting the black. Posterior tibiae varying with the color of the femora; the prevailing color greenish, with a lighter, generally conspicuous, subapical annulus.

Length of body, male, 20 to 22 mm., female, 27 mm.; length of tegmina, male, 22 to 23 mm., female, 26 mm.; length of posterior femora, male, 12 mm., female, 13 mm.

Southern Illinois, Thomas; Union County, Illinois (French collection); Arkansas.

In Arkansas the species is found only on rocky ground, and its color varies with the surroundings. Where the exposed rocks are light colored or white and covered with lichens the individuals will be white, green, and black in color and so thoroughly protected that it is quite impossible to see them when at rest.

## TRIMEROTROPIS PILOSA, new species.

Size small, colors plain or dark, but the tegmina conspicuously banded. Head, thorax, and limbs conspicuously hairy. Scutellum very broad, even in the male, but moderately long, being one and a quarter times as long as broad; deeply sulcate, with the median carina distinct. Pronotum with the median carina very moderately cristate on the prozone; metazone nearly twice as long as the prozone, its disk finely and evenly granulate, and the metazonal process decidedly obtuse angular, the sides straight and the tip rounded. Tegmina with the usual bands distinct, the basal one unusually broad and plainly encroaching upon the light band just beyond it, which is unusually narrow. Wing very broad, being less than one and a half times as long as broad, with the tip not at all attenuate; fuscous band rather nar-



row, scarcely more than a fifth the length of the wing in width, but very distinct, continued upon the posterior margin more than half-way to the anal angle; spur short, extending plainly less than halfway to the base; apical portion hyaline without fuscous spots. Posterior femora not plainly banded exteriorly, with the lower sulcus obscurely infuscated rather than black, with one or two indistinct light bands on the apical half. Posterior tibiae deep brown darker on the basal half, where this color, however, is interrupted by a lighter annulus.

Length of body, male, 16½ mm.; length of tegmina, 20 mm.; length of posterior femora, 9½ mm.

One male, Palo Alto, California, March 17; Stanford University collection.

This species is the smallest *Trimerotropis* known to me, easily recognized by its broad wings, brown posterior tibiae, and unusually hairy body. Another specimen from Palo Alto, which I would refer to *Trimerotropis vinculata*, without doubt, except for the fact of its having the right posterior tibia yellow, while the left one is deep brown. It is not unlikely a hybrid produced by these species.

#### FALLAX group.

Brown, more or less deeply infuscated and maculate. Frontal costa sulcate below the ocellus, but, except for a very short distance, full, rounded, and punctate above. Scutellum of the vertex much longer than wide, with the central foveolæ only feebly biarolate but very distinct, lateral foveolæ only a little less distinct. Pronotum with the dorsum rather flat and the shoulders well marked, with lateral carinae distinct on the front of the prozone at least; median carina cristate on the prozone, scarcely more than a raised line on the metazone; the latter from once and a half to twice as long as the prozone, with its dorsum furnished with a few larger granulations; lateral lobes never toothed. Tegmina broad, with the maculations distinctly annular and scattered pretty evenly over the whole surface or rarely gathered into the usual bands; last branch of the radial sector distant from the fork about one-fourth the length of the sector. Wings never more than twice as long as wide, with the outer half fuscous or the apical part fuliginous or rarely only infuscated at the tip; the spur long, reaching fully half way to the base; the disk yellow. Posterior femora with the disk of the inner face black, with two light bands on the apical half; lower sulcus black, with one light subapical band. Posterior tibiae never bright red.

The species in this group all bear a strong resemblance to *Circotettix*, especially to *Circotettix suffusus* and *obscurus* Scudder and *reticulatus* Kirby. They are all closely related, and may prove to be varieties of a single species.

## TRIMEROTROPIS FALLAX Saussure.

*Trimerotropis fallax* SAUSSURE, Prodr. *Cedip.*, 1884, p. 170.

Very similar to the preceding species, from which it may be distinguished by the following characters: Scutellum of the vertex moderately sulcate, with the median carina always apparent and usually distinct. Pronotum with the anterior margin not plainly angulate and the process of the metazone slightly obtuse-angular, the angle sharp and the sides straight, not sinuate in the least; metazone twice as long as the prozone. Tegmina with the maculations quite evenly scattered (sometimes faint) over the whole surface, with scarcely a trace of the usual bands, the apex distinctly obliquely truncate instead of evenly rounded.

