The genus Eucerceris: its morphology and biology, with a monograph of the genus (Hymenoptera:Sphecidae)

Herman Austin Scullen

Iowa State College

Follow this and additional works at: https://lib.dr.iastate.edu/rtd

Part of the Entomology Commons

Recommended Citation
https://lib.dr.iastate.edu/rtd/15158

This Dissertation is brought to you for free and open access by the Iowa State University Capstones, Theses and Dissertations at Iowa State University Digital Repository. It has been accepted for inclusion in Retrospective Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.

BY

Herman Austin Scullen.

A Thesis Submitted to the Graduate Faculty for the Degree DOCTOR OF PHILOSOPHY.

Major Subject: Entomology.

Approved: [Signature was redacted for privacy.]

In charge of Major Work [Signature was redacted for privacy.]

Head of Major Department [Signature was redacted for privacy.]

Dean of Graduate College

Iowa State College

1934
# Table of Contents

I. INTRODUCTION ........................................... p. 4

II. THE TRIBE CERCIERINI ................................ p. 8

III. MORPHOLOGY OF EUCERCIERIS ...................... p. 11

IV. BIOLOGY OF EUCERCIERIS .............................. p. 15

V. MONOGRAPH OF THE GENUS EUCERCIERIS ............. p. 21
   A. INTRODUCTION ........................................ p. 21
   B. SPECIFIC CHARACTERS ............................... p. 23
   C. CLASSIFICATION ..................................... p. 23
   D. HISTORY AND DIAGNOSIS OF GENUS ................. p. 24
   E. KEY TO SPECIES ..................................... p. 27
   F. DISCUSSION OF SPECIES .............................. p. 31

1. Eucerteris lacunosa, new species .................... p. 31

2. Eucerteris arizonensis, new species ............... p. 34

3. Eucerteris violaceinennis, new species ............ p. 37

4. Eucerteris punctiferma (Cameron) .................. p. 39

5. Eucerteris flavocincta Cresson ..................... p. 41

6. Eucerteris rubripes Cresson ......................... p. 51

7. Eucerteris fulvipes Cresson ......................... p. 51

8. Eucerteris similia Cresson ........................... p. 68

9. Eucerteris elegans Cresson .......................... p. 75
10. Eucereria sonata, new name ... p. 82
11. Eucereria bitrunata, new
   species ... ... ... ... ... ... ... ... p. 84
12. Eucereria superba Cresson ... p. 37
13. Eucereria sonata (Say) ... p. 99
14. Eucereria insignis Provancher ... p. 110
15. Eucereria cecaeriformis Cameron p. 116
16. Eucereria sinuata, new species ... p. 118
17. Eucereria canaliculata (Say) ... p. 120
18. Eucereria marginipennis (Cameron) p. 130
19. Eucereria vittatifrons Cresson ... p. 132
20. Eucereria tricolor Cockerell ... p. 138
21. Eucereria montana Cresson ... p. 148
22. Eucereria annulata Rohwer ... p. 149

VI. LITERATURE CITED ... ... ... ... ... ... ... ... p. 155
VII. VITA ... ... ... ... ... ... ... ... ... ... ... ... p. 164
VIII. PLATES ... ... ... ... ... ... ... ... ... ... ... ... I to XIII
4.

I. INTRODUCTION

The present work was first undertaken at the suggestion of Dr. J. Chester Bradley as a part of a study of the tribe CERATIIN. Upon the suggestion of Mr. S. A. Rehwer and Mr. J. O. Bridwell of the National Museum who have both spent considerable time studying this group, special attention was turned first to the genus Eucerceris. The genus Eucerceris being much the smaller and confined to the western hemisphere presented less of a problem to start with than the genus Cerceris, which is much larger and world-wide in distribution. The writer has already done considerable work on the latter genus and will continue with it.

Work was started on the genus Eucerceris in 1928. More or less time has been spent since that date on a survey of the literature and in becoming familiar with the group by studying available material. In the summer of 1933 the writer spent some time studying types in the United States National Museum, the collection of the American Entomological Society of Philadelphia, and the American Museum at New York. Close to 1000 specimens have been borrowed from the leading collections of North America. It is estimated that this borrowed material re-
presents over 90% of the available specimens in the United States.

The writer is especially indebted to several workers who have assisted in various ways in the carrying out of these studies. Particular mention should be made of the following: Dr. H. H. Knight, for his kindly suggestions during the latter part of the studies; Dr. J. Chester Bradley, for frequent suggestions during the studies; Mr. S. A. Kohnor, who has kindly placed his notes at the disposal of the writer, compared specimens with types and rendered other valuable assistance; Miss Grace Sandhouse, for making comparisons with types and rendering assistance in many other ways; Dr. Harold Morrison, for his kind assistance in arranging for accommodations while the writer was studying types at the National Museum; Mr. E. F. Creason, Jr., for making comparisons with types and providing accommodations for the writer while studying types at Philadelphia; Dr. A. L. Hutchler, for making available the necessary accommodations for studying types at the American Museum; Mr. V. S. L. Pate, for making comparisons with types on several occasions; Dr. R. E. Snodgrass, for suggestions on the morphology studies; Dr. B. Eldon Beck, for suggestions relating to the genitalia studies; Prof. Raymond Roberts, for making comparisons with Nickell's types at Nebraska; Dr. W. H. Wellhouse, for sug-
gestions on the morphology; Dr. Robert L. Benson and O. P. Tassart of the British Museum, for descriptions and drawings of types; and to Dr. Don C. Mote, for providing accommodations for work at Oregon State College.

The following persons and institutions have assisted in these studies by the loan of material: Dr. Harold Morrison, United States National Museum; Dr. J. Chester Bradley, Cornell University; Mr. E. T. Cresson, Jr., American Entomological Society; Dr. Clarence E. Nickel, University of Minnesota; Dr. F. P. Van Duzee, California Academy of Science; Dr. Herbert F. Schwarz, American Museum of Natural History; Dr. George P. Engelhard, Brooklyn Museum; Dr. H. B. Hungerford, University of Kansas; Dr. Walter Carter, University of Hawaii; Dr. Carl D. Duncan, Stanford University; Earl Pritchard, Oklahoma A. & M. College; Prof. Geo. A. Dean and Prof. Reginald H. Painter, Kansas State College; Dr. H. P. Severin, South Dakota Agricultural College; Prof. O. A. Stevens, North Dakota Agricultural College; Prof. Chas. T. Vorhies and Prof. L. P. Wehrle, University of Arizona; Dr. Richard Dow, Boston Society of Natural History; Dr. A. L. Strand, Montana State College; Dr. J. Bequaert, Harvard Medical School; Dr. T. H. Prison, Illinois Natural History Survey; Dr. Hugo Fahl, Carnegie Museum; Dr. L. J. Muckmore, Los Angeles Museum; Dr. R. W. Deane, Stanford
University: Albert F. Winn, Peter Redpath Museum; C. H. Hicks; Prof. C. L. Fluke, University of Wisconsin; Prof. Sam C. Mc-Campbell, Colorado Agricultural College; Dr. H. H. Knight, Iowa State College; Mr. E. R. Buchell, Canadian Department of Agriculture; Dr. P. H. Timberlake, University of California; Mr. Wyall W. Jones; Prof. Raymond Roberts, University of Nebraska.
II. THE TRIBE CERCERINI

The tribe **CERCERINI** as recognized by Comstock (1930) includes the genera *Cerceris* and *Eucerceris*. The genus *Cerceris* was erected by Latreille in 1802. For many years it was included under the family **CRABRONIDAE**. In more recent years it has usually been placed in the family **PHILANTHIDAE**. Cresson (1865) in his "Monograph of the Philanthidae of North America," included the three genera: *Philanthus*, *Cerceris* and *Eucerceris*. Packard (1866) in his "Revision of the Fossorial Hymenoptera of North America," included the three genera under the subfamily **PHILANTHINAE** in the family **CRABRONIDAE**. Patton (1879) followed the method of classification used by Packard, and in 1880 erected the genus *Aphilanthops*. The African genus *Hectanebus* is also included in this family. Ashmead (1899), in his "Classification of the Entomophilous Wasps, or the superfamily Sphangoidea," separates *Cerceris* and *Eucerceris* from *Philanthus* and *Aphilanthops*. The first two genera were placed in the subfamily **CERCERINAE** and the last two in the subfamily **PHILANTHINAE**. Both subfamilies were included in the family **PHILANTHIDAE**, which was included in the superfamily **SPHINGOIDEA**. European workers quite generally do not recognize *Eucerceris* as a distinct genus separate from *Cerceris* which
is placed in PHILANTHIDAE under the superfamily SPHECOIDEA. Tillyard (1928) follows the European workers but does not mention Eugerceris as it is not represented in the Australian Realm.

In more recent years there appear to be three somewhat distinct methods of classification followed. In all three methods of classification the genera Cerceris and Eugerceris are included under the superfamily SPHECOIDEA (spelled SPHECOIDEA by some workers). The first method of classification is the one mentioned above as common among European workers where the two genera are included with others under PHILANTHIDAE. The second method is used by Rohwer (1913) who follows Ashmead (1899) but places the two genera in the family CERGERIDAE as distinct from the family PHILANTHIDAE. The third method is that adopted by Comstock (1950), who places the two genera in the tribe Cergerini in the subfamily Bembicineae and the family CERGERIDAE. Since the classification of the Hymenoptera as used by Comstock (1950) represents more or less the combined views of the three leading authorities on wasps in this country, viz., Bradley, Rohwer and Bequaert, the writer will follow that classification in so far as the general classification of Hymenoptera enters into consideration.
The genus *Cerceris* is world-wide in distribution, while the genus *Eucerceris* is considered as native to North America. Heretofore the latter genus has been considered as being limited to North America (Bradley, 1921). A male specimen of *E. annulicollis* (Say) labeled Ivan Beni, Bolivia (W. H. Mann) is in the collection of the United States National Museum. If this is not an error in labeling, it is probably an introduction. The unique specimen being described in this paper as *E. violaceipennis* from Cebina, Panama, represents the most southerly record for the genus in North America. As stated elsewhere, it is also distinctive in being one of the three females with cell 1st \( R_5 \) petiolate.

From the present studies the writer is led to accept the views of Patton (1880) and believes that the genus *Cerceris* arose as an offshoot from the genus *Eucerceris*. Four species, viz., *E. vittatifrons*, *E. tricolor*, *E. montana* and *E. angulata*, as a group show a close relationship to *Cerceris* in that the males of all four species have cell 1st \( R_5 \) petiolate. *E. violaceipennis*, *E. punctifrons* and *E. arizonensis* would be the most primitive of the species in that the females have cell 1st \( R_5 \) not petiolate. In all the other species cell 1st \( R_5 \) is petiolate in the females but not in the males.
III. MORPHOLOGY OF EUCERERIS

Plate I

The head is noticeably large but less so than in CRAB-ROKIDAE. The mandibles in general are unarmed on the males but armed with one or two mesal denticles on the females. The males of montana and angulata are exceptions. The clypeus has the three distinct lobes common to all members of the tribe CERKERINI. As a rule the clypeus is shorter and broader on the females than on the males. The apical clypeal border of the female is variously modified and presents the most valuable characters for separating the species. In the males there is much similarity in the form of the clypeus except in such extreme cases as spinata and lacunosa.

Distinct anterior tentorial pits (Atp) lie between the lateral wings and the medial portion of the clypeus.

The inner margins of the eyes may be subparallel or they may be noticeably converging. A depressed line extends from the antennae to the clypeus and is continued for a short distance above the antennae. In this depressed line the punctuation is finer and more compact.

The antennae as a rule are normal in form. Two exceptions are the males of angulata and lacunosa (Pl. IV, Fig.36).

The prothorax is represented by three distinct parts.
The pronotum ($E_1$) is the largest and has the posterior lobe, or tubercle ($tu$) characteristic of all sphecoid-wasps. The episternum of the prothorax ($Eps_1$) is a small sclerite on the side of the neck. The prosternum ($S_1$) is a small plate between the precoxal cavities ($CxG_1$).

The mesothorax consists of the scutum ($Sct_2$) and the scutellum ($Sct_2$), the tegula ($Tg$) and the mesoplectus ($Mpt$), which, according to Snodgrass (1910, p. 79) "consists of the fused mesosternum ($S_2$) and mesopleurites ($Eps_2$, and $Epm_2$)." Two small plates ($Sa_2$, $Sb_2$) lying between and just in front of the second pair of coxal cavities are assigned to the mesosternum by Snodgrass. The prepectus common in some wasps (Philanthus, etc.) is not found in CERCERINI.

A longitudinal furrow ($s$) divides the episternal area. Mesopleural tubercles ($mpt$) are present on some females.

The metathorax consists of the metanotum ($E_3$), the metapleura ($P_3$) and metasternum ($S_3$). The metanotum, which is frequently called the postscutellum, is a narrow rounded ridge between the mesoscutellum and the propodeum. The metapleura lie along the lateral borders of the propodium. The metasternum consists of three more or less distinct parts ($Sa_3$, $Sb_3$, $Sc_3$) between the second and third coxal cavities ($CxG_3$, $CxG_3$).
The propodeum (IT), which is considered as the first segment of the abdomen in Hymenoptera, has a distinct triangular area dorsally with the base of the triangle resting on the posterior border of the metanotum. This triangular area is usually referred to as the enclosure (enc). It is often ridged or punctate and in some cases is of taxonomic value, but the sculpturing varies in amount within the species.

Following the usual custom of students of Hymenoptera the propodeum is not considered in referring to the abdominal segments by number. The abdomen proper consists of six segments in the females and seven segments in the males (Fig. 4). This is true of all CERCERINID. The first segment of the abdomen is much constricted and of subuniform width. The second segment suddenly widens back of its junction with the first segment to the maximum width of the abdomen. The last three or four segments become progressively smaller. The distal tergite has a well marked pygidial area which is of some taxonomic value in the form of its outline.

The distal ends of the third pair of femora are characteristic in the tribe CERCERINID. They are broad and reniform in shape (Fig. 9x).

The wing venation typical for most males of the genus is illustrated on plate 1. The venation nomenclature used is
based on the Bradley (1931) system. In Eucerinus cell 1st $R_5$ is always petiolate in both sexes and cell 2nd $R_5$ is separated from cell 1st $R_1$ by a deep incision and is not greatly enlarged. In Eucerinus cell 1st $R_5$ may or may not be petiolate and cell 2nd $R_5$ is much enlarged and not separated from cell 1st $R_1$ by a deep incision.

The male genitalia (Pl. 1, Fig. 13) consists of a single basal ring (BR) through which opens the genital foramen (GF), and the following paired parts: large lateral coxopodites (Cxp), smaller and more medial parameres (Par), and the valves of the penis (VP). The two latter parts are together known as the aedeagus.

The background color is black, fuliginous or ferruginous. The markings are yellow or ferruginous. It is common for the yellow to blend into or be replaced by ferruginous or fulvous. Some parts retain the yellow markings more persistently than other parts. This is especially true of the metanotum. The yellow markings on the posterior border of the protergum and on the mesoscutellum are also quite persistent when other markings tend to fade out. There is a general tendency for elevated convex areas to be of a lighter color than the depressed concave areas.
IV. BIOLOGY OF PSEUDOCERAMIS

Apparently no observations have ever been published relative to the nesting habits of any species of the genus Pseudoceramis. The genus Cerceris has been studied by several workers in this country. Beckham and Beckham (1898, 1905) studied Cerceris olivacea Dahlb., Cerceris desertae Say and Cerceris nigrescens Smith in Wisconsin. Carl Hartman (1905) published some brief notes on Cerceris fumipennis Say in Texas. Rau and Rau (1918) published some observations on Cerceris fumipennis Say. Rau (1928) records some detail studies on Cerceris paul Rohwer and Cerceris serripes (Fabric.) (= Cerceris bicornuta Guerin) in Missouri. Brooks (1930) records some observations on an undescribed species of Cerceris in West Virginia.

In a personal letter J. C. Bridwell (1933) reports finding "a female at Detroit, Oregon on July 11, 1907 nesting in the ground in the manner ordinary for Cerceris. The prey used was a large Otiorhynchid beetle which Dr. Van Dyke subsequently determined for me as Dyslobus segnis LeConte." The wasp referred to by Mr. Bridwell was determined by him as Pseudoceramis flavocinota Cresson. In the same letter Mr. Bridwell states: "I have found a considerable number of the males of the same Pseudoceramis sleeping in burrows under stones at a place called 'Lost
Prairie, I believe, along the Santiam road in the Cascades two years later." Prof. O. A. Stevens made some interesting observations on *Eucoecris superba* Cresson in North Dakota. His notes are recorded under that species in Section V.

The present writer had an unusual opportunity to study the nesting habits of *Eucoecris flavocinata* Cresson at Breitenbush Hot Springs, Oregon from July 2nd to 7th, 1934. Two colonies of nesting wasps were found. The first and smaller colony of the two was located along a little used roadway which was more or less covered with chips and sawdust from a nearby deserted saw-mill. Only five burrows were located in this colony. Two of these burrows were in the process of being excavated by females. A second and much larger colony (fig XIII, fig 154) was found in a large open patch of ground near the mineral springs where the owner of the ground reported having seen them in considerable numbers for the past three years. Several dozen burrows were observed in this colony which extended over an area at least as large as the average city lot. The burrows were more numerous along the border of a large patch of tipton-weed (*Hypericum perforatum* L.). A few of the burrows were well hidden in the thick growth of the above plant. The soil where the nests were found
was quite rocky. The rocks ranged in size from that of a pea to several inches in diameter and constituted nearly fifty per cent of the soil. The soil between the rocks was quite light and dry. Miscellaneous short weeds and grass covered the ground not occupied by the tipton-weed.

The burrows were approximately one half inch in diameter at the surface opening. They entered the ground at an angle of about 75°. Two or three inches below the surface they appeared to be slightly enlarged. From this main tunnel which extended to a depth of about four inches the female wasp apparently excavated side galleries at the ends of which the nursery cells were formed. The cells are about seven-eights of an inch in diameter and an inch in length. Apparently each cell is excavated and provisioned with beetles and an egg before another is started. It was impossible to find out how many cells are constructed from one main burrow but apparently from six to ten or more.

The prey used (Pl.XIII, fig.155d) by the female of *Euceraeris flavocinata* Cresson to provision her nest is *Dyslobus lacontei* Casey which Dr. E. G. Van Dyke was kind enough to determine for the writer. Numerous females with their prey were taken while transporting the beetles to their burrows. Many additional specimens of the beetles were removed from the provisioned cells. Apparently all the
beetles used were of the same species. Four specimens appeared to be the usual number of beetles provided for each cell. Close observation showed that the beetles were carried by one of the front legs when they were being dragged over the weeds. When the wasp was flying with her prey the beetle was held close to her ventral surface. The writer was unable to determine how this was accomplished but doubtless the wasp used her legs for this purpose.

An effort was made to find how long it took the wasp to complete one collecting trip. One was observed to return with a second beetle fifty-three minutes after it entered its burrow with a previous beetle. The nest was not under observation during all the intervening time. Several other burrows were kept under observation for an hour or more and the wasps did not return with additional prey. It would seem that approximately an hour or more was necessary to add an additional beetle to the supply. Even on the most favorable days the wasps did not start out for prey until nearly ten in the morning. From these observations it seems unlikely that a wasp could excavate and provision more than one cell in a day. Possibly a much longer time is necessary for the process.

No eggs were found on the beetles in the cells. Two very young larvae (Pl.XIII, fig.158c) were observed. Both
of these were lying on the ventral surface of the thorax of a beetle. A few nearly mature larvae (Pl.XIII, fig.155b) were observed feeding on beetle remains. The majority of the cells which were found contained the prepupae (Pl.XIII, fig.155a, 155c) along with the remains of the beetles. These prepupae were still larval in form but more compact in shape and yellow in color than the larvae. They were completely enclosed by a light brown parchment-like silken cocoon which was rounded on the anterior end but elongated and blunt on the posterior end. The anterior end of the cocoon was free but the posterior end was firmly attached to the end of the cell. The entire cocoon was loosely attached to beetle remains and to the side walls of the cell by means of slender silken threads.

It is not known how long the young wasps remain in the prepupa stage but at least some of our solitary wasps and bees spend the winter as such and pupate in the spring. It is quite probable that such is the case with *Euceroes flavocincta* Cresson also.

The females spend the night in the burrows where they may be found until late in the forenoon. The burrows remain open at all times. As indicated above Bridwell found males sleeping in burrows in the ground under stones. The writer also found males in small shallow burrows. They never were
found in the larger burrows used by the females. During the warmer part of the day the males spent their time flying about the nesting grounds, sitting on rocks and chips or flying after the females when they came in with their prey.

Both females and males of many species of *Eucerceris* may be found on such plants as *Solidago*, *Eriogonum*, wild carrot and similar plants where they apparently feed on nectar or pollen. The floral visiting habits of some of the species are indicated in the list of specimens examined as given in section V.

From the enormous number of beetles taken by the colony of *Eucerceris flavocincta* Cresson under observation it would appear that the genus may be of considerable value as a biological check on injurious forms.
V. SYSTEMATICS OF THE GENUS EUCLERERIS

A. INTRODUCTION

The genus Euclereris was erected by Cresson in 1865. In this genus Cresson placed two species previously described by Say (1823) under the genus Pallanthus (Euclereris sonata (Say) and E. canaliculata (Say)). The female of the latter species had been described by Say (1823) as Cerotara bidentata. At the time Cresson erected the genus Euclereris he had not seen specimens of E. canaliculata (Say) and was not aware of the fact that E. bidentata Say belonged in the new genus. In addition to Say's two species referred to above, Cresson described and added the following new species to the genus Euclereris: E. laticosta (here considered synonymous with Say's E. sonata), E. suprema, E. flavocineta, E. cingulata (later recognized by Cresson as the male of E. flavocineta), and E. fulvipes. Later species have been added by Cresson (1879, 1881, 1882), Patton (1879), Cameron (1888), Provancher (1889), Banks (1913), Cockerell (1897), Viereck and Cockerell (1904), Cockerell and Rohwer (1908), Rohwer (1913), and Nielson (1916). Several of these are here considered as synonyms. A total of twenty-six species have been described. Three of these have heretofore been reduced to varieties or reported as synonyms. The present writer here recognizes twenty-two species including five new
There to show the inner markings and the parts to close them on the head the lower part of the case and the gene are the parts to show the markings and the parts to close them on the ab圆满.

