

Proceedings of  
the United States  
National Museum



SMITHSONIAN INSTITUTION • WASHINGTON, D.C.

Volume 116

1965

Number 3506

REVIEW OF THE GENUS *CERCERIS*  
IN AMERICA NORTH OF MEXICO  
(HYMENOPTERA: SPHECIDAE)

By HERMAN A. SCULLEN<sup>1</sup>

Introduction

The wasp tribe *Cercerini* as recognized in this country (Muesebeck, Krombein, and Townes, 1951) consists of the two genera *Cerceris* Latreille (1802) and *Eucerceris* Cresson (1865). The former is well represented in all continental areas while the latter is limited to North America.

The earliest references to the genus *Cerceris* in North America were by Thomas Say when he published descriptions of the following species: *frontata* Say (1823), *deserta* Say (1825), *fumipennis* Say, (1837) and *sexta* Say (1837). Numerous species have been described since the publications of Say. In 1865 E. T. Cresson monographed the Family Philanthidea of North America, which at that time included the genus *Cerceris* and the new genus *Eucerceris*. Cresson published over 20 papers relating to *Cercerini* and described a total of 20 species recorded from north of the Mexican border. In 1912 Nathan Banks published his first paper on the genus *Cerceris*. This was followed by eleven additional papers. In all, Banks described 52 species of

<sup>1</sup> Professor Emeritus, Department of Entomology, Oregon State University, Corvallis, Oreg. Grants from General Research (Research Paper no. 469) under the Graduate School and from the National Science Foundation have assisted in these studies.

*Cerceris* north of the Mexican border. In spite of the fact that many of Bank's species have proven to be synonyms, his contribution has been outstanding. The work of H. S. Smith and C. E. Mickel in Nebraska is worthy of special note. In describing new Mexican species, Saussure (1867) and Cameron (1890) included several species found subsequently to range north of the Mexican border. Numerous other workers have added one or more species to the present list.

A summary of all contributors (with the number of species described and their principal publication dates in parentheses) is as follows: Say (4, 1823, 1825, 1837); Spinola (1, 1841); Dahlbom (2, 1845); Guérin (2, 1845); F. Smith (4, 1856); Cresson (20, 1865, 1872); Packard (1, 1866); Saussure (6, 1867); Taschenberg (1, 1875); Patton (1, 1880); Schletterer (1, 1887); Provancher (1, 1888); Cameron (4, 1890, 1904); Fox (2, 1893); Cockerell (1, 1897); Viereck (1, 1902); Viereck and Cockerell (17, 1904); H. S. Smith (2, 1903); Rohwer (6, 1908, 1920); Banks (52, 1912, 1913, 1915, 1916, 1917, 1919, 1923, 1947); Mickel (15, 1916, 1917); Brimley (5, 1927, 1928, 1929).

Fourteen new species and 12 new subspecies are described by the author in the present paper.

BIOLOGY.—Members of the genus *Cerceris* are solitary in their nesting habits although several females usually are found nesting close together. The grouping of several nests in the same area has been considered to be the result of the suitability of soil conditions and the availability of food for both larvae and adults. Krombein's observations (1936) on *C. nigrescens* F. Smith, however, indicate there are exceptions. Apparently the adults feed solely on nectar and pollen, while the larvae are fed beetles.<sup>2</sup> Only a limited number of species of *Cerceris* have been studied carefully to determine their nesting and feeding habits. Most species of *Cerceris* use some species of weevil to feed their young. On the other hand, the females of Group II are known to use Buprestidae. Both species forming Group IV (*macrosticta* Viereck and Cockerell and *femurrubrum* Viereck and Cockerell) are known to use Tenebrionidae. Recently, Werner (1960) reported *C. truncata* Cameron using three species of Bruchidae in Arizona. *C. convergens* Viereck and Cockerell also has been recorded collecting *Bruchus* sp. in southern California. Several species of *Cerceris* have been found to collect Chrysomelidae.

One observation recorded by J. C. Bridwell in unpublished notes is of special interest. Females of *C. fumipennis* Say under observation at Clifton, Virginia, were found "to be storing their nests with adult

<sup>2</sup> Some European species of *Cerceris* are known to store solitary bees as food for their young. For a brief discussion and references, the reader is referred to Linsley and MacSwain (1956, p. 72). The records of *Cerceris* collecting insects other than beetles in this country are open to question.

beetles of the genus *Chlamisus*, a Chrysomelidae resembling Buprestidae only in their hard integument and their metallic luster." This change of prey took place after Buprestidae ceased to fly.

Two unpublished records (Princeton, N.J., July 5, 1948, by K. W. Cooper, and Winchester, Va., July 23, 1961, by Frank Kurczewski) of *C. clypeata* Dahlbom taking *Lema trilineata* Oliver, a Chrysomelidae, have come to the writer's attention. *C. clypeata* normally takes weevils.

Noteworthy published contributions in the field of *Cerceris* biology north of Mexico are summarized briefly below.

The Peckhams (1898, pp. 108–117) report observations made on *C. clypeata* Dahlbom, *C. deserta* Say, and *C. nigrescens* F. Smith. *C. clypeata* Dahlbom was seen taking *Balaninus nasicus* Say. *C. deserta* Say was reported taking *Conotrachelus posticatus* Boheman. From Peckham's statement that *C. deserta* Say "closely resembles *clypeata*," it would appear the observations were made on a species other than the one accepted as *deserta* Say by Cresson, the present writer, and others (see p. 478). The above beetles are Curculionidae. The prey of *C. nigrescens* F. Smith was not recorded. In 1900 (p. 90) the Peckhams published a brief note on *C. fumipennis* Say found nesting in Wisconsin. This wasp was found collecting *Chrysobothris 4-imprensa* Castelnaw.

