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CHAPTER XIII.

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REPORT

UPON

THE COLLECTIONS OF ORTHOPTERA

MADE IN PORTIONS OF

NEVADA, UTAH, CALIFORNIA, COLORADO, NEW MEXICO, AND ARIZONA,

DURING

THE YEARS 1871, 1872, 1873, AND 1874.

BY

Prof. CYRUS THOMAS.

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## CHAPTER XIII.

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Lieut. GEO. M. WHEELER, *Corps of Engineers, U. S. A.* :

DEAR SIR: The *Orthoptera* which you have submitted to me for examination includes your collections made during the explorations of 1871, 1872, 1873, and 1874. Those of first two years are comparatively small, but those of 1873 and 1874 are the most extensive I have seen from the West, and contain much of value and interest to foreign as well as our own orthopterists. Although the first is small, yet it contains several new species and also one new genus. This genus presents some very interesting features and peculiarities. In fact, so important was this deemed, that with your permission a description of it, as well as a few other new species of *Acrididæ*, was published in the Proceedings of the Philadelphia Academy of Sciences, in order that I might avail myself of this new material for publication in my "Synopsis of the Acrididæ of North America", which I desired to have as complete as possible for the use of our entomologists. You will see by an examination of my work that I have availed myself of your kind permission in this respect; nevertheless, as this material was obtained by your expedition, I have not only inserted the descriptions here in full, but have also added such remarks as I deemed of scientific interest.

This collection is of peculiar interest to me besides, for the following reasons: it contains a specimen in color, and a female of *Locusta fuliginosa*, Thos., which I described from a single male furnished by Dr. Palmer. As this was the first specimen of *Locusta* observed in the United States, I was very anxious to obtain the female, and, if possible, a specimen in color. This wish has been gratified by the receipt of your collection. Although some doubt was expressed at the time as to the correctness of my opinion as to

this being a different species from a specimen obtained in California, I am now able to set all doubts at rest, and state positively that the two are quite different and distinct species.

The collections of 1873 and 1874, as will be seen, contain a number of new and interesting species, especially of *Calopteni* and *Ædipodæ*, but it is somewhat singular that so few specimens of *Caloptenus spretus*, the destructive grasshopper of Utah and the West, are found in them. This certainly indicates that the line of your survey was along the southwestern border of its district. In fact, the collection of 1871 did not contain a single specimen, which was somewhat surprising to me, as I am aware from personal knowledge that its migrations extend along the line of the Central Pacific Railroad some distance west of Salt Lake.

The absence from the earlier collections of *Ædipoda atrox*, Scudd., which corresponds exactly with the fact presented by my own collections from Salt Lake north to Montana, is somewhat puzzling when connected with the additional fact that specimens of this species have been found on the mountains about Yellowstone Lake, and also on the mountains in Central Colorado. This species is found in abundance in California, where it is not only destructive, but to a certain extent migratory. It is therefore quite strange that it should be absent from the intermontane plains and valleys of Utah, Idaho, and Nevada, and yet be found in the higher mountain regions of Colorado and Wyoming. The same thing also appears to be true in regard to some other Californian forms, which reappear in the mountains of Colorado.

Your collection also corresponds in another somewhat singular respect with the collection I made in 1871 in Northern Utah and Southeastern Idaho. While the Rocky Mountain range appears to form a boundary to the range of the species of *Locustidæ*, on the other hand, the distribution of the *Acrididæ* appears to be but little affected by it; for example, *Stenobothrus coloradus*, which I supposed was confined to the eastern slope and eastern plains, I find in this collection. *Ædipoda neglecta*, which, although a western species, is found as far east as Illinois, is contained in your collection, as is also *Æ. cincta*, which reaches eastward to the Mississippi River.

*Pedioscertetes nevadensis*, which is very closely allied to *Acrolophitus*

*hirtipes* (the *Gryllus hirtipes* of Say), I judge is a southwestern form, which ranges chiefly south and west of the line of your survey, as I have seen it in no other collection. It is possible that Major Powell's collection, which I have not seen, may contain specimens of this interesting species.

Having pinned a number of your specimens by the side of a small collection from Southern California, I observed a somewhat singular contrast in color; the prevailing color of the *Calopteni* and *Ædipodæ* from California being a bright yellow, while the corresponding species of your collection were largely rufous. I have been inclined to believe, though not fully satisfied on the point, that, in the West, the general or ground color of species which inhabit barren spots, is, to a certain extent, dependent on the color of the surface soil.

I find also a specimen of *Ædipoda undulata*, Thos., which I supposed was confined to the section east of the Rocky Mountain range; but this collection shows that it also belongs to the middle or intermontane area. I find in the collections of both years a fine large *Acridium*, which is new, a description of which, by your permission, has been published, and is contained in my synopsis. But the most interesting object of the collection is a specimen of *Ephippigera tschivavensis*, Hald. I have expressed the opinion, in my synopsis, that Haldeman's specimen was the pupa of some species of *Ædipoda*; but a slight examination of this specimen is sufficient to show any entomologist that it is an imago, and that Haldeman was right in describing it as new. Other notes in regard to the collection will be found under the proper heading.

Since the publication of my Synopsis, I have received from Dr. C. Stål, of Sweden, a copy of his *Recensio Orthopterorum*, published about the same time, which introduces quite a number of changes in the arrangement of the groups of this order. As this author is the leading orthopterologist in Europe, I have thought it proper to call attention to such changes as relate to our Orthopteral fauna.

I have also received from Mr. Otto Hermann a copy of his paper on the *Dectidæ*, recently published in the *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien*, which contains a friendly criticism on my provisional arrangement of this group of the *Locustidæ*. As the

author had sufficient material before him (obtained chiefly from the collection of Dr. Brunner de Wattenwyl) to properly systematize this group, and clear up the confusion into which it had fallen, I have thought it proper to give here his arrangement for the benefit of our entomologists.

Allow me to state that your collection has been of much value to me in my investigations of this order, and that I trust the following brief report may be accepted as a partial attempt on my part to repay you for your kindness in submitting it to me.

I remain yours, very respectfully,

CYRUS THOMAS.

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### LIST AND DESCRIPTIONS.

The specimens of 1871, as I learn from the letters of Lieutenant Wheeler and Dr. W. J. Hoffman, as well as by personal communication of Dr. H. C. Yarrow, were collected chiefly along the route of the expedition, from Carlin, on the Central Pacific Railroad, to Cottonwood, in the southern part of Nevada; a small portion only of the collection being obtained in Northwestern Arizona. A portion of this collection is preserved in alcohol; others are dried specimens, which retain their colors.

The collections of 1872, 1873, and 1874 were made in Utah, Nevada, Colorado, New Mexico, and Arizona, by Dr. H. C. Yarrow, Dr. J. T. Rothrock, Dr. C. G. Newberry, Lieut. W. L. Marshall, Mr. H. W. Henshaw, and others of the expedition.

### BLATTIDAE.

The absence of this family from western collections would seem to indicate at least that it was not well represented in that section. This also corresponds with my observations in the sections I have visited. I do not think I have seen a dozen specimens in all the collections I have examined. I do not find a single specimen in this collection.

### MANTIDAE.

There are three specimens belonging to this family in the collection, one of which is new, and is named in honor of Lieutenant Wheeler, in charge of the expedition.

## MANTIS, Linn.

MANTIS WHEELERII, *sp. nov.*

The specimen is dry, and is so badly damaged that it is impossible to determine positively the genus to which it belongs, or to do more than indicate some of its leading specific characters.

*Female*.—Head flat, transverse, triangular in front. Occiput short, reduced to a transverse ridge. Vertex transverse, directed downward and backward toward the face, with four slight longitudinal depressions. Ocelli distinct and prominent. The face transversely quadrilateral; the upper carinate margin bent upward between the antennæ. The antennæ wanting. Prothorax about twice the length of the rest of the thorax; the margins minutely serrate, slightly emarginate, scarcely expanding posteriorly, expanding near the transverse incision. Anterior femora denticulate on the exterior carina. Abdomen enlarged, fusiform. Middle and posterior legs wanting, and but a remnant of the wings remaining.

*Color*.—Yellow, probably faded from a pale green. The abdominal segments with a piceous black fascia or ring on the posterior margin of each. The remnants of the wings carneous-red.

It is probably a species of *Stagmatoptera*; but it certainly approaches very near to *Hierodula*, notwithstanding Saussure's assertion that those belonging to the genus are "*Insectes asiatiques et africains*".\*

The specimen is too much injured to give any very accurate measurements; but the following approximations will indicate the size:—Length, 2.2 inches; prothorax, 1.0 inch; anterior femora, 0.5 inch; anterior tibiæ, 0.6 inch.

Stål (*Ofver. k. Vetensk.-Akad.*, 1871) gives a new arrangement of the *Mantidæ* in the form of a synoptical table. Although this possesses some advantages in tracing species, yet I prefer that of Saussure, as given in his *Mélanges orthopterologiques* (3<sup>me</sup> fas., 1870).

He divides the family into two divisions, which he terms *groups*, but which might very properly be called subfamilies. The first, *Nudipedes*, is distinguished by setaceous antennæ in the two sexes; head triangular, simple, without prolongations; feet and body simple, without membranous

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\* *Mélanges Orthopterologiques* III, Fascic. 214.

appendages; elytra oval or lanceolate with entire borders. The second, *Lobipedes*, is distinguished chiefly by the appendages found on some part of the body or feet.

The former group is divided into two tribes, *Orthoderii* and *Mantii*; the former having the prothorax straight, the sides parallel, and the front not attenuate, while the latter has that portion of the prothorax over the anterior coxæ more or less expanded, and the front attenuate or convergent. The three species here mentioned belong to the latter tribe.

This tribe is separable into two divisions distinguished by the form of the super-anal plate; in the first (*Mantites*, Sauss.), it is transverse, or in the form of a short triangle; in the second (*Thespites*, Sauss.), it is elongate-triangular or lanceolate.

Saussure, in his synoptical table of the genera of the *Mantii*, groups the genera under the following headings:—

- I. Super-anal plate transverse, or a short triangle ..... *Mantites*.
  - a. The discoidal vein of the wing of the ♂ ♀ undivided or furcate.
    - aa. The discoidal vein of the wing of ♂ ramose:
      - b. Species small; pronotum short.
      - bb. Species large; pronotum more or less elongate; body robust; abdomen rhomboidal or fusiform or narrow:
    - c. Elytra of the ♀ squæmiform.
    - cc. Elytra and wings of the ♀ complete.

It is to this last subdivision, embracing some six or seven genera, that the species in this collection belong.

#### MANTIS ——— (?).

It is possible this is new; but as it bears a strong resemblance in some respects to *M. carolina*, I have not ventured to describe it as a new species from the single alcoholic specimen before me.

*Female*.—Elytra greenish-yellow, unspotted; stigma small, oblong, same color; extending to the margin of the penultimate segment of the abdomen. Wings similarly colored, with yellow interneural fasciæ; discoidal vein furcate. Stature that of *M. carolina*. These characters would appear to place it between *Cardioptera* and *Stagmatoptera*; it may belong to the southern form of *Stagmomantis carolina* which Saussure has separated as a distinct species, it is therefore impossible to determine accurately its position without the male.

## MANTIS ——— (?).

This specimen is very much mutilated; the greater portion of the abdomen is wanting. It is possible that it is but the pupa of the previous species, to which it is evidently closely allied.

## PHASMIDAE.

Two specimens of this family are contained in the collection, and, although not in a condition to be specifically determined, yet it is evident that they are quite distinct.

## ACRIDIDAE.

## INTRODUCTORY REMARKS.

Most of the specimens collected belong to this family, and are the most interesting on account of the new forms brought to light. I find in the collection no representatives of the group *Tryxalini*, as this group is limited in my Synopsis, nor have I seen any representative of it west of the Rocky Mountain range, except two or three larvæ of what I supposed to be a species of *Opomala*. So far as the number of species is concerned, the *Ædipodæ* appear to be more abundant than the *Acridii*.

As Stål's "*Recensio Orthopterorum*", heretofore mentioned, relates wholly to this family, I have concluded to introduce what I have to say in regard to it at this point. And first I may state that I am as yet unable to ascertain positively which has priority in date of publication, the "*Recensio*" or my *Synopsis*. The title page of the former bears date 1873, which is also the date of the latter. The author quotes his own paper published in *Öfv. Kongl. Vet. Akad.-Förhandl.*, No. 4, 1873. By reference to this paper, which, with the "*Recensio*" has been kindly communicated to me by the author, I find that it was presented April 16, 1873. As it is probable it was not published for a month or so after it was presented, I infer that the "*Recensio*", in which it is quoted, did not make its appearance until in the latter part of the year. My *Synopsis* was actually published (distributed) about the first of October, 1873. It is therefore a matter of doubt as to which has precedence in date of publication; and until this is settled by ascertaining the exact date of the publication of the "*Recensio*", I shall retain

the names I have adopted in that work where they relate to the same division, genus, or species, except where I find that I am in error.

It is proper to remark here that this work relates almost exclusively to the species named by Linné, De Geer, and Thunberg, yet the author seizes the occasion to present a somewhat detailed synopsis of his arrangement of the family. While I cannot agree in every respect with this arrangement, yet I think it must be admitted that he has made a marked advance in systematizing this troublesome family, and that entomologists must adopt much that he has presented.

Although I am inclined to think my own arrangement should be somewhat modified, I cannot adopt his division into eleven subfamilies, if they are intended to stand as divisions of equal value, or as representing corresponding variations. The grouping does not differ very materially from that of most recent authorities, although the characters used as his chief guides are somewhat different. This would indicate that the larger groups, as now established, are natural, as the same result is reached, no matter from what stand-point our investigations are made.

In my synopsis, I have divided the family into two primary divisions, which I call, and I think correctly, subfamilies, while the next divisions, corresponding, in part, with Stål's, I have termed groups. This method, I think, corresponds more closely with the nature of the characters that separate these divisions, and renders the arrangement more systematic than either that of Walker or Stål.

The subfamilies given by Dr. Stål are as follows:—

*Phymatidæ*;  
*Pamphagidæ*;  
*Acridiidæ*;  
*Truxalidæ*;  
*Ædipodidæ*;  
*Pneumoridæ*;  
*Cælopternidæ*;  
*Tittigidæ*;

arranged in the order here given; also *Proscopidæ*, *Mastacidæ*, and *Chorætypidæ*, whose position in his system the author does not give.

Although the author, in his diagnoses of these groups, reveals the fact that the distinctions in one case are greater than those in another, yet so far as the arrangement and naming is concerned they stand as equivalents. No one will contend for a moment that the difference between *Acridium* and *Ædipoda* is as great as between either of these and *Proscopia* or *Tettix*. Yet Dr. Stål's system does not indicate this fact, as his groups stand as equivalents.

If we compare the true *Acridians*, as *Acridium*, *Ædipoda*, &c., with the *Tettigi*, we find the following differences:—

ACRIDII.—Of various sizes, from half an inch to four inches in length; wholly terrestrial in their habits.

*Tarsi* furnished with a pulvillus, or pad, between the claws; although sometimes minute, yet it is seldom, if ever, absent.

*Pronotum* consisting of a kind of shield, covering the prothorax and extending backward at farthest only upon the base of the elytra.

*Prosternum* drawn up; that is, it is not in the same plane as the rest of the sternum; spined, tuberculate or smooth, but never advanced upon the mouth.

*Mouth* free, not covered by the prosternum.

*Elytra* and *wings* generally present, but sometimes aborted or entirely wanting; but, when present, the latter never exceed the former in length.