Length of body, male, 22 mm., female, 27 mm.; length of tegmina, male, 23 mm., female, 30 mm.; length of posterior femora, male, 12 mm., female, 14 mm.

One male and one female, Placer County, California; Bruner collection. Three males and one female, Placer County, California; U. S. National Museum; California, Saussure, Koebele.

## TRIMEROTROPIS NUBILA, new species

Color variable, but maculations usually distinct. Frontal costa only slightly constricted below the ocellus; scutellum of the vertex shallowly sulcate, with the median carina indistinct. Pronotum with the anterior margin distinctly angulate, and the process of the metazone rectangulate and sharp, with the margins slightly sinuate; the median carina is moderately cristate on the prozone, with the front lobe nearly twice as long as the second; the lateral carinae are distinct on the front of both prozone and metazone. The tegmina have the annular fuscous spots gathered into two somewhat distinct bands; the maculations on the distal two-fifths are about as numerous in the middle as along the margins of this area; the intercalary vein is separated from the median by once its width; the distance between the radial and median forks is considerably greater than the width of the anterior field; the radial sector has three or four forks; the median and cubital veins do not fuse at the end of the intercalary area, but are free or connected by a cross vein; the anterior fork of the cubitus furcates near its base. The wings are moderately broad, scarcely twice as long as broad, with the disk greenish-yellow and the rest of the wing infuscated, or the subapical portion merely infumated; the fuscous band does not extend beyond the fifth lobe, or less than halfway to the anal angle; the median stem joins the radius a little more than one-third the length of the wing from the base, and the latter forks halfway between this point and the apex. The second dividing vein joins the second anal one-third the distance from the base to margin. The posterior femora

are more or less distinctly banded on the outer face with fuscous. The posterior tibiae are steel-blue with a light subbasal and a fuscous basal ring.

Length of body, male, 22 mm., female, 27 mm.; length of tegmina, male, 23 mm., female, 29 mm.; length of posterior femora, male, 11 mm., female, 13 mm.

One male, Hot Springs, New Mexico, 7,000 feet altitude; Bruner collection.

The species is closely related to *Trimerotropis fallax* Saussure, from which it is readily distinguished by the distinct bands of the tegmina and the obtuse-angled process of the metazone.

#### TRIMEROTROPIS CONSPERSA, new species.

Very closely related to *Trimerotropis fallax*, from which it may not be specifically distinct. Scutellum of the vertex somewhat narrower than in that species, being fully one and a half times as long as broad and deeply sulcate, with the median carina distinct. Wings somewhat longer, being very nearly twice as long as broad, with the disk faintly tinged with very pale citron instead of greenish yellow. Hind tibiae obscure yellow or red, without any distinct pale subbasal annulus.

Length of body, male, 25 mm., female, 28 mm.; length of tegmina, male, 25 mm., female, 30 mm.; length of posterior femora, male, 13 mm., female, 14 mm.

One male, Mount Shasta, California, September, 1885, J. Behrens, collector. One female, Shasta County, California, July, J. Behrens, collector. Bruner collection.

#### TRIMEROTROPIS VARIEGATA, new species.

This species is closely related to *Trimerotropis conspersa* from which, however, it is readily distinguished. Scutellum somewhat narrower than in the preceding species, being nearly twice as long (not including the central foveole) as broad, dully sulcate, with the median carina distinct. Pronotum with the anterior lobe of the carina of the prozone very little longer than the posterior; metazone plainly less than twice and scarcely one and three-quarter times as long as the prozone, with its process strongly obtuse-angulate, the sides straight, and the tip slightly rounded. Tegmina with the usual annular spots plainly collected into three groups, the basal one quite distinct and the apical very indistinct; nearly all the middle beyond the anterior cubital fork hyaline except for the veins and spots. Wing considerably less than twice as long as broad (26 by 15 mm.), with the disk very faint yellow, the fuscous band with a spur extending much more than halfway to the base and including less than five lobes on the exterior margin and reaching much less than halfway to the base; apical third hyaline except for the fuscous veins and an apical fuliginous cloud.

Posterior tibiae exactly as in *Trimerotropis*.