Hartman (1905, p. 66) in reporting briefly on the nesting habits of *C. fumipennis* Say indicates it was collecting the weevil *Conotrachelus neocrataege*.<sup>3</sup> This species of wasp usually takes Buprestidae.

Grossbeck (1912a, p. 135) reported briefly on observations made at Yaphank, Long Island., N.Y., in 1911 on nesting *Cerceris fumipennis* Say. He reported the wasp storing the following Buprestidae: *Dicerca punctulata* (Schönherr), *Buprestis lineata* Fabricius, and *Chrysobothris floricola* Gory.

Rau and Rau (1918), reporting on field studies near St. Louis, Mo., record the activities of *C. fumipennis* Say (pp. 126–127) and *C. finitima* Cresson (p. 133). The former wasp was found using *Argilus abjectus* Horn (Buprestidae). The prey of the latter wasp was not recorded. It was found to have made a nest in the pith-chamber of a weed-stalk although the Raus had noted it earlier entering holes in the ground as is usual for the genus. Rau (1928, pp. 325–341) reports detailed studies of *C. rawi* Rohwer (= *C. frontata rawi* Rohwer), which he found nesting at Jerseydale about thirty miles south of St. Louis, Mo. This wasp was found using *Thecesternus humeralis* Say and *Lixus concavus* Say. Rau here reports also on his studies of *C. bicornuta* Guérin, which was using three species of billbugs, *Spheno-*

<sup>3</sup> *C. neocrataege* is not a valid name in the genus *Conotrachelus*. Correct identification of the material Hartman had is not possible.

*phorus placidus* (Say), *S. zae* Walsh, and *S. parvulus* Gyllenhal. The cuckoo-wasp *Hedychrum violaceum* Brullé was seen entering the *bicornuta* burrow. On page 338, Rau reports that *C. finitima* Cresson "make nests in twigs," but the present writer finds no other record of this or any other species of *Cerceris* nesting in twigs.

In 1928 (pp. 205-206) Abbott reported observations on the nesting and prey of *Cerceris architis* Mickel (= *C. halone* Banks), which he found nesting at Elgin, Ill. This wasp was using *Curculio nasicus* Say as food for its young.

In 1929 (p. 35) Cartwright reported *C. bicornuta* Guérin provisioning its nests with the maize billbug *Calendra maidis* Chittenden. Cartwright in 1931 (pp. 269-270) reported some observations at Jocassee, S.C., on *C. fumipennis* Say, which he found collecting the beetle Buprestidae. Specimens of these beetles found about the wasp's nesting area numbered 136 and represented 20 species that he listed by name. At the same time, he reported seeing a specimen of *C. mandibularis* Patton bringing in a grasshopper nymph. This unusual prey record needs verification.

Strandtmann reported briefly in 1945 (pp. 311-312) observations of three species of *Cerceris* in Ohio. *C. serripes* Fabricius (= *C. bicornuta* Guérin) was reported collecting a weevil, *Calandra* sp.; *C. rufinoda* Cresson, the weevil *Tychius picirostris* (Fabricius); *C. finitima* Cresson, a black flea beetle, *Cheatocnema pulicaria* Melsheimer.

Krombein has taken advantage of the opportunity to study the biology of several species of *Cerceris* over the past years. In 1936 (pp. 93-99) he reported observations made of *C. nigrescens* F. Smith at Buffalo, N.Y. He found this wasp provisioning its nest with *Hyperodes delumbis* Gyllenhal and *Sitona hispidula* Fabricius. A sarcophagid (*Senotainia trilineata* Van der Wulp) was seen shadowing the wasp. In 1938 (pp. 1-3) Krombein reported subsequent observations at Buffalo on *C. nigrescens* F. Smith, where the wasp was found to be using the beetles *Sitona hispidula* (Fabricius), *Gymnetron antirrhini* Paykull, *Gymnetron* sp., and *Hyperodes delumbis* (Gyllenhal), all of which are Curculionidae.

In 1950 (pp. 147-149) Krombein reported studies of a colony of *C. robertsonii* Fox at Kill Devil Hills, N.C. This species of wasp was found provisioning its cells with a chrysomelid (*Rhabdopterus picipes* (Oliver)). *Metopia leucocephala* (Rossi), a parasitic sarcophagid fly was reared from the wasp cell. Subsequent studies by the same worker in 1952 at Kill Devil Hills, N.C. (1953, pp. 113-121), showed this wasp to be collecting *Cryptocephalus notatus* Fabricius and *Pachybrachis dilatatus* Suffrian (Chrysomelidae). At the same location he reported *C. bicornuta bicornuta* Guérin taking the following weevils: *Calendra venata venata* (Chittenden) and *C. cariosus* (Oliver). A more



extensive report on the nesting habits of *C. robertsonii* Fox is given by Krombein in 1952c (pp. 288-294). This same worker (1956, p. 43) published a brief note on the nesting of *C. atramontensis* Banks at Dunn Loring, Fairfax Co., Va., in which he reported the wasp collecting the weevils *Conotrachelus posticatus* Boheman and *C. naso* LaConte.