But an examination of the *Tettigi* reveals an entirely different set of characters in all these respects, as may be seen from the following statement of them:—

TETTIGI.—Generally of small size, many being less than half an inch in length, and seldom exceeding an inch, preferring moist damp situations, and in some cases even subaquatic.

*Pronotum* forming a shield over the entire body, extending backward nearly or quite to, and often beyond, the tip of the abdomen; sometimes flat, sometimes keeled and arched, and in some species elevated into a sharp foliaceous crest.

*Tarsi* without pulvilli, or pads, between the claws.

*Prosternum* depressed to the same plane as the rest of the sternum; advanced upon the mouth, and usually furnished with a kind of semicircu-

lar ridge, which forms a sort of muffler, into which the mouth is drawn when at rest.

*Mouth* covered by the advanced portion of the prosternum.

*Elytra* and *wings*, when present, generally placed upon the sides of the body, the latter exceeding the former in length; these organs being apparently pushed upon the sides by the extended pronotal shield.

These differences in the external structure, which all must admit are important, are accompanied by certain modifications of the internal structure, and certainly indicate important variations in habits.

Now, if we compare the species of Stål's subfamily *Acridiidae* with those of his *Ædipodidae*, or any other true Acridians, we shall find the tarsi in each case furnished with a pad between the claws; the shortened, shield-like pronotum; the prosternum drawn up; the mouth free; the elytra, when present, always equal to or exceeding the wings in length, and generally meeting or overlapping each other above the abdomen.

It is therefore clear that the true Acridians and the Tettigi are more widely separated from each other than the groups of the former; and a true arrangement ought to indicate this difference. For these reasons, I still hold that the Tettigi should be separated as a subfamily, and that the other groups of the true Acridians should be considered as subordinate divisions.

It will be observed that I have admitted that my arrangement should probably be somewhat modified; also, that, in speaking of certain groups, I have used the expression "True Acridians". My reason for this is that a more thorough examination of exotic forms has convinced me that the *Proscopie* constitute a distinct subfamily, equivalent to the Tettigi. Whether the *Mastacidae* should be embraced in the same division as Stål in effect does in his *Conspectus* of his subfamilies, I am unable to say; but I have considerable doubt as to the propriety of this course.

A single glance at a typical species of *Proscopia* is sufficient to reveal even to a superficial observer important variations from the true Acridian type. Their elongate, cylindrical bodies, long, slender legs, and general appearance would lead us, at the first glance, as it did Stoll, to place them among the apterous *Phasmæ*. In fact, *Cephalocæma subaptera*, West (Arcan. Ent., ii, 55, pl. 63, fig. 2), might easily be taken by the unscientific

observer for our common *Diapheromera Sayi*. Not only is the body elongate, slender, and somewhat cylindrical, but is generally almost uniform in size throughout its length, and usually wingless. The head is elongate-conical, and either ascending obliquely (*Proscopia*), or extending forward horizontally (*Cephalocæma*); antennæ very short, often falling short of the tip of the vertex, and composed of but few joints (six to nine). The legs are quite slender; the posterior pair being scarcely fitted for leaping. The prothorax is very long, slender, and subcylindrical, having no pronotum in the sense of a shield, as seen in the true Acridians; the pronotum here being simply the dorsal portion of the prothorax as in the *Phasmæ*; the anterior legs (in *Proscopiæ*) are attached to the sides near the middle. The mesothorax and metathorax are very short; their combined length seldom equaling one-half the length of the prothorax.

It is evident from these characters, and others which might be named, that the distinctions between this group and the true *Acridii* are much greater than those which separate the groups into which the latter have been divided. I am therefore inclined to think this group should be considered as a subfamily, and as equivalent to the *Tettigi*. We should, then, have three subfamilies, as follows:—

PROSCOPINÆ, ACRIDINÆ, and TETTIGINÆ.

Therefore, while I think the arrangement given in my synopsis should be thus modified, on the other hand, the reasons which lead me to this conclusion would also lead me to reject the plan suggested by Dr. Stål, if his larger groups are to be considered as subfamilies.

Raising his *Proscopidæ* and *Tettigidæ* to subfamilies, and considering the rest of the family as a third subfamily, I am prepared to accept, in great part, his other groups, if considered as inferior divisions.

I most heartily agree with him in suppressing Walker's *Trigonopterygidæ*, and in raising *Pneumoræ* to a distinct group, as equivalent to *Acridini* and *Ædipodini*. And, to show that I had arrived at this conclusion before the receipt of the "*Recensio*", I quote the following from my notes prepared during the winter of 1873-'74:—

"This singular group (*Pneumoræ*) presents some very singular features,

&c. . . . . Although these divarications from the typical form are considerable, and possibly may require their separation into a distinct group, as I have used the term in my classification, yet I do not think they will justify raising the division to the dignity of a subfamily."

In regard to the *Trigonopterygi*, I quote the following from the same notes:—

"*Trigonopteryx* has a conical, somewhat ascending head; an oblique but incurved face, and ensiform antennæ, and if the wings were of the usual form would doubtless be placed in this group (*Tryxalini*) by all entomologists. The same remark may be made in regard to *Hyalopteryx*, Charp. If we place the former in a separate group, or limited family, as has been done by Walker, and in which I have followed him improperly in my Synopsis, on account of the unusual elytra, how shall we avoid the necessity of forming a separate group for *Sphenarium*, which has but figments of elytra, unusual in form and neuration, attached to the sides of the thorax? *Trigonopteryx* is essentially tryxalidian in form and features, and should be included in this group (*Tryxalini*); therefore I feel compelled to correct my former work in this respect."

Notwithstanding Dr. Brunner Wattenwyl approves of the character chosen, which forms the chief ground for separating the *Phymatidæ* from *Pamphagidæ*, yet I doubt the propriety of forming two divisions. Placing *Mastax* in a separate group or division is certainly correct. I know nothing in regard to the species on which he bases his subfamilies *Cælopternidæ* and *Chorætypidæ*.

Before speaking of the genera which the author embraces in his subfamilies, I desire to call attention to the order in which he arranges these subfamilies, which has been given on a previous page. The author does not state positively that this is the order in which they should stand; but it is the order in which they are placed in the body of his work.

In his Conspectus, they stand in the same order, *Proscopidæ* standing at the head; *Mastacidæ* second; and, then, as given, down to *Pneumoridæ*; then follows *Chorætypidæ*; after that the other two as given. As the order in the body of the work, so far as given, corresponds with that in the Conspectus, it is probable that this forms a correct outline of his arrangement.

It is evident that by this arrangement the groups, with perhaps two exceptions, form as close connections on each side as is possible; for example, the connection of *Acrididæ* with *Tryxalidæ* is natural, as is that of the latter with *Ædipodidæ*.

By reference to my Synopsis (page 144), it will be seen that I also maintain this bilateral connection of the *Tryxalides*, placing *Xiphocera* on the side next the *Acridii* as the connecting link. But I there place the *Tryxalides* at the head, and the others as the parallel links of two descending or ascending lines.

If Stål intends *Proscopidæ* to stand before *Phymatidæ* as the connecting link between this family and *Phasmidæ*, and he can scarcely do otherwise, then his arrangement will be somewhat in the form of a recurring series: beginning with the elongate conical head and slender form in *Proscopia*, he passes through the gradually shortening and swelling forms of the *Phymatidæ*, to the large lubberly *Pamphagus elephas*, which, by its size and unwieldy appearance, reminds us strongly of the *Brachypeplus magnus* of our western plains. When he reaches his *Tryxalidæ*, he again has the conical head and slender body, which again recedes from view when he enters the *Ædipodidæ*. It is evident therefore that this linear arrangement depending on one or two characters, no matter how permanent, is not in accordance with nature. There are evidently diverging lines, and Dr. Stål's work has rendered it quite probable that there are three of these lines instead of two, as I have given; and this also increases the evidence in favor of Dr. Scudder's idea as to the ascending order of the families, as it indicates the conic head and slender form as the more generalized, as it is the converging point of three different lines. While I am compelled to admit these facts as against my view as to the position in the scale of being, yet it but increases the difficulty at the other extremity of the family.

I am satisfied that no arrangement can stand the test of future investigations which separates the *Proscopiæ* and *Tryxalidæ* so widely as Dr. Stål has done, no matter how satisfactory it may be in other respects. While I am fully conscious of the difficulties experienced in attempting to arrange the subdivisions in a continuous line, at the same time I consider it very doubtful whether success in this respect is advantageous or in accord-

ance with nature, if, while harmonizing the parts of a group with each other, we tear asunder the links which bind it as a whole to other adjacent groups. Moreover, I believe it is now generally conceded that, in ascending the scale of being, we pass, as a general rule, from the generalized to the specialized, and find the lines we are tracing repeatedly branching and forming other lines.

Without attempting at present a further review of the author's general arrangement, I will call attention to such changes in his work as relate to our North American orthopteral fauna.

*Sphenarium*, *Ichthydion*, and *Pyrgomorpha* are transferred to *Phymatidæ*.

The last named genus as he has limited it, and in fact the characters of this subfamily as he has given them, excludes our *P. brevicornis*, which, as will hereafter be seen, has been retained in *Truxalis*.\*

His subfamily *Acridiidae* includes the following genera, which have usually been placed in other divisions:—*Xiphocera*, *Tropinotus*, *Dictyophorus*, *Rhomalea*, *Mesops*, and *Opsomala*.

Our *Rhomalea centurio* (*microptera*) is retained in the *Dictyophorus* of Thunberg as *D. reticulatus*, the name given to it by that author in 1815. This genus, as now limited, is distinguished by the following characters:—The vertex and fastigium lying in the same plane and slightly declined, and seen from the side forming a right angle with the frontal costa; pronotum obtusely carinated; anterior margin forming an obtuse angle or rounded.

*Rhomalea* is limited to the species possessing the following characters:—The transverse impressions of the pronotum distinct; anterior lobe destitute of a carina; posterior lobe depressed, but ascending posteriorly; frontal costa suddenly flattened below the ocellus. In this, he places *R. miles*, Burm., but restores the specific name *speciosa* of Thunberg; *Acridium coloratum*, Serv. (*Chromacris colorata*, Walk.), is also included. His specimen of the latter species is from Mexico; it is therefore probable that the locality (Carolina) given by Serville for his specimen is a mistake.

The author also introduces a new genus (*Tæniopoda*) into this rhomalean group, which has the following as its distinguishing characters:—Fastigium strongly deflexed, forming with the frontal costa as seen from the side

\* The reader will notice that, in speaking of Stål's genera and subfamilies, I retain his method of spelling.

an obtuse, somewhat rounded, angle; pronotum cristate, the crista on each lobe near the posterior sulcus depressed.

This includes the *R. equita*, Burm., *Monachidium superbum*, Stål, and *R. pecticornis*, Walk. Stål describes the last named species as new under the name *T. picticornis*. This collection contains several specimens of this fine species, which will be noticed at the proper place.

Stål's division of this heterogeneous group into different genera is eminently proper; for a single glance at *R. microptera* and *R. miles* is sufficient to convince any entomologist that they are generically distinct. As the *Dictyophorus* of Thunberg has precedence in date, its restoration must be acquiesced in.

The *Lophacris* of Scudder is included under his *Titanacris*, which the author distinguishes from *Tropidacris* chiefly by the venation of the elytra and form of the genital plate of the male; being entire in the former and emarginate in the latter.

At this point, a new genus (*Hermistria*) is introduced, founded on a species from Mexico. This and the other new North American species mentioned will be noticed in this paper at the proper places.

The change which, if followed, will produce greatest confusion in our American nomenclature is that in reference to the caloptenoid species. He holds, as I learn by letter from Dr. Brunner de Wattenwyl, that we have no *Calopteni* in North America; all our species being referable to *Pezotettix*. Serville's name (*Calliptamus*) is amended and retained as *Calliptenus*. The chief distinctions given by the author between this genus and *Pezotettix* are as follows:—

In *Calliptenus*, the elytra destitute of the intercalate vein; the posterior femora broad and distinctly serrate above; the posterior sulcus of the pronotum in the middle or before the middle.

In *Pezotettix*, the elytra abbreviated or rudimentary, and furnished with an intercalate vein; posterior femora having the upper margin entire and unarmed; posterior sulcus of the pronotum sometimes situated behind the middle.

His numerous divisions of these restricted genera into subgenera show clearly the difficulty experienced in attempting to obtain a satisfactory

arrangement. It is clear that if we follow the diagnoses of these genera as given by him, all of our *Calopteni* will have to be removed to other genera. *C. femur-rubrum* is placed in *Pezotettix* under the subgenus *Melanoplus*, and, as a matter of course, must carry with it *C. spretus*, and other closely allied and congeneric species. Stål is undoubtedly correct in subdividing Serville's genus, as that author, in his *Histoire des orthoptères*, recognizes two quite distinct groups. But the question arises here as to which subdivision the name should be applied. The genus was formed by the author, and first used by him in his *Revue méthodique des orthoptères* (1831) for the reception of three species, *C. italicus*, *morio*, and *sanguinipes*. It is true that afterward (1839), in his *Histoire des orthoptères*, Serville removed *C. morio* to *Ædipoda*, as it was in fact no Acridian, and had been previously named by Creutz (Entom. Versch.); also that he returned *C. sanguinipes* to *Acridium*, thus leaving *C. italicus* as the only original representative of his genus. But, in the mean time, Burmeister\* changes the name to *Caloptenus*, and includes in the genus, as limited and understood by him, not only *italicus*, but also the American species *femur-rubrum*, *femoratus*, and *bivittatus*, besides a number of other exotic species. If Serville's name was erroneous, then Burmeister was as fully authorized to correct it as Dr. Stål, and it comes from the hand of either really a new genus. But not only this: Serville includes three species which are incongruous, each of which had been previously named, and two of which he afterward, in his *Histoire des orthoptères*, removes. Stål speaks of this contention in regard to priority as puerile and derogatory to science; yet he clings to the name given by Serville, although it is erroneous and has to be emended, making *C. italicus* the type.

Under these circumstances, and following out the spirit of his own advice, as given in his introductory remarks, I shall not follow him in this respect, because I do not think even the strictest construction of the law of priority requires it, and because to do so would inflict upon our nomenclature a host of synonyms which can be avoided by retaining the name *Caloptenus*, as given by Burmeister. Some of the species may have to be removed to other genera. It is true that the peculiar characters selected

\* I am aware that some doubt as to priority in date of the *Handbuch der Entomologie* and *Histoire des orthoptères* has recently been expressed; but so long as it is generally conceded to the former, our conclusions in regard to nomenclature must be based upon that assumption.

by Dr. Stål may map the ground into areas whose lines fall wide of those heretofore given; but before we follow this, we must be convinced that his characters group according to nature. Dr. Gill, if I recollect rightly, remarks, in the introduction to his arrangement of the Fishes, that a character or series of characters which may be used in one group or even part of it as a correct guide may fail to indicate the true relation of species at another point. Dr. Stål is doubtless fully aware of this fact; but it appears to me he has neglected at some points to act upon it, and has maintained his plan somewhat arbitrarily. Still I do not feel authorized to take direct issue with him without further opportunity for examination, but simply wish to be understood as saying that the change his arrangement requires in the group now under consideration is too great to be made without better reasons shown than those presented in his work.