Length of body, male, 20 mm., female, 25 mm.; length of tegmina, male, 21½ mm., female, 29 mm.; length of posterior femora, male, 9¼ mm., female, 12 mm.

*Type*.—Cat. No. 5374, U.S.N.M.; Tighes Station and Julian, southern California, Scudder. The species is known to me by this single specimen, a female. It is without a locality label.

#### CAERULEIPENNIS group.

Size medium, color brown or gray, considerably varied with darker spots. Scutellum of the vertex much (male) or little (female) longer than broad; central and lateral foveolæ distinct; eyes as long (male) or decidedly (female) shorter than the genal groove. Pronotum with the lateral carinae wanting; anterior lobe of the crest of the prozone not much longer than the posterior. Tegmina with the annular maculations distinctly segregated into three bands; intercalary vein in the apical half separated from the median by a space not greater than (male) or plainly greater than (female) its width; last branch of the radial sector distant from the fork from one-third to one-half the length of the sector; area of the cubital forks filled with irregular cells in several rows; median and cubital forks not fused, free or connected by a short vein; anterior fork of the cubitus forking near the base. Wings with the disk blue, fuscous bands present or plainly indicated by infuscated veins and cells. Posterior femora black on the disk of the inner face, with two light bands on the apical half; plainly but not conspicuously banded on the outer face. Posterior tibiae blue, with a lighter subbasal annulus.

#### TRIMEROTROPIS CAERULEIPENNIS Bruner.

*Trimerotropis caeruleipennis* BRUNER, Can. Ent., XVII, 1885, p. 10.

Scutellum distinctly wider than in *cyanipennis*, with the median carina distinct, especially in front. Pronotum with the anterior margin distinctly angulate; median carina strongly cristate upon the prozone; metazone with the disk finely granulate, its process right (male) or obtuse angulate (female), the sides slightly arcuate and tip scarcely rounded. Wings long and narrow, being twice as long as wide; disk light blue, bordered exteriorly by the usually incomplete and narrow fuscous band which, when present on the exterior border, reaches much less than halfway to the anal angle; apical two-fifths hyaline without any infuscated cells. Posterior tibiae light blue with a distinct light annulus, which is sometimes intensified on the outside by a white cloud.

Length of body, male, 18 mm.; female, 28 mm. Length of tegmina, male, 23 mm.; female, 31 mm. Length of posterior femora, male, 12 mm.; female, 15 mm.

Los Angeles, California, Bruner. I have seen Bruner's types in the U. S. National Museum, and I have typical specimens from him from Los Angeles, California, and Camp Umatilla, Wyoming.

TRIMEROTROPIS CYANEIPENNIS Bruner.

*Trimerotropis cyaneipennis* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 68.

Scutellum of the vertex narrow; median carina indistinct. Pronotum with the anterior margin scarcely angulate; median carina scarcely cristate even on the prozone; disk of the metazone smoothly granulate, sometimes with a few scattered larger granulations; metazone nearly twice as long as the prozone, with its process scarcely acute-angular, the sides straight and the tip slightly rounded. Wings not quite twice as long as broad; disk deep blue, with a moderately broad distinct black band, which sends a spur a little more than halfway to the base and is continued on the exterior margin never more and usually much less than halfway to the anal angle; apex hyaline, without any infuscated cells. Posterior tibiae deep blue, with a pale basal or subbasal annulus, sometimes suffused on the outside with brown.

Length of body, male, 23 mm.; female, 30 mm. Length of tegmina, male, 23 mm.; female, 31 mm. Length of posterior femora, male, 12 mm.; female,  $5\frac{1}{2}$  mm.

*Habitat*.—Salt Lake Valley, Utah, Bruner. I have seen Bruner's types in the U. S. National Museum, also specimens from Grand Canyon and Flagstaff, Arizona. Bruner says of this species: "It frequents rather well-clothed surfaces among the rocky talus of mountain sides."

AZURESCENS group.