In 1958 (p. 110) Krombein reported observations on the nesting of *C. fumipennis* Say at Kill Devil Hills, N.C., where he found the wasp utilizing the buprestids *Chrysobothris femorata* (Oliver) and *Dicerca lurida* (Fabricius) as food for its young.

In 1958 Krombein found a colony of *Cerceris flavofasciata* H. S. Smith nesting at Kill Devil Hills, N.C., in a vertical sand bank (1959, pp. 197-198). These wasps were found to be using as prey for their young the following chrysomelid beetles: *Cryptocephalus guttulatus* Oliver, *C. mutabilis* Melsheimer, *Cryptocephalus* sp. (probably *quadrimaculatus* Say), *Bassareus clathratus* (Melsheimer), *Bassareus* sp. (probably *sellatus* Suffrian), and *Chlamisus* sp. (probably *plicata* (LeConte)). A mutillid, *Dasymutilla nigripes* (Fabricius), was reared from a cocoon of the wasp.

In 1959 Krombein (1960a, pp. 75-77; 1960b, pp. 299-300) studied the nesting habits of *C. bicornuta fidelis* Viereck and Cockerell and *C. frontata frontata* Say at Portal, Ariz. The former wasp was found to be storing a weevil, *Eupagoderes* sp.; the latter wasp was storing *Cleonus pulvereus* (LeConte) and *Eupagoderes* sp.

In 1956 Linsley and MacSwain published extensive studies of the nesting and prey collecting habits of *Cerceris californica* Cresson, which they found at San Dimas Experimental Forest and Range Experiment Station, San Gabriel Mountains, Calif. These workers found *C. californica* Cresson using a total of 24 species of Buprestidae as prey to feed their young. Considerable information also is included on the parasites of the wasp. These include *Dasymutilla coccineohirta* (Blake) and the following sarcophagids: *Metopia leucocephala* (Rossi), *Amobia floridensis* (Townsend), and *Senotainia trilineata* (Van der Wulp). This is the most extensive report on the biology of a single species of *Cerceris*.

Wasbauer (1957, p. 131) published a brief note on the biology of *C. athene* Banks (= *C. femurrubrum athene* Banks) at Mecca, Riverside Co., Calif. The prey taken by this wasp was a tenebrionid (*Eurymetopon rufipes* Eschscholtz). It is significant that *C. macrosticta* Viereck and Cockerell, also belonging to Group IV, is known to collect Tenebrionidae in Colorado and Arizona. From Wasbauer's observations it was found that *C. athene* Banks is the female of *C. femurrubrum* Viereck and Cockerell (see p. 436).

Werner (1960, pp. 43-44) published his observations on a nest of *Cerceris truncata* Cameron found nesting in his own yard. This wasp

was found to be storing its cells with four species of native Bruchidae (Mylabridae): *Algarobius prosopis* (LeConte), *Mimosestes protractus* (Horn), *M. amicus* (Horn), and *Neltumius arizonensis* (Schaeffer). Rau (1933, pp. 164-165) also reports a wasp (*Cerceris* near *mexicana* Saussure) as collecting *Bruchus*.

Krombein (1963, pp. 72-79) published his observations on nests of *Cerceris blakei* Cresson nesting in Florida. This was found to be storing its cells mostly with the weevil *Derelomus basalis* LeConte but was also taking the weevils *Limnobaris confusa* Bocheman, *Anthonomus sexguttatus* Dietz, and *Hyperodes* sp. Less commonly taken were the chrysomelid *Graphops floridana* Blake and the tenebrionid *Blapstinus interruptus* (Say).

Cazier presently is conducting careful studies into the biology of several species of Cercerini at Portal, Ariz. It is probable that some of his studies will be reported before this publication appears.

Byers (1962, pp. 317-321) reports finding a colony of *Cerceris halone* Banks nesting at Mountain Lake Biological Station on Salt Pond Mountain near Pembroke in Giles Co., Va., in the summer of 1961. This wasp was collecting *Curculio nasicus* (Say) as prey for its young. The cuckoo wasp, *Hedychrum violaceum* Brulle, was observed entering the wasp nest. At least three species of sarcophagid flies were reported seen in the nesting area.

Several of the above investigators have made it a point to determine if the beetle prey is killed by the sting of the wasps or if it merely is paralyzed. From the published reports it would appear there is no consistency in this matter even with an individual wasp or within the same species.

Numerous floral visiting records are included on the labels of specimens studied by the present writer. These and his own observations show that most, if not all, species of *Cerceris* have their preferences as to flowers visited for food by the adults. Open types of flowers with a liberal supply of pollen seems to be the usual preference. When the collector or student of *Cerceris* is looking for specimens in the field, it is important to keep in mind this floral preference and to remember that the different species of *Cerceris* may be visiting different species of flora in the same locality at the same time. A record of the flora on which they are collected is desirable. The flora from which they may be collecting beetle prey may be quite different from the flora visited for food by the adults.

MORPHOLOGY AND TAXONOMIC CHARACTERS.—(Plate 1). The writer has found most of the descriptions of older species very inadequate. For this reason and to make the descriptions uniform, all former species have been redescribed. Illustrations have been provided wherever it seemed desirable to clarify characters used.

Color shades and color patterns that have been used extensively by earlier describers are used by the writer to a more limited extent. He has found the color markings of some parts are far more stable than those on other parts within the same species. Furthermore, the overall tendency for color markings to vary is different for different species. One of the most extreme cases of color variation within a species is *C. californica* Cresson. Since, in some cases, the color changes are associated closely with geographical distribution, it seems desirable to recognize subspecies.