The plastered area of the ab圆满 are the large bare areas that to present the ground on the gored rotor to depend the part. The agreed areas are on the periphery round the large part by for the medium part to make one think and the middle are not covered on the outer shell of the machine. The exception of the blade until to assemble in the machine. Among which to rotate in the machine and frame to rotate and frame to rotate by and make it understood to depend many parts works in this gene. Where are on gene. By the rotor to close the markings and molder of motors have been used.

3. SPECIFIC CHANGING...
The sculpturing of the enclosure has been overemphasized by some past workers in the opinion of the writer. It is constant and of value in separating some species, but in others it varies in amount but not in nature.

The apical margin of the clypeus in the female and the erect rows of hairs on the venter of the male are of special value. For some reason the latter have been neglected by most workers on the genus in the past. The genitalia of the male has proved of little value. The pygidial area of the female is of some value but not of as much value as in the closely related genus Carniceris. The relative length of the segments of the antennae has been of little value. Wing venation is used in separating the three groups recognized. There is some slight variation in the venation within the species and in some cases between the wings of the same individual.

C. CLASSIFICATION

The twenty-two species of Oacerceris recognized in this paper are divided into three groups based on the wing venation. Group A includes E. violaceipennis, new species, E. punctifrons Cameron and E. arizonensis, new species, in which the female has cell lst R₅ not pectiolate. The males are unknown, but when found they will no doubt have cell lst R₅ also not pectiolate. Group C includes E. vittatifrons Cr., E. tri-
color Chil., E. montana Cr. and E. angulata achower. This group is distinguished by the fact that both the males and females have cell lst R5 petiolate. Group B which includes all the other species not included in the other two groups has cell lst R5 petiolate in the females but not petiolate in the males.

In arranging the species an effort has been made to place them in their proper phylogenetic sequence. While this is not difficult in some cases there is still some uncertainty in the case of a number of the species.

D. HISTORY AND DIAGNOSIS OF GENUS.

Genus HUGERCHIS Cresson

---

LeConte (in part), Writ. of Th. Say, I:168, 1883.
Hand large, wider than the thorax, subquadrate, wider and more transverse in the female, with the face much broader anteriorly; eyes lateral, more or less ovate, entire; ocelli in a triangle on the vertex; antennae subovate, inserted above the alypeus, in the middle of the face, approximated; mandibles stout, acute or subacute at their apex; alypeus 3-toothed at tip, and trilobate in male, scarcely so in female. Thorax ovate, the collar transverse, the metathorax obtusely rounded or subtruncated. Wings: the anterior wing with one marginal and three submarginal cells; the female has the marginal cell oblong and obtusely rounded at the tip, the first submarginal cell much longer than the two following, the second triangular, petiolated, and receiving the first recurrent nervure before the middle, the third submarginal very large, subquadangular, the tip exceeding that of the marginal, the second recurrent nervure uniting with the second transverse subital nervure; the male has the marginal rather shorter, subtriangular, especially at base, truncate or subtruncated at tip, the posterior nervure descending in a gradual curve, and the inferior edge in an angle, to meet the superior angle of the second submarginal cell, which is triangular.

Balle Torre (in part), J. T. Syst., VIII:49-51, 1907.
Genotype (Logotype).---Tillantina concutus Say.
Creason's original definition (1905, pp.104-105)
and oblique, receiving the first recurrent nerve before the middle; the second recurrent nerve either unites with the second transverse subital nerve, or is received near to the base of the third submarginal cell which is shaped much as in the female, but varying in being a trifle shorter and more quadrate. Legs stout, rather strongly spined, the posterior tibiae serrate, the anterior tarsi ciliated exteriorly, but not strongly so. Abdomen as in Cerceris.

"This genus is much more closely related to Cerceris than to Philanthus, to which the two described species have been referred; it differs from the former genus especially in the neurulation of the anterior wings, which, however, shows a remarkable difference in the male and female."

The writer conforms to this definition with the exception that the female may have cell 1st R₅ not petiolate. Three species, E. arizonensis, new species, E. punctiformis (Cameron) and E. violaceipennis, new species, are included in this genus although the females have cell 1st R₅ not petiolate.

It should be added that members of the genus Euserceris differ from those of Cerceris by the presence of a depressed line on the tergites of the abdomen and the different form of the pygidial area in the males.


37.

**F. KEY TO SPECIES**

<table>
<thead>
<tr>
<th>Description</th>
<th>Key Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seven segments in abdomen</td>
<td>Males</td>
</tr>
<tr>
<td>Six segments in abdomen</td>
<td>Females</td>
</tr>
</tbody>
</table>

**MALES**

1. Cell 1st R5 petiolate                         | 2          |
   - Cell 1st R5 not petiolate                     | 5          |

2. Mandibles abnormally large                    | montana    |
   - Mandibles normal                             | 3          |

3. Scape wide and flattened, projections on the first five segments of the flagellum, rows of erect hairs on sternites three and four. | anculata   |
   - Antennae normal in form, one row of erect bristles on sternite five | 4          |

4. Abdomen with ferruginous                       | tricolor   |
   - Abdomen without ferruginous                   | vittatifrons |

5. No rows of erect bristles on the venter        | flavescinata |
   - One or more rows of erect bristles on the venter | 6          |

6. One row of bristles on the fifth sternite      | 7          |
   - More than one row of bristles on the venter  | 9          |

7. Second femora with a deep depression bordered with a row of long hairs | leasnosa |
   - Second femora normal                          | 8          |
8. Length 14 to 15 mm., ferruginous markings usually present --- rubripes
   - Length about 12 mm., without ferruginous markings --- fulvipes
9. Two rows of bristles on the venter --- 10
   - Three rows of bristles on the venter --- 11
10. Mesoscutum immaculate, body slender --- similis
    - Mesoscutum usually with four more or less distinct yellow stripes; body robust --- elegans
11. All three rows of bristles about equal in length --- 12
    - One or more rows with bristles shorter than the others --- 13
12. Bristles moderately long, in unbroken rows --- superbis
    - Bristles short, rows of bristles divided --- zonata
13. Length 11 to 12 mm. --- 14
    - Length 15 or more mm. --- cancellate
14. Black and yellow --- insignis
    - Black, yellow and rufous --- marginipennis

FEMALES
1. Cell 1st R₅ not petiolate --- 2
   - Cell 1st R₅ petiolate --- 4
2. Ferruginous and yellow --- arizonensis
| 29. | Black with yellow markings | 3 |
| 3. | Length about 23 mm. | violaceipennis |
|     | Length 15 mm. | punctifrons |
| 4. | Distinct projections on the middle or lateral lobes of the elytra | 5 |
|     | No distinct projections on the middle or lateral lobes of the elytra; surface flat, slightly elevated or ridged | 3 |
| 5. | A prominent tooth on each lateral lobe of the elytra | conalliculata |
|     | No distinct projections on the lateral lobes | 6 |
| 6. | Beak-shaped projection on the lower border of the central lobe of the elytra; tergites finely and closely pitted; enclosure strongly rugose | zonata |
|     | Cone-shaped projection on the middle lobe of the elytra; tergites sparsely pitted; enclosure more or less transversely ridged | 8 |
| 7. | Abdomen black and ferruginous | superba var. bisolor |
|     | Abdomen largely yellow | superba var. superba |
| 8. | Proximal tooth of mandible much smaller than the distal tooth; ridges on the enclosure parallel to the anterior border | rubripes |
|     | Distal tooth of mandible smaller than the prox- | 29. |
30.

Imal tooth: ridges on inclosure at a 45° angle to the anterior border - coristata

5. Apical border of clypeus without a distinct process - arizonensis
   - Apical border of clypeus with one or more processes 10

10. Apical border of clypeus with a single process - 11
   - Apical border of clypeus with more than one process 14

11. Clypeal process broadly rounded - sinuata
    - Clypeal process truncate, distal border sinuata

12. Lateral angles of pronotum dentate - angulata
    - Pronotum not dentate 13

13. Enclosure closely and coarsely pitted - montana
    - Enclosure transversely striated - cericeriformis

14. Two processes on the apical border of the clypeus - 15
    - More than two processes on the clypeal border - 17

15. Processes truncate and not widely separated - bitruncata
    - Processes pointed and widely separated 16

16. Black and yellow without ferruginous on the abdomen - vittatifrons
    - Black and yellow with ferruginous on the ab-
31.

dorcas - - - - - - - - - - - - - - tricolor
17. Three processes on the clypeal border - -
- Four processes on the clypeal border - - 18
18. Lateral processes bifid- - - - - - - - - - flavocineta
- Medial process bifid- - - - - - - - - - ecleans
19. The two medial processes widely separated - insignis
- All processes about equally spaced - - - 20
20. Elongated bristles emerge from above the medial processes; no distinct transverse ridge on the
medial lobe of the clypeus - - - - - - - - - - fulvipes
- Elongated bristles emerge from below the medial processes; no distinct transverse ridge on
the medial lobe - - - - - - - - - - - similis

1. GOSPERGERIS LACUSOSA, new species

II. IV, Fig. 37

Male. ---Ferruginous with yellow and fuscous markings;
mandibles with a medial carina; apical border of clypeus
bidentate medially; antennae with the terminal segment
hooked; front yellow; enclosure smooth with a central
groove; two small but distinct clusters of four or five
erect bristles on the posterior border of sternite 5;
pygidal area truncate; a large depression on the posterior sides of the second pair of femora fringed on the medial and lateral sides with dense rows of silky hairs. Length 19 mm.

Head subequal to thorax in width, closely to moderately punctate, clothed with long silvery hairs; mandibles non-dentate but with a pronounced medial carina, yellow with the distal third and medial carina dark fuliginous, a row of hairs on the medial surface; clypeus slightly concave, lateral wings small, two blunt processes medially on the apical border, closely and finely punctate, yellow, heavily clothed with silvery hairs dorsally and along the apical border; antennae with terminal segment hooked posteriorly, proximal segments ferruginous with a yellow patch on the scape, distal segments becoming fuliginous; front slightly narrowed above, yellow with short narrow fuliginous lines extending dorsad from the antennae; vertex ferruginous with the interocellar area dark fuscous; genae ferruginous with an elongated fulvous patch along the border of the eyes.

Thorax closely and coarsely punctate, clothed with long silky hairs, longer and more numerous ventrally; pronotum with a wide yellow band on the posterior border confluent with a yellow patch on the tuberole; mesonotum ferruginous; tegula smooth, ferruginous with a yellow patch; scutellum
ferruginous with a fulvous band; mesoscutum yellow with ferruginous borders and extremities; pleuron ferruginous; indefinite areas on the prosternum, mesosternum and the posterior plates of the mesosternum, yellow; propodeum ferruginous with large yellow patches laterally; enclosure smooth with a central groove, ferruginous with two converging oval yellow patches along the lateral borders.

Abdomen closely punctate, more densely pitted in depressed areas of tergites; tergite 1 with a wide yellow band emarginate on both sides; tergite 2 with a wide yellow band dilated laterally; tergites 3–6 yellow with ferruginous borders; sternite 7 yellow; venter ferruginous with lateral yellow patches on sternites 2–5, two clusters of 4 or 5 erect bristles on the posterior border of sternite 5; pygidial area (Pl.VIII, fig.102) truncate with a lateral carina, moderately pitted, yellow.

Legs largely ferruginous, with yellow spots on the first pair of coxae and on the posterior sides of the first four femora; a large depression on the posterior sides of the second pair of femora fringed on the medial and lateral sides with dense rows of silky hairs.

Wings subhyaline with the costal half clouded; cell 1st R₅ not petiolate (Pl.VII, fig.70).

Genitalia (Pl.IX, fig.116).
Holotype. — Male, Bill Williams Fork, Arizona, August (E. F. Snow), in the collection of the University of Kansas.

Paratypes. — Male, Dragoon, Cochise County, Arizona, July 20, 1917 (J. Requert); male, Tigley, Arizona, July 11, 1930 (Edward Tetum), in collection of Cornell University and University of Arizona.

E. lacunosa departs from the usual form by having the clypeal border bidentate. Its pygidial area is also different from the usual form. Its resemblance to E. arizonensis leads the author to think that the latter will prove to be the female of lacunosa. One paratype is slightly smaller and has the ferruginous replaced by fuscous and black.

E. lacunosa is about the same size and general color as the male of E. canaliculata from which it can be separated by the characters mentioned above.

The paratype from Dragoon, Arizona, shows slightly more yellow in some parts and the background is more ferruginous.

Distribution. — Arizona (Pl. XI, fig. 136).

2. EUGERCUS ARIZONENSIS, new species

Pl. II, fig. 14

Female. — Ferruginous with yellow markings; man—
dibles with a large bidentate tooth medially; elyptes short and broad, nondentate; enclosure with a velvety surface and medial groove; pygidial area wedge-shaped; cell last R is not pelticulate. Length 30 mm.

Head slightly wider than the thorax, closely and minutely punctate, clothed with yellowish hairs which are shorter toward the vertex but longer toward the elyptes and ventrally; mandibles with a single large bidentate tooth medially; ferruginous, with the distal third and tooth dark fuscous; elyptes short and wide, nondentate, a medial carina extending from the apical border half way to the dorsal border, three or four elongate bristles emerging from the apical border medially, clothed with long hairs medially and along the apical border, elsewhere with short hairs, yellow except for the medial carina and apical border which are ferruginous; antennae normal in form, proximally ferruginous, distally becoming fuliginous; front yellow with short ferruginous lines above the antennae; vertex and genuae ferruginous with an elongate yellow patch bordering the eye behind and two remote yellow spots on the occiput.

Thorax closely and minutely punctate, clothed with short amber hairs above becoming much longer ventrally and posteriorly, ferruginous with the following parts yellow:
band on the posterior border of the pronotum, tubercle, spot on the tegula, band on the scutellum, band on the metanotum, spot back of the tubercle, two large irregular patches on the propodeum, two converging patches on the enclosure; mesopleural tubercle present; enclosure impunctate and velvety with a central groove.

Abdomen closely and finely punctate, less so on the convex areas; tergite 1 with a wide yellow band emarginate on both sides; tergite 2 with a wide emarginate yellow band; tergites 3–5 yellow with the proximal borders ferruginous; tergite 6 fulvous; sternite 1 ferruginous; sternite 2 with two large lateral yellow patches confluent; sternites 3–5 with wide yellow bands; pygidial area (Pl. VIII, fig. 84) wedge-shaped with a lateral carina, fringed with a row of amber hairs.

Legs ferruginous with yellow patches on the lateral sides of the first four femora.

Wings subhyaline, cloudy along the costal half with a tendency to be violaceous. Cell 1st $R_5$ is not petiolate. (Pl. VI, fig. 52).

Holotype. — Female, Oselar, Huachucas Mountains, Arizona, in the collection of the University of Kansas (lot no. 940).
37.

**Parsotype.** --- Female, Southern Arizona, in the collection of Cornell University.

*E. arizonensis* may prove to be the female of *E. lacunose* which it closely resembles. Its general color and size make it superficially resemble the female of *E. canaliculata* from which it may easily be separated by the clypeal structure.

As noted under *E. violaceipennis* there are three species (*E. arizonensis*, *E. punctifrons* and *E. violaceipennis*) which have cell list *R*_5 not petiolate and therefore represent the most primitive species of the genus.

**Distribution.** --- Arizona (Pl.XI, fig.137).

3. **MELISSA VIOLACEIPENNIS**, new species

**Pl.II, fig.17**

**Female.** --- Black with yellow markings on front and first tergite only; mandibles with one short rounded denticle; apical clypeal border with a broad obtuse medial extension below which emerge a few elongated bristles; front broad and flat; enclosure closely and coarsely punctate and with a medial groove; wings black with a tendency to be violaceous, cell list *R*_5 not petiolate. Length 23 mm.

Head large, closely and coarsely punctate, clothed with silvery hairs becoming more closely set toward the clypeal
border, black with four yellow patches on the front dorsal of the lateral wings of the clypeus, the smaller patch bordering the eye, a small ferruginous spot just above the medial portion of the clypeus; mandibles with a broad rounded denticle; clypeus short and broad, apical border with a single medial broad obtuse extension below which emerges a cluster of elongated bristles; antennae normal in form.

Thorax closely and coarsely punctate, immaculate, clothed with short silvery hairs becoming longer ventrally; mesopleural tubercle absent; enclosure closely and coarsely punctate and with a medial groove.

Abdomen closely and coarsely punctate, more finely punctate in the depressed areas of the tergites, clothed with silvery hairs, black except for two yellow patches on tergite 1; venter becoming slightly fuscous; pygidial area (Pl.VIII, fig.85) bordered by an indistinct carina, and fringed by a row of hairs.

Legs black.

Wings black with a tendency to be violaceous, cell 1st R5 not petiolate (Pl.VI, fig.53).

Holotype. — Female, Cabima, Panama, May 21, 1911 (August Busck), in the collection of the United States National Museum.
E. violaceipennis is of special interest for two reasons. It represents the most southern record for the genus in North America. Furthermore it is one of the only three female members of the genus in which cell 1st R₅ is not petiolate. It, together with E. arizonensis and E. punctifrons, therefore represents the most extreme departure from the Cerceiris type of venation. The author, however, includes all three species in the genus Cerceiris even though they depart in this respect from the description of the genus as set down by Cresson (1865).

Distribution. --- Panama.

4. CERCEIRIS PUNCTIFRONS (Cameron)

Fl. X, figs. 122, 133, 134


Cerceiris punctifrons Dalla Torre, Cat. Hymen., VIII:470, 1897.

E. punctifrons is close to E. violaceipennis but is much smaller and with more yellow markings. E. punctifrons belongs to group A since it has cell 1st R₅ not petiolate. Cameron's original description is quoted below.

"Niger; facie, maculis thoracis, lineis abdominis, pedibusque flavis; alis fumatis; flagello
Eyes diverging beneath. Ocelli in a triangle, separated from the eyes by the length of the third antennal joint, and from each other by the length of the fourth. Clypeus but very slightly convex; the apex produced, rounded, projecting outwardly; the lateral margin fringed with long yellow hair. Front and vertex rather strongly punctured; the face and oral region not so strongly and more sparsely.

Antennal tubercle broad, furrowed in the middle, dilated below the antennae, reaching to the base of the clypeus. The head is clothed with short pubescence; the face sparsely covered with silvery hair. The face, oral region, cheeks, inner orbits of the eyes to the top of the antennal tubercle, the antennal tubercle, and the mandibles (except the apex and the edges of the latter and a spot behind the top of the eyes), yellow; the apex of the clypeus black. Thorax punctured; the punctures above sparse, at the sides much closer and coarser, on the scutellum and metasternum the punctures are more widely apart than on the mesonotum. The heart-shaped area of the median segment with large scattered punctures, except on the centre, which is furrowed. Apex of the median segment obliquely rounded. A spot on either side of the pronotum, the tegulae, a spot on the pleurae below them, a spot on either side of the scutellum, a broad elongated line on the sides of the median segment, and two spots on the heart-shaped area at the base, yellow.

Abdomen longer than the head and thorax united; blunt at the base and apex, irregularly covered with large punctures; the second, third, and fourth segments with a transverse depression at the base and apex. Pygidial area irregularly reticulated, opaque, the sides margined, broader at the base than at the apex, the lat-

subtus pallide fulvo; area cordiformis punctata."
ter rounded, the size with large punctures; the lateral fringe moderately long, golden-fuscous. Incision in the hypopygium reaching to the middle of the segment, rounded at the base and not much narrowed there; the segment depressed on either side of the incision. The second ventral segment is depressed on theapical half, the basal part being considerably higher than it, margined at the base, the margin being continued out from the middle as a short stout triangular keel. There is a broad interrupted yellow band on the first abdominal segment; a narrower continuous one on the second (widest at the sides), a still narrower, interrupted one on the third, and an elongated mark on either side of the fourth and fifth segments. All the legs are yellow in front, except on the hinder trochanters. The first recurrent nervure is received about the length of the top of the second subital cellule from the first transverse subital nervure; the second is interstitial.

Holotype. — Female, Mexico, Temax in North Yucatan (Geumer), in the collection of the British Museum (London).

Distribution. — Mexico (Pl. X, fig. 135).

5. EUGERCESIS FLAVOCINCTA Cresson

Pl. II, fig. 18; Pl. IV, fig. 39


female.
43.

Cresson, Hymen. of Amer., p. 281, 1887, female, male.


_Cerceria flavocinata_ Dalla Torre, Cat. Hymen., VIII:460-461, 1897.


*Male.* --- Black with yellow markings; elytrae tridentate; front yellow; enclosure finely and obliquely striated;
without rows of erect hairs on the ventral side but by not peltate. Length 15 mm.

Head subequal to thorax in width; mandibles nondentate, proximal two-thirds yellow and sparsely clothed with hairs, distal third feliginous and globose; clypeus sparsely punctate, tridentate radially at the apical margin, yellow, sparsely clothed with amber hairs on the surface, apical margin of lateral wings with a closely set band of amber hairs; scape of antennae black with a yellow patch on the anterior face, clothed with short hairs, pedical and flagellum black; front narrowed above, convex areas sparsely punctured, concave areas closely punctured, sparsely hairy anteriorly, clothed with long amber hairs toward the vertex, black of vertex extending to and surrounding antennae and as an acute projection bordering the eye; vertex closely punctured, black, clothed with amber hairs; genae closely punctured, black with oval yellow spots back of eyes, densely clothed with amber hairs.

Thorax, protergum closely punctured anteriorly, sparsely punctured posteriorly, clothed with short black hairs, black with subemarginate band of yellow on posterior border and a small yellow spot on the side; tuberole black; mesoscutum moderately punctured, black and clothed with black hairs; scutellum moderately punctured, moderately clothed with short
hairs, two small yellow spots; metasternum sparsely punctured, yellow, sparsely clothed with short hairs; tegula smooth, glabrous, anterior half yellow, posterior half amber; pleuron moderately punctured, black except for a yellow patch on the mesopleural region and an extension of the yellow of the mesosternum; sternum moderately pitted and hairy, mostly yellow with the yellow of the mesoscutus extending on to the mesopleuron; propodeum black, closely punctured, moderately clothed with fine hairs; enclosure distinctly covered with fine parallel oblique ridges, a marked dip near the posterior angle.