Frontal costa distinctly sulcate, but very briefly above the ocellus; scutellum always plainly longer than wide, but less obviously in the females; central and lateral foveolae distinct. Pronotum with the metazone nearly twice as long as the prozone, at least plainly more than once and a half as long; median carina low and very slightly cristate, even on the prozone; lateral carinae obsolete, even on the front part of the prozone, but the disk plain and shoulders well marked; lateral lobes never toothed; process of the metazone rectangular or acute. Tegmina maculate with annular spots, which are generally collected into quite irregular and ill-defined bands, one occupying the basal third, another the middle, and the last the apical third; middle field beyond the median and cubital forks largely hyaline; intercalary vein on its apical half close to the median, at same point separated from it by about once its width; the median is free from the cubitus at the end of the intercalary field or united with it by a short vein, but never fused with it. Wing without any trace of a fuscous band

except sometimes in the infuscations of the veins of the area usually occupied by the band; hyaline, with the base very faintly tinged with blue, or greenish; dividing vein of the second anal uniting with the second anal one-third the length of the latter from the base. Posterior femora with the disk of the inner face black with two light bands on the apical half; lower sulcus black or more or less infuscated with two light bands on its apical half. Posterior tibiae never red nor blue, yellowish or obscure.

**TRIMEROTROPIS AZURESCENS** Bruner.

*Trimerotropis azurescens* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 69.

*Trimerotropis perplexa* BRUNER, Proc. U. S. Nat. Mus., XII, 1890, p. 74.

Size medium; color varying from grayish-white to dull brown, much but not conspicuously varied with fuscous.

Frontal costa sulcate for a considerable distance above the ocellus; scutellum of the vertex only moderately (female) or deeply (male) sulcate, a little (female) or much longer (male) than wide, with the median carina distinct though slight; eyes plainly shorter than the genal groove. Pronotum with the median carina low, even upon the prozone, and barely cristate; posterior lobe of the crest of the prozone conspicuously longer than the posterior lobe; lateral carinae entirely wanting on the metazone and scarcely visible on the anterior part of the prozone; metazone finely granulate without larger scattered granulations, nearly twice as long as the prozone, with its process acute angular, sides straight, and tip slightly rounded. Tegmina much varied, with slightly contrasting, not very dark, annular spots, which are very imperfectly segregated into the three bands typical of the genus; area of the cubital fork in the male occupied by a single series of cells, at least at the base in the male; this area very variable in the female. Wings broad, but much more decidedly in the females; in the former scarcely, in the latter fully two-thirds as long as broad; hyaline, faintly tinged with blue or greenish, especially on the anal portion of the radiate field, with fuscous band only faintly indicated in some specimens by infuscation of the veins. Posterior femora plain on the outer face or very inconspicuously banded. Posterior tibiae obscure yellow, with indefinite brownish clouds on the basal half and apically.

Length of body, male, 22 mm., female, 29 mm.; length of tegmina, male, 24 mm., female, 30 mm.; length of posterior femora, male, 12 mm., female, 14 mm.

*Habitat*.—Fort Benton, Montana, United States National Park, Wyoming, Lemhi or Salmon River, Idaho; Chadron, Nebraska, Bruner; Alkali Stage Station, Green River, Wyoming, Scudder. I have seen specimens of *azurescens* from Fort Benton, Montana, and Salmon City, Idaho, from Doctor Bruner's collection, also Bruner's

types in the U. S. National Museum, and in the same collection specimens from Yellowstone, Montana. I have specimens of *perplexa* from Chadron, Nebraska, determined by Doctor Bruner.

A careful examination of these specimens fails to show any constant difference, and I am compelled to believe them synonymous. Bruner says of *perplexa*:

It produces a very decided clatter upon the wing. According to the same authority it is a bare-ground species, living upon stunted chenopodiaceae, which manages to live in the alkali flats, where it abounds.

#### TRIMEROTROPIS PSEUDOFASCIATA Scudder.

*Trimerotropis pseudofasciata* SCUDDER, App. J. J. Ann. Rept. Chief Eng., 1876, p. 514.

Size medium; color usually light brown, rather strongly varied with fuscous maculations. Frontal costa rather strongly sulcate above as well as below the ocellus, with the carinae gradually diverging from immediately below the ocellus to the clypeus; scutellum of the vertex much longer than wide, strongly sulcate with the median carina faint, but continued across the occiput to the pronotum; eyes decidedly longer than the genal groove. Pronotum with the anterior margin plainly angulate; median carina more than usually cristate, with the anterior lobe of the prozonal crest only slightly longer than the posterior lobe; disk of the metazone with a few larger granulations which show a tendency to run together into lines; process of the metazone rectangular, with the sides straight and the apex rounded; metazone a little less than one and three-quarter times as long as the prozone. Tegmina long and slender, with the usual bands distinct, but obviously composed of annular spots, the basal one with its inner margin distinguishable from the spots between it and the base of the wing; only the apical third is distinctly hyaline; area between the cubital forks wide, occupied by several series of polygonal cells. Wing narrow, twice as long as broad, hyaline with the disk tinged with very dilute dull yellow, fuscous band represented only by a darkening of the veins and occasionally by some smokiness in a few of the cells in area usually occupied by the band. Posterior femora rather distinctly banded on the outer face. Posterior tibiae obscure yellow with traces of three brownish clouds, one basal, another near the middle, and a third apical.