*Opsomala*, Serv. (*Opomala*, Scudd.), is torn into fragments, and scattered hither and yonder. *O. filiformis* and *O. marginicollis*, Serv., are placed in a new genus, *Leptyσμα*, belonging to *Acridiidae*, which has no marked or prominent character to distinguish it; that of the head being longer than the pronotum forming one of the principal features. But those who have paid any attention to this group know how unsatisfactory this character is.

A new genus, *Arnilia*, is established by the author for the reception of his *O. cylindroides*, with which he places two specimens from Carolina. The latter, I presume, belong to *Stenacris chlorizans*, Walk. (*Mesops chlorizans*, Thos.).

*O. bivittata*, as Dr. Stål informs me by letter, is probably his *Mermiria Belfragii*, a new genus belonging to his *Truxalidae*, and a species from Texas, which he has described as new; but his description leaves it doubtful whether he is correct in this opinion.

The following changes occur in *Truxalidae*:—*Oxycoryphus*, *Gomphocerus*, *Stetheophyma*, *Stauronotus*, and *Epacromia* are transferred to this division. So far as this change relates to *Oxycoryphus*, *Gomphocerus*, and *Epacromia*, I can heartily approve of it, and I find, by reference to my notes heretofore mentioned, that I have already transferred *Oxycoryphus*, *Pedioscertetes*, and *Chrysochraon* to *Tryxalini*.

The old name *Acrida* of Linnæus is restored for the typical *Truxalides*

and *Truxalis* is retained in the Fabrician sense with *T. brevicornis* (our *Pyrgomorpha brevicornis*) as its type. If these old names, which have been so long ignored, are now to be restored, then Stål is correct in replacing *Acrida*; and, although I doubt the expediency of such a course, yet, as the law of priority justifies him, entomologists will probably accept the change. But if this rule is to be rigidly enforced, what excuse has he to render for utterly ignoring Walker's new genera and species where he is correct?

Stål describes as new Scudder's *Chloëaltis viridis* under the name *Truxalis angusticornis*. He describes a new species of *Achurum* from Mexico, and informs me that he thinks my *Tryxalis brevipennis* belongs to the same genus. I think it very probable he is correct in this. Saussure's *Oxycoryphus montezuma* is transferred to a new genus, *Syrbula*, in which is also placed a new Texan species. *Stenobothrus* is wholly ignored, and *Gomphocerus*, which he appears to have used in *Freg. Eug. Resa*, in the sense in which it is used by Borck, is here scattered among a number of new genera. He gives *Stetheophyma*, Fisch., *Arcyptera*, Serv., *Chrysochraon*, Fisch., and *Gomphocerus*, Thunb., as synonyms.

*Stenobothrus viatorius*, Sauss., is removed to a new genus, *Scyllina*, which has for its chief character the inequality in length of the spines of the posterior tibiæ.

In *Ædipodidæ*, the following changes are worthy of notice, and are of interest to American entomologists. *Tragocephala* of Harris is retained with *T. viridi-fasciata* as the type; and *Æ. sordida*, Burm., and *Æ. costalis*, Scudd., are transferred to it. *Tomonotus* of Saussure is ignored, and a new genus, *Arphia*, established for the reception of the following species found in the United States:—*T. sulphureus* and *T. tenebrosus*; the latter being described as a new species under the name *A. sanguinaria*. I can see no possible excuse for this new genus, which corresponds very closely in its characters with those given by Saussure, and especially as given in my Synopsis. If the *Acrida* of Linnæus and *Calliptenus* of Serville are to be retained at every sacrifice of convenience, why is it that the genera established by living authors are treated so cavalierly? There is no more reason why a Linnæan or Thunbergian genus should be retained than one established by a living author. In this case, I think Stål's apparent desire to furnish new names to

science has carried him a step too far, and, as I think he is wrong here, I cannot follow him.

A new genus, *Camnula*, is established for the reception of a species from Vancouver's Island. This species, which the author says is very similar to *Tragocephala sordida*, I am inclined to believe is my *Tr. pacifica*.

*Æ. discoidea*, Serv., is removed to *Hippiscus*. This change I can readily concur in.

*Ædipoda* is very properly restricted to but a small portion of the heterogeneous mass which has been thrown into it, for which entomologists have reason to thank the author. Our *Æ. Carolina* is retained, and appears to be his typical genus; this retains *Æ. trifasciata*, Say, and *Æ. undulata*, Thos. A new species from Illinois is described under the name *Æ. Belfragii*, which is probably my *Æ. cincta*. A new species from Mexico, *Æ. punctata*, is also described. *Æ. fenestralis*, Serv., is removed to a new genus, *Psinidia*, in which also two new species from Texas are placed.

*Æ. maratima*, Harr., is removed to *Tremerotropus*, also a new genus.

No important change appears to have been made in the *Tettigidæ*.

Although the author of this work has made a number of changes which I do not think entomologists can accept, as well as some which appear to be unnecessary, yet it must be admitted that he has rendered an important service to science in splitting up some of the heterogeneous and unwieldy genera as *Ædipoda*, &c., and especially in properly determining and locating the Linnæan, De Geerian, and Thunbergian species from an examination of the specimens. It is to be regretted that, while he has such scrupulous regard for the generic names of Linné, De Geer, and Thunberg, he should occasionally fail to give the proper credit to modern authors, wholly ignoring, as he states to me in a letter, the work of Walker, as this will necessitate a change by some future orthopterologist. It is true the catalogue of Walker is of but little value; yet, so far as it is correct, it should be accepted, no matter how much chaff surrounds the wheat.

Accepting this author's changes in the larger groups so far as I consider them correct, and making the modifications I have suggested, my arrangement of the divisions of the family would then be as follows:—

## I. Subfamily PROSCOPINÆ.

1. Group *Proscopini*.2. Group (*Mastacini*).

## II. Subfamily ACRIDINÆ.

## Division 1.—CONOCEPHALIDES.

3. Group *Tryxalini*.

## Division 2.—ORTHOCERIDES.

4. Group *Ædipodini*.5. Group *Acridini*.

## Division 3.—XIPHOCERIDES.

6. Group *Phymatini*.7. Group *Pamphagini*.

## Division 4. (———?).

8. Group *Pneumorini*.9. Group (*Chorætypini*).10. Group (*Cælopternini*).

## III. Subfamily TETTIGINÆ.

11. Group *Tettigini*.

Those included in parentheses are introduced provisionally, as I am unacquainted with the species forming them. So far as I am aware, only the third, fourth, fifth, sixth, and eleventh groups are represented in the North American fauna.

In connection with the list of the species found in the collection under examination, I will give short descriptions of the new North American genera and species described by Stål, and also give the new positions of some of the hitherto described species, under the foregoing modifications.

## Subfamily ACRIDINÆ.

## TRYXALINI.

I cannot, with my present knowledge of the genera, accept Stål's removal of *Mesops* and *Opomala* from this group. It is probable that the species I have placed in *Mesops* may have to be removed to other genera, and the name retained for other species which belong elsewhere. I shall also transfer to this group *Oxycoryphus*, *Acrolophitus*, *Pedioscertetes*, *Chrysochraon*, *Stenobothrus*, and *Gomphocerus* (the two latter should probably be united into one genus).

## TRYXALIS.

## TRYXALIS BREVIPENNIS, Thos.

*Tryxalis brevipennis*, THOS., Synop., 58.

This, I presume, will have to be removed to *Achurum*, and will then become *Achurum brevipenne*.

## TRYXALIS BREVICORNIS, Linn.

*Grillus brevicornis*, LINN., Cent. Ins., 1763, 15, 37.

*Acrydium ensicornu*, DE GEER, Mém., 1773, iii, 499, 16, pl. 42, f. 7.

*Tryxalis brevicornis*, BURM., Handb. Ent., 1838, ii, ii, 607, 3.

*Pyrgomorpha brevicornis*, WALK., Cat. Dermap. Salt., 1870, iii, 500.

Stål's restoration of *Acrida* for the typical *Tryxalidæ*, and retention of *Tryxalis* for its earliest signification, will restore this species to the position assigned it by Fabricius. He has also identified De Geer's *A. ensicornu* with this species by an examination of the original specimen. I have determined, beyond any reasonable doubt, that the *Tr. notochlorus*, of Pal. Beauv. is the male of this species.

My *P. punctipennis* (Synop., 68) is but the female of this species; consequently this name will have to be suppressed.

## ACHURUM.

This genus should now precede *Tryxalis* in a linear arrangement.

The following new species from Mexico is described by Stål:

## ACHURUM ACRIDODES, Stål.

*Achurum acridodes*, STÅL., Recens. Orthop., 1873, 101.

*Truxalis acridodes*, STÅL., Öfv. Vet. Ak. Förh., 1873, xxx, 4, 52, 1.

Fusco-testaceous; vertex, dorsum of the pronotum, and anal area of the elytra greenish; cheeks and lateral lobes of the pronotum near the dorsum obscure; elytra griseo-hyaline, except the anal area, which is veined with fuscous; wings dusky. ♂, length, 27 millimeters.

Closely allied to *A. Sumichrasti*, Sauss., but differs in the color of the dorsum of the pronotum, and in the dorsum not being alutaceo-rugose, but on the front and posterior lobe is obsoletely punctate, and the lateral lobes being obsoletely variolose. Elytra a little shorter than the body, more than twice the length of the posterior femora; anal and axillary veins free.

Posterior femora not extending to the tip of the abdomen. Antennæ slightly narrowed at the apex, extending beyond the tip of the pronotum. Genital segment of the male elongate and acuminate.

#### MERMIRIA, Stål.

This new genus is introduced here, and the description copied from the *Recensio*, as the single species described under it is the one to which Stål is disposed to refer *Opomala bivittata*.

GENERIC CHARACTERS.—Posterior tibiæ armed with numerous spines; those on the exterior margin numbering from eighteen to twenty-two. Head equal to, or but little shorter than, the pronotum; fastigium prominent; the frontal tempora (lateral foveolæ, or spaces of the vertex) not or but obsoletely separated. Base of the very obtuse (subtruncate) anterior lobe not shorter than the posterior. Elytra and wings not so long, or but slightly passing the apex of the abdomen; apex rounded. Frontal costa flat; margins sometimes subcallous. Antennæ ensiform; prosternal tubercle obtuse, distinct, strongly elevated in the middle; eyes shorter than the portion of the cheeks below them.

#### MERMIRIA BELFRAGII, Stål.

*Mermiria Belfragii*, STÅL, Recens. Orthop., 1873, 102.

Pale olive-green. Head greenish-white; median carina of the pronotum and an interior vitta of the lateral lobes fuscous; the lateral carinæ pale. Elytra griseo-hyaline, greenish externally and yellow-veined internally; anal and axillary veins pale. Wings near the base pale greenish-yellow, near the apex fuscous-veined. Spines of the posterior tibiæ black at the tips.

♂.—Length, 44 millimeters. Texas.

A vitta on the cheeks behind the eyes pale fuscous; two olive-green lines on the vertex; fastigium narrow in front, rounded at the apex, slightly impressed near the margins, shorter than the eyes. The portion of the cheeks below the eyes somewhat longer than the eyes. Face obsoletely and frontal costa distinctly punctate. Antennæ broadly ensiform, somewhat narrowed at the apex, as long as the head and pronotum. Pronotum, or the dorsum, slightly convex transversely; lateral margins parallel; the

front and the posterior lobe punctulate; this lobe shorter than the front lobe; lateral lobes anteriorly and posteriorly punctate. Elytra extending to the apex of the posterior femora; apex very slightly narrowed and subrotund; the anal and axillary veins connect not far from the base. Posterior femora extend somewhat beyond the apex of the abdomen.

**PEDIOSCERTETES, nov. gen.**

*Pedioscertetes*, published in Proc. Acad. Nat. Sci. Phila., 1873, by permission.

Occiput somewhat ascending; vertex rises obliquely in front of the eyes in the form of a triangular pyramid. The dorsum of the pronotum and head as seen from the side taken together form a regular curve from the posterior extremity of the one to the tip of the other, the concave side being upward. The vertex as seen from above is triangular, convex above; no median or lateral foveolæ; the tempora represented only by a slight depression on the deflexed margin. Frontal costa distinct above the ocellus, fading below; face suboblique and slightly incurved. Pronotum regularly expanding posteriorly, subtricarinate, the front lobes being rounded so as to render the lateral carinæ nearly obsolete; median carina absent or but a minute line; front margin truncate; hind margin rounded; the three transverse impressions distinct, close together, and occupying the second fourth, the posterior sulcus being about the middle. Elytra and wings normal, extending a little beyond the tip of the abdomen. Posterior femora slender, but slightly enlarged at the base; upper and lower carinæ slight, entire, unarmed, not quite reaching the tip of the abdomen in the female; tibiæ fully as long as the femora; spines not very numerous; first joint of the posterior tarsi as long as the other two. Metasternum broad; prosternum narrow, unspined.

**PEDIOSCERTETES NEVADENSIS, sp. nov.**

PLATE XLIII, FIG. 4.

*Pedioscertetes nevadensis*, Ext. Pub. in Proc. Acad. Nat. Sci. Phila., by permission.

The tip of the vertex is separated from the portion between the eyes by a shallow, curved, transverse sulcus, which runs from the upper canthus of one eye to that of the other; the portion in front of the eye not quite as

long as the eye, acute-angled, flat or very slightly convex above. Frontal costa prominent and narrow between the eyes and slightly sulcate, fading suddenly below the ocellus or broadly expanding and becoming obsolete; lateral carinæ indistinct and subparallel.

Eyes oblong-ovate, subreniform, oblique. Antennæ large, filiform, slightly depressed, and extending to the second abdominal segment (?). Pronotum subselliform; front lobes rounded and subcylindrical; the posterior lobe distinctly tricarinate; sides flat and slightly expanding posteriorly; posterior portion of the dorsum slightly elevated; the intercostal spaces flat, but slightly raised at the median carina; the median carina is but an indistinct line; the three transverse impressions distinct, but not profound, the posterior one placed slightly behind the middle; the posterior margin regularly rounded, nearly semi-circular; the posterior lateral margin curves inward at the humerus, but makes no angle; the posterior lobe is distinctly broader than the head. Elytra of moderate width; lower (anterior) margin slightly arcuate; wings rather narrow; both extend slightly beyond the abdomen. The abdomen comparatively enlarged and rather deep at the base; the valves of the ovipositor slender and acute. The body and legs hairy.

*Color* (after immersion in alcohol).—Dull greenish-yellow, showing clearly that the original color was green, probably light pea-green, as the closely allied species *Acrolophitus hirtipes*. This appears to have been the uniform color of the insect, the elytra being unspotted; there is a slight rufous tinge on the posterior part of the pronotum and base of the elytra; the apical portion of the latter is translucent. Wings pale yellow at the base, probably a transparent greenish-yellow when living; a moderately broad fuscous band across the disk; apex transparent, with dark nerves. Spines of the posterior tibiæ very slightly or not at all tipped with black.

♀.—Length, 1.25 inches; elytra, 0.80 inch; posterior femora, 0.60 inch; posterior tibiæ, 0.63 inch; pronotum, 0.25 inch.

REMARKS.—This very interesting species, so far as I am aware, has been found in no collections except those made by this expedition. I find it marked as from Nevada, and, as it has been seen by no other collectors, I presume it must have been taken in the extreme southwestern limit of the

second expedition. It is evidently closely allied to the *Acrolophitus hirtipes*, Say, although the elevated pronotal crest and acute posterior pronotal margin of the latter place the two in different genera.

Professor Cope has somewhere remarked that specific characters may be carried over from one genus to another. If he is correct in this opinion, this would appear to be a case in point, for the similarity in the specific characters of this species and *A. hirtipes* is apparent to the most superficial observer. The figure of this species is copied from one engraved by Professor Glover.