Abdomen moderately punctate, black areas more closely pitted than yellow areas; tergites 1-6 with yellow bands on distal margins, bands on tergites 1-4 dilated laterally; venter clothed with amber hairs, no prominent rows of erect hairs; sternites 1-4 with wide yellow bands; sternites 5 and 6 black; pygidial area (Pl.VIII, fig.103) margined by a carina, fringed by a row of hairs, sparsely pitted.

Legs black and yellow; coxae, trochanters and femora yellow ventrally and black dorsally; first two pair of tibiae and tarsi dark amber with some yellow ventrally.

Wings subhyaline, anterior two-fifths of forewing fuliginous; cell 1st R₅ not petaiolate (Pl.VII, fig.71).

Genitalia (Pl.IX, fig.117).
Family. — Like this in all respects except for the usual sexual differences and as indicated. Mandibles undentate; front black with two large patches bordering the eyes, a patch on the medial part of the clypeus and a stripe on the interantennal carina, yellow; cell 1st P5 petiolate. Length 18 mm.

Head wider than thorax; mandibles undentate, black, proximal two-thirds sparsely clothed with hairs ventrally; clypeus sparsely punctate, sparsely clothed with amber hairs on the surface, apical margin with two widely separated bidentate processes and a single small medial denticle above separated by a groove from the centrally located denticles below, a prominent row of bristles emerge from between the two rows of denticles, lateral rings bordered with a row of short amber hairs, central lobe with a yellow patch; antennae black; front comparatively wide, convex areas sparsely punctured, concave areas closely punctured, clothed with long amber hairs toward the vertex, a large yellow patch bordering the compound eye medially, a broken yellow line between the antennae dilated below; genae closely punctured, moderately clothed with amber hairs, black with a wedge-shaped yellow mark bordering the compound eye.

Thorax black with a divided band of yellow on the posterior border; tubercolo black; mesoscutum moderately
punctured, black, clothed with short black hairs; scutellum moderately punctured, moderately clothed with short hairs, two small yellow spots; metanotum very sparsely punctured, yellow, very sparsely clothed with short hairs; tegula smooth, fulvous with a yellow patch; pleuron moderately punctured, black, mesopleural tubercle present; propodeum and its enclosure as in the male.

Abdomen black marked with yellow, sculptured as in male; yellow band of first tergite emarginate; yellow bands of tergites 2-5 dilated laterally; venter black; pygidal area as illustrated (Pl.VIII, fig.86), rugose, margined by a carina and fringed by a row of prominent black hairs.

Legs black proximally to tibiae, tibiae yellow becoming fuliginous medially, tarsi fulvous.

Wings as in male except cell 1st Rs in petiolate (Pl. VI, fig.54).

Holotype. --- Female (flavocinatus Cresson), Rocky Mountains, Colorado Territory (Ridings), in the collection of the American Entomological Society at Philadelphia (Type No. 1963).

Allotype. --- Male (singulatus Cresson), Rocky Mountains, Colorado Territory (Ridings), in the collection of the American Entomological Society at Philadelphia (Type No. 1964.1).

Paratype. --- Male (singulatus Cresson), Colorado, in
47.

the collection of the American Entomological Society at
Philadelphia (June 12, 1964).

The types of E. diaphana Viereck and Cockrell, and
E. striolata Viereck and Cockrell are in the collection of
the American Entomological Society at Philadelphia. They were
compared with the type material of flavocincta Cresson and
circulatus Cresson. The type of flavocincta shows only slight
differences in the amount of yellow from the type of
circulatus. The type of striolata has much more yellow than
the type of flavocincta. The differences, however, are well
within the range of variation. There is a tendency, especially
among the females, for the venter of the tegmen to extend
around the depressed area leaving the latter as isolated
black patches. The species also shows considerable variation
in size. The male is distinctive in not having rows of erect
bristles on the venter.

Distribution. --- British Columbia, California, Colorado,
Idaho, Nevada, Oregon, South Dakota, Utah, Washington, Wyoming;
2000 to 10,000 foot elevation. (Fig. 139).

SPECIMENS EXAMINED

British Columbia, Canada: Female, Vaseo, 1928 (R. F. Currie);
Female, male, Vancouver; female, Vaseo, July 26, 1928
(A. A. Henry).
California: Female, Camp Beuldy; male, Giant Forest, Tulare County, July 24, 1923 (C. L. Fox); male, Golden Lake, Sierra County, July 16, 1921 (C. L. Fox); male, Huntington Lake, Fresno County, 7000 feet elevation, July 8, 1919 (E. P. Van Duzee); 3 females, Huntington Lake, Fresno County, 7000 feet elevation, July 12 - 20, 1919 (E. P. Van Duzee); male, Meadow Valley, Plumas County, 6000 - 7000 feet elevation, June 6, 1924 (E. C. Van Dyke); male, Meadow Valley, Plumas County, 3500 - 4000 feet elevation, June 7, 1924 (E. C. Van Dyke); female, Meadow Valley, Plumas County, 3500 - 4000 feet elevation, June 21, 1924 (E. P. Van Duzee); female, Mineral King, Tulare County, July 30, 1922 (C. L. Fox).

Colorado: 3 females, 5 males; male, Aspen, about 8000 feet elevation, about 39° 11' N and 106° 49' W, July 24 - 27, 1919; female, Bailey, August, 1890; female, Cascade, August 21, 1914; female, Cornet Creek, Telluride, about 10,000 feet elevation, about 37° 55' N and 107° 45' W, July 9, 1919; 2 males, Creede, August, 1914 (S. J. Hunter); 2 females, male, Electra Lake, about 8400 feet elevation, about 37° 33' N and 107° 48' W, June 28 - July 1, 1919; male, Estes Park, July, 1892 (F. H. Snow); female, Estes Park, August 1892 (F. H. Snow); 2 males, Estes Park, 9500 feet elevation, July 11 - 15,
49.

1923 (R. A. Leussler); female, Pagosa Springs, about 7500 feet elevation, about 37° 28' N and 106° 37' W, July 21-23, 1919.

Idaho: Female, Beaver Canyon; female, Coolin, July 23, 1927 (E. C. Van Dyke); 7 males, Priest Lake, Coolin, July 22-24 (E. C. Van Dyke); female, Moscow, July 25, 1925 (C. L. Fox); male, Victor, about 6300 feet elevation, about 43° 30' N and 110° 8' W, July 11, 1920.

Nevada: 2 females, male.

Oregon: Female, Austin, Grant County, 4000 feet elevation, August 11, 1929 (H. A. Scullen); female, Big Lake, near Mt. Washington, Cascade Mountains, Linn County, July 20, 1909 (J. C. Bridwell); male, Blitzen Valley, Harney County, June 1, 1929 (J. E. Davis); 17 females, 21 males, Breitenbush Hot Springs, 2222 feet elevation, July 2-7, 1934 (H. A. Scullen); 11 females, 6 males, Detroit, July 11, 1907 (J. C. Bridwell); 3 females, 2 males, trail Detroit to Permelia Lake, Marion County, July 12, 1907 (J. C. Bridwell); female, male, Dixie Mountain, Blue Mountains, Grant County, 6700 feet elevation, August 12, 1929 (H. A. Scullen); 3 males, Eagle Ridge, Klamath Lake, Klamath County, May 29-31, 1924 (C. L. Fox); 2 females, 9 males, East Tule Gate,
July 15, 1906: 2 males, East Tule Gate, July 15, 1906
(J. C. Bridwell); female, Hanson's Resort, Jefferson County, July 29, 1929 (E. C. Van Dyke); male, 54 miles north of Klamath Falls, Klamath County, 4700 feet elevation, July 28, 1930 (H. A. Scullen); 2 males, Lake-of-the-Woods, Klamath County, 4950 feet elevation, July 18, 20, 1930 (H. A. Scullen); female, 75 males, Lost Prairie, near Clear Lake, Cascade Mountains, Linn County, August 5, 1909 (J. C. Bridwell); 10 females, McKenzie Bridge, Lane County, August 1, 1909 (J. C. Bridwell); 4 males, Mt. Hood; female, Home- stead Inn, Mt. Hood, July 6, 1927 (E. C. Van Dyke); male, Oak Ridge, Lane County, June 30; female, Union, 2716 feet elevation, June 11, 1928 (H. A. Scullen); male, Wallowa Lake, Wallowa County, 4500-5500 feet elevation, July 27, 1929 (H. A. Scullen).

South Dakota: Male, Custer, July 17, 1924 (H. C. Severin); male, Fringle, July 16, 1924 (H. C. Severin).

Utah: Female, Bear ears, Elk Ridge (Vasco H. Tanner); female, 2 males, Bear ears, Elk Ridge (Irvin Rasmussen); male, Beaver Ridge Mountains, 8-10,000 feet elevation, June, 1904 (Geo. P. Engelhardt); male, Bisknell; male, Brown County, 5-6,000 feet elevation, June, 1904 (Geo. F. Engelhardt); male, Consumers, July 4, 1921 (Jas.
Roaf); male, North Fork, Duchesne River, July 13-14, 1927; 2 males, Rock Canon Provo (Vasco W. Tanner); 4 males, Rock Canon, Provo (C. Lynn Hayward); 2 females, 2 males, South Fork, Provo Canon, July (C. Lynn Hayward); female, 3 males, Timpanogas (Vasco W. Tanner); male, White Pine Lake, Logan, 8000 feet elevation, July 15, 1922 (F. C. Van Duzee).

Washington: 10 females, 25 males; male, June 30, 1890 (T. Winsdor); 6 females, 6 males, Metaline Falls, August 1, 1925 (C. L. Fox); female, Metaline Falls, August 2, 1925 (C. L. Fox); 7 males, Sullivan Lake, 2500 feet elevation, July 21-22, 1931 (F. Foley); 2 males, Sullivan Lake, 2500 feet elevation, July 13, 1932 (F. Foley).

Wyoming: 2 males, Jackson, about 6300 feet elevation, about 43° 30' E and 110° 46' W, July 13-17, 1920; male, Newcastle, June, 1900; female, Lake Hotel, Yellowstone National Park (Vasco W. Tanner); male, Camp Roosevelt, Yellowstone National Park, July 14-17, 1925.

6. *Eucer ceris Rubripes* Cresson

Pl.II, figs.15, 16; Pl.IV, fig.38

*Eucer ceris rubripes* Cresson, Trans. Amer. Ent. Soc., VII:
xxii, 1879, male.
Cresson, Hymen. of Amer., p. 281, 1887, male.

Cresson, Hymen. of Amer., p. 281, 1887, female.

Dalla Torre, Cat. Hymen., VIII:473, 1897, male.


Dalla Torre, Cat. Hymen., VIII:480, 1897, female.

**Male.** -- Black and fulvo-fuliginous with yellow and creamy-white markings; clypeus tridentate; metatergum yellow; enclosure with prominent ridges running obliquely; sternite 5 with a distinct row of erect matted hairs; legs fulvous; cell 1st R5 not petiolate. Length 13 mm.

Head slightly wider than thorax, moderately pitted and clothed with short silvery hairs; mandibles condentate, fulvous, black at the tips; clypeus tridentate on the apical border of the medial part, yellow, apical border fulvous, black of front extending as a narrow line between the front and the medial part, between the front and the lateral wings, and between the medial part and the lateral wings, apical border of lateral wings with more elongated rows of light amber hairs; antennae normal in form, fulvous proximally becoming dark fuscous distally; front yellow with black of vertex extending as narrow stripes through the antennal scrobes to the clypeal border and as narrow...
wedges along the medial border of the eyes to the level of the antennae, yellow between antennae reaching the medial ocellus; vertex and gene black with a large fulvous patch bordering the eye.

Thorax closely to sparingly pitted, clothed with short silvery hairs; pronotum with a creamy-white band on the posterior border confluent with a patch of like color on the tubercle; a yellow margin on the ventral border of the pronotum; mesoscutum black; tegula smooth, fulvous with a creamy-white spot; scutellum black with a creamy-white subinterrupted line at the base dilated laterally; metanotum very sparsely pitted, creamy-white with narrow black borders and extremities; pleuron dark fuscous with a creamy-white spot behind the tubercle bordered by a patch of fulvous; sternum black becoming light fuliginous at extremities; propodeum black blending into two large fulvous areas on the sides; enclosure with a central groove and lateral ridges running somewhat obliquely.

Abdomen moderately pitted on convex areas, closely pitted on depressed areas, clothed with very short hairs dorsally, becoming longer ventrally; tergite 1 with a wide creamy-yellow band slightly emarginate; tergite 2 with a wide creamy-yellow band surrounding a depressed line of dark fuscous; tergites 3 and 4 with the yellow band narrow
medially but dilated laterally; tergites 5 and 6 with yellow bands subequal throughout their length; venter fuliginous with the elevated areas more fulvous; two small confluent yellow spots on sternite 3; sternite 5 with an erect row of matted hairs on the posterior border; pygidial area (Pl.VIII, fig.104) sparsely pitted with a lateral carina.

Legs fulvous, yellow spots on the anterior femora below, yellow lines on the anterior tibiae before.

Wings hyaline, apical costal margin clouded with a tendency to be violaceous; cell 1st R₅ not petiolate (Pl.VII, fig.72).

Genitalia (Pl.IX, fig.118).

Female. --- Similar to male except for the usual sexual differences and as indicated. Medial portion of clypeus with a prominent acute tubercle on its surface; clypeal border with two remote teeth and a medial broad process of equal length having its apical border sinuate. Length 11 mm.

Head ferruginous; mandibles with one small denticle; clypeal border with two remote teeth on the medial portion and a medial broad process of equal length having its apical border sinuate, medial portion with a prominent acute tubercle; front with black stripes through antennal
scrobes to elytral border; vertex and gemae ferruginous except for ocellar region which is black.

Thorax with more ferruginous; pronotum with yellow band broken into elongated patches; tuberole fulvous with little or no yellow; mesoscutum black with borders and a central angular patch fuliginous; scutellum fuliginous with the posterior part black; pleuron without yellow but with more fuliginous; sternum black becoming more fuliginous at extremities; propodium largely fuliginous with a tendency to blackness along the anterior border of the enclosure and along the medial line to the posterior border.

Abdomen with fulvous replacing black of the male; tergite 1 with wide yellow band emarginate; tergites 3–5 with the yellow band tending to inclose the depressed fulvous line; tergite 6 with a wide yellow band including the depressed area; sternite 5 without an erect row of hairs; sternite 3 without yellow spots; pygidial area (Pl.VIII, fig.87) subrugose, bordered by a carina and fringed by a row of curved amber hairs.

Legs fulvous without yellow.

Wings as in male except cell 1st R₅ is pectinate (Pl.VI, fig.55).

Neotype. — Female, Las Cruces, New Mexico, in the collection of the American Entomological Society of Philadelphia.

The type male is somewhat smaller than most of the specimens examined which are from 14 to 15 mm. in length. The color pattern varies in the male as follows. The black line between the medial portion and lateral wings of the elytra may end in a black depression near the apical border; the thorax may be black and yellow only without any shade of brown; there may be no creamy white on the scutellum; rarely yellow spots may appear on the enclosure; a trace of yellow may appear on the mesocutum; the legs may be fulvous without yellow.

In the female the black stripes of the face may or may not reach the ocelli; the elytra, the sides of the face, a solid band on the pronotum, the tubercles, a spot within the ferruginous patch of the propodeum, a band on sternites 2 to 8, and much of the legs may be yellow. Intermediate variations are found. The specimen selected as a neotype differs from the original description of E. unicornis Patton as follows: black stripes through the antennae.
not confluent with the black of vertex; costae and stigma are not yellow but fulvous. Length of neotype 13 mm.

The enclosure in *E. rubripes* may vary from nearly smooth to noticeably ridged. Slight variations in wing veins are observed.

**Distribution.** --- Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah. (Pl.XI, fig.139)

**SPECIMENS EXAMINED**

**Arizona:** Female, Southern Arizona (F. H. Snow); 2 males, Southern Arizona, August, 1902 (F. H. Snow); 2 males, Baboquivari Mountains, August 18, 1924 (O. C. Poling); male, Baboquivari Mountains, near Vits Peak, 3600 feet elevation, August 7-9, 1916 (Clark and A. H. S. P.); male, Chisos Mountains, Brewster County, July 17, 1921 (Carl D. Duncan); 2 males, Nogales, August 30, 1927 (J. C. Bradley); 9 males, Oak Creek Canyon, 6000 feet elevation, July and August (F. H. Snow).

**Colorado:** 7 males; female (Wm. J. Fox); male, Clear Creek (E. Banks); female, Las Cruces; 7 males, Wray, 3700 feet elevation, about 40° 0' N and 102° 10' W, August 17-19, 1919; 5 males, Wray, 3700 feet elevation, Aug-
Kansa: Female, female, Cheyenne County, 3300 feet elevation (F. X. Williams); male, Cheyenne County, July 2, 1926 (R. H. Beamer); 3 males, Dickinson County, August, 1901 (J. C. Bridwell); male, Graham County; male, Hays County, September 7 (Lantz); female, male, Pratt County, 1900 feet elevation, June 27, 1911 (F. X. Williams); male, Riley County; female, Riley County, August 2 (J. B. Morton); 5 males, Riley County, July 17 (O. A. Dean); male, Seward County, 2600 feet elevation, August 17, 1911 (F. X. Williams); 3 males, Sherman County, 3690 feet elevation (F. X. Williams); 2 males, Thomas County, 3150 feet elevation (F. X. Williams); 2 males, Trego County, 2450 feet elevation, July 12, 1912 (F. X. Williams).

Montana: 5 females, 13 males; 2 females, Huntley, August 16, 1916.

Nebraska: Female, West Point (J. C. Crawford); male, West Point, June 24.

New Mexico: Female, male, Albuquerque, 5000 feet elevation, June 27, 1931 (Don Prentiss); female, Albuquerque, 5000 feet elevation, June 27, 1931 (N. A. Scallen); male, High Rolls, June 3, 1902; female, Las Cruces; female, East Las Vegas, July 26, 1902; 4 males,
Mounttainair, 1934 (Chas. M. Hicks); male, Pecos
(W. F. Cookerre); 2 males, Pyramid Peak, Dona Ann County, July 24 and August 1, 1930 (F. E. Rosberg);
male, Gran Quivira, August 11, 1931 (R. H. Painter);
female, near White Sands, September 30 (Cookerrell);
male, Santa Fe, July 22, 1926 (E. G. Van Dyke).
North Dakota: Female, male, August 2, 1923 (O. A. Stevens).
Oklahoma: Female, Ellis County, August 16, 1933, at Tamarix pallica L. (A. E. Fritschard); male, Ellis County,
August 12, 1923 (A. E. Fritschard).
South Dakota: Male, Custer, September 11, 1927 (H. C. Severin); 2 males, Hot Springs, July 5 and 10, 1924
(A. C. Severin); male, Pierre; male, Rapid City.
Texas: Male, Pecos, September 5, 1927 (J. C. Bradley);
female, Sierra Blanca, July 9, 1917; male, Valentine,
Presidio County, July 9, 1917 (J. Bequaert).
Utah: Male, Emery County, August 14, 1921 (Grace O. Wiley).

7. EUCERGERIS FULVIPES Cresson

Pl.II, fig.19; Pl.V, fig.50

Eucerceris fulvipes Cresson, Proc. Ent. Soc. Phil., V:111-
112, 1865, male, female.
Cresson, Hymen. of Amer., p. 281, 1887, male, female.

(Apparently a mistake in spelling)


Dalle Torre, Cat. Hymen., VIII:456, 1897, male, female.
Male. — Black to fuscos with yellowish-white markings; clypeus tridentate; enclosure obliquely ridged; cell 1st R₃ not petiolate; sternite 5 with an erect matted row of hairs. Length 11 mm.

Head subequal to thorax in width, moderately pitted distally, becoming more closely pitted on the vertex and posterior aspects, clothed with short silvery hairs; mandibles nondentate, yellow, becoming fuliginous at the tips; clypeus tridentate on the apical border of the medial portion, moderately convex, moderately pitted, elongated rows of hairs on the apical borders of the lateral wings, yellow with a fuliginous apical border; antennae normal in form, dark fulvous becoming fuliginous distally, an elongated yellow spot on the medial side of the scape; front slightly narrowed above, yellow with black of vertex extending as a narrowing stripe through the antennal scrobes to the clypeus and as narrow slits along the mesal borders of the eyes to opposite the antennae, yellow of the medial carina reaching to the medial ocellus, hairs becoming longer toward the vertex; vertex and germ black with a small yellow spot bordering the upper part of the eye.

Thorax moderately to closely pitted, clothed with short silvery hairs becoming longer ventrally; pronotum with a yellow band on the posterior border; tubercle with
a large yellow patch; mesoscutum black; tegula smooth, fulvous with a yellow patch; scutellum sparsely pitted, black with a yellow band interrupted by a narrow black line; metanotum subimparulate, yellow slightly emarginate behind, borders and extremities black; mesopleuron with two irregular yellow patches, one back of the tubercle and one ventrad of the longitudinal furrow confluent with the yellow of the mesonotum; propodeon, mesopleuron and metapleuron each with yellow patches; propodeum black with large yellow patches on the sides; enclosure obliquely striated, immaculate.

Abdomen moderately pitted except for the depressed lines which are closely pitted; tergite 1 with a wide yellow band emarginated on both sides; tergites 2-6 with narrower yellow bands dilated laterally; tergite 6 with a yellow band emarginate in front, narrowed laterally; venter pale fulvous; sternites 1, 5 and 6 immaculate; sternite 2 with a broken yellow band; sternites 3 and 4 with unbroken yellow bands; sternite 5 with an crest, closely matted row of amber hairs on the posterior border; pygidal area (Pl.VIII, fig.105) moderately pitted, lateral borders with a carina.

Legs; coxae, trochanters and first pair of femora yellow below, fuliginous above; third pair of femora
fuliginous becoming yellow at the distal end; tibias and tarsi yellow to fulvous.