Length of body, male, 22 mm., female, 24 mm.; length of tegmina, male, 25 mm., female, 27 mm.; length of posterior femora, male, 10½ mm., female, 12.2 mm.

Santa Cruz Island, San Diego, Scudder; San Joaquin Valley, Coquillett. I have seen one of Scudder's type specimens in the U. S. National Museum from Santa Cruz Island and have examined a male of the typical specimens from San Diego collected by Palmer.

According to Coquillett this species occurs in destructive numbers in the Joaquin Valley. In 1885 he estimated that it was one-twentieth as abundant as the Devastating Locust (*Melanoplus devastator*). Early in June the species was most abundant in grain fields, but after harvest it did considerable injury to grapevines and low trees. They do not migrate in swarms, but apparently quite independent of each other fly with or against the wind at will. They occasionally make the crackling sound while flying which is especially characteristic of *Circotettix*. When at rest they seem to prefer the bare ground, but seek the shade in the hottest part of the day. They readily eat dry leaves and the bodies of their dead companions. The eggs are laid in bare fields. Mr. Coquillett has given the name of Yellow Locust to this species, which appears to be very suitable.

TRIMEROTROPIS LAUTA Scudder.

*Trimerotropis lauta* SCUDDER, Ent. Notes, V, 1875-76, p. 26.

Small or medium, brown much varied with fuscous maculations, occasionally plainer, except the tegmina, which are always distinctly maculate. Scutellum of the vertex very deeply sulcate, with the median carina faint, but continued upon the occiput, nearly twice as long as broad; eyes a little longer (male) or a little shorter (female) than the genal groove. Pronotum with the disk flat and the lateral carinae barely apparent on the front of the metazone and prozone; median carina less prominent on the prozone than in *Trimerotropis pseudofasciata* and scarcely cristate, with the anterior lobe of the crest of the prozone plainly longer than the posterior lobe; metazone nearly twice as long as the prozone, with the disk smooth with a few scattered larger granulations; metazonal process acute, rectangular, or obtuse in the same sex, with the sides straight and the apex barely rounded. Tegmina thickly maculate with annular spots, which exhibit only a trace of the usual arrangement into three bands; area of the cubital forks occupied by a single row of cells in the male, in the female by about two rows at least proximally. Wings narrow, but not quite twice as long as broad, hyaline even on the disk, and without a trace of the usual fuscous band even in the veins. Posterior femora distinctly banded on the outer face. Posterior tibiae as in the preceding species, with the markings more distinct.

Length, male, 19 mm., female, 26½ mm.; length of tegmina, male, 18 mm., female, 25 mm.; length of posterior femora, male, 9 mm., female, 12 mm.

*Habitat*.—Lower California, Guadalupe Island, Scudder. I have one of Dr. Scudder's types and a number of specimens from Guadalupe Island in the museum of Stanford University.

This species is doubtless restricted to Guadalupe Island, and while very closely related to the preceding species, it is probably distinct.