In the females the form of the clypeal process and clypeal border continue to be the most important characters to use in separating species. For the males, the relative width of the hair lobes on the clypeus is important in separating groups but not individual species. Denticles on the mandibles, which were seldom mentioned by earlier workers, have been found of value in numerous cases. Other characters seldom or never mentioned by former workers but found useful by the writer are the form and sculpturing of the tegulae, the sculpturing of the enclosure, the mesosternal process, and the form of the pygidium. The form of the pygidium has been of special value in separating females. Extensive studies have been made of the male genitalia in an effort to find more dependable characters to help in their identification. Noticeable differences are found when comparing the males of one group with those of another, but, when species are otherwise closely related, no usable differences have been found.

In general, the writer has found it far more difficult to separate males than females. Even in some cases wherein the males definitely have been recognized by their association with known females, no characters as yet have been found that will separate them. Here is an important field of study in this genus that should be pursued.

**NATURAL SUBDIVISIONS.**—Structures and biological behavior show certain natural divisions within the genus *Cerceris*. In the present publication the writer recognizes five more or less distinct groups. Further study may show that some or all of these groups are sufficiently distinct to warrant recognition as subgenera. For the present, it seems desirable simply to separate them as groups. Other natural subdivisions, not herein recognized, may appear with further studies. Future structural and field biological studies may help in separating distinct groups. Ungrouped species are arranged alphabetically separate from the groups. The characters of each group are presented under each heading.

**MATERIAL STUDIED.**—Through the kind cooperation of many persons, the writer has been able to study well over ninety percent of the material from north of Mexico now found in the collections of this country and also many collections in Europe. Over 40,000

specimens have been made available to him. Type material in the museums of this country has been studied on several occasions, and, with the aid of a grant from the National Science Foundation, the writer was able to study types from this hemisphere deposited in European institutions.

The following institutions have loaned material for these studies:

- Academy of Natural Sciences of Philadelphia, Philadelphia, Pa.
- American Museum of Natural History, New York, N.Y.
- Arizona State University, Tempe, Ariz.
- Boston Society of Natural History, Boston, Mass.
- Brigham Young University, Provo, Utah
- Brooklyn Museum, Brooklyn, N.Y.
- California Academy of Sciences, San Francisco, Calif.
- Canadian National Collection, Ottawa, Canada
- Carnegie Museum, Pittsburgh, Pa.
- Centre de Recherches Agronomiques de L'Etat, Gembloux, Belgium
- Clemson College, Clemson, S.C.
- Colorado State University, Fort Collins, Colo.
- Cornell University, Ithaca, N.Y.
- Deutsches Entomologisches Institut, Berlin, Germany
- Emory University, Atlanta, Ga.
- Hancock Foundation, University of Southern California, Los Angeles, Calif.
- Harvard University, Museum of Comparative Zoology, Cambridge, Mass.
- Illinois Natural History Survey, Urbana, Ill.
- Instituto Tecnológico y de Estudios Superiores, Monterrey, Mexico
- Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
- Iowa State University, Ames, Iowa
- Kansas State University, Manhattan, Kans.
- Los Angeles County Museum, Los Angeles, Calif.
- Louisiana State University, Baton Rouge, La.
- McGill University, Redpath Museum, Montreal, Canada
- Michigan State University, East Lansing, Mich.
- Milwaukee Public Museum, Milwaukee, Wis.
- Montana State College, Bozeman, Mont.
- Museum Histoire Naturelle, Geneva, Switzerland
- Museum National d'Histoire Naturelle, Paris, France
- Natural History Museum, San Deigo, Calif.
- Naturhistorisches Museum, Zoologische Abteilung, Vienna, Austria
- New Mexico State University, Las Cruces, N. Mex.
- North Carolina State Department of Agriculture, Raleigh, N.C.
- North Carolina State College, Raleigh, N.C.
- North Dakota State University, Fargo, N. Dak.
- Ohio State University, Columbus, Ohio
- Oklahoma State University, Stillwater, Okla.
- Oregon State University, Corvallis, Oreg.
- Pennsylvania State Department of Agriculture, Harrisburg, Pa.
- Pomona College, Claremont, Calif.
- Purdue University, Lafayette, Ind.
- Rockefeller Foundation, Mexico City, D.F., Mexico
- San Jose State College, San Jose, Calif.
- South Dakota State College, Brookings, S. Dak.



Stanford University, Palo Alto, Calif.  
State Plant Board of Florida, Gainesville, Fla.  
Sul Ross State College, Alpine, Tex.  
Texas Agricultural and Mechanical University, College Station, Tex.  
United States National Museum, Washington, D.C.  
University of Alberta, Edmonton, Alberta, Canada  
University of Arizona, Tucson, Ariz.  
University of Arkansas, Fayetteville, Ark.  
University of British Columbia, Vancouver, B.C., Canada  
University of California, Berkeley, Calif.  
University of California, Davis, Calif.  
University of California, Los Angeles, Calif.  
University of California, Riverside, Calif.  
University of Colorado, Boulder, Colo.  
University of Georgia, Athens, Ga.  
University of Idaho, Moscow, Idaho  
University of Kansas, Lawrence, Kans.  
University of Kentucky, Lexington, Ky.  
University of Massachusetts, Amherst, Mass.  
University of Miami, Coral Gables, Fla.  
University of Michigan, Ann Arbor, Mich.  
University of Minnesota, St. Paul, Minn.  
University of Nebraska, Lincoln, Nebr.  
University of Utah, Dugway Proving Grounds, Tooele, Utah  
University of Wisconsin, Madison, Wis.  
University of Wyoming, Laramie, Wyo.  
Utah State University, Logan, Utah  
Washington State University, Pullman, Wash.  
West Virginia University, Morgantown, W. Va.