By permission of Lieutenant Wheeler, a description of this new genus and species was published in the Proceedings of the Academy of Natural Sciences of Philadelphia, from which it was copied into my Synopsis. As it was given there really as an extract from this paper, it is given here as new.

#### SYRBULA.

This is another of Stål's new genera in which he places a new North American species. I insert his short description of the genus.

Similar to *Mermiria*, except as follows:—Antennæ slender, filiform, slightly dilated toward the apex; eyes longer than the portion of the cheeks below them; prosternum destitute of a spine; posterior lobe of the pronotum strongly punctate, rugulose.

#### SYRBULA MONTEZUMA, Sauss.

This is the *Oxycoryphus montezuma* of Sauss. transferred.

#### SYRBULA LEUCOCERA, Stål.

*Syrbula leucocera*, STÅL, Recens., 1873, 102.

Very similar to the *S. montezuma*, green changing into testaceous gray; the cheeks and lateral lobes of the pronotum obscure fuscous; an oblique vitta of the cheeks, margin of the mandibles, the entire broad exterior margin, and a narrow abbreviated interior margin and two abbreviated longitudinal lines of the lateral lobes of the pronotum pale. Elytra griseo-hyaline, sprinkled with fuscous; veins reddish or fusco-ferruginous; an anterior intercostal, ferruginous, opaque vitta. Posterior femora with three exterior fuscous spots; posterior tibiæ fuscous at the base, with a broad

pale ring near the base. Wings very slightly fuscous. Genital segment elongate, acuminate; cerci slender, but not acute.

♂.—Length 25 millimeters. Texas.

Posterior lobe of the pronotum very distinctly punctate and rugulose.

SYRBULA FUSCO-VITTATA, *sp. nov.*

PLATE XLIII, FIG. 5.

*Male*.—Antennæ a little longer than the head and thorax, filiform; apical half somewhat enlarged, acuminate at the apex. Top of the head about as long as the pronotum, slightly ascending, tricarinate. Vertex short, horizontal; margins slightly elevated, rounded somewhat acutely at the front; tempora almost or quite obsolete, submarginal (if present). Face quite oblique, straight, quadricarinate, the middle pair subparallel. Pronotum slightly constricted in the middle, tricarinate, the lateral carinae slightly and regularly curving inward at the middle, a little wider apart at posterior extremity than at the anterior; posterior sulcus subdistinct, situated a little behind the middle; anterior margin subtruncate; posterior margin obtusely rounded. Elytra narrow, extending slightly beyond the abdomen, semi-transparent; the lower (anterior) field without veinlets on the basal half; the apical half with regularly transverse veinlets; the middle portion of the upper (posterior) part of the disk with similar transverse veinlets. Wings narrow, as long as the elytra. Abdomen slender; subanal plate with a slight tubercle on its upper margin; apex acuminate; cerci slender, cylindrical. Posterior femora slender, elongate, extending beyond the abdomen. Posterior tibiae with numerous minute spines,—seventeen or eighteen in the outer row. Prosternum unarmed.

*Color* (alcoholic).—Ferruginous or rufous, varied with fuscous and yellowish stripes. Face rufous; cheeks and occiput ferruginous-brown, with two narrow, dim, paler, longitudinal lines each side. Pronotum ferruginous, with a broad fuscous stripe on each side; the lower margin striped with yellowish. Upper (posterior) margin of the elytra yellowish, forming a dorsal stripe when closed; a narrow, submarginal, yellow stripe along the costal (lower) submarginal space, extending from the base about half the length of the elytra; remainder dark fuscous, forming a broad middle stripe

on each elytron, extending from the base to the apex, widening toward the apex. Wings black, or very dark fuscous; this color being almost uniform throughout. Posterior femora ferruginous, except the disk, which is occupied by a dark-fuscous or black stripe. Venter yellowish; sternum rufous.

♂.—Length to tip of abdomen, 1.10 inches; elytra, 0.75 inch; posterior femora, 0.62 inch; posterior tibiæ, 0.62 inch.

Lower Arizona; from the collection of 1874; H. W. Henshaw, collector.

The present species is evidently closely allied to *S. leucocerca*, as is indicated by the color of the wings, and form of the subgenital plate of the male; but *leucocerca* has the posterior lobe of the pronotum roughly punctate, which clearly distinguishes it from our species. The want of this last character would possibly exclude it from Stål's genus as now restricted, yet the other characters are so clearly and distinctly marked that I have no hesitancy in placing it here, although this may necessitate the dropping of this character from the generic distinctions.

#### CHRYSOCHRAON.

##### CHRYSOCHRAON VIRIDIS, Scud.

*Chrysochraon viridis*, SCUD., Bost. Jour. Nat. Hist., 1862, vii, 455.

Stål has described this under the name *Truxalis angusticornis* (*Recensio*, 105) as a new species. His specimen was from Carolina.

#### GOMPHOCERUS.

##### GOMPHOCERUS CARPENTERII, Thos.

##### PLATE XLIV, FIG. 5.

*Gomphocerus Carpenterii*, THOS., Bul. No. 2 U. S. Geol. Surv. Terr., 1874, 65.

I find a few specimens of this singular species in the last collection. Although there is nothing accompanying the collection to indicate the exact locality where, or altitude at which, it was found, yet, as it is a true montane species, I presume it was obtained in the mountains of Northern New Mexico or more probably of Southern Colorado. I have also received a large number of specimens from Mr. Putnam, of Iowa, chiefly males. In this collection I find not only the male, but also some specimens which I feel quite well satisfied are the females of this species; but as they vary somewhat I will give a short description of one of the best specimens

before me so far as it differs from the description of the male heretofore published.

The margins of the vertex meeting in a somewhat obtuse angle; the club of the antennæ distinct, but not so broad as in the male. The pronotum scarcely gibbous, as in the male; slightly constricted in advance of the middle; the lateral carinæ forming a distinct angular convergence in advance of the middle, and diverging anteriorly and posteriorly; median carina (also in the male) distinct; posterior margin obtusely rounded, almost truncate. Elytra and wings abbreviated, the former extending over but three or four abdominal segments, lanceolate, with longitudinal nerves (also in the male) prominent. Posterior femora a little shorter than the abdomen.

*Color* (after long immersion in alcohol).—As the male, except as follows:—face brown; pronotum dark-yellowish on the sides, with elongate dashes and scattered spots and dots of dark fuscous; the upper portion of the sides in the exterior angle of the lateral carinæ black; dorsum yellowish, with a triangular black spot on the posterior lobe each side of the median carina; elytra brown; posterior femora reddish-brown, with two or three very oblique, somewhat irregular, dusky stripes across the external face.

Length about 1 inch; elytra, 0.12 to 0.15 inch.

#### STENOBOTHRUS.

##### STENOBOTHRUS OCCIPITALIS, THOS.

*Stenobothrus occipitalis*, THOS., Synop., 1873, 81.

Dr. Brunner de Wattenwyl, to whom a specimen of this species was forwarded, gives it as his opinion that it will have to be transferred to *Oxycoryphus*. As it does not belong here, and closely approaches the latter genus, he is probably correct in this opinion.

##### STENOBOTHRUS CURTIPENNIS, Scud.

*Stenobothrus curtipennis*, SCUD., Bost. Jour. Nat. Hist., 1862, vii, 456.

*Stenobothrus longipennis*, SCUD., Bost. Jour. Nat. Hist., 1862, vii, 457.

*Locusta curtipennis*, HARR., Cat. Ins. Mass., 56.

*Chlœaltis curtipennis*, HARR., Rep., 3d ed., 184, pl. 3, f. 1.

Several specimens of the long-winged variety are contained in the collections of 1872 and 1873.

## STENOBOTHRUS COLORADUS, Thos.

*Stenobothrus coloradus*, THOS., Syn. Acrid., 82.

*Stenobothrus bicolor*, THOS., U. S. Geol. Surv. Terr., 1871, 465.

A single specimen of this species is contained in the collection, and is the first I have seen from the west side of the mountains, showing its range to be much greater than I had supposed.

## OEDIPODINI.

This group, as heretofore stated, I am disposed to limit by removing from it the following genera, and transferring them to *Tryxalini*, viz:—*Oxy-coryphus*, *Acrolophitus*, *Pedioscertetis*, *Chrysocraon*, *Stenobothrus*, and *Gomphocerus*.

As might have been expected, it is better represented than any other group, as the barren plains and dry mountain regions of the West appear to be peculiarly adapted to these orthopteral forms.

## TRAGOCEPHALA.

Modifying the group to which this belongs, as above stated, and retaining the arrangement of the groups as given in my Synopsis, this genus will, so far as North American genera are concerned, form the connecting link with *Tryxalini*.

*Æ. sordida*, Burm., and *Æ. costalis*, Scud., have been transferred by Stål to this genus, a change which I think is justifiable and in which I concur.

## TOMONOTUS, Sauss, (ARPHIA, Stål).

As before stated, Stål has wholly ignored *Tomonotus*, and established *Arphia* for the reception of *T. sulphureus* (*Æ. sulphurea*) and congeneric species. Both the species which Stål admits into his new genus are represented in the collection.

## TOMONOTUS SULPHUREUS, Fabr.

*Gryllus sulphureus*, FABR., Syst. Ent., ii, 59.

(*Locusta*) *sulphureus*, GMEL., Linn. Syst. Nat., i, 2079.

*Acridium sulphureum*, OLIV., Encyc. Méthod., vi, 227.

*Locusta sulphurea*, HARR., Rep., 177, pl. 1, f. 6.

*Edipoda sulphurea*, BURM., Handb. Ent., ii, 643.

*Tomonotus sulphureus*, SAUSS., Rev. et Mag. Zoöl., xiii, 1861, 321.

*Arphia sulphurea*, STÅL, Recensio, 119.

The two or three specimens of this species found in the collection are

very dark, and indicate an approach to *T. tenebrosus*, with which it is evidently closely allied. As will be seen, I have in this case, for the reasons heretofore given, retained Saussure's generic name, rejecting Stål's as unnecessary. I am aware he considers Saussure's genus as improperly characterized, and as combining incongruous elements; but I have seen no evidence on this point, and I think the characters as given in my Synopsis are sufficiently limited and distinct to clearly define the group intended to be embraced, and, as I had the typical species before me while preparing the diagnosis, I am satisfied the rule that Stål has followed in other cases will certainly retain Saussure's generic name.

TOMONOTUS TENEBROSUS, Scud.

PLATE XLIII, FIG. 3.

*Tomonotus pseudo-nietanus*, THOS., Proc. Acad. Nat. Sci. Phila., 1870, 82.

*Tomonotus tenebrosus*, THOS., Synop., 107.

*Edipoda tenebrosa*, SCUD., U. S. Geol. Surv. Neb., 251.

*Arphia sanguinaria*, STÅL, Recensio, 119.

The two varieties of this species are represented in the collection.

I give Stål's description of his *A. sanguinaria* for the benefit of American entomologists, and to show that I am correct in considering it as a synonym.

"Ferruginous-fuscous; posterior margin of the pronotum black-spotted; elytra opaque, paler near the apex; wings sanguineous, with the broad posterior external margin and a short anterior ray dark-fuscous.

♂, length, 20 millimeters. Vancouver's Island.

Very similar to *A. sulphurea* (Stål), but distinguished by the structure of the head, the lower crest of the pronotum, and the sanguineous wings. A very distinct (median?) carina running along the vertex, interrupted at the base of the vertex; apex of the vertex truncate, forming an obtuse angle with the frontal costa (as seen from the side); margins elevated, and converging posteriorly (?) then subparallel, becoming obsolete near the base of the head; frontal costa punctate, slightly narrowed at the base (Stål's specimen at this point was imperfect). Tempora smaller than in the preceding species. Crest of the pronotum equal throughout, not arcuate, incised (not notched) between the lobes. Posterior femora black internally,

pale bifasciate behind the middle. Posterior tibiae fuscous, with a pale annulation near the base."

This is evidently the ash-brown variety common in Nebraska and Dakota, which has the fuscous dashes on the posterior lobe of the pronotum and the elytra sprinkled with fuscous dots. It is intermediate between the dark or black variety and that with the pale-colored pronotum.

Dr. Brunner de Wattenwyl remarks, in a letter to me, that he considers *T. tenebrosus* as but a variety of *sulphurea*, and that these and *T. xanthopterus* belong to the genus *Pachytylus*.

These are the first specimens I have seen from the west side of the Wahsatch range. Its range is now known to extend from the western border of Minnesota to the southeast border of Nevada, and from Northern Wyoming to New Mexico; and I am of the opinion it will be found as far south as Mexico. The sharp crackling note of the male and bright-red wings of this species, which are so plain during flight, easily distinguish this species from any other in the West with which I am acquainted.

#### CAMNULA, Stål.

This is a new genus established by Stål for the reception of the following species from Vancouver's Island.

#### CAMNULA TRICARINATA, Stål.

*Camnula tricarinata*, STÅL, Recensio, 120.

I give the following from the "*Recensio*", as the species is North American.

"Pale reddish-yellow; the front on each side of the base to the tempora or between the tempora and antennæ and a stripe on the cheeks behind the eyes black. Elytra next the base reddish-brown; costal area paler, spotted with fuscous; apical portion subhyaline, fuscous-veined; and obsolete nebulous. Wings hyaline; veins dusky. Posterior femora obliquely fusco-bifasciate; apex fuscous; posterior tibiae pale; spines, except at the base, black.

"♂ ♀.—Length, 19–25 millimeters.

"Similar to *Tragocephala sordida*."

## OEDIPODA, Latr.

I would be glad if I could seize upon this opportunity to arrange our North American species under the genera which Stål has very properly carved out of this heterogeneous group, but am unable to do so, as my specimens are placed in the Agricultural Department at Washington. I can therefore only refer to such species as are contained in the collection now under consideration and those mentioned by Stål in his work.

## OEDIPODA CAROLINA, Linn.

*Acrydium carolinum*, DE GEER, Mem., 1773, 3, 491.

*Gryllus carolinus*, THUNB., Mem. Acad. St. Pet., 1815, 5, 239.

*Ædipoda carolina*, SERV., Hist. Orthop., 1839, 722.

This species, of which several specimens are in the collection, appears to be Stål's type of the genus. This widespread species is found on the plains of Nevada and Arizona without any marked variation from the eastern specimens. I may remark here, that during the past summer (1873) I saw it more abundant on one spot in the northwest part of Washington City than at any other spot in the limits of my observations.

OEDIPODA HOFFMANII, *sp. nov.*

*Ædipoda hoffmanni*, (copied into Synopsis, 127).

Very closely allied to *Æ. trifasciata*, and possibly it may be but a variety of that species, yet there are some variations which appear to mark it as distinct. The only specimen which has been preserved dry is so badly damaged, that it is impossible to do more than indicate its characters; even the sex is unknown, as the apex of the abdomen has been broken off, and the antennæ and legs are wanting.

The occiput ascending and the top of the head somewhat elevated, more so than in *Æ. trifasciata*; eyes ovate, large, prominent; vertex slightly elongate and expanding slightly in front of the eyes; margins raised; a slight median carina apparent; frontal costa sulcate, very slightly contracted below the ocellus; lateral carinæ arcuate, but not angled, extending to the corners of the face. Pronotum as in *Æ. trifasciata*, except that at each posterior lateral angle there is a minute tooth pointing downward. Elytra of usual length; when closed, they present an unusually flat surface on the

dorsum, forming right angles with the deflected portion. The metasternum appears to be shorter than is usual in the other species, but I have no male specimens at hand at this time to determine this positively.