Wings hyaline, clouded along the costal half to the apex; cell 1st Rg not petiolate (Pl.VII, fig.73).
Genitalia (Pl.IX, fig.119).

**Female.** --- Similar to the male in all respects except for the usual sexual differences and as indicated; mandibles unidentate; four teeth on the apical border of the clypeus, the two lateral ones more obtuse; a row of elongated hairs emerge from above the medial teeth, central portion elevated; legs ferruginous. Length 13 mm.

Head slightly wider than the thorax; mandibles with a small blunt denticles, dark fulvous except for yellow patch on lateral base; clypeus with the central portion noticeably elevated and dropping off sharply just above the apical border, apical border of medial portion with two remote obtuse teeth between which are two smaller blunt teeth, a row of elongated bristles emerge from above the smaller teeth, a slightly elongated row of hairs on the apical border of the lateral wings, fuscous with large yellow patches on the medial portion and lateral wings; antennae fulvous becoming black distally; front with yellow parts slightly less extended than in male; genae
with yellow patches more elongated than in male.

Thorax black and yellow; scutellum with a yellow band unbroken, dilated laterally; pleuron with a yellow patch back of the tubercle only; sternum immaculate; inclosure with two converging oval yellow spots.

Abdomen with dorsal yellow bands which are wider than in male and include the depressed areas; venter immaculate; pygidial area (Pl. VIII, fig. 56) with sides subparallel, rugose, bordered by a carina, fringed by a row of dark amber hairs.

Legs bright fulvous.

Wings as in male except cell 1st $R_5$ is petiolete (Pl. VI, fig. 56).

**Holotype.** --- Female, Rocky Mountains, Colorado Territory (Ridings), in the collection of the American Entomological Society of Philadelphia (Type No. 1966.1).


**Paratypes.** --- Two females, Colorado, in the collection of the American Entomological Society of Philadelphia (Type Nos. 1966a, 1966b).

The original allotype male apparently has been lost if one was ever selected. The above specimen selected as the allotype evidently belonged to the original type series.
66.

The type of *simulatrix* Viereck and Cockerell is in the collection of the American Entomological Society of Philadelphia (Type No. 1039.6).

The extent of yellow varies. In the male the scutellum may be almost immaculate with only two yellow spots remaining. The inclosure is immaculate in the type but not as a rule. The band on sternite 4 may be broken. The black stripes of the face may not be confluent with the black of the vertex. Two small yellow spots may appear on the propodeum back of the inclosure and in one specimen they are confluent with the larger yellow patches.

*E. fulvipes* is very close to *E. rubripes*. The females are easily separated by the absence of the cone-like projection as found on the medial portion of the clypeus of *rubripes*. Both sexes are smaller than *rubripes*. *E. fulvipes* is also superficially like *E. vittatifrons* but the males may be separated by cell 1st R5 being pectinate and the females by the apical clypeal border being bidentate in the latter.

**Distribution.** --- Arizona, Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oregon, South Dakota, Utah, Wyoming. (Pl.XI, fig.140).
SPECIMENS EXAMINED

Arizona: Female, Southern Arizona, August, 1902 (F. H. Snow); male, Flagstaff, July 19, 1892.

Colorado: 10 males; female, (C. F. Baker); female (Wm. J. Fox); male (Snow); 2 males, Agricultural College; female, male, Aspen, 8000 feet elevation, about 39° 11' N and 106° 49' W; 2 males, Boulder, July 17 (T. D. A. Cockerell); male, Boulder County, June 26, 1925 (C. H. Hicks); female, Buena Vista, 1800 feet elevation, August, 1932 (C. Lynn Hayward); male, Clear Creek (Olar); female, Estes Park, August, 1892; 3 males, Estes Park, August, 1892 (F. H. Snow); 4 females, 52 males, Meeker, 6800 feet elevation, about 40° 2' N and 107° 56' W, July 20-21, 1919; male, Ridgway, 7000 feet elevation, about 38° 9' N and 107° 45' W, July 10, 1919.

Idaho: 2 males, Paris; female, Paris (C. Lynn Hayward); 3 males, August (C. Lynn Hayward).

Kansas: Male, Scott City, July, 1929 (V. F. Calkins).

Montana: 7 females, 9 males.

Nebraska: Male, Bad Lands, Sioux County, August 10, 1908 (L. Bruner); male, Halsey, August 14, 1925 (R. W. Dawson).

New Mexico: 2 females, 3 males, Datil, Continental
divide, July 16, 1922 (A. E. Painter).

North Dakota: Male, Bismarck, July 25, 1926 (S. A. Stevens); female, male, Mandan, August 22, 1922 (S. A. Stevens).

Oregon: Male, Castle, September 2, 1923 (Carl B. Duncan).

South Dakota: 2 males, Custer; male, Hot Springs; male, Hot Springs, July 7, 1924 (M. C. Seaver); male, Scenic, August, 1920 (G. B. Fairchild).

Utah: 2 males, Axe Creek, Kane County, July (C. Lynn Hayward); female, Porovan Can., Iron County, July 27, 1919 (C. B. Duncan); male, South Creek, Beaver County.

Wyoming: 2 males, Jackson, 6500 feet elevation, about 42° 30' N and 110° 46' W, July, 2-17, 1920; 3 males, Jenny Lake, Grand Teton National Park (D. Eldon Beck); male, New Castle, July 1, 1911 (F. C. Bishop); 2 males, Rock River, July, 1912 (J. J. Hunter); male, Stewart R. Sta., 6700 feet elevation, July 18, 1920.

9. *EUGERceris Similis* Cresson

Pl. II, fig.20; Pl. IV, fig.40


Cresson, Hymen. of Amer., p. 281, 1887, male, female.
Cresson, Memoirs of the Amer. Ent. Soc., I:101, 1916,
       male, female.
Cerberis similis Dalla Torre, Wien. Ent. Zeit., IX:202,
       1890, female.
Dalla Torre, Cat. Hymen., VIII:477, 1897, female.

**Male.** --- Black with yellow markings; entire body
shiny; mandibles nondentate; scutellum with an interrupted
yellow band dilated laterally; enclosure smooth with a
central groove and two converging oval yellow spots;
stermites 3 and 4 with rows of long erect, slightly matted
hairs; sternite 5 with an inconspicuous short row of matted
hairs. Length 10 mm.

Head large, sparsely pitted on the clypeus becoming
more closely pitted toward the vertex and occiput, clothed
with short appressed silvery hairs; mandibles nondentate,
yellow, becoming fuscous at the tips, slightly hairy at the
base laterally; clypeus moderately convex, tridentate on
the apical border of the medial portion; antennae normal
in form, ferruginous with a yellow patch on the scape
medially, first three or four segments of the flagellum
with yellow patches becoming ferruginous distally; front narrowed above, yellow with black of vertex extending as a narrowing wedge to the antennae and as a narrow line on the mesal border of the eye for a short distance; vertex and gene black with a yellow patch along the lateral border of the eye to the base of the mandible.

Thorax sparsely to closely pitted, sparsely clothed with short hairs; pronotum with a wide yellow band on the posterior border slightly margined medially; tuberole with a yellow patch; mesonotum sparsely pitted except on anterior portion, black; tegula smooth, fulvous with a yellow patch; scutellum sparsely punctate with two yellow spots; metanotum subimpendate, yellow with black borders and extremities; propodeum with an elongated yellow patch; mesopleura with a large yellow patch extending from back of the tuberole ventrad to fuse with the yellow of the sternum; sternum largely yellow; propodeum closely pitted, black with large yellow patches; enclosure smooth except for a central groove, black with two large converging oval yellow patches.

Abdomen sparsely pitted except for depressed lines on tergites which are closely punctate; tergite 1 with a wide yellow band margined medially on both sides; second
Tergite with a wide yellow band nearly enclosing and covering the depressed area; tergites 3-6 with a narrow yellow band dilating laterally; tergite 6 with a narrow yellow band; sternites 3 and 4 with rows of elongated hairs on the apical border, somewhat matted; sternite 5 with an inconspicuous short row of short matted hairs on the apical border; sternites 2-4 with yellow bands, slightly emarginate on 3; pygidial area (Pl.VIII, fig.106) with a lateral carina ending distally in elongated projections, moderately pitted.

Legs yellow with elongated dark fuliginous patches on the dorsal sides of the coxae, trochanters, femora and tibiae; tarsi light fulvous.

Wings subhyaline, cloudy toward the apex, fulvous along the costal region; cell 1st R5 not petiolate (Pl. VII, fig.74).

Genitalia (Pl.IX, fig.180).

**Female.** --- Like male in all respects except for the usual sexual differences and as indicated. Mandibles with one short rounded denticle; apical border of clypeus with five teeth, two large processes at the lateral border.
of the medial portion, one medial bifid projection below,
two medial processes above, two elongated bristles emerging
from between the upper paired and lower bifid processes;
enclosure smooth but for faint suggestions of striations;
pygidial area somewhat wedge-shaped.

Head subequal to thorax in width; mandibles unindentate,
denticle small and blunt, yellow proximally becoming fulvous
medially and dark fuscous at the tips; apical border of
the medial portion of the clypeus with two remote teeth,
one medial bifid process below and two medial processes
above, two elongated bristles emerge from between the upper
and lower processes; antennae without yellow, dark fuliginous
except for about the first four segments of the flagella
which are fulvous; black of front extends as wide stripes
through the antennal scrobes to the clypeal border.

Thorax similar to male; tuberole immaculate; scutellum
with an interrupted yellow band; propleura immaculate except
for a yellow ventral margin; yellow of mesopleura reduced
to two spots; inconspicuous mesopleural tuberole; venter
with yellow much reduced; enclosure with a slight tendency
to be ridged.

Abdomen with first four tergites much as in male;
yellow of tergites 4 and 5 encroaching more on the black;
tergites 6 with an oval and emarginate on the interior border; sternites 2-3 with wide yellow bands, that on sternite 2 divided by a line and the interior border minute; pygidal area (PL. VIII, Fig. 99) somewhat wedge-shaped, rugose, bordered by 4 carina, fringed with pilose hairs.

Legs yellow with coxae, trochanters and proximal ends of femora dark fulvo-ferruginous; strip on ventral surface of 1st pair of tarsi, distal end of 3rd pair of femora, and all tarsal fulvo-ferruginous.

Wings as in male except cell lat 2-g in pectiolate (PL. VII. fig. 57).

Holotype.---Female, Nevada (H. V. Morrison), in the collection of the American Entomological Society of Philadelphia (Type No. 1968f).

Allotype.---Male, Nevada, in the collection of the American Entomological Society of Philadelphia (Type No. 1965b).

Paratypes.---1 Female, Nevada (Type No. 1965a); 1 male, Nevada (Type No. 1965b), in the collection of the American Entomological Society of Philadelphia.

The yellow markings may vary to some extent. The yellow band of the scutellum may or may not be divided. Two yellow spots may be found on the scutellum of the male near the posterior-lateral angle. The pygidal area
of the male may have yellow patches. The black lines through
the sternites may not be confluent with the black of the
vertex, and they may extend to near the clypeal border.
The yellow bands of the sternites may not be divided. The
enclosure may be quite smooth except for the central groove,
or it may show slight evidence of ridges.

*E. simila* is very close to *E. fulvipes* from which
it can be separated by the single row of erect hairs on the
venter of the male of *fulvipes* and by the different clypeal
margins of the females. In the female of *fulvipes* the
legs are ferruginous.

**Distribution.** — California, Colorado, Idaho, Nevada,
New Mexico, Oregon, Utah, Wyoming. (Pl. XI, fig. 141)

**SPECIMENS EXAMINED**

**California:** Female, Duck Creek, Modoc County, July 25, 1922
(C. L. Fox); 3 females, 14 males, Cayton, Shasta County,
July 9, 1913 (W. P. Van Dyke); 5 females, 13 males,
Shasta County, July 19, 1918 (W. P. Van Dyke); 2 males,
Meadow Valley, Plumas County, 4-5000 feet elevation,
July 6 and 11, 1924 (W. C. Van Dyke); male, Redding,
July 7, 1918 (W. P. Van Dyke); female, Sisson, August
14, 1908 (J. C. Bradley).

**Colorado:** Male, Nabeel, August 30, 1921 (R. E. Beamer).
Idaho: Male, Montpelier, 6100 feet elevation, about 43° 19' N and 111° 18' W, July 5, 1929.

Nevada: Female, male; female, Glenbrook, September 12, 1923 (Carl D. Duncan).

Oregon: 5 males, Coletin, Jackson County, July 30, 1924 (E. F. Van Duzer); 2 females, Lake-of-the-Woods, Klamath County, 4950 feet elevation, July 13 and 20, 1930 (H. A. Scullien); male, Lake-of-the-Woods, Klamath County, 4950 feet elevation, July 10, 1930 (H. A. Scullien); male, Lake-of-the-Woods, Klamath County, 4950 feet elevation, July 18, 1920 (C. L. Goddard); 2 females, 3 males, Pelican Bay, Klamath County, July 22, 1930 (H. A. Scullien).

Wyoming: Male, Jackson, 6300 feet elevation, about 43° 30' N and 110° 46' W, July 13-17, 1920.

9. SUICEREAUS ELEGANS Cresson

Fl. II, fig. 21; Fl. V, fig. 41


Cresson, Hymen. of Amer., p. 291, 1887, male.
Dalla Torre, Cat. Hymen., VIII:458, 1897.

Eucerceris spicata Banks, Canad. Ent., XLVII:404, 1918, male.

Male. — Shiny black with creamy-white and fulvous markings; mandibles nondentate; clypeus tridentate; enclosure obliquely striated; elongated rows of erect hairs on sternites 3 and 4; sternite 5 with an inconspicuous short row of short erect hairs; cell 1st R₅ not pectiolate. Length 11 mm.

Head moderately punctate, shiny, clothed with short silvery hairs; mandibles nondentate, ferruginous becoming fuscous at the tips; clypeus tridentate on the apical
border, creamy white, apical border ferruginous; antennae fulvous proximally becoming fuliginous distally; front creamy-white with a black line above the antennae; vertex and occiput black; genae fulvous.

Thorax moderately punctate and clothed with short silvery hairs; pronotum with a creamy-white band on the posterior margin; tubercle creamy-white; four creamy-white spots on the anterior margin of the mesoscutum; tegula creamy-white with the posterior part fulvous; scutellum with a creamy-white band; metanotum creamy-white; pleuron with a creamy-white patch back of the tubercle; sternum immaculate; propodeum immaculate, enclosure obliquely ridged.

Abdomen moderately to sparsely punctate; tergites 1-5 with wide creamy-white bands tending to be narrowed laterally; venter ferruginous to fuliginous; prominent rows of long erect hairs on the posterior borders of sternites 3 and 4; sternite 5 with an insconspicuous short row of short erect hairs on the posterior border; pygidial area as illustrated (Pl.VIII, fig.107).

Legs fulvous.

Wings subhyaline, costal region clouded with fulvous becoming blacker towards the tips; cell 1st R5 not petiolate
Genitalia (Pl.IX, fig.121).

**Female.** --- Dark fuliginous, ferruginous and creamy-yellow; mandibles with a broadly divided tooth; apical border of clypeus with two widely separated black denticles between which and on a lower level is a medial bifid process; a medial cluster of elongate bristles emerges from just above the medial process. Length 10 mm.

Head long, moderately and scarcely punctate, clothed with short silvery hairs, becoming longer and more thickly set along the apical border of the clypeus; mandibles with a broadly divided tooth, ferruginous with black tips and denticles; clypeus depressed, ferruginous, apical margin with two blunt teeth widely separated and a medial bifid process below a cluster of elongate bristles; antennae normal in form, ferruginous; front ferruginous; vertex, occiput and genae ferruginous, interocellar area black.

Thorax moderately to sparsely punctate, clothed with short silvery hairs; pronotum with a yellow band on the posterior border and a yellow ventral margin; tubercle ferruginous; mesoscutum black with slight evidence of
ferruginous stripes; tegula fulvous; scutellum with an unbroken band of yellow; metanotum subin punctate, creamy-white; pleuron with a yellow patch back of the tuberole of the pronotum; a prominent mesopleural tuberole; sternum ferruginous to fuliginous; propodeum closely and coarsely punctate, ferruginous with large yellow patches, enclosure faintly ridged and with a central groove, fuliginous.

Abdomen moderately punctate, clothed with short silvery hairs; tergite 1 with a wide yellow band emarginate on both sides; tergite 2 with a yellow band dilated laterally and tending to inclose the dark depressed area; tergites 3 and 4 with yellow bands dilated laterally; tergite 5 with a subuniform yellow band; venter ferruginous except for traces of yellow on the lateral borders of sternites 3 and 4; pygidial area as illustrated (Pl.VIII, fig.30).

Legs ferruginous.

Wings subhyaline,clouded sparsely beyond the stigma (Pl.VI, fig.59).

Holotype. --- Male, Nevada (H. E. Morrison), in the collection of the American Entomological Society of Philadelphia (Type No. 1968.).

Allotype (Holotype of E. pimerum Cockerell and

The male of E. elegans was described by Cresson in 1879. In 1908 Cockerell and Rohwer described a female from Phoenix, Arizona as E. pimerium. In 1915 Banks described a male from Yuma, Arizona, as E. elegantula. In 1918 Nickel described a female from Halsey, Nebraska, which he called the female of E. elegans Cresson as two males taken at the same locality were recognized as E. elegans Cresson. From a series of males and females taken in Arizona the present writer is convinced that E. elegantula Banks is E. elegans Cresson, that E. pimerium Cockerell and Rohwer is the female of E. elegans Cresson, and that the female from Halsey, Nebraska, which Nickel thought was the female of E. elegans Cresson is the female of a new species close to E. rubripes. The female from Halsey, Nebraska, is therefore more fully described and given the new name of E. cristata.

Through the kindness of Dr. Banks, comparisons have been made with his type of E. elegantula in the Museum of Comparative Zoology at Harvard. Miss Sandhouse and the writer have compared material with the type of E. pimerium Cockerell and Rohwer at Washington. The writer has compared material with the type of E. elegans Cresson at
Philadelphia. Professor Raymond Roberts and the writer have compared material with Nickel's specimens from Halsey, Nebraska.

There is considerable color variation among the different specimens of *E. elegans* Cresson. The black background may be more or less fuliginous to ferruginous, and the yellow markings may vary from white to creamy yellow, or the light markings may blend into ferruginous.

**Distribution.***—Arizona, Nebraska, Nevada (Pl. XI, fig. 142).

**SPECIMENS EXAMINED**


Nebraska: male, Halsey, July 25, 1912 (J. T. Zimmer).

Nevada: male, Nixon, June 20, 1927 (E. P. Van Duzee).


Female. — Black and ferruginous with yellow markings; mandibles bidentate; clypeus with a cone-like elevation on the surface of the medial portion and four denticles on the apical margin above which emerges a row of elongated bristles. Length: 13 mm.

Head moderately and coarsely punctate, clothed with short suck hairs; ferruginous except for tips and denticles of the mandibles, the antennal scrobes and the interocular area which are all black; mandibles bidentate, the proximal denticle the longer; clypeus with a low cone-shaped process on the surface of the medial portion, four denticles on the apical border, a row of elongated bristles emerge from between the cone-like process and the apical border; antennae normal in form, ferruginous proximally becoming fuliginous distally.

Thorax sparsely to moderately punctate, clothed with short suck hairs; pronotum with a wide yellow band confluent with the yellow of the tuberole, a yellow line on the ventral
margin of the pronotum; mesoscutum black; tegulae fulvous; scutellum yellow with a black posterior border; metanotum yellow with black extremities; pleuron fuscous with elevated parts tending to be ferruginous, a yellow patch back of the tubercle; mesopleural tubercle barely evident; sternum fuliginous to fuscous; propodeum ferruginous mottled with fulvous becoming black medially; enclosure obliquely ridged becoming nearly smooth posteriorly, fuscous with two converging yellow patches along the lateral borders.

Abdomen moderately and coarsely punctate, fulvo-ferruginous with wide yellow bands on tergites 1-5 and broken yellow bands on sternites 3 and 4; band on tergite 1 emarginate on both sides; sternite 5 with two lateral yellow spots; pygidial area (Pl. VIII, fig. 91) with a bordering carina and fringed with hairs.

Legs ferruginous.

Wings subhyaline, clouded along the distal half of the costal region to the tip, cell last R₅ petiolate (Pl. VI, fig. 59).

Holotype. --- Female, Halsey, Neb., Aug. 28, 1911 (J. T. Zimmerman), in the collection of University of Nebraska.

Paratypes. --- Females, Halsey, Neb., August
84.

89. 1918 (J. T. Zimmerman); Halsey, Neb., Aug. 15, 1925
(H. W. Dawson); in collections of University of Nebraska
and University of Minnesota.

*E. sonata* was first described by Nickel (1916) who
considered it to be the female of *E. elegans* Cresson.
It is very close to the female of *E. rubripes* Cresson
from which it may be separated by the bidentate mandibles
of *E. sonata*.

**Distribution.** — Nebraska (Pl.II, fig.145).

11. **HUECGERIS BITRUNCATA**, new species

Pl.III, fig.84

**Female.** — Black and ferruginous with yellow markings;
mandibles with a broad subdivided tooth; elyphus short and
broad, two truncate processes on the apical border of the
medial portion, a medial cluster of three or four bristles
emerges from below the two truncate processes; enclosure
obliquely ridged becoming rugose laterally; legs ferruginous.
Length 10 mm.

Head long, slightly wider than the thorax, moderately
and coarsely punctate, more closely and finely pitted toward
and on the elyphus, moderately clothed with very short
silvery hairs, yellow mixed with ferruginous except for the
tips and mandibles, the clypeal border and processes, and the intercalary area, which are black; mandibles with a median subdivided denticle; clypeus short and broad, the truncate processes on the apical border of the medial portion, a median cluster of three or four bristles emerges from below the two truncate processes, hairs along the apical border somewhat elongated; antennae ferruginous proximally becoming fuliginous distally; front fulvous below becoming ferruginous above, fuscous stripes through the antenial scrobes to the clypeal border; vertex fuscous; genae and occiput ferruginous.