Materials from the personal collections of the following persons have been loaned for study: Rollin W. Baker, J. Bequaert, George E. Bohart, Richard M. Bohart, Duis D. Bolinger, E. R. Buckwell, Walter Carter, Margaret L. Cook, Kenneth W. Cooper, Richard Dow, R. R. Dreisbach, Carl D. Duncan, George R. Ferguson, H. T. Fernald, Roland L. Fischer, J. E. Gillaspay, C. H. Hicks, Harry A. Hill, Gordon A. Hobbs, Paul D. Hurd, H. E. Jaques, Stanley G. Jewett, Wyatt W. Jones, Karl V. Krombein, Roy Latham, Howard L. McKenzie, C. D. Michener, H. E. Milliron, Reginald H. Painter, H. B. Parks, L. P. Rockwood, Vincent D. Roth, C. W. Sabrosky, P. H. Timberlake, and M. Wasbauer.

ACKNOWLEDGMENTS.—Financial assistance which has made possible studies in the tribe Cercerini over the past thirty years has come from two sources. Grants of variable amounts have been received for many years from the General Research Council, Oregon State University, Corvallis, Oreg. In more recent years three separate and substantial grants have been received from the National Science Foundation. These latter grants have made it possible to take two extensive collecting trips into Mexico (1956, 1957), to make an extended trip

through the East to study types at several institutions (1958), and to study types in European institutions (1959). Financial assistance from both sources has made it possible to secure secretarial aid, laboratory help, and illustrative assistance.

Over the years many individuals have assisted in making these studies possible. While it would be impracticable to name all who have contributed, a few should be indicated. The most outstanding has been Dr. Karl V. Krombein of the United States Department of Agriculture. Over many years he has been the writer's principal advisor; further, he has contributed much original information through his many field studies; and finally, he has freely devoted much of his time to checking the present manuscript with special attention to the keys. Without his devoted help it is doubtful if this paper could have been completed. Among the technical assistants who have given noteworthy assistance, four deserve special mention: Marybeth Buddenhagen, Helen Dickason, and Margaret Johnson, who helped in checking records and references as well as many other details associated with such an undertaking, and Margaret Hsieh, who is responsible for most of the illustrations. The writer also is deeply indebted to Dr. Paul O. Ritcher, Head of the Entomology Department, Oregon State University, for the use of facilities to continue these studies after retirement. Sincere appreciation is here expressed to my wife, Johanne, for many hours of assistance in proof reading.

### Key to the Species of *Cerceris*

#### FEMALES

1. Stigma dark amber or black; mesosternal process usually present; species mostly small . . . . . GROUP I  
    Stigma light amber; mesosternal process absent; species mostly medium to large . . . . . 2
2. Clypeus without a distinct medial elevation or process on the surface of the medial lobe; a pair of small tuberculi (sometimes very indistinct) on the surface of the medial clypeal lobe just above the border; entire border of the clypeus without denticles . . . . . GROUP II  
    Clypeus with a distinct medial elevated process (sometimes little more than a ridge but not just a convex area) on the medial lobe; distinct extensions or denticle-like processes on the clypeal free border . . . . . 3
3. Clypeal process with a lamella or lamellae on the free border . . . . . GROUP III  
    Clypeal process without a lamella or lamellae on the free border . . . . . 4
4. Pygidium not narrowing to an acute or near-acute base (sides may converge slightly basally) . . . . . 5  
    Pygidium narrowing basally to an acute or very narrow end . . . . . 36
5. Elevation on the medial lobe of the clypeus is cone shaped or with the distal end very much narrowed and without a distinct overhang . . . . . 6  
    Elevation on the medial lobe of the clypeus with a definite overhang; the sides of the process may diverge, converge, or be subparallel . . . . . 7