*Color (siccus).*—The color and markings very similar to *Æ. trifasciata*, except that the middle and outer bands are less distinct, and the middle and apical spaces have a few brown dots in them; the bands are also of a deeper reddish-brown than the other species.

I at first laid this aside as a specimen of *Æ. trifasciata*, but in looking at it again the peculiarly flat dorsal surface of the closed elytra attracted my attention; the tooth at the lateral angle and somewhat elevated occiput appear sufficient to distinguish it as a new species. I have therefore described it as new, naming it in honor of Dr. W. I. Hoffman, who collected it while accompanying the expedition in Arizona.

OEDIPODA TRIFASCIATA, Say.

*Gryllus trifasciatus*, SAY, Ent. ed. Lec., i, 78, pl. 34.

*Ædipoda pruinosa*, THOS., Proc. Acad. Nat. Sci. Phila., 1870, 80.

A few specimens of this widely spread western species were obtained at different localities in Southeastern Nevada, Arizona, and New Mexico. Dr. Brunner de Wattenwyl places this in *Sphingonotus*, to which *Æ. Hoffmannii* will also have to be referred if he is correct.

OEDIPODA UNDULATA, Thos.

*Ædipoda undulata*, THOS., U. S. Geol. Surv. Terr., 1871, 460.

This species is readily distinguished from closely allied forms by its broad papilioniform wings, which are very distinctly and regularly undulated along the posterior margin. Its general color is an ash-brown; the elytra being marked with minute dusky spots or dots. The wings in the alcoholic specimens are pale yellow at the base; the apical third being more or less dusky. The length of the body is a little more than one inch in the female; the elytra extend beyond the abdomen about one-third their length.

Dr. Brunner de Wattenwyl, of Vienna, to whom I sent a specimen of this species, says it is a true *Ædipoda* as the genus is now restricted, but he thinks it is identical with *Æ. ochraceipennis*, Blanch., a South American

species. I have been unable to decide positively in regard to this, as the only copy of Gay's *Fis. Hist. Chili* to which I have had access wants the plate on which this species is figured. By a letter recently received from Dr. E. C. Reed, of the Museo Nacional, Santiago, I learn a package of Chilean *Acrididæ* has been forwarded to me. From this I may be able to determine this point. I have received the package since the above was written and in it find a specimen of the latter species, but it is so badly damaged that I am unable to decide with certainty as to the identity of the two, yet it is evident they are closely allied.

Although I collected this species along the eastern base of the Rocky Mountains, I did not have my attention called specially to it at the time my collection was made; nor was I aware it existed beyond the mountains until I found it in the collection of 1871.

OEDIPODA CINCTA, Thos.

*Ædipoda cincta*, THOS., Proc. Acad. Nat. Sci. Phila., 1870, 80.

There is but one rather small specimen of this species in the collection.

OEDIPODA BELFRAGII, Stål.

*Ædipoda belfragii*, STÅL., Recensio, 129.

This is a new species described by Stål as coming from Illinois. In order to call the attention of our western entomologists to it, I give the author's description in full.

"Fuscous-brown; the head variegated with cinereous; carina of the head and of the posterior femora, also the posterior margin of the pronotum, sprinkled with black; antennæ annulated with fuscous. Pronotum with the posterior margin acute-angled; crest somewhat prominent, profoundly incised between the lobes. Elytra pale grayish-brown, somewhat translucent toward the apex, where they are also clouded with fuscous. Wings pale-yellow at base, with a broad black band across the disk, arcuate, and narrowed internally; apex transparent, with fuscous veins. Anterior legs subannulated with fuscous; posterior femora with the fascia and apex black, the inferior margin and exterior side hairy; posterior tibiæ pale yellowish, fuscous at the base, spines tipped with black, hairy.

♀, length 25 millimeters. Illinois.

In the structure of the head and pronotum similar to *Æ. carolina*, but differs in being smaller, the elytra and wings less ample, and the former less densely reticulated; the pronotum behind the middle being subalutaceous; and in the color of the wings. The posterior angle of the lateral lobe of the pronotum rounded."

Although this description differs considerably from the description of my *Æ. cincta*, which is found in Illinois, I am rather inclined to believe they are identical; otherwise I am wholly unacquainted with it.

#### OEDIPODA PHÆNICOPTERA, Germ.

*Ædipoda phænicoptera*, BURM., Handb. Ent., ii, 643.

*Locusta apiculata*, SAY, MSS. (Harr. Cat. Ins. Mass., 56).

*Locusta corallina*, HARR., Rep., 176.

*Ædipoda oblitterata* (?), GERM., BURM., Handb. Ent., ii, 643.

*Ædipoda corallina*, ERICHs., Archiv. f. Nat., ix, 2, 229.

*Acridium phænicopterum*, DE HAAN, Bijdr. Kenn. Orthop., 144.

Stål places *Æ. discoidea* in Saussure's genus *Hippiscus*, and, as this is a very closely allied species, it should probably be placed in the same genus, though, in some respects, it appears to correspond more closely in generic characters, with his *Pynodictya*.

*Hippiscus phænicopterus*, Burm., will therefore be its new name, thereby remanding another name to the list of synonyms.

There are four specimens in the collection of 1872.

#### OEDIPODA CORALLIPES, Hald.

This, in all probability, will have to follow *Æ. discoidea* to *Hippiscus*. I find but one specimen of this species in the collection, which was taken in Nevada. It would appear from this fact that it does not extend very far southward in the intermontane area.

#### OEDIPODA WHEELERII, *sp. nov.*

##### PLATE XLIV, FIG. 1.

Has much the appearance of *Æ. trifasciata*, but is quite distinct, and possibly is not congeneric as Stål has limited the genera. The upper portion of the head rounded and smooth; seen from the front, elliptical; eyes small,

elliptical, and not prominent, widely separated. Vertex broad, arcuately deflexed, and passing into the frontal costa without any mark of distinction; the subhexagonal margin faintly outlined; a very slight median elongate tubercle; frontal costa broad, flat, rounded on the margins, and scarcely distinct from the face, not sulcate. Pronotum similar in form to that of *Æ. trifasciata*, expanding posteriorly, very slightly constricted or indented at the posterior sulcus, covered throughout, except a small space on the middle of the lateral lobes, with small tubercles, giving it a coarsely granulated appearance, forming thereby a strong contrast with the smooth head; posterior sulcus quite distinct, situated about the middle, and extending upon the sides; the other transverse incisions obsolete on the dorsum; median carina obliterated; lateral carinae rounded and subobsolete; posterior margin rectangular. Elytra and wings extending but slightly beyond the abdomen; elytra rather narrow, minutely but densely reticulated, except about one-fifth at the apex, which is transparent, and has regular transverse veinlets; axillary vein connects with the anal vein. Posterior femora very broad; lower carina very prominent, but suddenly narrowed near the apex; shorter than the abdomen; anterior and middle femora small and slender.

*Color* (after immersion in alcohol).—Dull ash-brown, varied with fuscous; head, thorax, and legs almost uniform; a black puncture at each side of the lower extremity of the frontal costa; a small black spot at the lower corner of the face; a few black points on the dorsum of the pronotum. The elytra with four broad transverse fuscous bands, one about the middle of the basal half rather narrow and of regular width, the other three on the apical half, between which are alternate yellow bands; the anterior of these fuscous bands quite broad and widening upward (posteriorly); apex transparent; a narrow yellowish stripe along the humeral angle. Base and disk of the wings yellow; a broad, black, arcuate band along the exterior (posterior) margin, having a small transparent space at the apex. This band should perhaps be called submarginal, as the front portion curves slightly inward, and leaves an apical space, which is traversed by fuscous veins. Posterior femora with a few black dots on the external face, and an indistinct paler ring near the apex; internal face fuscous on the basal half, crossed by a fuscous band on the apical half, rest yellow. Tibiæ and tarsi pale; spines

tipped with black. The portions described as fuscous are in fact pale fuscous-brown. Antennæ slender.

♀.—Length, 1.9 inches; elytra, 1.5 inches; posterior femora, 0.85 inch.

This fine, large species forms an interesting link between *Æ. trifasciata* and *Æ. corallipes*, and with my *Æ. montana* well nigh fills up the hiatus. It agrees in every respect with Stål's genus *Pynodictya*, except that in that genus the posterior lobe of the pronotum is much longer than the anterior, while in this species the two are nearly equal. He gives as the type of this genus the *Gryllus obscurus* of Linné, with *Æ. rosacea* of Serville as a synonym. Serville (Hist. Orthop., 728-729) describes the two as distinct species; and as his *Æ. rosacea* has "a slightly elevated carina" on the pronotum, it appears difficult to reconcile this with Stål's diagnosis. As he had access to Linnaeus's type, this was most assuredly his guide in forming his genus; and Serville's description accords very closely with the generic characters so far as he gives them. The wings of these species are red at base, and possibly this was the original color in the species before me, but I think it was yellow.

Named in honor of Lieut. G. M. Wheeler, in charge of the expedition.

This species is placed in *Ædipoda* provisionally, as it must be removed when this genus is restricted to its proper limits. I am strongly inclined to name it at once *Pynodictya Wheelerii*; otherwise a new genus will have to be formed for its reception.

#### OEDIPODA GRACILIS, Thos.

*Ædipoda gracilis*, THOS., U. S. Geol. Surv. Terr., 1871, 461.—*Id.*, Synop., 121.

I find in the collection a specimen which probably belongs to this species; but the head and thorax are so badly damaged that it is impossible to determine this with any degree of certainty.

#### OEDIPODA NEGLECTA, Thos.

##### PLATE XLIV, FIG. 3.

*Ædipoda neglecta*, THOS., Proc. Acad. Nat. Sci. Phila., 1870, 81.

I find one specimen of this species in the collection of 1873, probably from Southern Colorado. I found it quite common in Northern Utah and

Southeastern Idaho; but I have unintentionally omitted to mention this locality in my Synopsis. I have also traced it east to Southern Illinois; and from this collection I find that it extends into the borders of Nevada and Arizona.

This is one of the most unvarying species in reference to its characteristics I have ever had the pleasure of naming. The unvarying markings and carvings of the vertex confirm the propriety of selecting these as specific characters.

It approaches very near to Stål's *Trilophidia*, and probably belongs to that genus; otherwise it also will require the formation of a new genus, as it evidently does not belong to *Ædipoda* as restricted. Dr. Brunner de Wattenwyl thinks this and also *Æ. montana* and *Æ. corallipes* should be placed in *Leprus*.

OEDIPODA HAYDENII, Thos.

*Ædipoda haydenii*, THOS., U. S. Geol. Surv. Terr., 1871, 460.—*Id.*, Synop., 120.

I find no specimens in the collection, but mention it here to state that it will have to be transferred to Stål's new genus *Cosmorhyssa*, which is distinguished by the numerous elongate tubercles or short carinæ on the posterior lobe of the pronotum, and by the character of the vertex and frontal costa, as given in my Synopsis (p. 120). This species should, therefore, hereafter be known as *Cosmorhyssa haydenii*, Thos.

OEDIPODA FENESTRALIS, Serv.

This has been transferred to *Psinidia*, Stål, in which he also places two new species—*P. capito* and *P. fuscifrons*—from Texas. It is probable that my *Æ. kiowa* will also fall in this genus.

OEDIPODA MARATIMA, Harr.

This is now, according to Stål, *Trimerotropus maratima*. It is not found in the collection, but is mentioned here to show in what genus it belongs. Where no remark is made to the contrary in speaking of other species which Stål's arrangement affects I accept the change, and shall hereafter adopt the new generic name.

OEDIPODA UTAHENSIS, *sp. nov.*

## PLATE XLIV, FIG. 2.

*Female*.—Very similar to *Æ. carolina* in general color and appearance, but differs in size and in the color of the wings. Vertex slightly deflexed, subhexagonal or subelliptical, with two slight depressions at the tip; frontal costa sulcate below the ocellus. The crest of the pronotum a little more elevated than in *Æ. carolina*; the notch distinct. Elytra and wings much longer than the abdomen. Posterior femora passing the abdomen; upper carina and rather broader than in *Æ. carolina*.

*Color* (alcoholic).—Dull-brown, dotted with fuscous; the brownish is uniform except on the elytra and posterior femora, the former being sprinkled on the upper portion of the basal half and on the apical portion with very small fuscous spots or dots; the latter marked with a few fuscous dots along the upper half. Wings pale-yellow at the base and crossed by a very broad, black, arcuate band just beyond the middle; apex pellucid, with dark veins. The black band of the wing, which is quite broad, occupying nearly one-third of the wing, is one of its distinguishing characters; the marginal ray is much abbreviated and broad. Apex of the elytra transparent.

*Dimensions*.—Length of body, 1.15 inches; to tip of elytra, 2 inches; elytra, 1.2 inches; posterior femora, 0.75 inch.

I have heretofore seen a specimen of this species, which was given to me by the curator of the Salt Lake City Museum, but, being doubtful as to its being a distinct species, marked it provisionally with the name here given, but did not publish a description, waiting an opportunity to examine other specimens.

OEDIPODA SPARSA, *sp. nov.*

*Male*.—Of moderate size, and with closed wings, strongly resembling, in color, the paler specimens of *Tomonotus tenebrosus*.

Eyes large and more than usually prominent. Occiput very short. Vertex elongate, slightly deflexed; the central foveola rather distinct, with sharply and prominently raised margins, and at the anterior margin, on the fastigium, is an angular depression or pit, which sends back an acute angular projection into the front margin of this foveola; the tempora scarcely

foveolate, being simply flat triangular spaces. Frontal costa rather narrow; sides parallel, distinctly channeled, scarcely or not expanding at the ocellus; ocelli immediately below the external angle of the tempora and close against the front margin of the eyes at the middle.

Pronotum rather narrow; median carina distinct, though but slightly raised on the posterior lobe, more prominent on the anterior lobes, severed twice by the transverse incisions. The posterior sulcus about or slightly in front of the middle; the middle lobe shorter than the anterior one; lateral carinae subdistinct; anterior margin distinctly obtuse-angled, posterior margin about a right angle or very slightly acute. Elytra and wings passing the abdomen fully one-third their length. The wings are broad and somewhat papilioniform, reminding us very much of *Æ. undulata*, to which, in fact, this species appears in several respects to be closely allied.

*Color* (alcoholic).—Dull ashen-brown throughout, sprinkled with fuscous dots. The elytra are somewhat darker brown on the basal third, which is the extent of the densely veined portion; the other two-thirds being less densely veined, semi-transparent, and sparsely sprinkled with fuscous dots. Wings transparent; the veins and veinlets of the apical half dark; the veins prominent and strong; it is possible these were of a bluish tint when living, yet they may have been tinged with greenish-yellow.

Length of body, 0.85 inch; elytra, 1.00 inch; posterior femora, 0.50 inch. New Mexico.

The female has a very distinct longitudinal carina through the central foveola of the vertex. The interior of the posterior femora marked with black or dark-brown, and slightly sprinkled externally.

Length to tip of elytra, 1.25 inches.

It is possible this belongs to *Æ. undulata*, but if so the venation of the wings is very different, the *undulata* having the transverse veinlets very regularly scalariform and close, while in this there is no such marked arrangement. This single character I think is entirely sufficient to show the two are quite distinct. The two species are true *Ædipodæ* as the genus is now restricted.