Thorax moderately to sparsely punctate, clothed with short silvery hairs; pronotum fuliginous to black with a yellow band on the posterior border confluent with a yellow patch on the tubercle; mesoscutum black; tegula smooth, fulvous, with a yellow spot; scutellum black with a divided yellow band dilated laterally and two smaller yellow spots on the posterior lateral margins; metanotum yellow with black borders and extremites; propodeum black becoming fuliginous ventrally; mesopleura and metapleura dark fuliginous to black with a large yellow patch back of the tubercle; a distinct mesopleural tubercle present; propodeum ferruginous with large yellow patches, a black
medial area embracing the enclosure; enclosure obliquely
striated tending to be rugose laterally.

Abdomen moderately punctate, more closely and finely
pitted in depressed areas on the tergites, clothed with
short silvery hairs; tergite 1 with a yellow band emer-
ginating on both sides; tergite 2 with a wide yellow band
emerginating with black anteriorly which in confluent with
a black line in the depression; tergites 3-4 with yellow
bands dilated laterally, black of anterior borders con-
fluent with the black of depressed areas; tergite 5 with
a wide band; tergite 6 ferruginous; venter fulvo-ferr-
uginous; pyridial area (Pl.VIII, fig.98) rugose, bordered
by a carina, fringed with a row of dark hairs.

Legs ferruginous.

Wings subhyaline, costal margin and stigmas light
ferruginous, clouded beyond to the tip, cell lst Rs
petiolate (Pl.VI, fig.60).

Holotype. --- Female, S. Antonio, Texas, June 16,
1906 (J. C. Crawford), in the collection of the United
States National Museum.

Paratype. --- Female, Sierra Blanca, Texas, July 9,
1917 (Cornell Lot 342, subject 157), in the collection
of Cornell University.
... Blitarum is reported close to the Harbour of "Legans"
from which it can easily be captured by the surgical pro-
cedure.

**Distribution:** -- Texas (Pl. X, Fig. 14).

---

11. <i>Euceroteria superbus</i> Cresson

Pl. III, Figs. 25, 26; V, Fig. 41

**Euceroteria superbus** Cresson, Proc. Nat. Soc., Phil., V:

109-109, 1865, male.


Peterson, U. S. Geol. and Geog. Survey, V:256-
357, 1879, male.


Cresson, Synops. of Amer.; p. 261, 1887.


Cresson, Memoirs of the Amer. Ent. Soc., II:101, 1916,

male.

**Euceroteria superba** Stevens, Nat. Backw., XVIII:428, 1917.


Cresson, Canz. Ent., IVII:102, 1921, male.

Eugercaria Fulvipes var. rhodops Cerezo and Cockerell, Jour. N. Y. Ent. Soc., VII:24, 6b, 6b, 1904, female.


Bella Torre, Cat. Mem., VIII:451, 1890, female.

Male. — Black with yellow and fulvo-ferruginous markings; mandibles mandiculate; clypeal border tridentate on the medial portion; enclosure striated and black laterally; distal borders of sternites 2-5 with rows of long erect hairs somewhat setulose. Length 18 mm.

Head subequal to thorax in width, closely and coarsely
punctate, striae with silvery hairs; antehum and metasternum
greenish-yellow, lateral portion, hairs elongated
and closely grouped along the apical border of the lateral
wings; antennae black in seta; prothorax and elytra, be-
coming fuliginous distally; front slightly narrowed above,
yellow with the black of the vertex extending well down
on the front and continuing as narrowed stripes to the
antennae; vertex black; genae fuliginous.

Thorax: closely and coarsely punctate, clothed with
silvery hairs; pronotum with a solid yellow band dilated
laterally; tubercle with a yellow spot; metasternum black;
tegula smooth, fulvous with a yellow spot; metanotum and
metasternum moderately punctulate, black; mesepimeron black
with a yellow patch back of the tubercle and with an extension
of the yellow of the sternum; sternum largely yellow; pro-
podeum and enclosure black; enclosure slightly and obliquely
striated medially, laterally somewhat rugose, distal portion
smooth, with a central groove.

Abdomen: moderately punctate on convex areas, closely
punctate in depressed areas, clothed with short silvery
hairs; tergites 1-6 yellow with narrow black anterior and
posterior borders; tergite 5 with black breaking into the
yellow; tentae 5 black with two triangular yellow spots; tentae 6 black at ends; cerci yellow white in the center; cerci of other species yellow brown anteriorly; cerci of other species black; vibrissae seen as illustrated (Fig. 17A, Pl. 19).

On yellow back, ocellus near median on the fuscous line.

Vibrissae unicellular, cellular region blends into radial cell, one cell below the anteriorly; cell is hy postulate (Pl. 19, Fig. 27).

Genetics (Pl. 19, Fig. 19).

Tentae.—Scabbard and scabdulae, as large; one large scabdula on two scabdulae; ciphers short and broad with a prominent elevated pyramidal projection medially; two cornic-like projections near the border of the lateral wings; resolutely elevated present; cell is hy postulate; black hill below the square-mottle markings; length 16 cm.

Head large, closed, and coarsely punctate, covered with more hairs; antennae unicollars, serrate with distal two-thirds of corolla dark brown, root of hair along the root; ciphers short and broad with a large sub-cornic-like projection medially, a short radial denticle below, two cornic-like projections on the lateral
91.

wings, or nearly a square. Antennae a cluster of three
or four, complete and equal in number. Thorax typical
brown, set on sides and back in crescent, there are closely
set also two lateral; antennae with slight white
ferruginous, dark red segments, front and waved above,
dark ferrugineous. Antennae divided into one
above and divided into a short and smaller yellow
patch on the side, and above extending weird, half way
to the end of the very posterior and more fully ferrugineous
except the red connection area middle in front.

Thorax black except posterior border of prot and

Fibules, a pair, posterior, inter-mated blue in the metanotum,
patches wide on sternites, metanotum, antennae, patches
on the tegulae, on the sides of the endocercus, which
are yellow.

Venter decapitated as in color; tergites 1-6, sand on
sternite 5, black below on sternites 6, lateral patches on
sternites 4 and 5, yellow; genital area (fig. 128, fig. 128)
rugose, bordered by a bar and fringed by a row of fuscous
hairs.

Last Abdominal.

Wings as in male except base yellow on the costal area
and cell 12-14 is petiolate.

See note 1990 on Cerceris fulvescens Cresson).

— Female, New Mexico, in the collection of the American Entomological Society of Philadelphia (Type No. 1989).

Cerceris bicolor var. hicksoni, new combination


Cresson, synon. of Amer., p. 391, 1907, female.


Central, scapular, and axillary hair in clumps with yellow-brown small and minute, ferruginous with distal brown; the same also on pedicellate setae. Telson, row of hairs along the central angle, also on ventral band with a large emunctory perinatal projection medially, a short, medially dentate below, the curved-like projections on the telson edges; a cluster of three or four prolonged spiniform setae, especially from the lateral border between the two medial processes, hairs more closely set along the lateral edges; interspace with proximal half ferruginous, distal and fuscous; from narrowed crura, dark fuscous-ferruginous; vertex and gene fuscous-ferruginous except for the intersection area which is black.

Papillae black except tubercles, tegulae, setae, setaline, propodeum, and scutellum which are light ferruginous; propodeum fuscous-ferruginous with a black line bordering its enclosure and a median radial stripe on the propodeum; enclosure as in male.

Pedicles sculptured as in male; tergites 1-5 ferruginous; tergite 4 darker; tergites 5 and 6 nearly black; sternites 1-5 ferruginous; sternites 4 and 5 nearly as dark as tergite 3; pygidial area (PL.VIII, fig.32) rugose, bordered by a marginal and fringed by a row of fuscous hairs.
Leps ferruginous except for some black on coxae.

Wings as in male except less yellow on the costal area and cell 1st R₅ is petiolate (Pl.VI, fig.61).

Holotype. --- Female, Montana (Morrison), in the collection of the American Entomological Society of Philadelphia. (Type No. 1959.1).

The male of E. superba shows some variations in its color pattern. The black of the vertex may not extend onto the front. A yellow patch surrounded by ferruginous may appear on the genaeback of the eye. The scutellum and metanotum may be fuliginous and the latter may have some yellow. The black on some of the tergites may be replaced by fuliginous. All tergites may have yellow bands. Some specimens are smaller than the type.

In variety bicolor of the female the tubercles and the entire propodeum may be black.

In the yellow variety of the female the tubercle may not be yellow, the metanotum may be ferruginous, and the propodeum may be without black. The sternum may be entirely black. Tergite 6 may be yellow or ferruginous and sternite 5 may lack the yellow marks.

To Prof. O. A. Stevens of North Dakota State College should go the credit for first calling attention to the fact that E. bicolor Cresson is the female of E. superba.
Cresson. Prof. Stevens has had an unusual opportunity to observe these wasps in North Dakota and has kindly given the author permission to record below the following unpublished notes:

"My first specimens of _E. bicolor_ were identified by Mr. Nathan Banks who wrote: '----- a fine species; few collections have it.' From the specimens which he had examined I reported (Ent. News) this species from Minot, North Dakota, taken August 22 (1915) and _E. superba_ at the same place and time, also at Williston, North Dakota, August 15 (1915) at flowers of _Petalostemon oligophyllum_. Further collections in the state show the following records:

**E. superba**

Steele - July 15, 1919; Aug. 4, 1923, 1925, 1922; at _P. oligophyllum_.

Mandan - Aug. 22, 1922, at _Solidago canadensis_.

Washburn - July 23, 1926, at _P. oligophyllum_.

**E. bicolor**

Valley City - Aug. 17, 1917 (P. W. Fattig) at _Petalostemon purpurea_.

Steele - July 15, 1919; Aug. 4, 1923, at _P. oligophyllum_.

Mandan - Aug. 22, 1922, at _P. oligophyllum_.

Washburn - July 22, 1926, at _P. oligophyllum_.

Cannon Ball - Aug. 20, 1922.

Breien - Aug. 21, 1921, at _Erigeron annuus_.

"These records and further notes indicate that both forms are quite common over most of North Dakota (they would not be expected in the extreme eastern part of the state). From Nebraska, Nickel (Univ. Nebr. Studies 17:137-138, 1917) had only four and five specimens, both sexes from one locality and one of each from two others. The fact that he had only females of _bicolor_ and males of _superba_, that the other sex of neither had been described,
and that I had repeatedly found both to be fairly common in different localities in North Dakota, seemed very strong evidence that these forms were the two sexes of a single species.

"About a mile south of the town of Steele, the highway cuts through a gravel ridge the like of which is uncommon in the vicinity. Petalostemon grew in abundance along the roadside and it was a good collecting ground for Ceroeria and Enceroeria. I spent most of August 4 and 5, 1925, at this place trying to secure further information on these and other forms. My notes are as follows: 'Both were common at flowers of Petalostemon oligophyllum. The females (E. bicolor) spent most of their time on the blossoms. Frequently they rested upon the ground, and occasionally one was seen running around on the ground (not actively), but no suggestion of nesting habits was obtained. The males (E. superbus) appeared a little earlier in the day and spent a large part of their time flying about, evidently hunting for the females which they seemed unable to see until they came within 6 or 8 inches. Several times they were seen to fly past within a foot of a female. When a male did see a female, he usually paused a few seconds, then darted upon her. About a dozen times this was observed, the pair tumbling to the ground and the male soon flying away. Actual mating could not be observed but may have taken place. The males also hovered for a few seconds over flies (Conops) and other insects. After the middle of the afternoon they spent more time on the flowers giving little attention to the females.'

"Similar observations were made again at Washburn on July 23 and 24, 1926, where the wasps were even more numerous on the flowers in a railroad cut. I could have taken 100 males but the females were estimated at less than one-tenth as many. The same behavior as at Steele was noted. Males were seen to dart upon the females seven times during two and one-half hours in one forenoon.

"The slender build of the females and their
continued failure to show any indication of nesting activities suggested an inquiline habit. For further evidence I captured five in the bare hand. They pinched with the mandibles and thrust the tip of the abdomen against my hand much as do male bees and wasps. No sting could be seen even with a lens."

The types of *E. fulviceps* Cresson and *E. fulviceps* var. *rhodope* Viereck and Cockerell have been examined and were found to be females of *E. superba*.

*E. superba* is very close to *E. azonata* but the coloration is quite different. The males can also be separated by the much longer rows of longer hairs on the ventor of *superba*. The females can be separated by the structure of the clypeus and the single undivided denticle on the mandible of *superba*.

**Distribution.** --- Alberta (Canada), Colorado, Idaho, Kansas, Nebraska, Montana, New Mexico, North Dakota, South Dakota, Utah, Wyoming (Pl.XII, fig.145).

**SPECIMENS EXAMINED**

Alberta (Canada): Female, Lethbridge, August 6, 1923 (Walter Carter); 4 males, Lethbridge, August 6-16, 1923 (Walter Carter).

Indiana: 1 male, 1 female, Steeleville, Aug. 11, 1904; 1 male, 1 female, Steeleville, Aug. 17, 1913 (Walter Coccorelli).

Minnesota: 3 males, 3 females, 3000 feet elevation, 1911.

Montana: 3 males, 3 females, 3000 feet, Aug. 29, 1911; 3 males, 3 females, Aug. 31, 1911; 3 males, Aug. 30, 1911.

New Mexico: 3 males, 3 females, Aug. 25, 1911 (C. A. Coccorelli); 2 males, 2 females, Aug. 27, 1911 (C. A. Coccorelli).

North Dakota: 2 males, 2 females, Steele, July 14 and Aug. 4, 1915, at Lepidoptera oligopryilla (C. A. Stevens); 2 males, 2 females, Steele, July 20, 1919, at Lepidoptera oligopryilla (C. A. Stevens); female, male, Bonduel, Aug. 15, 1925, at Lepidoptera oligopryilla (C. A. Stevens); male, Tillamook, Aug. 15, 1915 (C. A. Stevens).

South Dakota: 3 females, Meckin County (W. J. Fox); 3 females, Meckin County; 3 females, 4 males, Pierre (W. J. Fox).

Utah: 2 males, best side of Green Lake (W. A. Bock).

Yellow forms of the female. All females not so marked are of the variety bicolor.
Wyoming: Female, male Greybull, August 16, 1927
(H. H. Knight).

15. HUCHECRISS ZONATA (Say)
Pl. III, fig. 27; Pl. V, fig. 44

Say, American Entomology, III:111-112, pl. 49, fig. 5, 1838, male.
LeCante, Writ. of Th. Say, I:111-112, 167, pl. 49, fig. 5, 1839, male.

Huxtercris zonatus Cresson, Proc. Ent. Soc. Phil., V:
105-107, 1866, male, female.
Cresson, Hyman. of Amer., p. 281, 1897, male, female.
REPORT OF FIELD SURVEY.

1. Field notes.

2. Field sketches.

3. Field photographs.

4. Field measurements.

5. Field observations.

6. Field samples.

7. Field equipment.

8. Field safety.


10. Field coordination.

11. Field regulations.

12. Field ethics.

13. Field permissions.

14. Field reports.

15. Field conclusions.

16. Field recommendations.

17. Field limitations.

18. Field acknowledgments.

19. Field references.

20. Field appendices.


22. Field Index.

23. Field Acknowledgments.

24. Field References.

25. Field Bibliography.

26. Field Appendix.

27. Field Glossary.

28. Field Index.

29. Field Acknowledgments.

30. Field References.

31. Field Bibliography.

32. Field Appendix.

33. Field Glossary.

34. Field Index.

35. Field Acknowledgments.

36. Field References.

37. Field Bibliography.

38. Field Appendix.


40. Field Index.

41. Field Acknowledgments.

42. Field References.

43. Field Bibliography.

44. Field Appendix.

45. Field Glossary.

46. Field Index.

47. Field Acknowledgments.

48. Field References.

49. Field Bibliography.

50. Field Appendix.
Dalla Torre, Cat. Hymen., VIII:466, 1897.

Male. — Black with yellow marks, closely and coarsely pitted; clypeal border with three slender black teeth; enclosure strongly rugose; paired rows of short erect hairs on sternites 3-5; legs fulvous. Length 15 mm.

Head subequal in width to thorax, clothed with long fulvous hairs; mandibles nondentate, closely and finely pitted laterally at the base, yellow becoming fulvous and finally dark fuliginous at the tip; clypeus tridentate on the apical border of the medial portion, more closely
The depressed track area, where on January 2-5 there was a tendency to lower the level of the February 22nd, and the depression on the surface, the region of the evening of 2.6, the yellow border, the depression area denoted by a yellow border, signifies that the depression area is denoted by a yellow border.
narrow, that on tergite 6 irregular and interrupted; ventral fuliginous becoming darker distally; pygidial area (Pl. VIII, fig. 109) truncate, lateral borders with carinae ending in slight denticles apically, moderately pitted.

Legs blackish proximally becoming fulvous and finally light fulvous distally.

Wings subhyaline with a clouded area through the costal half; cell 1st R₅ not pectinate (Pl. VII, fig. 76).

Genitalia (Pl. IX, fig. 123).

**Female**.—Much like the male except for sexual differences and as stated below. Head slightly larger; mandibles with a large triangular obtuse tooth; clypeal border with a medial process and two small pointed denticles at the lateral borders of the medial portion; a small tubercle on the mesepisternum. Length 19 mm.

Head closely and coarsely pitted, clothed with erect amber hairs; mandibles with a large triangular obtuse tooth, ferruginous with black tips and denticles, a row of long hairs on the medial angles; clypeus broad and narrow, a truncated process medially on the apical border, short pointed processes at the lateral-apical borders of the medial process, black with large yellow patches on the medial and lateral parts; antennae normal in form, fulvous
proximally becoming fuliginous distally; front wide, narrowing above, black with large yellow triangular patches bordering the eyes and a yellow stripe extending from the elyptial border between the antennae to near the medial osellus; vertex and gaune black with a fulvo-ferruginous patch extending from just back of the lateral osellus to and along the border of the eye to the base of the mandible.

Thorax closely and coarsely pitted, clothed with erect amber hairs; pronotum with a yellow band slightly emarginate; tubercle with a yellow spot; scutellum densely and finely pitted, ferruginous with a yellow band divided; metanotum with a wider yellow band than in male; mesopleural tubercle prominent, a yellow spot cephalad of the mesopleural tubercle and another yellow spot just back of the tubercle of the prosternum; propodeum with a large sub-pyriform yellow patch on each side; enclosure densely pitted with the pits running into slightly oblique striae, a medial groove, two small yellow patches along the lateral borders.

Abdomen densely and finely punctate, more so in the depressed areas on the tergites; yellow band on tergite 1 emarginate; yellow band on tergite 2 wide, surrounding the depressed area which is ferruginous, a ferruginous border between the black and yellow; tergites 5 and 6 with narrow yellow bands dilated laterally, two widely separated
ferruginous spots near the proximal border of tergite 3; tergite 5 with a wider yellow band dilating laterally; venter immaculate rufous, sparsely pitted, second segment fulvous; pygidial area (Pl.VIII, fig.94) ferruginous, with a curina around the border, fringed with long dark ember hairs.

Legs fuliginous becoming more fulvous and then yellow distally.

Wings similar to those of the male except cell lst F5 is pectinate (Pl.VII, fig.62).


The above types have been selected since they appear to have been determined by T. T. Cresson, Sr., as such. The author is compelled to consider laticeps Cresson as synonymous with zonata (Say) after carefully studying a large series. The female type (Type No. 1962.1) of laticeps Cr. and one male labeled "Paratype," from Massachusetts (Type No. 1962) are in the collection of the American Entomological Society of Philadelphia.

Due to the wide variation in the extent of yellow found in this species Cresson was led to consider the
darker form, \textit{laticeps} Cresson, as a distinct species. He evidently had a limited number of specimens available for study at the time. Cresson (1882) reduced \textit{laticeps} Cresson to subspecies rank. After examining a series from all sections of its range the present writer is compelled to consider the two as synonymous. All variations appear to occur throughout its range. The types represent the more extreme forms from the standpoint of yellow coloration. Many forms can be found with the yellow markings replaced by ferruginous or lost completely except for the yellow marks of the propodeum and the first two tergites. The relative size of the head of the female varies, but this does not appear to indicate different species.

The truncated process on the olypeus of the female varies in the form of its distal end. In some specimens it is acute, in others it is truncate and in some it is slightly emarginate as in the illustration (Pl.III, fig. 27).

\textit{K. zonata} is close to \textit{E. superba}. The males may be separated by the erect hairs on the venter of the former being much shorter and forming shorter broken rows than on the latter. The females may be separated by the structure of the olypeus and the form of the denticle on the
mandible.

**Distribution.** — Arkansas, Colorado, Connecticut, Illinois, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New York, South Dakota, Vermont, Wisconsin (Pl.XII, fig. 146).

**SPECIMENS EXAMINED**

**Colorado:** Male, White Rock, near Boulder, 5100 feet elevation, about 40° 3' W and 105° 6' W, August 13, 1919; male, Wray, 3700 feet elevation, about 40° 0' N and 102° 10' W, August 17-19, 1919.

**Illinois:** 4 males; male, Southern Illinois, 1889 (Marten); male, Albion, September 21, 1902, et *Eupatorium aeruginosum* (Titus); female, McHenry, September, 1902; male, McHenry, July 24, 1897; female, Metropolis, September 19, 1891 (Shiga); female, Pekin, September, 1892.

**Iowa:** Male, Lake Okoboji, August 12, 1923 (H. A. Osullen); female, Sioux City, August 20, 1918 (C. H. Ainslie).

**Kansas:** Female, Baldwin, August 26, 1906 (J. C. Bridwell); male, Baldwin, August 19, 1906 (J. C. Bridwell); male, Douglas County, September 6, 1921 (W. J. Brown); male, Norton County, 2270 feet elevation, August 24, 1912.
(F. X. Williams); female, 2 males, Phillips County, 1940 feet elevation, August 30, 1912 (F. X. Williams); female, Riley County, September 4 (Popenoe); female, Riley County, September 11 (G. A. Dean); female, Smith County, 1800 feet elevation, September 4, 1915 (F. X. Williams); male, St. George, August 27; female, male, Topeka, September (Popenoe).