6. Entire medial lobe of the clypeus elevated into a cone flanked by single but less prominent pointed processes on each lateral lobe . . . . GROUP IV  
Clypeal elevation or process not flanked by smaller processes on the lateral lobes . . . . . GROUP V
7. Lateral apices of the clypeal process considerably prolonged, giving the appearance of horns or the points of a new moon . . . . . 8  
Lateral apices of the clypeal process, if any, not greatly prolonged . . . . 12
8. Secondary lateral apices on the sides of the clypeal process . **alceste** Mickel  
No secondary lateral apices on the sides of the clypeal process . . . . . 9
9. Small species, approximately 10 mm. in length . . . . **dentifrons** Cresson  
Species of medium to large size, 15 mm. or more in length . . . . . 10
10. Distinctly black with creamy white markings . . . . **stigmatosalis** Banks  
Black with yellow markings . . . . . 11
11. Apical mandibular denticle subequal to or smaller than the other denticles; distance between apical and medial denticles about one-half mm., medial and basal denticles confluent; clypeal process horns very long, curved, and acute; no yellow on the 6th tergum (Central States) . . . **sexta** Say  
Apical mandibular denticle noticeably larger than the other denticles; distance between all denticles subequal; 6th tergum yellow to the sides of the pygidium (west of the Rocky Mountains and into Mexico).  
**tepaneca** Saussure
12. Clypeal process width subequal to or greater than the length . . . . . 13  
Clypeal process noticeably longer than the width . . . . . 27
13. Clypeal process very short, little more than a curved carina . . . . . 14  
Clypeal process length subequal to its width . . . . . 15
14. Length 13 to 15 mm.; band on tergum 2 much broader than other abdominal bands but deeply emarginate . . . . . **halone** Banks  
Length 10 to 11 mm.; bands on terga 2 to 5 subequal . . . . . **deserta** Say
15. Clypeal process relatively flat above . . . . . 16  
Clypeal process convex above . . . . . 18
16. Free margin of the clypeal process showing very little emargination, lateral apices not acute, minute medial denticle on the margin (Eastern States from Kansas to the New England States) . . . . . **banksi** Scullen  
Free margin of the clypeal process with considerable emargination, lateral apices acute, margin without a medial denticle . . . . . 17
17. Legs amber with no yellow markings (Texas) . . . . . **texana** Scullen  
Hindfemora largely yellow with amber at the apical end only (Central Plains States from North Dakota to Texas) . . . . **occipitomaiculata** Packard
18. Sides of clypeal process subparallel . . . . . 19  
Sides of clypeal process converging . . . . . 21
19. Creamy yellow markings (Northern States from coast to coast).  
**nigrescens nigrescens** F. Smith  
Yellow markings . . . . . 20
20. Somewhat more robust; lateral apices of clypeal process less acute (California and bordering states) . . . . . **nigrescens munda** Mickel  
Lateral apices of the clypeal process very acute (Northeastern States).  
**nigrescens arelate** Banks
21. Tergum 1 and anterior part of tergum 2 largely ferruginous; free margin of the clypeal process rounded . . . . . **wyomingensis** Scullen  
Black with creamy white or yellow markings only . . . . . 22
22. Markings yellow. . . . . 23  
Markings creamy white . . . . . 25

23. Band on tergum 2 broader than on other terga; clypeal process emarginate (Eastern States, rarely west to North and South Dakota, Nebraska, and Kansas). . . . . *atramontensis* Banks  
Bands on terga 2 to 5 subequal in width . . . . . 24
24. Apex of clypeal process rounded (California and bordering states).  
*aequalis aequalis* Provancher  
Apex of clypeal process somewhat truncate and emarginate (California and bordering areas) . . . . . *varians* Mickel
25. Apical end of the clypeal process acute or rounded, not emarginate (Idaho, adjoining areas, and mountains of central New Mexico).  
*aequalis idahoensis* Scullen  
Apical end of the clypeal process slightly emarginate. . . . . 261
26. Apical denticle on the mandible the larger; lateral apices of the clypeal process not extended (Rocky Mountains, west to eastern Washington east to North Dakota, north to Alberta, and south to northern Texas).  
*calochorti* Rohwer  
Medial denticle on the mandible the larger; lateral apices of the clypeal process extended to form a distinct denticle (southern California).  
*macswaini* Scullen
27. Clypeal process sides distinctly converging to a smaller apex . . . . . 28  
Clypeal process sides subparallel . . . . . 31
28. Markings showing considerable ferruginous or amber (eastern slope of the Rocky Mountains and adjoining areas) . . . . . *vicina* Cresson  
Markings black and yellow or cream, no ferruginous or amber . . . . . 29
29. Markings black and white; apex of clypeal process rounded.  
*aequalis bolingeri* Scullen  
Markings black and creamy yellow; apex of clypeal process truncate. . . 30
30. Pygidium sides subparallel (Central and Northeastern States).  
*astarte* Banks  
Pygidium sides converging to a narrow apex . . *clypeata dakotensis* Banks
31. Bands on terga 2 to 5 broad and not emarginate. *morata* Cresson (in part)  
Bands on terga 2 to 5 not all broad, some narrow or emarginate. . . . . 32
32. Bands on terga 2 to 5 subequal in width; tergum 1 with considerable fulvous.  
*nebrascensis* H. S. Smith  
Band on tergum 2 broader than those on terga 3 to 5 . . . . . 33
33. Markings with considerable amber or shades of brown.  
*morata* Cresson (in part)  
Markings black and yellow, no amber or brown . . . . . 34
34. Band on tergum 2 deeply emarginate (Eastern States, rarely in the Central States) . . . . . *clypeata prominens* Banks  
Band on tergum 2 with little or no emargination . . . . . 35
35. Bands on terga 3 to 5 narrow but unbroken and broad laterally; band on tergum 2 sometimes slightly emarginate (Eastern States, rarely west to the Great Plains) . . . . . *clypeata clypeata* Dahlbom  
Bands on terga 3 to 5 absent or reduced to lateral spots; band on tergum 2 not emarginate (Great Plains, rare in the East) . *clypeata gnarina* Banks
36. Large species, 16 mm. or longer . . . . . 37  
Small species, 12 mm. or less in length . . . . . 42
37. Clypeal process with a single acute apex . . . . . *verticalis* F. Smith  
Clypeal process bicuspidate . . . . . 38