#### PSINIDIA, Stål

As I find in the collection two specimens of my *Æ. kiowa*, which I am

satisfied belong to this genus, I give briefly its characters from the "*Recensio*."

Median carina of the pronotum somewhat prominent and twice notched; posterior margin distinctly angulate, generally rectangular; posterior lobe much longer than the anterior. Eyes never longer than the infraocular part of the cheeks, but generally much shorter. Axillary vein confluent with the anal vein.

I think, from the species mentioned, that the top of the head is generally elevated, and the median foveola of the vertex probably confluent with the sulcus of the frontal costa.

PSINIDIA FENESTRALIS, Serv.

*Ædipoda fenestralis*, SERV., Hist. Orthop., 726.

PSINIDIA KIOWA, Thos.

*Ædipoda kiowa*, THOS., U. S. Geol. Surv. Terr., 1871, 461.

Two specimens in the collection of 1872; locality not given.

By some oversight I described this species the second time in my Synopsis, 123, as new, under the name *Æ. plattei*, which must therefore be suppressed.

EPHIPPIGERA, Hald.

EPHIPPIGERA TSCHIVAVENSIS, Hald.

A single specimen of this singular species was contained in the collection, but I find on examination that it is now missing, so that I cannot state positively where it belongs, but an examination made when I first discovered it satisfies me that it should be placed near *Eremobia*. The figure given in Stansbury's report is correct. The specimen I examined was a perfect female, which has satisfied me that I was mistaken in supposing Haldeman's specimen was a pupa. If I should find it, I will determine its position, and report on it hereafter.

TROPIDOLOPHUS, Thos.

TROPIDOLOPHUS FORMOSUS, Say.

*Gryllus formosus*, SAY, Am. Ent. ed. Lec., i, 78, pl. 34.

*Tropidolophus formosus*, THOS., Synop., 138.

*Cyrtolopha formosa*, STAL., Recensio, 118 (note).

The collection of 1873 contains one very large specimen (♀) of this

species, being a little more than two inches in length; wings abbreviated, as I believe is usual in the females, yet I see I have not mentioned this fact in my description, although I recollect very distinctly that I had short-winged females in my collection at that time.

I do not find that Stål has anywhere given the characters of his genus except what is given in a note to page 118 of his "*Recensio*," where he states that "*Cyrtolopha* (typ. *Gryllus formosus*) appears to stand midway between the *Ædipodæ* and *Ommexacha*; eyes small; dorsum of the pronotum throughout its whole length elevated into a high serrulate and arcuate crest, posteriorly strongly produced, angulate anteriorly; legs long and slender; also slender in form (*statura*)."

Here the question of date in reference to the publication of my Synopsis and Stål's "*Recensio*" arises in determining which generic name shall stand. As a matter of course, I will retain that which I have given until it is shown that Stål's has precedence.

#### BRACHYPEPLUS, Charp.

##### BRACHYPEPLUS MAGNUS, Girard.

A number of specimens of this singular but well known species are found in the collections of both years.

*B. verescens*, Charp., I think, is but a variety of this species. In the collection made in Southeastern Nevada and Northern Arizona, some were obtained in color, which, although not agreeing exactly with Charpentier's figure and description, appear to form an intermediate link between the two both in size and color; in fact, rendering it doubtful to which they belong.

#### EREMOBIA.

##### EREMOBIA MAGNA, *sp. nov.*

##### PLATE XLV, FIG. 1.

*Female*.—Vertex deflexed, broad, quadrate, slightly enlarged in front of the eyes; margin slightly elevated; central portion nearly flat, with a distinct median carina; tempora vertical, subobliterated, in which the lateral ocelli are situated. Frontal costa expanded and prominent between the eyes, slightly sulcate, with two indistinct diverging lines of minute tubercles

above the ocellus, constricted and subobliterated below the ocellus. The face and cheeks rugose. Pronotum broad and rapidly expanding posteriorly to the middle legs, flat and rugose above; sides perpendicularly deflexed, forming distinct humeral angles; transverse incisions distinct, the posterior in front of the middle; median carina somewhat distinct on the posterior lobe, obliterated on the anterior lobes; lateral carinae distinct, not elevated; disk of the posterior lobe elongate-tuberculate; anterior margin truncate; the posterior extremity elongate, extending upon the second abdominal segment, giving the posterior lobe an elongate-ovate form; posterior lateral margins quite oblique, and slightly but regularly incurved. Abdomen very large, tapering rapidly posteriorly, not carinate above. Elytra squamose, extending only to the middle of the second abdominal segment; minutely reticulated; longitudinal veins inconspicuous; wings minute. Posterior femora shorter than the abdomen, robust, and convex on the disk; pinnæ not distinctly angulated on the disk but simply curved, and somewhat bifurcated above, giving the disk somewhat the appearance of being covered by imbricated scales; upper and lower carinae hairy. Posterior tibiae curved forward in the lower half, expanding below, with strong, somewhat distant, and slightly incurved spines nearly to the knee, hairy, especially between the rows of spines. Anterior and middle legs pilose. Meso- and meta-sternum very broad and flat; the posterior margin of the latter squarely truncate with no entering lobe or sinus. Prosternum about half the width of the meta-sternum; a somewhat prominent curved ridge extending across from one leg to the other. Antennæ of medium length, filiform.

*Color* (alcoholic).—Dull ochreous or yellowish-brown; a few black points on the anterior portion of the pronotum; elytra brown with paler reticulations; interior face of the posterior femora dark-brown or black; tips of the valves of the ovipositor and of the tibial spines black; sternum and venter yellow.

*Dimensions*.—♀, length, 1.90 inches; pronotum, 0.75 inch; width of pronotum at the broadest point, 0.50 inch; elytra, 0.25 inch; posterior femora, 0.70 inch; posterior tibiae, 0.65 inch; width of mesosternum, 0.56 inch. ♂ much smaller.

Lower Arizona. From the collection of 1874; H. W. Henshaw.

Stål has restored the generic name *Eremobia* of Serville in place of *Thrincus* of Fischer, and I think properly; I have therefore followed him. The specific name *magna* is given because it is supposed to be the largest species of the genus known.

### ACRIDINI.

This group corresponds almost exactly with Stål's subfamily *Acridiidae*. He places *Rhomalea* in it, and I think very correctly. The changes in the genera and transfer of species will be noticed in the appropriate places. I shall retain the arrangement of the genera as given in my Synopsis.

#### PEZOTETTIX, Burm.

As heretofore stated and for the reasons given, I shall not follow Stål in transferring our *Calopteni* to this genus, yet, at the same time, I admit that these groups need revision, and would gladly adopt any consistent arrangement which does not wholly revolutionize these genera. I may remark here that Dr. Brunner de Wattenwyl thinks my *P. picta* is the *Dactylotum bicolor* of Charpentier; but a single glance at a specimen in color would convince him of his error.

#### PEZOTETTIX UNICOLOR, Thos.

##### PLATE XLV, FIG. 5.

*Pezotettix unicolor*, THOS., Synop., 151.

I find some specimens which, although differing somewhat from the type, I think belong to this species. The frontal costa is not sulcate, and the wings are shorter. They are contained in the last collection, and were probably obtained in the mountains of Southern Colorado, although the exact locality is not given.

#### PEZOTETTIX OREGONENSIS, *sp. nov.*

##### PLATE XLV, FIGS. 2, 3.

Caloptenoid in the form of the head and thorax; wings abbreviated.

*Male*.—Small and slender. Vertex but moderately deflexed, and

slightly sulcate; frontal costa flat, punctured, scarcely sulcate. Pronotum compressed on the sides, which are parallel; lateral carinæ somewhat distinct though not sharp; transverse impressions distinct; the two anterior distant from the posterior, which is situated behind the middle; posterior margin obtusely rounded; the posterior lateral margins ascending without any inward curve or angle. The thorax appears rather longer than usual, especially the prothorax; the middle coxæ falling behind the lower corner of the pronotum a little farther than usual. Elytra very short, extending only upon the second segment, ovate, not quite meeting on the back. The spines or processes of the last abdominal segment long and slender, extending upon the super-anal plate more than half its length; a small tubercle at the base of each; cerci very broad, somewhat narrowed at the apex, but not suddenly decreasing in width; sub-anal plate terminating in a rounded tooth-like point. Anterior femora somewhat strongly arcuate.

*Color* (after immersion in alcohol).—A yellowish-brown, except as follows:—antennæ pale; eyes brown; a shining, dark-brown, quadrate spot on the side of the pronotum, extending from the anterior submarginal indentation to the posterior sulcus; a spot of similar color extending from the middle of the posterior lateral margin of the pronotum to the insertion of the middle legs; elytra brown, unspotted; a dark-brown stripe on the side of each abdominal segment except the last; spines of the posterior tibiæ black.

Length, 0.80 inch; elytra, 0.14 inch.

Although found in this collection, it is marked as having been obtained in Oregon by J. Haldeman.

PEZOTETTIX MARSHALLII, *sp. nov.*

PLATE XLV, FIG. 4.

*Male and female*.—Vertex narrow between the eyes, which are more than usually approximate, expanding somewhat in front, slightly deflexed, distinctly sulcate; frontal costa flat slightly depressed at the ocellus. The immediate foveolæ in which the antennæ are inserted have a more than usually prominent margin. Pronotum flattened and compressed on the sides, which are straight in both sexes, parallel in the male and slightly

diverging in the female, tricarinate, each about equally distinct, though not prominent, yet forming sharply defined angles; the two sides (halves) of the dorsum flat, but ascending slightly to the median carina; posterior margin obtusely and regularly rounded; posterior sulcus behind the middle, distant from the other two, all distinct but not profound. Posterior femora of the female not reaching the tip of the abdomen, about equal to it in the male. Elytra not extending beyond the middle of the second segment, obovate, not meeting on the back; wings but mere figments. Sub-anal plate of the male pointed (cerci and super-anal plate damaged); cerci of the female broad, short; super-anal plate thick, oblong, and subsulcate. Antennæ not extending beyond the tip of the pronotum.

*Color* (after immersion in alcohol).—

*Male*.—Brown, varied with yellowish. Eyes, top of the head, dorsum of the pronotum, elytra, and abdomen brown; an irregular spot on the upper portion of the side of the pronotum shining brown. Posterior femora with the disk reddish-brown; upper and lower margins yellow; two broad spots on the inner face dark, rest yellow, except the apex, which is also black. The female has the general color, greenish yellow, but I am inclined to think that usually this is darker, perhaps even brown; spot on the side of the pronotum and disk of the femora reddish-brown. The abdomen in both sexes keeled above.

Length, ♀, 0.75 inch; ♂, 0.62 inch. Mountains of Southern Colorado.

It is possible that the specimens I have marked as *P. unicolor* belong to this species.

Named in honor of Lieut. W. L. Marshall, U. S. A., who has made valuable collections of *Orthoptera*.

PEZOTETTIX HUMPHREYSII, *sp. nov.*

Belongs to *Pezotettix* proper of Burmeister as limited by Stål, and is closely related to *P. mendax*, Fisch.

*Female*.—Large and fleshy; abdomen short and tapering rapidly, scarcely reaching the tip of the posterior femora. Head large and convex above; eyes large and approximate above; vertex somewhat broad and expanding in front of the eyes, slightly channeled, usually a round pit or

large deep puncture in the channel exactly between the upper corners of the eyes; frontal costa very broad and flat, fading below; sides parallel; lateral carinae quite distinct, diverging slightly toward the corners of the face. Antennae of medium length. Pronotum short, cylindrical, without any lateral carinae; median carina scarcely apparent; expanding slightly, but regularly, posteriorly; posterior sulcus about two-thirds back from the front, leaving the posterior lobe very short; the posterior margin truncate on the back, or curved slightly forward; the anterior lobes smooth on the sides, marked with distinct shallow depressions on the disk; the posterior lobe distinctly and densely punctured; the posterior lateral margin slightly curving inward as it ascends. Elytra mere figments on the sides, not meeting on the back, extending across two segments, spatulate. Wings appear to be entirely wanting. Cerci minute and tapering to a point; the super-anal plate rather large, triangular, broadly rounded at the apex, marked transversely so as to give it the appearance of being a part of two segments. The prosternal spine stout, conical, and somewhat transverse.

The *male* differs in being much smaller and less robust; the abdomen is but moderately enlarged at the apex; the cerci are much longer than in the female, flat, and enlarged at the base and apex, the apical portion being somewhat broader than the basal portion; the anterior apical angle is rounded, while the posterior one is somewhat acute, dentiform; the super-anal plate is bicarinate longitudinally; sub-anal plate slightly elongate and cone-shaped.

*Color* (after immersion in alcohol).—Yellow, with black and brownish markings; male and female similar. The general color throughout is a bright yellow, therefore I will note only the markings on this yellow ground. A broad piceous black stripe on the sides of the pronotum, extending from the anterior margin to the posterior sulcus, with an oblique yellow stripe extending through it from the lower anterior angle to the middle of the upper margin, thus leaving a triangular black spot above in front immediately behind the eye; the sides of the meso- and meta-thorax striped obliquely with black; a black spot on each segment under the upper margin of the elytra. All of these black markings are margined by a brighter yellow than that which surrounds it. Dorsum of the anterior lobes

of the pronotum brownish-yellow (probably olive when living); the posterior lobe rufous; a distinct bright-yellow spot, of uniform width, runs along the whole length of the dorsum of the abdomen, margined with black; disk sometimes fuscous. The color of the alcohol specimens probably varies but little from that of the living specimens.

*Dimensions*.—♀, length, 1.25 inches; posterior femora, 0.74 inch; posterior tibiæ, 0.63 inch. ♂, length, 1 inch; elytra, 0.18 inch; posterior femora, 0.62 inch; posterior tibiæ, 0.50 inch.

From Southern Arizona; collected by the expedition of 1874, and named in honor of Gen. A. A. Humphreys, the chief of the Engineer Corps, under which these expeditions have been conducted. It is a fine, robust species, well marked, and quite distinct.

#### OMMATOLAMPIS, Burm.

##### OMMATOLAMPIS VIRIDIS, Thos.

*Ommatolampis viridis*, THOS., Synop. Acrid., 156.

*Caloptenus viridis*, THOS., U. S. Geol. Surv. Terr., 1871, 450, pl. ii, f. 3.—*Id.*, Glover Orth., pl. xi, f. 3.

There is an imperfect specimen of this species in the collection; it is the first, so far as I am aware, that has been obtained west of the range.

#### CALOPTENUS, Burm.

##### CALOPTENUS SPRETUS, Uhler.

A number of specimens of this destructive species are contained in the last collection, a few only in the first, indicating that as we move southwest into Arizona it ceases to be so abundant as in Utah and farther east and north; whether this inference be correct or not I am not aware. So far as I can learn, it has not yet been found in California; but as it is found immediately east of the Sierra Nevada it is quite probable that it reaches to the Pacific, though it may not be migratory on the west side of the range. It is a matter of some scientific interest to learn positively in regard to this, and it would be well for collectors in California to look carefully for it. From a remark by Dr. Packard in the American Naturalist, I presume he has received specimens from California.

It is somewhat strange that the first specimen ever examined and named

should have been found in Southern Illinois, by the writer, and sent to Professor Uhler, of Baltimore, about the year 1860, though previous to that time various scientific expeditions had penetrated the western plains; yet it is but seldom seen in the section where that specimen was obtained.