Massachusetts: Male, Chester, August 7, 1911; female, Gloucester, August 20, 1912 (C. W. Johnson); male, South Hampton, July 14, 1894; 5 females, male, Washington, August 8, 1912; 2 females, Woods Hole, August 17, 1899 and July, 1900 (J. Bequaert); male, Woods Hole, August, 1910 (J. Bequaert); male, Woods Hole (L. L. Holander); male, Woods Hole, August 13, 1899; female, Woods Hole, August, 1912; female, Woods Hole, August, 1913; female, Woods Hole, August 12, 1899.


Minnesota: Male, Fridley Sand Dunes, Anoka County, July 14, 1925 (C. B. Philip); female, Hennepin County, August 2, 1920 (W. H. Knight); female, Highwood, July 23, 1918 (M. A. Riley); male, Rice Creek, Anoka County, August 15, 1924 (R. W. Dawson); male, T. C. Golf Club, Ramsey County, August 5, 1922 (C. W. Mickel); male,
Lumbra Heights, Carver County, September 2, 1929
(Edwin C. Alfonseus).

Montana: Male.
Nebraska: Female, Anselmo, August 18, 1925 (R. W. Dawson);
    male, Omaha, September 9, 1923 (R. J. Laussler);
    female, West Point, September 19.
New Hampshire: Female, Hanover, July 6, 1908 (C. W. Johnson);
    male, Hanover, July 6, 1908; male, Hanover,
    July 4 (J. Bequert); female, male, Webster (Fiske).
New Jersey: 2 females.
New York: Male, Lake George, August 25, 1894 (J. L. Zabrinsky);
South Dakota: Female, 2 males, Buffalo, September 9, 1927
    (H. C. Severin); female, Forestburg, September 6,
    1928 (H. C. Severin); female, Sand Hills, Martin,
    September 15, 1927 (H. C. Severin).
Vermont: 3 females, male, Drummerston, July 14, 1908; male,
    Drummerston, July 14, 1908 (C. W. Johnson); female,
    Lyndon, July 22, 1900.
Wisconsin: 3 females, male, Madison, September 16, 1917
    (James I. Hambleton).
110.

**1. Trichius indigetis Provencher**


**Cerceris provencheri Cline Torre, Ill. Nat. Sci. Ent., IX:**

1917, 1892.

Cline Torre, Can. Ent., VIII:470, 1897.

**Lep.** — Dark fulvous to black, with yellow markings;
mandibles mandellate; clypeus convex, tridentate; en-
closure with sparse hairs parallel to the anterior border;
rows of long, erect hairs on sterna 3, 4 and 5; cell 1st
Rg not petiolate. Length: 12 mm.

Head subquadrate, flat. to thorax, closely pitted, clothed
with short silvery hairs; mandibles mandellate, scattered row
of hairs along the lateral-ventral angle, yellow except tip
which is dark brown; clypeus convex, tridentate on apical
border of medial portion, prominent rows of longer hairs on
apical borders of lateral wings; antennae normal in form,
yellow patch on scape, otherwise ferruginous; front yellow
with wedge-shaped extensions of the black of the vertex
reaching to end below the antennae and along the border of
the compound eyes, hairs of ocular region longer; vertex black; gena black with a yellow band along the border of the eye to the mandible.

Thorax closely pitted and clothed with short hairs; pronotum with a yellow band on the posterior border confluent with an elongated yellow patch on the propleura; tubercle yellow and ferruginous; mesoscutum black; tegula smooth, yellow with some fulvous; scutellum sparsely pitted, black with a divided yellow band, small yellow spots at the lateral extremities; metanotum very sparsely pitted, yellow with black extremities; mesopleura with an anteriorly emarginated yellow patch confluent with yellow of the mesosternum; sternum largely yellow on a background of dark fuliginous to black; propodeum black with a large yellow pear-shaped patch on each side; enclosure with 8-10 prominent ridges subparallel to anterior border, indistinct central groove, two posteriorly converging oval yellow spots.

Abdomen moderately pitted on convex areas, closely pitted on concave areas, clothed with short hairs becoming longer on the venter; rows of closely matted erect hairs on the posterior borders of sternites 3, 4 and 5, shorter on 5; wide bands of yellow on tergites and sternites 1-6; tergites 2-5 with elongated black patches in the central depressed lines; pygidal area (Pl.VIII, fig.110) sparsely pitted,
bordered by a carina, proximal half yellow.

Legs yellow with more or less brown on the inner surfaces of femora.

Wings subhyaline with the costal half of the anterior wing clouded; cell 1st R₅ not peltolate (Pl.VII, fig.90).
Genitalia (Pl.IX, fig.124).

**Female.** — Black with yellow markings. Like male in all respects except for usual sexual differences and as indicated; mandibles unidentate; apical clypeal border with a medial bifid projection ventrad of a single short acute projection, two large bidentate projections on the apical margin at the border of the medial and lateral portions; cell 1st R₅ peltolate. Length 11 mm.

Head large; mandibles with one small denticule, yellow with black tips and denticules; clypeal border with a medial bifid projection ventrad of a single short acute projection, two larger bidentate projections on the apical margin at the junction of the lateral wings and the medial portion, yellow, prominent row of elongated bristles on the medial apical border emerging from just below the smaller medial process; black stripes of front extending to clypeus, apical denticules black; vertex with two small spots of yellow posterior to lateral ocelli.

Thorax: propleura without yellow; mesopleura with a
deeply notched. Intestines not confluent with gill
orifices. Distal end of anal papillae strongly armed with
small basipinnae, lower angle.

Antennae extremely slender at very long hairs on venter;
prostomial cone (Fig. 13, Fig. 14) bimembranous, conical.
fringe below long, broad hairs.

Eye, mandible, and tibia in 1st portion above;
coxae in 1st segments with some or long hairs; distal end
of third pair on anterior chiefly united visible with distal end
darkened distinctly.

Large as in male except cauda by its pedunculate (Pl.
VI, Pl. 10).

Material: --- 1 st Vernon's prepared as a female
by section, Los Angeles County, California (Coquillett),
in the collection of the United States National Museum.

Material: --- Female, Los Angeles, California (Coquil-
lett), in the collection of the United States National
Museum.

Material: --- 7 males, Los Angeles County, California
(Coquillett), in the collection of the United States National
Museum and the author.

Many of the specimens examined are longer than the type.
Variations observed in the male are as follows: bend on the
Pronotum may be divided; small yellow spots may appear on
the posterior-lateral angles of the scutellum and the
yellow band of the scutellum may or may not be divided;
the yellow of the mesepisternum may be divided; the enclosure
and the pygidial area may either or both be impunctate.

In the female the yellow of the penna may not always
reach the mandibles; spots on the vertex may be absent;
the yellow of the tegulae may fade out or nearly so; the
yellow of the scutellum may be divided.

The female is here described for the first time.

E. insignis is close to E. fulvipes but the males of
fulvipes may be distinguished by having but one row of
exact hairs on the vertex, and the females by their elygeal
borders.

Distribution. — California and Nevada (Pl. XIII, fig.
147).

SPECIMENS EXAMINED

California: 3 males; male (F. Pergande); 2 males, Alameda
County, June, 1913 (E. J. Branigan); male, Arr. Seco,
Pasadena, Los Angeles County, August 20, 1917 (E.
Hay); 3 females, Cazadores, September 2, 1916 (E. P.
Van Duze); female, Mountains near Claremont, (Baker);
male, Descanso, San Diego County, August 14, 1917
(J. Bequavit); male, Forest Home, San Bernardino County, June 23, 1923 (R. C. Van Dyke); male, Idlewild, July 7, 1923 (R. C. Van Dyke); male, La Jolla, August, at Eriogonum fasciculatum (Cockerell); female, 6 males, Los Angeles County; male, Los Angeles County (Wm. Fox); female, Little Creek, July 4, 1923, at Eriogonum fasciculatum (J. L. Timberlake); male, Mt. Hermon, Santa Cruz County, July 30, 1922 (R. E. Blandell); female, Mount Hermon, August 14, 1931 (R. V. Muchmore); female, San Bernardino Mountains, San Bernardino County, July 10, 1916; male, San Gabriel Mountains, 3000 feet elevation, July 25, 1913 (R. Grinnell, Jr.); 2 males, San Jacinto Mountains, July, 1912 (J. C. Bridwell); male, Santa Cruz Mountains, August 9, 1895 (Wm. J. Fox); female, 9 males, Stanford University, August 20, 1928, at Baccharis douglasii (Carl D. Duncan); 61 males, Stanford University, June 24 - August 29, 1928, at Solidago sp., Eriogonum fasciculatum, Baccharis douglasii, Daucus carota (Carl D. Duncan); 15 females, Stanford University, July 17 to August 29, 1928, at Baccharis douglasii, Solidago sp. and Eriogonum fasciculatum (Carl D. Duncan); 8 males, Stanford University, August 30 - September 21, 1929, at Solidago sp., Baccharis sp., Mentha pulegium, Eri-
Eriogonum nudum (Carl D. Duncan); 2 males, Stanford University, June 20, 1910; 2 females, Stevens Creek, Santa Clara County, August 2, 1928, at Eriogonum nudum (Carl D. Duncan); male, Stevens Creek, Santa Clara County, August 21, 1939, at Angelimia sp. and Eriogonum nudum (Carl D. Duncan); 2 males, Bujunga, August 15, 1923 (R. I. Stahinger); male, Pytia Creek, July 4, 1929, at Eriogonum fasciculatum (F. H. Timberlake); 3 females, Uvas Creek, Santa Clara County, August 3, 1939, at Eriogonum nudum and Cerat belladonna (Carl D. Duncan); Uvas Creek, Santa Clara County, August 3, 1939, at Eriogonum nudum (Carl D. Duncan).

Nevada: 12 males, Ormsby County, July 6 (Baker); 5 males, Ormsby County, July (Baker).

15. **Eucerteris ceceriiformis** Cameron

Eucerteris ceceriiformis Cameron, Biol. Centr.-Amer., Hyman., II:120, 1890, female.


Cerasiis ceceriiformis Dalla Torre, Cat. Hyman., VIII:405, 1897.

E. ceceriiformis appears to resemble E. montana in the form of the clypeal border but differs from that species in the
scleriting of the apertures and in other respects.
No form which answers to the description have been
seen. Cameron's original description is quoted in
full below:

"Nigra, facie, lineo pronoti, linea scutelli, metanota,
abdominis segmentis marginatione, scutalisque 3 seg-
mento mediali, albida; pedibus fulvis, geniculis
tibialium anteriores albis; anta hyalina,
tuberculis femoris, elliptico areolato. Female." 
Long 10 millia.

"Antennae with the flagellum brownish; beneath,
gratually thickened towards the apex; the third
joint somewhat longer than the first, and nearly
equally on the length of the second. Head shining,
closely and not very strongly punctured; from below
the ocelli it is entirely whitish-yellow, and
there is an elongated mark behind the eyes;
a black elongated fusculet above the eyes, and a
short furrow between these fusculet; ocelli
separated from the eyes by somewhat less than the
length of the third antennal joint; apex of the
clypeus broadly rounded; eyes diverging a little
below. Thorax rather strongly punctured; the pleurae
rugose, the heart-shaped area of the median seg-
ment transversely striated, widely furrowed down
the centre; a broad line on the pronotum, the
tegulae, the tubercles, a mark behind them, a
broad complete line at the base of the scutellum,
the metanotum, the large marks on the median
segment, and a broad band on the abdominal segments,
yellowish-white. Abdomen shining, bearing scattered
punctures; the pygidial area with some large
punctures at the base, its sides curved, hollowed,
ending as stout, somewhat triangular, teeth, and
with a few large widely separated punctures;
incision in the hypopygium short; there is a
depression in the centre of the antenemultima
segment, and a row of stiff longish bristles at
its base."

Holotype. -- Female, Mexico (Quayssere). Present location of
type unknown.
16. EUGGERIS SINUATA, new species

III. IIII, fig.23

Female. --- Black and ferruginous with yellow markings; mandibles with two medial denticles, one dorsal and one ventral; clypeus depressed, apical border with a wide medial process sinuate distally; enclosure obliquely ridged.

Length 14 mm.

Head closely and finely punctate, densely clothed with short amber hairs; mandibles with two medial denticles, one dorsal and one ventral, fulvous at the base becoming ferruginous medially and black on the tip and denticles; clypeus short, broad and depressed, apical margin with a wide medial process sinuate distally; brownish-yellow with dark fuscous stripes passing through the tentorial pits and confluent with the black apical border; antennae normal in form, ferruginous proximally becoming fuliginous distally; front brownish-yellow with two wide fuscous stripes passing through the antennae, continuous with the stripes of the clypeus and confluent with the fuscous of the ocellar area; vertex and gene ferruginous except for the fuscous of the ocellar area and a narrow fuscous strip along the medial border of the compound eye.
Thorax closely to moderately punctate, clothed with short amber hairs becoming longer ventrally; pronotum with a yellow band on the posterior border confluent with the yellow of the tubercle; mesoscutum black mottled with ferruginous; tegula fulvous with a yellow patch; scutellum ferruginous with an emarginate yellow band; metanotum yellow; pleuron black in the depressed areas, becoming ferruginous on the elevated parts, a yellow patch back of the tubercle of the pronotum; mesopleural tubercle barely evident; sterna fuliginous becoming yellowish between the second and third pair of coxae; propodeum ferruginous with large lateral yellow patches and a medial fuscosous stripe; enclosure obliquely and coarsely ridged, fuscosous with lateral fuliginous patches.

Abdomen closely and finely punctate except for elevated ridges which are subimbricate, clothed with amber hairs becoming more closely set and conspicuous on the posterior venter, fulvo-ferruginous and yellow; tergite 1 with a wide emarginate band of yellow; tergites 2–5 with the yellow bands becoming progressively less distinct from the ferruginous background and tending to surround the depressed areas; venter fuliginous, mottled with ferruginous; pygidal area (Pl. VIII, fig.96) bordered by a carina, fringed with a row of hairs.

Legs ferruginous with yellow patches on the lateral
oldest of the first four tibiae.

Wings subhyaline, fiiled along the costal region to the tip; cell 1st R₅ noticulate (Pl.VI, fig.64).

Holotype. --- Devils river, Texas, May 5, 1907, on Sumack (F. S. Bishop), in the collection of the United States National Museum.

H. minuta superficially resembles H. canaliculata but may be separated from that species by the absence of the process on the lateral sides of the clypeus as found on the latter end by the apical border of the clypeus.

Distribution. --- Texas (Pl.XII, fig.149).

17. NEOCERESIS CANALICULATA (Sey)

Pl.XII, fig.30; Pl.V, fig.45


Say, American Entomology, III:111, pl. 49, fig.1, 1823, male.

LeConte, Writ. of Ph. Say, I:111, 1867, 1882, male.


LeConte, Writ. of Ph. Say, I:169, 1882, female.

121.


Cresson, Hymen. of Amer., p. 282, 1887.


*Cerceris canaliculatus* Cresson, Proc. Ent. Soc. Phil.,

V:112, 1865.


Cresson, Hymen. of Amer., p. 281, 1887, male, female.


*Cerceris canaliculata* Dalla Torre, Wien. Ent. Zeit., IX:

Male. — Yellow and ferruginous with occasional blackish parts; mandibles not dentate; elytral border tridentate; ferruginous line through the antennae to the elytral; sternites 1 and 4 with rows of long erect hairs; sternites 3 with a row of shorter and more closely matted hairs. Length: 13 mm.

Head long; mandibles not dentate, yellow becoming dark amber at the base, clothed with fine short hairs on the lateral base; elytral tridentate medially at the apical margin, sparsely matted above, becoming closely matted toward the apical margin, hairs becoming longer and more closely set toward the apical margin, yellow with the apical border ferruginous; antennae normal in form, scape yellow, pedicel and flagellum ferruginous, becoming darker distally; front, border of compound eyes subparallel, yellow with vertical ferruginous lines through scrobes to elytral border; vertex and some ferruginous.

Thorax yellow to ferruginous; pronotum with a yellow band on the posterior border confluent with the yellow tuberole; mesoscutum light ferruginous with anterior and
posterior margins narrowly black; scutellum sparsely pitted, light ferruginous with a yellow band on the anterior half; tegula smooth, fulvous with a yellow patch; metanotum sparsely pitted, yellow; pleuron and sternum fulvous with a yellow patch below the tegula, hairs of the venter longer; propodeum ferruginous with a large yellow patch on each side; enclosure smooth and velvety with a central groove.

Abdomen yellow, depressed areas closely pitted and fulvous; venter with longer hairs, sternites 3 and 4 with prominent rows of long hairs on the posterior borders, sternite 5 with a row of shorter stiff hairs closely fused together on the posterior border; pygidal area (Pl.VIII, fig.111) sparsely pitted.

Legs ferruginous with more or less yellow on all segments.

Wings subhyaline; costal half ferruginous; cell 1st R₅ not petiolate (Pl.VII, fig.79).

Genitalia (Pl.IX, fig.125).

Female. --- Like the male in all respects except for the usual sexual differences and as stated. Mandibles unidentate; clypeus with a conical protuberance on the surface of each lateral wing, apical border with a single
bifurcate projection and two large truncate processes widely separated, a group of elongated bristles emerge from just above the medial projection; cell 1st R₅ petiolate. Length 18 mm.

Head long; mandibles unidentate, light fulvous becoming black at the tips; clypeus short, a conical protuberance on the surface of each lateral wing, a single bifurcate projection on the apical border of the medial portion, two larger truncate projections more laterad on the apical border of the medial portion, sparsely clothed with short hairs above becoming longer toward the apical border, a distinct row of long hairs along the border of the lateral wings, a group of elongated bristles emerge from above the medial projection, yellow with a ferruginous apical border and two spots at the angles between the lateral wings and medial portion; antennae ferruginous becoming black at the distal ends; front yellow with the ferruginous of the vertex extending as wide stripes through the scrobes to the clypeal border and as a wedge-shaped extension along the medial margin of the eye.

Thorax; scutellum with a less distinct yellow band; mesopleural tubercle indistinct; enclosure with slight evidence of meso-lateral ridges.

Abdomen; venter ferruginous except for a trace of yellow on sternite 3, without prominent rows of erect hairs
or bristles; pygidial area (Pl.VIII, fig. 97) bordered by a carina and fringed by a closely set row of hairs.

Legs without yellow except first tibia.

Wings as in male except cell list R₅ is petiolate (Pl.VI, fig.65).

**Nectype.** --- Male, Kansas, in the collection of the American Entomological Society of Philadelphia.

**Allotype.** --- Female, Kansas, in the collection of the American Entomological Society of Philadelphia.

The specimens accepted as the neotype and allotype are each marked with a small red label bearing male and female signs. It is assumed that these were selected and so marked by A. T. Gresson, Sr., to be the types.

The male of *E. canaliculata* is superficially like the male of *E. lasiogaster* from which it may be separated by the absence of a depression on the second pair of femora and the tridentate elyphal border as found on the latter species.

The female closely resembles the female of *E. aviscensia* from which it may be separated by the processes on the lateral wings of the elyphal of *E. canaliculata*.

Patton (1878) gives an extended discussion of the variations of *E. canaliculata*. Briefly it may be stated that much of the ferruginous background may be fuliginous to black. This condition is especially noticeable in a series from Utah. Other specimens from Utah and Texas
show the lateral lobes. The fatteraulous line through the antrum may be found heightened and not extend to the vertex or to the clypeal border.

The enclosure may also vary from smooth to slightly ridged. Size is also variable. Patton states that the length is from 21 mm. to 17 mm. The author's studies confirm this statement.

Linton (p. 255) also makes the following interesting statement relative to the early history of our knowledge regarding this species:

"Since 1870, when Thomas Er., while on Major Long's Expedition to the Rocky Mountains, captured one male and one female specimen which he described as distinct species under different genera, this species has remained unrecovered. In establishing a new genus for the reception of these species, it was the variation of the male resembles Philanthus and the venation of the female resembles 

Philanthus, Dr. Cresson in 1865, relying on Say's description, referred \textit{P. canaliculatus} to \textit{Hecercerus}, while he left \textit{C. bifasciata} in \textit{Corcoris}, not suspecting that they were the sexes of one species. The Fine series collected by Mr. Tilliston enables me to unite them. The female may be at once distinguished from all other forms by the conical protuberance on the lateral lobes of the clypeus."

Distribution. --- Arizona, Arkansas (?), Colorado, Kansas, Montana, New Mexico, Oklahoma, South Dakota (?), Texas, Utah, Bolivia* (Pl.XII, fig.149).

* Possibly a mistake in labeling. The genus is not supposed to be in South America. It could, however, be an introduction.
SPECIMENS EXAMINED

Arizona: Male; 3 males, Bill Wm. Fork, August (F. H. Snow); female, Douglas, July 25, 1922 (H. Letcher); 2 females, Douglas, August 4 and 24, 1923 (W. W. Jones); female, 5 males, Dragoon, Cochise County, July 20, 1917 (J. Bequaert); male, Rigley, June 7, 1930 (Edward Tatum); female, Phoenix, October 23, 1924 (J. D. Gander); 2 males, San Bernardino Ranch, Cochise County, 3750 feet elevation, August (F. H. Snow); male, Tucson, June 7, 1924 (A. A. Nichol).

Arkansas (?): Male, Springdale.

Bolivia: Male, Ivan Bení (W. H. Mann)

Colorado: Male, Boulder County, July 4, 1925 (Mrs. Chas. H. Hicks); male, Caddoa (Snow); male, Fruita, 4500 feet elevation, about 39° 3' N and 108° 44' W, July 16, 1919; male, Greeley (H. Snook); male, Owl Canon, Larimer County, August 14 (S. A. Rohwer); female, Palisade, 4700 feet elevation, August, 1932 (Lee Jeppson); male, Wray, about 3700 feet elevation, about 40° 0' N and 102° 10' W, August 17-19, 1919.

Kansas: 3 females, male; 2 females (Snow); female, Western Kansas, August 22 (Popeo); male, Cheyenne County.