24. Markings silvery white; tegula smooth, not elevated.  
*finitima vierecki* Banks  
 Markings yellow; tegula elevated and pitted . . . . . 25
25. Bands on terga narrow and deeply emarginate; propodeum black, immaculate; occiput black except for small yellow spots back of the compound eyes . . . . . *finitima finitima* Cresson  
 Yellow markings greatly extended; yellow bands on terga wide with little or no emargination; considerable yellow on the propodeum and occiput.  
*finitima citrina* Scullen

GROUP II

1. Enclosure surface deeply ridged at 45° angle to base . . . . . 2  
 Enclosure surface not ridged . . . . . 4
2. Pygidium with sides converging uniformly to a narrow apical point; length 20 mm . . . . . 3  
 Pygidium pyriform with sides concave on the apical half; length 14 to 15 mm.  
*completa* Banks
3. Yellow with very limited amber markings, very little or no black.  
*grandis grandis* Banks  
 Black with yellow markings . . . . . *grandis perena* Scullen
4. Abdomen black with one complete, wide ivory band on second tergum.  
*fumipennis* Say  
 Abdomen largely yellow, light amber, or with light bands on more than one tergum . . . . . 5
5. Posterior half of abdomen (from center of third tergum) brownish yellow; thorax black except for broken band on pronotum and metanotum . . . 6  
 Thorax largely black or amber yellow; yellow bands on all terga or abdomen all yellow . . . . . 7
6. First and second abdominal segments black . . . *dilatata dilatata* Spinola  
 First abdominal segment reddish, second tergum with a limited amber yellow patch and red shading . . . . . *dilatata chisosensis* Scullen
7. Black with yellow markings, little or no amber.  
*californica californica* Cresson  
 Head and thorax light amber marked with yellow; abdomen largely yellow or with some light amber . . . . . *californica arno* Banks

GROUP III

1. Clypeal process broad and lunar or crescent shaped with the free margin subequal to the process in width . . . . . 2  
 Clypeal process narrowing to a margin apically subequal in width to one-half the width of the process . . . . . 7
2. Process with an undivided short but continuous lamella extending over nearly the entire margin of the process . . . . . *mandibularis* Patton  
 Lamella of process divided into two distinct oval lobes . . . . . 3
3. Process equal to approximately two-thirds of the distance between the eyes . . . . . 4  
 Process equal to about seven-eighths of the distance between the eyes . . 6
4. Amber and yellow markings . . . . . *cochisi* Scullen  
 Black and yellow markings . . . . . 5

5. Abdomen almost entirely yellow, occasionally some black on the first tergum; prominent yellow patch on propodeum often C-shaped.  
*sandiegensis* Scullen  
 Most terga deeply emarginate with black; band on tergum 2 broader than others; propodeum with little or no yellow . . . *compacta compacta* Cresson
6. Black with limited yellow markings; wide yellow band on distal half of tergum 2; no red or amber . . . *flavofasciata flavofasciata* H. S. Smith  
 Head and thorax mostly reddish amber; first tergum reddish amber; second tergum reddish amber anteriorly, often with a yellow line posteriorly; terga 4, 5, and 6 dark amber to black . . . *flavofasciata floridensis* Banks
7. Lamella bent at about 45° angle to plane of clypeal process.  
*squamulifera* Mickel  
 Lamella slightly or not at all bent from the plane of the clypeal process . . . 8
8. Lamella undivided to base, border might be slightly emarginate . . . . . 9  
 Lamella divided to base, divisions more or less completely separated . . . 10
9. Black and yellow; no reddish amber . . . . . *robertsonii robertsonii* Fox  
 Prothorax, scutellum, metanotum, basal two or more terga, and legs mostly reddish amber . . . . . *robertsonii emmitosus* Scullen
10. Black and yellow . . . . . *robertsonii bifidus* Scullen  
 Prothorax, scutellum, metanotum, basal two terga, and legs reddish amber with traces of yellow . . . . . *robertsonii miltosus* Scullen

GROUP IV

1. Length 15 to 18 mm.; punctation deep and close.  
*macrosticta* Viereck and Cockerell  
 Length 10 to 12 mm.; punctation fine and more widely separated . . . . . 2
2. Body colors black and yellow with very little or no amber.  
*femurrubrum athene* Banks  
 Body colors amber and cream with very little black or none at all.  
*femurrubrum femurrubrum* Viereck and Cockerell

GROUP V

1. Clypeal elevation low and rounded without a distinct point . . . . . 2  
 Clypeal elevation not low and rounded but sides converging to a distinct apex, which may be blunt, approximately perpendicular to the surface; lower surface of elevation smooth and concave or flat . . . . . 5
2. Color markings dark red . . . . . *rufa* Scullen  
 Color markings yellow or cream . . . . . 3
3. Subequal narrow bands on all terga . . . . . *compar compar* Cresson  
 Band on tergum 2 absent or reduced to small lateral patches on the posterior margin . . . . . 4
4. Usually a single elongate patch and rarely a second smaller yellow spot on the propodeum; band on tergum 3 more or less emarginate on the anterior margin; small yellow spots usually on the lateral posterior angles of tergum 2 . . . . . *compar geniculata* Cameron  
 Markings on propodeum fused, or nearly so, to form a hook-shaped patch; wide complete band on tergum 3; somewhat smaller than the latter subspecies . . . . . *compar orestes* Banks
5. Second tergum with a band equal to or wider than that on other terga.  
*zelica* Banks  
 Second tergum immaculate or with small lateral spots on the posterior margin; bands on other terga subequal . . . . . 6