## DESCRIPTION OF PLATE XXI.

- FIG. 1. Right tegmen of *Trimerotropis saxatilis*. *1st A* and *2d A*, first and second, anal veins; *c. v.*, cross veins at end of area *M*; *Cu*, cubitus, *Cu<sub>1</sub>* and *Cu<sub>2</sub>*, forks of cubitus; *Cu<sub>1</sub>A*, branch of *Cu<sub>1</sub>*; *I*, intercalary vein; *M*, media; *M<sub>1 & 2</sub>* and *M<sub>3 & 4</sub>*, forks of *M*; *R*, radius; *R<sub>1</sub>* and *R<sub>2</sub>*, first fork of radius and radial sector; *R<sub>1</sub>A*, *R<sub>2</sub>A*, *R<sub>3</sub>A*, first, second, and third branches of *R<sub>1</sub>*; *Sc.*, subcosta.
- FIG. 2. Right wing of *Trimerotropis saxatilis*. The letters and numerals have the same significance where they are the same, and in addition *3d A*, third anal vein; *2d A<sub>1</sub>* and *2d A<sub>2</sub>* represent the first fork and the sector of *2d A*; *2d A<sub>1</sub>A<sub>2</sub>*, second, branch second *A*; *R<sub>2 & 3</sub>* and *R<sub>4 & 5</sub>*, second and third, and fourth and fifth forks of the radius; *3d A<sub>1</sub>*, *3d A<sub>2</sub>*, etc., first, second, etc., branches of third *A*; *C*, costa; *S*, spurious veins.
- FIG. 3. Right tegmen of *Metator pardalina* Sauss. *I*, intercalary vein; *S*, spurious veins dividing areas formed by the accessory branches of the principal veins.
- FIG. 4. Right wing of *Circotettix undulatus* Thomas. *Ant.*, anterior field; *Mid.*, middle field; *Post.*, posterior field; *R*, radiate veins, branches of *2d* and *3d A*; *G*, interplical grooves occupied by spurious veins.
- FIG. 5. Right tegmen of *Conozoa wallula* Scudder.
- FIG. 6. Right tegmen of *Derotmema haydenii* Thomas.



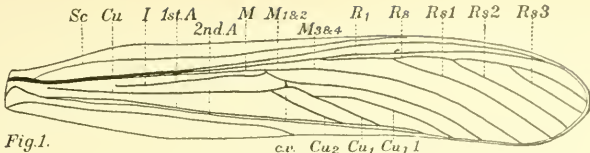


Fig. 1.

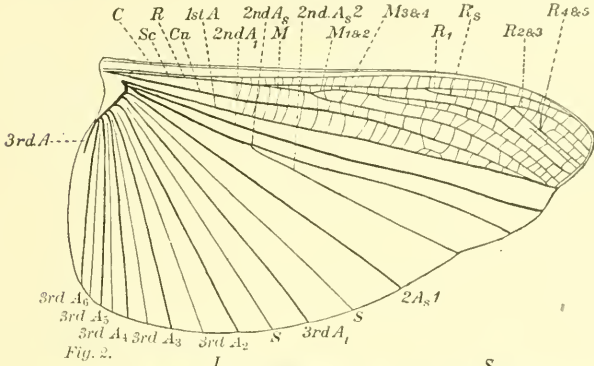


Fig. 2.

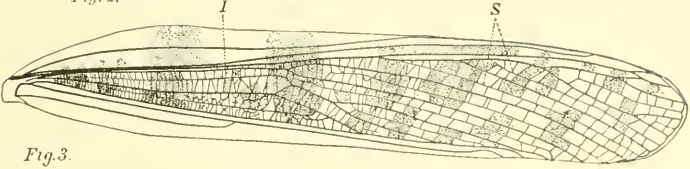


Fig. 3.

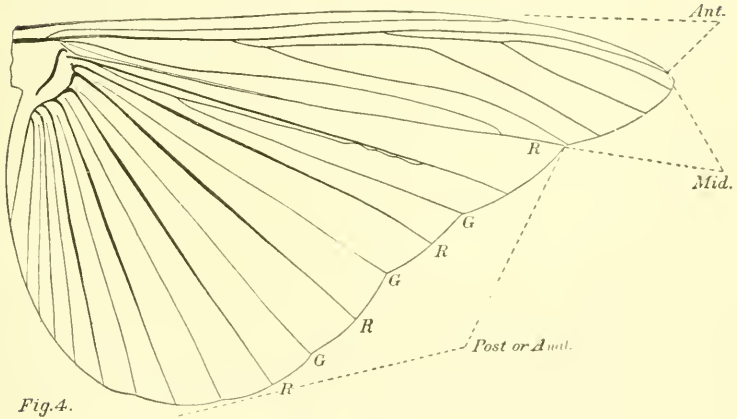


Fig. 4.



Fig. 5.



Fig. 6.

VENATION OF THE TRIMEROTROPIS.

FOR EXPLANATION OF PLATE SEE PAGE 449.