* Possibly a mistake in labeling. The genus is not supposed to be in South America. It could, however, be an introduction.
2300 feet elevation (F. X. Williams): male, Finney County, August, 1095 (H. W. Henke); female, Hamilton County (S. J. Hunter); 4 males, Hays, September 7-9 (Lentz); 4 males, Morton County, 2800 feet elevation, August 5, 1911 (F. X. Williams); female, Rawlins County, July 4, 1925 (Howard Deny); male, Rawlins County, July 4, 1925 (R. H. Beamer); male, Russell County, July; male, Scott County, June 22, 1925 (R. H. Beamer); male, Scott County, June 22, 1925 (Howard Deny); female, Stanton County, 3000 feet elevation, July 30, 1911 (F. X. Williams); female, 4 males, Trego County, 2450 feet elevation, July 12, 1912 (F. X. Williams); 3 females, 3 males, Wallace County, 3440 feet elevation (F. X. Williams); male, Wallace County, August 19 (Lentz); 4 males, Wichita County, 2300 feet elevation (F. X. Williams).

Montana: Female, Huntley, August 16, 1916.

New Mexico: Male, Aden, July 12, 1917 (J. Bequard); female, Alamogordo, June 7, 1902; 15 males, Alamogordo, May 10-June 7, 1902; female, Alamogordo (V. Brockow); 5 males, Albuquerque, August, 1894 (F. R. Snow); male, 10 miles east of Deming, July 12, 1917 (R. C. Shannon); male, Eddy County, July 11, 1923 (W. Benedict); male, Las Cruces (Cockerell); male, Las Cruces (Townsend);
male, Russell, July 11, 1935 (J. W. Painter); male, Colby, August 17, 1928 (C. E. Painter).

Oklahoma: female, Cimarron County, June 26, 1928 (C. E. P.); 3 males, Cimarron County, June 28 - July 6, 1929 (C. E. Painter); female, Ellis County, Oct. 10, 1944, at Enid (Miller); (C. E. Painter); 10 males, Ellis County, August 12 and 16, 1927, at Enid (Miller); C. E. Painter); 2 females, Comanche County, July 22, 1943 (C. E. Chiles); 3 males, Comanche County, July 23 and 24, 1928 (C. E. Painter).

South Dakota (1): female, Corson (1) County.

Texas: male (Helfred); male (Cresson); female, 6 males, Culberson County, July 3, 1917, at Kockerling (Bergmeyer). Female, male, ligons, Pecos River, July 2, 1917; male, jarretson, June 7, 1909 (Mitchell and Cushman); 3 males, jarretson, July 1-2, 1916 (Clark and T. L. L.); male, jarretson, June 5, 1907 (Mitchell and Cushman); male, harra, Aug. 15, 1918 (J. S. Evard); 2 males, collins, June 8, 1918, at Ort's Mill Taylor (C. E. Painter); male, Ort, Aug. 5, 1933 (C. E. Painter); female, male, 2 miles north of Ort, Reeves County, July 10, 1933 (Will and Wellroy);
settles, male, Beaver Island, July 9, 1917; female, 2 males, Beaver Island, Jul. 9, 1917 (C. C. Shannon); 4 males, Beaver Island, Hubbard County, July 4, 1921, at Kooperativa dp. [C. C. Dunham]; 3 females, 2 males, Beaver Island, Hennepin County, July 8, 1917 (C. Beuscher); 1 male, Harlingen, Ramsey County, Feb 10, 1917 (C. C. Shannon); male, male, Valentine, Marathon County, August 9, 1917 (C. Beuscher); male, Valentine, July 1, 1917 (C. C. Shannon); female, Valentine, July 12, 1927 (C. C. Beuscher); 3 males, Valentine, July 12, 1927 (C. C. Beuscher); male, Valentine, July 12, 1927 (C. C. Beuscher).

Utah: 2 females, 2 males, little Canyon, Beaver County, 8,000 feet elevation, June, 1904 (Cec. F. Engelhardt); male, Great Creek, Furt County, July 14, 1922 (Tom Spalding).

16. VUCHERETTI S MARGINIPENNIS (Cameron)

Pl.X, figs.130, 131, 135

Aphisenthos marginipennis Cameron, Biol. Contr. Amer., hymen., II:110b, t. 7, fig. 1, 1850, male.

Ceracris marginipennis Della Torre, Cat. Hymen., VIII: 467, 1897.

M. marginipennis appears to be very close to E.
oralis (120-160). The color is black in
the former. It may prove to be a darker phase of the latter
species. It also appears close to P. insigne but the
latter has no brown markings. Cameron's original descrip-
tion is quoted in full below.

"Flower, corolla, ovary, style, stamens, pedicel black; petals
yellow; ovary, style, stamens, filaments of style, stamens, petal
yellow. Seed, I. 2 mill."

"Vase slightly diverging beneath. Pedicel almost
reaching the triangle, separated from the eye by
distance more than the length of the third external joint,
and from each other by nearly the length of the
fourth. Clypeus at apex fringed with long fulvous
hair; the ridge projecting and armed with two
blunt teeth. Third external joint as long as
the basal two joints united, and nearly twice
the length of the fourth. The incrustation of
the neck is moderately coarse; each spars on
the face. The orbits of the eyeS behind the
discal and in a plane of the vertex are red; the
oral region, chin, cheeks, lower orbits to
the occiput, and a stripe between the antennae
to near the occiput are yellow; the rest of the
head is black. The pile is thick and silvery-
white; it is much longer on the face. Mandibles
yellow and pubescent, black at the apex. Thorax
densely covered with short silvery-white pubescence;
silvery and densely punctured; scutellum
densely punctated; the metanotum almost tu-
punctate; the median segment rugosely punctured;
the pronotum with a pile, shining, slightly
raised, deeply furrowed down the middle, the
scutellum extending to the end of the median seg-
ment, the apex of which has an obliquely rounded
slope. The ground-color of the thorax is black;
the pronotum above, the tubercles, the metanotum,
and two elongated stripes on the sides of the
median segment, yellow; the scutellum, tegulae,
broset, and an irregular splash on the mesopleurae.
rufous. Abdomen elongate-oval, a little longer than the head and thorax united; segments 2-5 furrowed at the base and in the middle sparsely punctured, the sixth segment almost impunctate; the basal and central depressions black, the central inclining to rufous; the rest of the abdomen yellow, except the p. glidial area, which is rufous; the sides margined, slightly curved, and narrowed gradually to the apex. The ventral segments black and rufous, the basal segment for the greater part rufous, the others yellow at the apex. The fringe of hairs on the third and fourth segments occupies the middle three-fourths; it is pale fulvous, soft, and silky, each hair being clearly separated from its neighbor and nearly as long as the segments. On the fifth segment, at its junction with the sixth, in the middle are two erect, stiff, comb-like, almost continuous, yellowish processes, which are black or piceous-black on the top. The ventral segments are sparsely punctured, furrowed at the base and apex. Legs rufous; the hind tibiae with a black line on the outer side. The cloud in the fore wing occupies the base of the median, the radial, and the upper part of the cubital cellsules. The first recurrent nervure is received shortly before the basal third of the second cellule; the second in the third cubital cellule a little less than the length of the top of the second cubital cellule beyond the second cubital nervure; the latter is curved, the first cubital nervure hardly so.

Holotype. ---Male, Mexico, Atoyac in Vera Cruz (Schumann), in the collection of the British Museum (London).

Distribution. --- Mexico (Pl.X, fig.135).

19. Eucerorhis vittatiprons Cresson

Pl.IV, fig.31; Pl.V, fig.49

Cresson, Hymen. of Amer., p. 291, 1887, male.

Dalla Torre, Cat. Hymen., VIII:481, 1897, male.

_Male._ — Black with yellow markings; clypeus tridentate medially; front yellow with two black stripes extending from the vertex through the antennae to the apical border of the clypeus; a row of elongated erect hairs on the distal border of the fifth sternite. Length 11 mm.

Head somewhat wider than the thorax, moderately punctate, clothed with short silvery hairs; mandibles nondentate, trace of yellow on the proximal third, amber becoming black at the tip, very sparsely clothed with hairs; clypeus moderately punctured, tridentate medially at the apical margin, apical margin with a row of closely set hairs becoming longer on the lateral wings, yellow except for black apical border and narrow black stripes between the lateral wings and the medial segment reaching to apical border;
antennae dark fuliginous; front convex, depressed areas
more closely and finely pitted, yellow except for two
black stripes extending from the black of the vertex through
the scrobes to the apical margin of the elyptus; vertex
closely punctured, black and clothed with short silvery
hairs; genae black with a small yellow spot near the upper
part of the eye.

Thorax closely punctate, clothed with short silvery
hairs; protergum black with a yellow band on the posterior
border; tubercle yellow; mesoscutum black; scutellum black
with a yellow band divided by a line in the center; meta-
notum impunctate, yellow with black borders and extremities;
tegula smooth, rufo-fulvous with an irregular yellow patch;
pleuron closely and coarsely punctate, densely clothed
with silvery hairs, black with a yellow patch behind the
tubercle and a smaller spot more ventral on the mesopleura;
sternum closely and coarsely punctate, clothed with silvery
hairs, black except for two yellow patches on the mesopleuron
and two similar patches on the metapleuron; propodeum black
with an oval yellow patch on each side, closely and coarsely
punctate, clothed with silvery hairs; enclosure with a pitted
central groove and with oblique ridges, disappearing toward
the posterior angle, subimpunctate.

Abdomen black, convex areas sparsely punctate, concave
areas closely punctured, sparsely clothed with short silvery hairs longer on the venter, one prominent row of amber bristles on the posterior border of sternite 5; yellow bands on the posterior part of tergites 1-6, emarginate and wider on the first, dilated laterally on tergites 2 and 3; sternites 2 and 4 with broken yellow bands; sternite 3 with a continuous yellow band; pygidal area (Pl.VIII, fig.112) margined by a carina, sparsely pitted and fringed by silvery hairs.

Legs black to ferruginous with elongated yellow patches on the four anterior tibiae and small yellow spots on the mesocoxae.

Wings subhyaline, the costal margin beyond stigma slightly fuliginous; cell 1st R5 pectolate (Pl.VII, fig.80) (barely pectolate in right wing of type).

Genitella (Pl.IX, fig.126).

**Female.** — Black with yellow markings; mandibles unidentate; apical border of clypeus with two widely separated carina-like processes between which and on a lower level are two smaller denticles; an elevated ridge on the medial process below which emerges a row of elongated bristles. Length 11 mm.

Head like male except mandibles unidentate with a trace
of cream on the lateral base; clypeus with two widely separated obtuse processes on the apical margin, between which and on a lower level are two smaller denticles, a prominent single row of bristles inserted below an elevated ridge on the medial lobe; black stripes of front wider; cream of genae larger than male and in contact with the eye.

Thorax like male except sternum immaculate, cream-colored spot on propodeum reduced.

Abdomen like male except hairs of venter short and inconspicuous; pygidial area (Pl.VIII, fig.98) margined by a carina, rugose and fringed by a closely packed row of dark amber hairs.

Legs ferruginous to black, immaculate.

Wings as in male (Pl.VII, fig.66).

Holotype. --- Male, Nevada (H. V. Morrison), in collection of the American Entomological Society of Philadelphia (Type No. 1969.1).


The yellow markings vary in their extent and shade. The black stripes on the face may or may not fuse with the black of the clypeal border. The propodeum may lack the yellow patches and the lower yellow patch of the mesopleura may be lacking. The first pair of coxae may be yellow. The band on the sixth tergite may be broken. The California series has the yellow bands of the tergites more dilated laterally. The enclosure may vary in its surface sculpturing from smooth with only a medial groove to quite rugose. The Washington and California series have the yellow markings more creamy white than the others.

*E. vittatifrons* is closely related to *E. tricolor* which was originally described by Cockerell as a variety of the former. *E. vittatifrons* differs from the latter by the absence of ferruginous markings on the abdomen, by its larger size, and by its slightly different pygidial area. It shows some resemblance to *E. fulvipes* but the latter does not have cell 1st R5 petiolate in the male.

The female is here described for the first time.

**Distribution.** --- California, Colorado, Nevada, Utah, Washington (Pl. XII, fig.150).

**SPECIMENS EXAMINED**

California: 3 males, Big Pine, Inyo County, July 16, 1929
(E. P. Van Duzee); 8 males, Jacumba, San Diego County, August 12, 1917 (J. Bequaert); female, San Diego, August 25, 1927 (J. C. Van Boekel).

Colorado: Male, Mesa Verde National Park, June, 1927 (James Vartochner).

Nevada: Male, Nixon, June 30, 1927 (E. P. Van Duzee); male, Ormsby, July 6 (Saker).

New Mexico: Female, Rinconada (?), September 26 (Cockerell).

Utah: Male, Bellevue, Washington County; 2 males, Zion National Park (Vasco M. Tanner); female, Logan, Utah County, August 31 (F. Marlatt); female, Uinta County, July 12, 1911 (C. A. Peterson).

Washington: 6 females, 21 males, Setum Creek, August 8, 1925 (Walter Carter).

20. EUCERTERIS TRICOLOR Cockerell

Pl. IV, fig. 32; Pl. V, fig. 46

Eucerteris vittatifrons tricolor Cockerell, The Entomologist, XXX:136, 1897, male.


Male. — Black with yellow, cream-color and ferruginous markings; front yellow with two black stripes extending from the vertex to near the apical border of the elyptus; enclosure with oblique ridges; the first two abdominal segments with considerable ferruginous; a row of erect hairs on the fifth sternite. Length 10 mm.

Head slightly wider than the thorax; mandibles nondentate, proximal two-thirds yellow, distal third amber becoming black at the tip, very sparsely clothed with hairs; elyptus moderately punctate, tridentate medially at the apical margin, apical margin with a row of closely set hairs becoming longer on the lateral wings, yellow except for black apical border and narrow black stripes between the lateral wings and the medial segment reaching nearly to apical border; antennae dark fuliginous; front with convex areas moderately pitted and clothed with short silvery hairs, concave areas more closely and finely pitted, yellow except for two black stripes extending from the black of the vertex through the antennae to near the apical margin of the elyptus; vertex moderately punctate and clothed with short silvery hairs, black; gnaeae moderately punctate and clothed with short silvery hairs, black with an oval yellow patch bordering the upper part of the eye.

Thorax closely punctate, clothed with short silvery
hairs; pronotum black with a creamy white band on the posterior border slightly concave anteriorly and confluent with the creamy-white tubercle, narrow yellow stripe on ventral border of prothorax; mesoscutum black; scutellum moderately punctate, black with a wide yellow band deeply and widely emarginate posteriorly; metanotum subimprintate, yellow with black posterior border and extremities; tegula smooth, rufo-fulvous with an irregular cream-colored patch; pleuron closely and coarsely punctate, indistinct mesopleural tubercle, black with a creamy-white patch on the mesopleura; sternum closely and coarsely punctate, black except for two creamy-white patches on the mesosternum and two similar patches on the metasternum; propodeum black with a large oval creamy-white patch on each side, closely and coarsely punctate; enclosure with a central groove and with distinct oblique ridges.

Abdomen with convex areas sparsely punctate, concave areas closely punctate, sparsely clothed with short silvery hairs longer on the venter, one prominent row of amber bristles on the posterior border of sternite 5, black with a creamy-white band on the posterior part of tergites 1-6, emarginate on the first; sternites 3-4 with continuous creamy-white bands; black of tergites 1 and 2 largely replaced with ferruginous; sternites 2 and 5 with
broken creamy-white bands; pygidial area (Pl.VIII, fig. 113) margined by a carina, sparsely pitted and fringed by silvery hairs.

Legs black to ferruginous with creamy-white patches on the first four coxae, femora and tibiae.

Wings subhyaline, cell R₁ and anterior margin beyond slightly fuliginous; cell last R₅ pectinate (Pl.VII, fig. 81).

Genitalia (Pl.IX, fig.127).

**Female.** — Black with cream-color and ferruginous markings. Like male in all respects except for the usual sexual differences and as indicated. Length 10 mm.

Head like male except mandibles unidentate with a trace of yellow on the lateral base; clypeus tridentate on apical margin with the central process bifurcate and more ventrad, a prominent single row of bristles inserted dorsad of the medial process, medial lobe strongly convex; black stripes of front wider; yellow of gemae larger than in male.

Thorax like male except yellow of scutellum is divided; yellow of sternum limited to four small spots on the mesosternum and metasternum.

Abdomen like male except yellow of first tergite is
divided; venter is immaculate and lacks the prominent row
of bristles; pygidial area (Pl.VIII, fig.99) margined by a
scars, rugose and fringed by amber hairs.

Legs ferruginous with creamy-white patches on the first
four femora and black to ferruginous on all coxae.

Wings as in male (Pl.VII, fig.67).

**Lectotype.** --- Male, Las Cruces, New Mexico, 9-5 (Twns.),
in the collection of American Entomological Society of
Philadelphia.

**Allotype.** --- Female, Las Cruces, New Mexico, October
5, 1895 (Cockerell), in the collection of American Entomolog-
ical Society of Philadelphia.

The ferruginous may extend onto the third tergite.
In one specimen from Texas it extends onto the fourth
tergite. The yellow of the scutellum may or may not be
divided.

_E. tricolor_ was originally described from the male
only as a variety of _E. vittatifrons_. Later Viereck and
Cockerell recognized it as a valid species. It differs
from _vittatifrons_ by its ferruginous abdominal segments;
its smaller size; and its differently shaped pygidial area
and clypeal border in the females.

**Distribution.** --- Arizona, Mexico, New Mexico, Texas
(Pl.XII, fig.151).
SPECIMENS EXAMINED


Mexico: October 9, 1896.

New Mexico: Female, Alamogordo, May 13, 1902; 6 males, Alamogordo, May 12 - June 17, 1902; 2 males, Eddy County, July 10 and 12, 1927 (R. H. Beamer); 2 females, High Rolls, May 30 and June 10, 1902; 9 males, High Rolls, May 30 - June 10, 1902; male, Las Cruces, September 5; male, Organ, August 8, 1931 (R. H. Painter); 2 males, Steins, August 8, 1932 (R. H. Painter).

Texas: Female, Girvin, August 4, 1931 (R. H. Painter); female, 12 males, Sierra Blanca, El Paso County, July 8, 1917 (J. Bequaert); 12 females, 30 males, Sierra Blanca, July 9, 1917; 2 males, Sierra Blanca, July 9, 1917 (R. C. Shannon); 2 females, 2 males, Sierra Blanca, Hudspeth County, July 4, 1921 (Carl D. Duncan); male, Valentine, July 13, 1927 (R. H. Beamer).

21. **NUCERCERIS MONTANA** Cresson

Pl. IV, fig. 33; Pl. V, fig. 47


Male. -- Black and ferruginous with yellow markings; mandibles massive with a single recurved tooth; front broad and flat; apical border of clypeus unarmed; enclosure closely and deeply pitted; cell 1st R₅ petiolate. Length 13 mm.

Head large; mandibles massive, one large sharp recurved denticle, yellow except tip and denticle; clypeal surface flat, apical margin unarmed, closely punctured, yellow, clothed with yellow hairs becoming more pronounced along the apical borders of the lateral wings; antennae normal in form, scape yellow, pedicel and flagellum fulvous; front, wide, closely punctured, clothed with moderately long silvery-yellow hairs, yellow with black of vertex extending as angular projections to the antennae; vertex
closely punctured, black, hairs medium in length; genu

closely pitted, black with a round yellow spot margined
by amber bordering the upper part of the eye, hairs short.

Thorax closely punctured, clothed with moderately
long hairs; pronotum black with a yellow band on the
posterior border; tuberola black, narrow yellow strip on
ventral border of prothorax; mesoscutum, scutellum, pleuron,
and sternum black; metanotum yellow with black anterior
border and extremities; tegula smooth, fulvous with a
yellow patch; propodeum black with a small yellow spot
on each side; enclosure closely and coarsely pitted, with
a central groove.

Abdomen with convex areas moderately pitted, concave
areas closely pitted, clothed with short silvery hairs on
the tergum, very long hairs on the venter, indistinct
rows of erect amber hairs on the posterior borders of
sternites 3, 4 and 5 nearly covered by the long silvery
hairs; yellow bands on tergites 1-6, yellow on tergites
2-5 dilated laterally; sternites 3-5 with yellow bands;
sternite 2 with a yellow patch; pygidial area (Pl.VIII,
fig.114) margined by a carina, moderately and coarsely
pitted.

Legs yellow below, fuliginous above.

Wings subhyaline with costal area clouded, cell lst
R5 petiolate (Pl.VII, fig.82).
Genitalia (Pl.IX, fig.128).

**Female.** --- Like the male in all respects except for the usual sexual differences and as indicated. Black and ferruginous with yellow markings; mandibles unidentate; a flat rounded process on the apical border of the clypeus; mesopleural tubercle absent. Length 20 mm.

Head subequal to thorax in width; mandibles normal in size, unidentate, amber with black tips and denticles; clypeus with a flat rounded process on the apical border of the median portion, moderately pitted, clothed with silvery-yellow hairs, apical border and a strip between lateral and medial portions black; antennae fuliginous proximally becoming black distally; front black with large yellow patches between the antennae and compound eyes, and between the antennae; genae with yellow patch more elongated.

Thorax; mesopleural tubercle absent; propodeum with much larger yellow patches tending to be confluent; enclosure with two small yellow patches.

Abdomen; tergites with wider bands; tergite 1 with yellow band deeply indented with fuliginous; yellow of tergites 2-4 surrounding depressed areas which are black
in part; sternites 2-5 with two large yellow patches; less hairy than in male; no erect rows of long hairs; pygidial area (Pl.VIII, fig.100) margined by a carina, rugose, fringed by amber hairs.

Legs fulvous-yellow.

Wings like those of the male (Pl.VII, fig.68).

Holotype. --- Female, Montana (Morrison), in the collection of the Philadelphia Academy of Sciences (Type No. 1946a).

Allotype. --- Male, Montana (Morrison), in the collection of the Philadelphia Academy of Sciences (Type No. 1946a).

Paratype. --- Male, Montana (Morrison), in the collection of the Philadelphia Academy of Sciences (Type No. 1946b).

The extent of the yellow markings varies. The yellow band of the first tergite may be divided by a wide black stripe in the male. In the female the scutellum may have the yellow band broken or as a solid line. The first sternite may be fulvous.