The great distress it has caused in the Western States by the destruction of the crops the past season renders it a matter of public interest to ascertain whether there is any remedy for the evil. I think it extremely doubtful whether they can be brought under control by any practical scheme; yet the question cannot be fully decided until it is ascertained positively from what point the hordes visiting Kansas, Nebraska, and Minnesota come, and where they originate. While their history on the western side of the plains is pretty well known, but little appears to have been ascertained that is reliable in regard to their passage across the plains.

So far as I have been able to learn from personal observations and from information received in the west, they move north, south, and east, but seldom migrate westward. May it not be that settlements along the eastern flank of the Rocky Mountain range are pushing them eastward? It would be well for some one connected with the expeditions the Government is sending west to gather all the data in regard to their operations last season possible, and this should be done the coming summer, while the facts are fresh in the memory of the people of the sections visited by them. While it is quite probable no adequate remedy can be found, yet every means possible should be tried; and it is evident no progress can be made in this direction until their habits and history have been thoroughly studied. Much has already been ascertained, but an important gap yet remains to be closed; the swarms which visit these States must be traced back, step by step, to their starting place. Much can be done in this direction the next season, and while dates are fresh in the memory of the numerous sufferers this should be done.

#### CALOPTENUS OCCIDENTALIS?, Thos.

*Caloptenus occidentalis*?, THOS., U. S. Geol. Surv. Terr., 1871, 453, pl. ii, f. 2.

I find in the collection a specimen which appears to belong to this species, although it varies somewhat from the type. It differs in the following

respects:—the anterior and middle femora are not more slender than is usual in this genus; the prosternal spine is not unusually broad at the base, but is blunt and transverse, as described; the oblique brownish bands on the posterior femora wanting. But the specimen is a male, and shows the unusually broad cerci of this species; there does not appear to be any blunt tooth at the tip of the last abdominal segment, which has the same form as in *C. femur-rubrum*. It is, therefore, quite probable I was mistaken in this respect in my original description; but if I am correct in regard to the former, then this is a new species. This species appears to be closely allied to *C. femur-rubrum* on the one side and to *C. keelerii* on the other.

CALOPTENUS BIVITTATUS, Say.

*Gryllus bivittatus*, Say, Jour. Acad. Nat. Sci. Phila., iv, 308.

*Locusta leucostoma*, KIRBY, Faun. Bor.-Am. Ins., 250.

*Acridium sanguinipes*, HARR., Hitch. Rep., 583.

*Acridium flavovittatum*, HARR., Treat. ed. 1862, 173.

*Acridium bivittatum*, THOS., Trans. Ill. Agl. Soc., v, 449.

*Acridium leucostomum?*, DE HAAN, Bidjr. Kenn. Orthop., 143.

*Acridium femoratum?*, DE HAAN, Bidjr. Kenn. Orthop., 144.

*Caloptenus femoratus*, BURM., Hand. Ent., ii, 368.

*Caloptenus bivittatus*, UHLER, Say's Ent. ed. Lec., ii, 238.

The specimens of this species in the collection, captured at various points of the routes explored, appear to be unusually large, and, although preserved in alcohol, retain sufficient of the coloring to show that they belong to the greenish-yellow or olive variety.

CALOPTENUS YARROWII, *sp. nov.*

PLATE XLV, FIG. 6.

*Female*.—Very similar in appearance and form to *C. bivittatus* Say, to which it is very closely allied.

Vertex scarcely sulcate; the frontal costa broad and slightly sulcate; antennæ scarcely reaching the tip of the pronotum; the joints distinct, each joint being somewhat enlarged at the tip. The transverse incisions of the pronotum distinct; the posterior one behind the middle; median carina distinct, though not elevated. Elytra and wings reaching the tip of the abdomen; the intercalate vein of the elytra present. Posterior femora not

reaching the tip of the abdomen. The inner angles of the mesosternal lobes rounded.

*Color* (after immersion in alcohol).—Brownish, varied with yellow. Face and cheeks yellow, tinged with brownish; two oblique brownish stripes on the cheeks extending from near the border of the pronotum downward and forward. The sides of the posterior and lower portions of the sides of the anterior lobes of the pronotum greenish-yellow; upper portions of the sides of the anterior lobes pale brown; a pale-yellow stripe extending from the vertex along each lateral carina to the anterior sulcus; the middle portion of the occiput and dorsum of the pronotum pale brown. The elytra brown, with four or five oblong yellow spots in a row along the disk; a pale-yellowish indistinct stripe running along the upper angle; nervules mostly yellow. Posterior femora yellow with three oblique reddish stripes across the external face, which cross the upper margin and extend upon the upper portion of the inner face; lower margin of the outer and inner face yellow. Tibiæ dull yellow (probably bluish when living); spines black. Tips of the valves of the ovipositor black.

Length, 1.3 inches; elytra, 0.87 inches; posterior femora, 0.62 inch.

Named in honor of Dr. H. C. Yarrow, the surgeon and zoölogist of the expedition.

One specimen only found in the collection, but this is in good order.

#### ACRIDIDIUM, Geoff.

ACRIDIDIUM SHOSHONE, *sp. nov.*

PLATE XLIII, FIG. 2.

*Acridium shoshone* (extract from this MSS. published in the Proc. Acad. Nat. Sci. Phila., 1873, 296).

By some oversight I neglected to state in my Synopsis that such was the case, which should have been done, as the description was published by permission of the officer in charge in order that I might copy it into my Synopsis, it being understood that it and the other species published at the same time should appear in this paper as new, a note to be made of the fact.

Large size; green; without any dorsal stripe.

*Female*.—Vertex nearly horizontal,; sides angularly expanding in front of the eyes; flat frontal costa prominent, sides parallel, sulcate from the ocellus downward, above the ocellus somewhat gibbous and punctured; lateral carinae very prominent, parallel. Pronotum slightly expanding posteriorly, coarsely and reticulately punctured; median carina distinct, severed by the three transverse impressions. Elytra and wings passing the abdomen. Cerci very short, broad at the base, narrowed and rounded at the apex. Posterior femora much enlarged at the base; posterior tibiae considerably enlarged at the apex. Prosternal spine robust, cylindrical, and nearly straight. Pectus punctured. Abdomen of the male somewhat elongated; cerci very broad and flat, very slightly and obtusely notched at the apex, which is bent upward and over the last segment; subanal plate elongate, turned upward, with a distinct square notch at the apex.

*Color*.—Dark olive-green. Ocelli bright transparent-umber; eyes brown; cheeks yellowish, with a dark-green stripe extending downward from the eyes. The pronotum has some pale spots on the sides, and sometimes the posterior lobe is tinged with brown. Elytra uniform green, somewhat transparent at the apex, and in some specimens faintly tinged with brown. Wings hyaline; nerves and nervules dark-brown. Posterior femora greenish above and below; pinnæ of the disk alternately white and green, the white occupying the flat interspaces; inner face greenish-yellow. Posterior tibiae bright-vermilion, the under surface being striped with yellow; spines yellow at the base, tipped with black. Venter and pectus dark-green, sometimes varied with dark-brown.

*Dimensions*.—♀. Length, 2 to 2.25 inches; elytra, 1.7 to 2 inches; posterior femora, 1.25 inches; posterior tibiae, 1.2 inches. ♂. Length, 1.6 to 1.75 inches.

Several specimens of this fine, large species are in the collection, having been obtained in Southeastern Nevada and Arizona. In some respects, it is closely allied to *A. obscurum*, Burm., but is evidently quite distinct, as it wants the stripe on the pronotum and black dots on the hind femora. It is one of the largest species known to the orthopteral fauna of the United States. This, with the other new and subtropical species found in the collection, shows clearly that the southern portion of the area visited by the

expedition embraces the northern boundary of the subtropical faunal district. The beautiful Rhomalean species hereafter mentioned is strongly confirmatory of this opinion.

ACRIDIDIUM ALBOLINEATUM, *sp. nov.*

PLATE XLIII, FIG. 1.

Very similar in form, size, and general color to *A. emarginatum*, Uhler, and may be described by the colors, which are very marked and distinct.

*Female*.—Face marked with perpendicular alternate stripes of black and white (or pale yellow, probably yellow when living, as the specimen before me has been immersed in alcohol); the frontal costa black, with a narrow yellow line on each margin and one in the middle, the latter not distinct except above the ocellus; a dark stripe extending downward from each antenna, and each bordered each side by broad, parallel, yellowish stripes. The yellow line above the ocellus is continued upon the vertex, occiput, and along the middle of the pronotum and the inner margins of the elytra, forming a dorsal stripe, widening posteriorly. Lower half of the sides of the anterior lobes of the pronotum yellow; a yellow stripe from the base of the elytra to the insertion of the middle legs; and another extending upward from the insertion of the posterior legs. The remaining portions of the pronotum and elytra uniform light brown. Wings transparent yellow. Anterior and middle legs yellow on the anterior (outer) face and brown on the posterior (inner) face. Posterior femora with the lower half of the disk white; upper half with a black stripe from the base to the middle, the outer end extending in the form of a short band over the upper carina; there is another broad black band midway between this and the apex, rest yellow; apex black with a yellow spot at the lower corner; inner face yellow, with two oblique dusky stripes.

*Dimensions*.—Length, 1.8 inches; elytra, 1.75 inches; posterior femora, 1 inch; posterior tibiae, 1 inch.

The colors show this species to be distinct from *A. emarginatum*, which it resembles most.

There is but one specimen in the collection of 1873; no locality given, but it is probably from Arizona.

## DICTYOPHORUS Thunb.

Stål has restored this generic name of Thunberg with *R. microptera* as the type. In this he is undoubtedly correct, and should be followed. But when he separates from it those species which have the vertex slightly deflexed, and places them in a new genus, *Tæniopoda*, his desire to form new genera would seem to overcome his better judgment and accurate knowledge of this group. Although it is true that the vertex is somewhat sloped, yet it is but slightly so, and scarcely varies from the line of the anterior part of the pronotum and occiput. An examination of his *T. pecticornis*, a specimen of which is now before me, shows that it is congeneric with *R. microptera*, and if removed from association with that genus it must be arbitrarily done. Therefore, while I cheerfully follow Stål in separating the *miles* form from the *microptera* form, I cannot accept his new genus *Tæniopoda*.

## DICTYOPHORUS PICTICORNIS, Stål.

*Rhomalea pecticornis*, WALK., Cat. Dermap. Salt., iii, 538.

*Tæniopoda pecticornis*, STÅL, Recensio, 51.

Walker's specific name would take precedence but for the fact that it is certainly incorrectly printed. For the benefit of American entomologists I give here a somewhat complete description from the specimens before me, as Walker's description is somewhat deficient (as given in my Synopsis), and Stål's not generally accessible.

*Female*.—Robust; similar in form and size to *R. centurio* (*microptera*) Head depressed; the top from the middle of the occiput to the tip of the vertex sloped slightly downward in a line with the top of the anterior lobe of the pronotum; seen from the side, it forms with the frontal costa an angle of about  $110^{\circ}$ . Vertex slightly produced in front of the eyes; the sides meeting in a right angle; surface flat; margins slightly elevated. Frontal costa narrow, slightly expanded at the ocellus, obliterated before reaching the clypeus, sharply sulcate. Antennæ somewhat elongate, extending slightly beyond the tip of the pronotum, acuminate; joints distinct. Pronotum slightly expanding posteriorly; the dorsal portion elevated, being arched from the lateral carinæ so that the portion above these equals in height two-thirds the portion below them; the crest forming an obtuse,

slightly elevated carina, arcuate from the middle sulcus forward; lateral carinae obliterated on the front lobes, distinct on the posterior lobe; transverse incisions distinct, each severing the median carina, the posterior one behind the middle; anterior margin subangulate; posterior margin produced and forming an angle a little less than a right angle; the posterior lateral margins extend almost in a direct (oblique) line from the lower corner to the tip. Elytra and wings in the female about as long as the abdomen, slightly passing it in the male; the former reticulately veined, the veinlets prominent; in the male, these are not only longer but also broader than in the female, and have the cells considerably larger in the apical two-thirds than at the base or in any part of those of the female. Posterior femora reaching the tip of the abdomen in the female, passing it in the male, rather slender as compared with the size of the insect. Upper valves of the ovipositor remarkably robust; apex of the subanal plate of the male strongly curved upward and tapering to a blunt point.

*Color* (after immersion in alcohol).—Head, thorax, abdomen, and legs shining black, varied with bright yellow; the yellow markings as follows,—a narrow stripe extending down the face on each side just in front of the eyes; face margined with yellow below; a narrow stripe extending from the tip of the vertex along the median carina of the pronotum its entire length; a stripe down each side of the head adjoining the pronotum; posterior lobe of the pronotum margined with yellow; a triangular spot on each side of each abdominal segment; posterior femora with two narrow lines above and two below the disk (carinae), and the basal half of the disk pinnate with yellow. Antennae with the two basal and eight or nine apical joints black, the rest yellow, but annulate with black or fuscous at the tips (or joints). Elytra greenish-yellow, the cells or meshes black or dark fuscous. When living the black portions are more or less greenish; the elytra are green or greenish, the meshes black; the wings a bright red; exterior border and the broad front interneural space to the base fuscous, with a red spot (usually) near the apex.

*Dimensions*.—♀. Length, 2.25 inches; elytra, 1.5 inches. ♂. Length, 1.9 inches; elytra, 1.75 inches.

Several specimens, male and female, are contained in the collection of

1873 obtained in Arizona by Dr. C. G. Newberry. The specimens described by Walker and Stål are from Mexico.

Before leaving this family, I will give a list of the species whose position is affected by Dr. Stål's work so far as I am able to do so at present; but before this can be completed it will be necessary to examine all the species, but, most of my types being now at the Agricultural Department in Washington, I can only give such as are mentioned by Stål and those of which I have specimens before me. I also add the names of the new North American species described by Stål, and in this paper and also those in other papers published since my Synopsis, so as to complete the list of species.

*Names according to my Synopsis.*

Tryxalis brevipennis.  
 Mesops chlorizans.  
 Opomala bivittata.  
 Opomala marginicollis.  
 Oxyeorophus montezuma.  
 { Pyrgomorpha brevicornis. }  
 { Pyrgomorpha punctipennis. }  
 Stenobothrus viatorius.  
 Œdipoda sordida.  
 Œdipoda costalis.  
 Œdipoda discoidea.  
 Œdipoda phœnicoptera.  
 Œdipoda Haydenii.  
 Œdipoda fenestralis.  
 Œdipoda kiowa.  
 Œdipoda gracilis.  
 Œdipoda maritima.  
 Stenobothrus occipitalis.  
 Tomonotus sulphureus, &c.  
 Chrysochraon viridis.  
 Caloptenus (all).  
 Acridium americanum.  
 Rhomalia centurio.  
 Rhomalia pecticornis.  
  
 Chromacris colorata.  
 Monachidium superbum.

*Names according to Stål's new arrangement.*

Achurum brevipenne.  
 Arnilia (?) chlorizans.  
 Mermiria (?) Belfragii. (Doubtful).  
 Leptysma marginicollis.  
 Syrbula montezuma.  
 Tryxalis brevicornis.  
 Scyllina viatoria.  
 Tragocephala sordida.  
 Tragocephala costalis.  
 Hippiscus discoidea.  
 Hippiscus phœnicopterus (?).  
 Cosmorhyssa Haydenii.  
 Psinidia fenestralis.  
 Psinidia kiowa.  
 Psinidia gracilis (?).  
 Trimerotropis maritima.  
 Oxyecoryphus occipitalis (Brun. Wat.).  
 Arphia sulphurea, &c. (?).  
 Tryxalis viridis (?).  
 Pezotettix (?).  
 Acridium (Schistocerca) americanum.  
 Dictyophorus reticulatus.  
 Dictyophorus picticornis (Thos.). Tænio-  
   poda picticornis (Stål).  
 Rhomalea colorata.  
 Tæniopoda superba.