E. montana is very close to E. angulate from which it may be separated by the processes on the pronotum of the female and the unusual form of the antennae of the male in the latter.

Distribution. --- Arizona, Colorado, Kansas, Montana,
New Mexico, Oklahoma, Texas, Utah (Pl. XII, fig. 152).

SPECIMENS EXAMINED

Colorado: Female, Sterling, July 1, 1921 (Grace E. Sandhouse).

Kansas: Male, Hamilton County, 3350 feet elevation (F. H. Snow); 2 females, Meade County, July 10 and August 5, 1911 (F. X. Williams); male, Meade County, 2500 feet elevation, July 12, 1911 (F. X. Williams); 3 females, Morton County, 3200 feet elevation (F. H. Snow); female, Morton County, 2800 feet elevation, August 5, 1911 (F. X. Williams).

New Mexico: Female (Mrs. J. Fox); 2 males, Alamogordo, May 13, 1902; female, Highrolls, May 30, 1902; 19 males, Highrolls, May 29 - June 3, 1902; male, 35 miles east of Santa Fe, 6900 feet elevation, June 27, 1931 (Don Prentiss).

Oklahoma: 2 males, Cimarron County, June 21 and July 6, 1933 (A. E. Pritchard); male, Guymon, 3133 feet elevation, August 15-16, 1921 (R.); female, Texas County, July 22, 1933 (A. E. Pritchard).

Texas: 5 males, Coyote Lake, Bailey County, August 25, 1921, at Solidago sp. and Cuscuta sp. (Carl D.
149.

Duncan): 2 males, Tabiona, July 9, 1917; male, Nueco Mountains, Nueco County, 6000 feet elevation, July 12, 1922 (Allan and Sallie Roy); 2 males, June to Ozone, July 7, 1917; female, male, Fortun, May 12, 1916 (J. C. Bradley); female, Sierra Blanca, Chavez County, July 8, 1917 (L. Coquart); 2 males, Sierra Blanca, July 9, 1917 (J. C. Coopman); male, Sierra Blanca, July 9, 1917; male, Sierra Blanca, Escalada County, July 4, 1921, at Lubberline s2 (Carl B. Duncan); female, Valentine, Presidio County, July 8, 1917 (J. Coquart); male, Valentine, July 13, 1927 (L. A. Stephenson).

Utah: Male, Salt Lake City, June 29, 1922 (E. P. Van Duzee).

SP. EUSERGEREA OMAURATA Kocher

PL. IV, Fig. 24; PL. V, fig. 48

Euseringia omaurata Kocher, Bull. Amer. Mus. nat. Hist.,
XXXI (24): 226, 1912.

Male. — Black with yellow markings; mandibles with a slight elevated ridge medially above and a prominent rounded denticle below; clypeus border with a truncate process sinuate distally, surface depressed and very hairy; scape enlarged; first segment of flagellum enlarged, seg-
ments 1 to 5 with distinct distally pointing denticles; enclosure moderately and coarsely pitted and with a medial groove; pygidal area without the usual lateral carina; cell 1st R₅ pectinate. Length 11 mm.

Head very little wider than thorax; mandibles with a slightly elevated ridge on the inner dorsal angle and a prominent rounded denticle on the inner ventral angle (Pl.V, fig.81), proximal two-thirds yellow, distal third amber, a row of long hairs along the inner dorsal angle and short hairs on the lateral aspect; elytra with a strongly protruding truncate process on the apical border medially with the distal and sinuate, medially concave, yellow closely punctate and densely clothed with moderately long yellow hairs over its entire surface above; antennae with scape dilated distally, pedicel normal, first segment of flagellum dilated and segments 1–5 with a distally pointing denticle on the dorsal aspect, dark amber with a yellow patch on the scape, pedicel, and base of first segment of flagellum; front yellow extending to anterior ocellus, black of vertex extending to the suture, closely punctate, clothed with silvery hairs; vertex black, closely and coarsely punctate, clothed with silvery hairs; genae moderately punctate, clothed with silvery hairs, small yellow patch bordering the upper part of the eye.
Thorax; protergum closely punctate, clothed with short silvery hairs, black with a yellow band on the posterior border confluent with a yellow patch on the tubercle, narrow yellow stripe on the ventral border of the prothorax; mesoscutum and scutellum black, closely punctate, clothed with short silvery hairs; metanotum sparsely punctate, yellow with black extremities; tegula smooth, fulvous with a yellow patch; pleuron, sternum and propodeum closely and sparsely punctate, black, clothed with silvery hairs; enclosure with a central groove, moderately punctate.

Abdomen with convex areas sparsely punctate, concave areas closely punctate, clothed with short silvery hairs, longer on venter and tergite 6, black with yellow bands on tergites 1-5, wider and emarginate on first, laterally dilated on 3-5, two lateral yellow patches on tergite 6, prominent rows of erect long hairs on posterior borders of sternites 3 and 4, an inauspicious row on sternite 5; pygidial area (Pl.VIII, fig.118), subequal in width and length, sparsely punctate, without a bordering carina, fringed by unusually long silvery hairs.

Legs dark fuliginous dorsally, yellow ventrally.

Wings subhyaline except anterior half of mesal wing which is slightly fuliginous; cell lst Rg petiolate (Pl. VII, fig.38).
152.

Genitalia (Pl.IX, fig.129).

Female.— Like the male in all respects except for the usual sexual differences and as indicated. Mandibles unidentate; apical border of clypeus with a flat rounded process; antennae normal in form; mesopleural tubercle absent. Length 1½ mm.

Head subequal to thorax in width; mandibles with a single sharp tooth, dark fuliginous to black with a small yellow patch on the lateral base, less hairy than on male; clypeus with a flat rounded process on the apical border of the median portion; front black except for large yellow patches bordering the compound eyes, the facial carina and a patch on the median portion of the clypeus; antennae normal in form, fuliginous to black; gonae with yellow patch more elongated.

Thorax with lateral anterior angles of pronotum distinctly dentate; no yellow on ventral border of prothorax; mesopleural tubercle absent; large yellow patches on the propodeum.

Abdomen with yellow bands on tergites 2 and 4 broken, yellow of tergites 2–4 laterally dilated, yellow patches on tergite 6 laterad of pygidial area; venter without distinct rows of erect hairs; pygidial area (Pl.VIII, fig.}
153.

101) margined by a center variee and fringed by silvery hairs.

Legs and T-12 with tined, yellow elongated patches on dorsal surface of first four tibiae.

Legs as in color Pl. XIV, fig. 69.

Holotypa. --- Female, Lower California, between San Jose and Cabo San Lucas. Collected by 'Alcatross' Expedition, 1911. In collection of the American Museum of Natural History.


The yellow patches vary somewhat in different specimens.

E. sagulata is very close to E. montana in many respects but can be separated from it by the more normal form of the mandibles and the unusual type of antennae in the male, and by the processes on the protergum of the female of the former.

The male is here described for the first time.

Distribution. --- Lower California, Arizona (Pl.XII, fig.153).

SPECIMENS EXAMINED

Arizona: 2 Females, Sabino Cn., Santa Catalina Mts., August
164.

13, 1924 (F. E. Van Doren); female, male, Sabino Canyon, Santa Catalina Mts., August 13, 1924 (C. T. Van Doren); male, Tucson; male, Tucson (C. T. Van Doren); male, 16 miles north of Tucson, August 19, 1924 (D. S. Martin); female, 10 miles south of Tucson, July 21, 1924 (C. T. Van Doren).

California (Lake ?); female, La Paz, Baja, October, 1923 (C. T. Van Doren).
Cameron, Peter.


Carter, Walter.


Cockerell, T. D. A.


Comstock, John H.


Cresson, E. T.


Dalla Torre, C. G.

1897. Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus, VIII: 449-481.

Dalla Torre, F. W. V.


Gahan, A. B. and Rohwer, S. A.

1917-1918. Lectotypes of the species of Hymenoptera (except Apoidae) described by Abbé Provancher.

Crosbey, John A.


Hartman, Carl.


Latreille, Pierre Andre.


Le Conte, John L.


Leonard, M. D.

Munkel, Charles E.


Packard, A. S.


Patton, W. H.


Peckham, George W. and Peckham, Elizabeth G.


Provancher, L. A.


Rau, Phil.


Rau, Phil and Rau, Nellie.


Robertson, Charles.


Rohwer, S. A.


1913. "See Grossbeck, 1912.

Say, Thomas.


Schletterer, August.


Schulz, W. A.


Smith, H. S.

1906. The Sphagoidea of Nebraska. Univ. of Neb. Studies, VII:583-611.

Smith, John B.


168.

edition of 1900.

Snedgrass, R. E.


1934. Private communication.

Snow, F. H.


Stevens, O. A.


Tillyard, R. J.

1926. The Insects of Australia and New Zealand. Angus & Robertson, Ltd., Sydney, Australia.

Viereck, H. L.


Snodgrass, R. E.


1934. Private communication.

Snow, F. H.


Stevens, O. A.


Tillyard, R. J.

1926. The Insects of Australia and New Zealand. Angus & Robertson, Ltd., Sydney, Australia.

Viereck, H. I.


Viereck, H. L. and Cockerell, T. D. A.


Washburn, F. L.

I was born in Pierce County, Wisconsin, November 27, 1887. My father's name was Willard Jay Scullen and my mother's name was Elizabeth Ann (Cle landfill) Scullen. I attended a rural country school until I moved to Oregon in the spring of 1901. In the fall of 1901 I entered the seventh grade at Ashland, Oregon. On completing the eighth grade there in 1903 I entered the Southern Oregon State Normal at Ashland from which I graduated in 1906. In the fall of 1906 I entered the University of Oregon and majored in Biology and Premedicine. I received the B. A. degree from the University of Oregon in 1910. Graduate work was taken at the University of Oregon summer school in 1910.

From 1910 to 1912 I was principal of the Junction City, Oregon, High School. The summer of 1911 was spent at the Puget Sound Marine Biological Station. During the summer of 1912 graduate work was taken at the University of Oregon.

In the fall of 1912 I came to the Iowa State College as an instructor in Zoology and two years later was advanced to the rank of assistant professor. I remained at Iowa State College for six years. In the summer of 1918 I entered the government service as a Field Specialist in
For the Bureau of Entomology. After two years in the federal service I went to Oregon State College as instructor in Entomology and Bee Culture. In 1923 I was advanced to the rank of assistant professor and in 1929 to the rank of associate professor, which position I now hold.

Since coming to Oregon State College I have had charge of all teaching, extension and experiment station work in Bee Culture. During my later years at this institution I have also had charge of classes in Insect Morphology, Insect Physiology and Insect Zoology. I have also assisted in Economic Entomology and Insect Taxonomy.

From 1925 to 1927 I took additional graduate work at Oregon State College and the University of Oregon and received my M.A. degree from the University of Oregon in 1927.

The summer of 1928 was spent at Cornell University doing graduate work in Entomology. During the summer of 1930 I served as Ranger Naturalist in the Crater Lake National Park. Graduate work was taken at Iowa State College during the summer of 1931. During the winters of 1927-1929, graduate work has been taken at Oregon State College in addition to my regular duties at that institution. From June 1923 to December of the same year I was on leave of absence from my own institution and during that time I
completed my residence requirements and course work at
Iowa State College. I was admitted as a candidate for
the degree of Doctor of Philosophy at Iowa State College
December 15, 1908.

I was married to Johannah Marie Frederickson on
August 22, 1911. I have one daughter, Ruby Mae Scullen,
born August 24, 1916.
167.

Abbreviations.

At., anterior tentorial pits.

A.R., head ring.

C.cx 1, C.cx 2, C.x 3, Coxal cavities.

C.z., coxal plate.

Epx., humerus.


Fr., ventral femur.

It., procoxa.

Myn., mesopleurus.

Npt., mesopleural tubercle.

R 1, R 2, pronotum, metanotum.

Pcr., parasternum.

Fp. 3, metapleura.

S 1, S 2, S 3, Sternum.

S.a 1, S.b 1, plates of the mesosternum.

S.a 2, S.b 2, S.c 2, parts of the metasternum.

Scl. g., scutellum.

Sct. g., scutum.

Tf., tegula.

Tu., tubercle of the prothorax.

VF., valve of the penis.
Fig. 1. Lateral view of thorax, E. flavocineta, male.
Fig. 2. Dorsal view of thorax, E. flavocineta, male.
Fig. 3. Ventral view of thorax, E. flavocineta, male.
Fig. 4. Lateral view of abdomen, E. flavocineta, male.
Fig. 5. Fore wing, E. flavocineta, male.
Fig. 6. Hind wing, E. flavocineta, male.
Fig. 7. Distal portion of fore wing, E. flavocineta, female.
Fig. 8. Antennae, E. flavocineta, male.
Fig. 9. Posterior leg, E. flavocineta, male.
Fig. 10. Lateral view of mesopectus, E. flavocineta, female.
Fig. 11. Face, E. flavocineta, male.
Fig. 12. Mouthparts, E. flavocineta, male.
Fig. 13. Genitalia, E. flavocineta, male.
PLATE II.

Fig. 14. Face, E. arizonensis, new species, female.

Fig. 15. Face, E. rubripes Cresson, female.

Fig. 16. Lateral view of clypeal projection, E. rubripes Cresson, female.

Fig. 17. Face, E. violaceipennis, new species, female.

Fig. 18. Face, E. flavocincta Cresson, female.

Fig. 19. Face, E. fulvipes Cresson, female.

Fig. 20. Face, E. similis Cresson, female.

Fig. 21. Face, E. elegans Cresson, female.
PLATE III.

Fig. 22. Face, E. constrict, new species, female.

Fig. 23. Lateral view of clypeal process, E. constrict, new species, female.

Fig. 24. Face, E. bitrunonta, new species, female.

Fig. 25. Face, E. superba bicolor Gravenon, female.

Fig. 26. Lateral view of clypeal process, E. superba bicolor Gravenon, female.

Fig. 27. Face, E. zonata (Say), female.

Fig. 28. Face, E. sinuata, new species, female.

Fig. 29. Face, E. insignis Provancher, female.

Fig. 30. Face, E. cenraliculata (Say), female.
Fig. 31. Face, E. vitripennis Cresson, female.
Fig. 32. Face, E. tricolor Cresson, female.
Fig. 33. Face, E. lutaria Cresson, female.
Fig. 34. Face, E. annulata Donner, female.
Fig. 35. Pronotus of E. annulata Donner, female.
Fig. 36. Intemes, E. annulata Donner, male.
Fig. 37. Face, E. locuncia, new species, male.
Fig. 38. Face, E. rubripes Cresson, male.
Fig. 39. Face, E. Flavocincta Cresson, male.
Fig. 40. Face, E. similis Cresson, male.
Fig. 41. Face, *E. elegans* Cresson, male.
Fig. 42. Face, *E. superba* Cresson, male.
Fig. 43. Face, *E. insignis* Provencher, male.
Fig. 44. Face, *E. zonata* (Say), male.
Fig. 45. Face, *E. canaliculata* (Say), male.
Fig. 46. Face, *E. tricolor* Cookerell, male.
Fig. 47. Face, *E. montana* Cresson, male.
Fig. 48. Face, *E. angulata* Rohwer, male.
Fig. 49. Face, *E. vittatifrons* Cresson, male.
Fig. 50. Face, *E. fulvipes* Cresson, male.
Fig. 51. Nasal view of mandible, *E. angulata* Rohwer, male.
Fig. 55. \( E. \) alamosi, new species, female.
Fig. 56. \( E. \) alamosi, new species, female.
Fig. 57. \( E. \) alamosi, new species, female.
Fig. 58. \( E. \) alamosi, new species, female.
Fig. 59. \( E. \) alamosi, new species, female.

**Fig. 60.** \( E. \) alamosi, new species, female.
**Fig. 61.** \( E. \) alamosi, new species, female.
**Fig. 62.** \( E. \) alamosi, new species, female.

**Fig. 63.** \( E. \) alamosi, new species, female.
**Fig. 64.** \( E. \) alamosi, new species, female.
**Fig. 65.** \( E. \) alamosi, new species, female.
PLATE VII.

Venation in the region of cell 1st R5.

(continued)

Fig. 66. E. vittatirrana Cresson, female.
Fig. 67. E. tricolor Cockerell, female.
Fig. 68. E. montana Cresson, female.
Fig. 69. E. angulata Kower, female.
Fig. 70. E. lacunosa, new species, male.
Fig. 71. E. flavocinata Cresson, male.
Fig. 72. E. rubripes Cresson, male.
Fig. 73. E. fulvipes Cresson, male.
Fig. 74. E. similis Cresson, male.
Fig. 75. E. elegans Cresson, male.
Fig. 76. E. insignis Provancher, male.
Fig. 77. E. superba Cresson, male.
Fig. 78. E. zonata (Say), male.
Fig. 79. E. canaliculata (Say), male.
Fig. 80. E. vittatirrana Cresson, male.
Fig. 81. E. tricolor Cockerell, male.
Fig. 82. E. montana Cresson, male.
Fig. 83. E. angulata Kower, male.
VIII.

Pygidial area.

Fig. 84. E. arizonensis, new species, female.

Fig. 85. E. violaceipennis, new species, female.

Fig. 86. E. flavocineta Cresson, female.

Fig. 87. E. rubripes Cresson, female.

Fig. 88. E. fulvipes Cresson, female.

Fig. 89. E. similis Cresson, female.

Fig. 90. E. elegans Cresson, female.

Fig. 91. E. conata, new species, female.

Fig. 92. E. bitruncata, new species, female.

Fig. 93. E. superba Cresson, female.

Fig. 94. E. zonata (Say), female.

Fig. 95. E. insignis Provancher, female.

Fig. 96. E. sinuata, new species, female.

Fig. 97. E. canalicolata (Say), female.

Fig. 98. E. vittatifrons Cresson, female.

Fig. 99. E. tricolor Cockerell, female.

Fig. 100. E. montana Cresson, female.

Fig. 101. E. angulata Rohwer, female.

Fig. 102. E. lacunosa, new species, male.

Fig. 103. E. flavocineta Cresson, male.

Fig. 104. E. rubripes Cresson, male.

Fig. 105. E. fulvipes Cresson, male.
PLATE VIII (continued).

Fig.106. E. similis Cresson, male.
Fig.107. E. sieglingi Cresson, male.
Fig.108. E. subala Cresson, male.
Fig.109. E. azalea (Say), male.
Fig.110. E. insignis Covencher, male.
Fig.111. E. concinnilata (Say), male.
Fig.112. E. vittatifrons Cresson, male.
Fig.113. E. tricolor Cookerell, male.
Fig.114. E. montana Cresson, male.
Fig.115. E. unipala Schwer, male.
PLATE VIII.

Fig. 84.
Fig. 85.
Fig. 86.
Fig. 87.
Fig. 88.
Fig. 89.
Fig. 90.
Fig. 91.
Fig. 92.
Fig. 93.
Fig. 94.
Fig. 95.
Fig. 96.
Fig. 97.
Fig. 98.
Fig. 99.
Fig. 100.
Fig. 101.
Fig. 102.
Fig. 103.
Fig. 104.
Fig. 105.
Fig. 106.
Fig. 107.
Fig. 108.
Fig. 109.
Fig. 110.
Fig. 111.
Fig. 112.
Fig. 113.
Fig. 114.
Fig. 115.
FAMILY III.

Centailla of Male.

Fig. 116. * trascosa, new species.

Fig. 117. * flavovinata Cresson.

Fig. 118. * flavipes Cresson.

Fig. 119. * flavipes Cresson.

Fig. 120. * similis Cresson.

Fig. 121. * eleoana Cresson.

Fig. 122. * superba Cresson.

Fig. 123. * zonata (Sey).

Fig. 124. * insignis Provancher.

Fig. 125. * emalligulata (Sey).

Fig. 126. * vittatifrons Cresson.

Fig. 127. * tricolor Cockerell.

Fig. 128. * montana Cresson.

Fig. 129. * ensulae Rohwer.
Fig. 130. Face, E. marginipennis (Cameron), male. 
Drawing by C. F. Passart.

Fig. 131. Head, E. marginipennis (Cameron), male. 
Drawing by C. F. Passart.

Fig. 132. Face, E. punctifrons (Cameron), female. 
Drawing by C. F. Passart.

Fig. 133. Lycidial area, E. punctifrons (Cameron), female. 
Drawing by C. F. Passart.

Fig. 134. Wing, E. punctifrons (Cameron), female. 
Drawing by C. F. Passart.

Fig. 135. Type localities of E. marginipennis (Cameron), 
    male, and E. punctifrons (Cameron), female.
Fig. 130.

Fig. 131.

Fig. 132.

Fig. 133.

Fig. 134.

Fig. 135.
PART VI.

Geographical distribution.

(Note: True localities are indicated by large circles including the number or decade sign. Locality records are indicated as a cross and state records by a small circle.)

Fig. 126. E. laceiana, new species.

Fig. 127. E. striocollis, new species.

Fig. 128. E. flaccicincta Cresson.

Fig. 129. E. rubripes Cresson.

Fig. 130. E. salivipes Cresson.

Fig. 131. E. similis Cresson.

Fig. 132. E. elegans Cresson.

Fig. 133. E. connata, new name.

Fig. 134. E. bitrupens, new species.
Geographical distribution (continued).

Fig. 138. A. dipthera Cresson.

Fig. 139. A. proptera (Say).

Fig. 140. A. interlinea Cresson.

Fig. 141. A. alba, new species.

Fig. 142. A. beaulliana (Say).

Fig. 143. A. viattifrons Cresson.

Fig. 144. A. tricolor Cockerell.

Fig. 145. A. cantans Cresson.

Fig. 146. A. angustata Schwer.
Fig. 154. Nesting habitat of *E. flavocinota* Cresson.

Fig. 155a. Prepupa of *E. flavocinota* Cresson with cocoon removed.

Fig. 155b. Mature larva of *E. flavocinota* Cresson.

Fig. 155c. Immature larva of *E. flavocinota* Cresson feeding on a beetle.

Fig. 155d. Beetles used as prey by *E. flavocinota* Cresson.

Fig. 155e. Prepupa with cocoon attached to cell wall and remains of beetles.
PLATE XIII.

Fig. 154.

Fig. 155.