*List of species to be added to those enumerated in my Synopsis, most of which have been described since its publication.*

FROM STÅL'S RECENSIO.

Zoniopoda emarginata .....	Central America.
Hermistria pulcheipes .....	Mexico.
Coscineuta virens .....	West Indies.
Acridium columbinum (Thunb.) .....	West Indies.
Acridium flavo-lineatum (De G.) .....	Panama ; Mexico.
Achurum acridodes .....	Mexico.
Mermiria Belfragii (?) .....	Texas.
Syrbula leucocerca .....	Texas.
Tryxalis angusticornis (?) Chrysochraon viridis (Scudd.) .....	Carolina.
Arphia sanguinaria (?) Œdipoda tenebrosa (Scudd.) .....	Vancouver's Island.
Camnula tricarinata .....	Vancouver's Island.
Œdipoda Belfragii (?) .....	Illinois.
Œdipoda punctata .....	Mexico.
Psinidia capito .....	Texas.
Psinidia fuscifrons .....	Texas.

FROM BULLETIN No. 2, U. S. GEOLOGICAL SURVEY OF TERRITORIES (SELF).

Gomphocerus Carpenterii .....	Colorado.
Thrinus californicus .....	California.
Ommatolampis brevipennis .....	New Jersey.
Caloptenus flavolineatus .....	California.
Caloptenus floridanus .....	Florida.
Caloptenus keelerii .....	Florida.
Machærocera sumichrasti .....	Mexico.

NEW SPECIES DESCRIBED IN THIS PAPER.

Pedioscertetes Nevadensis .....	Nevada.
Syrbula fusco-vittata .....	Arizona.
Œdipoda Hoffmannii .....	Nevada.
Œdipoda Wheelerii .....	Arizona.
Œdipoda Utahensis .....	Utah.
Œdipoda sparsa .....	Arizona.
Eremobia magna .....	Arizona.
Pezotettix oregonensis .....	Oregon.
Pezotettix Marshalli .....	Colorado.
Pezotettix Humphreysii .....	Arizona.
Caloptenus Yarrowii .....	Arizona.
Acridium shoshone .....	Nevada.
Acridium albo-lineatum .....	Arizona.

LOCUSTIDAE.

There are several species of this family contained in the collection, some of which I am unable to determine at present for want of access to

some works which are necessary. These I have reserved to be described in a subsequent paper.

#### STENOPELMATUS.

##### STENOPELMATUS FASCIATUS, Thos.

*Stenopelmatus fasciatus*, THOS., U. S. Geol. Surv. Terr., 1871, 434.

This species is distinguished by the dark fascia or bands across the abdomen, each segment having one band on it. I have heretofore seen specimens from Texas, Colorado, Wyoming, Utah, and Southern Idaho, to which list of localities may now be added Nevada and Arizona, as shown by this collection.

#### CEUTHOPHILUS.

There is one specimen of this genus in the collection of 1872, but it is too badly damaged to determine what species it is.

#### UDEOPSYLLA.

##### UDEOPSYLLA NIGRA, Scud.

*Udeopsylla nigra*, SCUD., Jour. Bost. Soc. Nat. Hist., vii, 1862, 443.

There is one specimen of this species, a female, in the collection of 1872. This is the first time I have seen this species; but Dr. Scudder's description is so exact that I feel no doubt as to the correctness of my identification, although the reddish stripe on the back is wanting.

#### DECTICIDES.

This group is the subject of a paper by Otto Hermann (*Verhand. d. k.-k. zool.-bot. Ges.*, 1874), in which he reviews my arrangement as given in my paper published in Geol. Surv. Terr., 1871, 440.

Although differing from me on some points, yet this author's plan does not vary very materially, so far as the grouping is concerned, from that I have given. But a reference to my paper will show that I considered it as depending too much upon a minor character, and gave it more as a provisional arrangement than otherwise.

Mr. Hermann certainly deserves the thanks of entomologists for disentangling and properly limiting the genera of this group. He not only retains both *Rhacocleis* and *Pterolepis*, which I considered as synonyms, but also adds some new genera. Having access to the fine collection of Dr.

Brunner de Wattenwyl, he has been able to resolve all questions of doubt which I allude to in my paper.

I give the synopsis of his arrangement in his own language, as it is of much interest to our entomologists.

“ A. Prosternum mit zwei Stacheln :

\* Stiele der lamina subgenitalis eingelenkt, ♂ ; Ovipositor am Ende der Schneide nicht gezähnt, ♀ :

b. Plantula ganz frei abstehend :

c. Vertex breit zugerundet :

1. Pronotum von der Seite mässig zusammengedrückt, Processus abgestutzt, abgeplattet ..... *Gampsocleis*, Fieb.
2. Pronotum walzig, Processus ausgezogen, zugerundet, ohne Kiel. *Rhacocleis*, Fieb.

cc. Vertex zugespitzt :

3. Pronotum zusammengedrückt, ohne Processus... *Metaballus*, Herm.
4. Pronotum zusammengedrückt, Processus lanzenförmig zugespitzt, *Rhachidorus*, Herm.

ccc. Vertex mässig erweitert ..... *Thyreonotus*, Serv.

cccc. Vertex verschmälert, mit seichtem Eindruck.... *Arytropteris*, Herm.

bb. Plantula verkürzt, eingezogen :

c. Vertex verschmälert, mit seichtem Eindruck .... *Pterolepis*, Fisch.

cc. Vertex ohne Mitteleindruck, verschmälert..... *Drymadusa*, Stein.

AA. Prosternum ohne Stacheln :

\* Stiele der lamina subgenitalis eingelenkt, ♂ ; Ovipositor am Ende der Schneide gezähnt :

b. Plantula ganz frei abstehend :

c. Vertex abgestumpft :

d. Mittelkiel des Pronotums entwickelt..... *Decticus*, Serv.

dd. Mittelkiel des Pronotums nur auf der hinteren Hälfte sichtbar, *Platycleis*, Fieb.

\*\* Stiele der lamina subgenitalis nicht eingelenkt, ♂ ..... *Steiroxys*, Herm.

\*\*\* Stiele der lamina subgenitalis eingelenkt, ♂ :

b. Pronotum mit Mittelkiel ..... *Psorodonotus*, Brun.

bb. Pronotum ohne Mittelkiel :

c. Tibien des ersten Fusspaares vorne mit zwei Reihen Stacheln, *Anabrus*, Hald.

cc. Tibien des ersten Fusspaares vorne mit einer Reihe Stacheln, *Thamnotrizon*, Fisch.”

It will be seen by reference to this synopsis that it corresponds with my arrangement in making the presence or absence of the prosternal spines the chief character separating the two divisions of the group. The author also adopts my distinctions to separate *Anabrus* from *Thamnotrizon*.

My *Decticus trilineatus*, of which some specimens were forwarded to Dr. Brunner de Wattenwyl, is removed to a new genus, *Steiroxys*, established for its reception.

**ANABRUS, Hald.**

**ANABRUS SIMPLEX, Hald.**

I find but one specimen of this species in the collection made in Nevada; but from Dr. W. J. Hoffman's letter I presume they were seen in considerable numbers in Central Nevada.

This is the species that is eaten by the Indians. Not only do they eat them after roasting, but often without any other preparation than simply pulling off their legs and head.

**ANABRUS PURPURASCENS, Uhler.**

The collection contains three specimens, which I am quite confident belong to this species, but at what locality taken does not appear. I have never found or known of it being found west of the main Rocky Mountain range, therefore conclude they are from Colorado or Northern New Mexico.

**STEIROXYS, Herm.**

**STEIROXYS HERMANNII, *sp. nov.***

**PLATE XLIV, FIG. 4.**

*Male*.—The dorsal portion of the pronotum, instead of having the margins subparallel as in *St. trilineata*, has them slightly curving inward just in advance of the middle, and then outward from there to the front; the middle dorsal line very minute and subobliterated in front; a slight transverse impression behind the front border; posterior margin truncate, and as given in Mr. Hermann's figure (pl. v, fig. 65); the lateral margins nearly straight, not curved inward at the humerus, and the slope upward more gradual than in *St. trilineata*. Elytra squamæform, extending only across the second segment, rounded to a blunt point at the apex; the two larger cells or areas subequal in the left or upper elytron; the outer area longest; the vein which separates them runs almost directly along the middle of the elytron toward the apex, making a slight sigmoid curve. Super-anal plate with a square notch in the middle, lobes obtusely rounded; cerci rather short, enlarged at the apex, forming a blunt point or angle externally at the tip, while the internal margin of the tip is prolonged into a long, very

sharp, and slightly curved spine equal in length to the cerci, thus **L**, somewhat in the form of an **L**, being different from any species in this respect that I am acquainted with; subgenital-plate triangularly but not very deeply notched at the extremity, similar in form to that of *St. trilineata*, the lobes carinated, obtusely pointed. Anterior tibiae with two spines in front; middle tibiae with two rows in front, inner row with four, outer two spines; posterior femora with a few minute denticulations along the inferior margin. Spine over the anterior coxae broad at base, prominent.

*Color* (after immersion in alcohol).—Purple and yellow. The face dull yellow; pronotum purplish, margined on the sides and posterior extremity with yellow, the purple deepest on the sides; abdomen purple, posterior margin of each segment yellow, forming narrow bands across the abdomen; genital parts yellow.

*Dimensions*.—Length, 1 inch; pronotum, 0.30 inch; posterior femora, 0.75 inch; elytra, 0.13 inch.

Locality not given. Contained in the collection of 1873.

In general appearance and size, this species is much like *Anabrus Stevensonii*, which will probably have to be referred to this genus, but is quite distinct. It is possible that on account of the abnormal character of the cerci a new genus will have to be formed for its reception; but I am doubtful whether variation in the cerci is sufficient ground for forming new genera. The stylets of the subgenital plate appear to have been broken off in the only specimen I find in the collection.

I have named the species in honor of Mr. Otto Hermann, of Vienna, author of the valuable revision of this group of genera.

STEIROXYS BILINEATA, *sp. nov.*

PLATE XLV, FIG. 7.

*Female*.—Pronotum very slightly emarginate in front, squarely truncate behind, without any distinguishable carinae; the dorsal area slightly constricted near the anterior margin, otherwise as in *St. trilineata*. Abdomen proportionally longer and larger than in the latter species, also enlarged in the middle, somewhat fusiform. Cerci short, slender. The posterior abdominal segment with a small, sharp, triangular notch; the lobes in the form of short teeth; the subanal plate with a small, blunt, triangular notch,

the lobes rounded; ovipositor nearly as long as the entire body, slightly curving upward at the apex, not enlarged in the apical portion. Antennæ wanting in the only specimen. Posterior femora slender, smooth, passing the abdomen about one-third of their length. Spines over the anterior coxæ slender. Prosternum unspined; and the meso- and meta-sternal plates small and obtuse.

*Color* (alcoholic).—Dorsal portions throughout pale olive, striped with yellowish lines. Two rather narrow yellowish lines (one from each eye) extend back along the entire length to the tip of the abdomen; each abdominal segment is margined posteriorly with a quite narrow yellowish line; the lateral margins are marked with a somewhat broader line of the same color. Face and entire ventral surface pale yellow. Legs purplish externally. The olive of the abdomen and pronotum is more or less slightly tinged with rufous near the margins of the spaces.

*Dimensions*.—Length of body, 1.30 inches; ovipositor, 1.20 inches; posterior femora, 1.25 inches; posterior tibiæ, 1.22 inches.

From the collection of 1874 (October 17). San Carlos; H. W. Henshaw.

The genus *Steiroxys* was established last year by Mr. Otto Hermann, of Vienna, Austria, from some specimens of my *Decticus trilineatus*, which I transmitted to Dr. Brunner Wattenwyl. The specimen now before me corresponds in several respects with the generic characters given by Mr. Hermann, yet the variation in the pronotum and the general appearance of the specimen render it exceedingly doubtful whether it should be placed here.

The tibial spines appear to be the same as in that genus; but as the specimen is somewhat imperfect I cannot speak positively in this respect I have therefore placed it here provisionally rather than establish a new genus on a single and somewhat imperfect specimen.

#### LOCUSTA.

##### LOCUSTA FULIGINOSA, Thos.

*Locusta fuliginosa*, THOS., U. S. Geol. Surv. Terr., 1871, 443.

I find among the dried specimens of the collection of 1872 a female of this species, which was established on a single somewhat imperfect male

specimen presented to me by Dr. Palmer, who obtained it in Arizona. From it I am enabled to set at rest all doubts in regard to the distinction between *L. fuliginosa* and *L. occidentalis*. The specimen before me shows very clearly and beyond dispute that the two are quite distinct; the long wings and elytra and the peculiar color of the wings being the same in the female as the male.

The general color is ashy-white. The occiput is striped longitudinally with white and cinereous; the pronotum is similarly striped on the dorsum, the lower portion of the sides being bordered with yellow. The numerous reticulate veinlets of the elytra are white, giving them the appearance of being sprinkled over with fine white powder. The wings in the female are similar in color and reticulation as described in the male, and as figured by Professor Glover in the report above referred to. The posterior legs (the only ones remaining) are of a pale ash color, with a purplish tinge. Ovipositor ash-brown, curving slightly downward at the apex.

*Dimensions.*—Length of body about 1.25 inches; length to tip of elytra, 2.25 inches; elytra, 2.0 inches; posterior femora, 1.4 inches; posterior tibiæ, 1.4 inches; ovipositor, 1.25 inches.

As this was the first species of *Locusta* known to our fauna, and the first specimen, badly damaged and alcoholic, this specimen in color, although also somewhat imperfect, is one of the most interesting of the collection to me. It not only enables me to complete my description, but also confirms the view I took in regard to the distinction between this and the one from California.

There are some other specimens of *Locustidæ*, chiefly *Xiphidium* and allied genera, which I am unable at present to determine with certainty; also a few *Gryllidæ* in the same condition; in fact, it is almost impossible to arrive at any certainty in regard to the crickets until there is a revision of this family. I will try and determine them, and report next summer, when I trust I shall have materials for comparison and some works of reference, which I do not have access to at present.

The following specimens having been found in the collections of Orthoptera sent me, are here appended.

## ARACHNIDA.

Although not embraced in my specialty, yet as I find one specimen of peculiar interest I desire to make a note of the fact.

### TARANTULIDAE.

#### THELYPHONUS EXCUBITOR, Gir.

*Thelyphonus excubitor*, GIR., Marcy's Exp. Red Riv. Louis., 265, pl. xvii, f. 1.

The collection contains a fine, almost perfect specimen, of this singular species. The description and figures of Girard are so exact that nothing can be added.

### SCORPIONIDAE.

#### SCORPIO (TELEGONUS) BOREUS, Gir.

*Scorpio (Telegonus) boreus*, GIR., Marcy's Exp. Red Riv. Louis., 267, pl. xvii, f. 5.

I find two specimens in the collection which appear to belong to this species, though rather smaller than the one described by Girard. The color of the alcoholic specimens is yellow, but doubtless the greenish cast has faded out.



Thomas, Cyrus. 1875. "Report upon the collection of Orthoptera made in portions of Nevada, Utah, California, Colorado, New Mexico and Arizona, during the years 1871, 1872, 1873, and 1874." *Report upon United States Geographical surveys west of the one hundredth meridian* 5, 843–908.

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