- 6. Markings all creamy white; band on third tergum, others a narrow line (Southwest desert area, New Mexico) . . . . . *insolita albida* Scullen  
 Markings on body yellow . . . . . 7
- 7. Single yellow patch on the propodeum; band on tergum 3 emarginate; pygidium fuscous; hindfemora variable shades of amber (East Central States) . . . . . *insolita insolita* Cresson  
 A small secondary yellow spot often appearing on the propodeum; band on tergum 3 broad and showing little or no emargination; pygidium ferruginous; hindfemora black with a creamy yellow patch near the apical end (Southwest desert area, Arizona) . . . . . *insolita atrafemori* Scullen

MALES

- 1. Stigma very dark to black. . . . . 2  
 Stigma light amber . . . . . 3
- 2. Length not over 9 mm.; complete bands on one or more terga in addition to tergum 2 . . . . . GROUP I  
 Length 10 to 11 mm.; complete broad band on posterior half of tergum 2; other terga with lateral markings or broken lines only, very rarely solid lines . . . . . *fumipennis* Say (of Group II)
- 3. Width of clypeal hair lobes greater than the distance between them and extending onto the medial clypeal lobe . . . . . 4  
 Width of the clypeal hair lobes no greater than the distance between them and not extending onto the medial clypeal lobe . . . . . 7
- 4. Hair lobes meet medially or nearly so; tergum 2 immaculate; posterior half of tergum 3 and all of terga 4, 5, and 6 fulvous . . . . . *azteca* Saussure  
 Hair lobes distinctly separated medially; bands on terga 4, 5, and 6 not all broad, at least some are narrow or deeply emarginate . . . . . 5
- 5. Medial denticle of the clypeal margin bicuspidate . . . . . GROUP IV  
 Medial denticle of the clypeal margin not bicuspidate . . . . . 6
- 6. Pygidium semioval; lateral clypeal lobe heavily setose . . . . . *tolteca* Saussure  
 Pygidium elongate, approximately twice as long as it is broad; lateral clypeal lobe very lightly setose . . . . . GROUP V
- 7. Medial lobe of clypeus less than half as wide as lateral lobe . . . . . GROUP III  
 Medial lobe of clypeus subequal to or wider than lateral lobe . . . . . 8
- 8. Prominent cluster of bristles at the side of the pygidium . . . . . 9  
 Bristles adjacent to pygidium sparse . . . . . 12
- 9. Bands on all terga narrowly interrupted along midline . . . . . 10  
 Not all bands on terga narrowly interrupted along midline . . . . . 11
- 10. Pygidium broad, width subequal to length; pubescence normal.  
*verticalis* F. Smith  
 Pygidium much longer than broad; pubescence very long on most body parts; pubescence on venter very prominent . . . . . *mimica* Cresson
- 11. Background color largely black . . . . . *bicornuta bicornuta* Guérin  
 Background color largely ferruginous (Southwest desert area).  
*bicornuta fidelis* Viereck and Cockerell
- 12. Basal width of second tergum subequal to one-third the greatest width of the segment . . . . . GROUP II  
 Basal width of second tergum subequal to or greater in width than one-half of the greatest width of the segment . . . . . 13
- 13. More or less ferruginous or amber replacing the darker color, especially along the margins of the dorsal abdominal markings . . . . . 14  
 Black with yellow, cream-colored, or white markings only . . . . . 16

14. Pygidium with sides diverging slightly apically and convex on the apical end . . . . . **morata** Cresson  
(also *vicina* Cresson) <sup>4</sup>  
Pygidium with sides converging slightly and the apical end slightly concave . . . . . 15
15. Bands of yellow on the terga with little or no emargination.  
**frontata frontata** Say  
Bands on the terga deeply emarginate anteriorly. . . **frontata raii** Rohwer
16. Band on tergum 2 distinctly wider than the bands on other terga . . . 17  
Bands on all terga subequal . . . . . 19
17. Small species, approximately 8 mm. in length . . . . . **nitida** Banks  
Medium in length, 10 to 12 mm. . . . . 18
18. Band on tergum 2 deeply emarginate . . . . . **clypeata prominens** Banks  
(probably also *halone* Banks)  
Band on tergum 2 not emarginate or, if so, very little.  
**clypeata clypeata** Dahlbom  
(probably also *clypeata gnarina* Banks, *dakotensis* Banks, *posticata* Banks, <sup>5</sup> *atramontensis* Banks, *rhois* Rohwer <sup>5</sup>)
19. Small species about 9 mm. in length; clypeal denticles reduced to two (Northeastern United States) . . . . . **astarte** Banks  
Medium to large species, 10 mm. or longer; three more or less distinct clypeal denticles . . . . . 20
20. Denticles on the clypeal margin separated by a distance subequal to one-fifth the width of the medial lobe; a distinct transverse ridge just above the denticles (Eastern States) . . . . . **deserta** Say  
Denticles on the clypeal margin in approximate conjunction; no transverse ridge on the surface of the medial lobe . . . . . 21
21. Markings yellow . . . . . 22  
Markings white to cream . . . . . 26
22. Lateral clypeal denticle prominent; the medial clypeal denticle greatly reduced or absent . . . . . 23  
Three clypeal denticles subequal . . . . . 24
23. Medial clypeal lobe with a distinct transverse swelling about the level of the anterior tentorial pits (Central States south to Texas).  
**occipitomaculata** Packard  
Medial clypeal lobe without a distinct transverse swelling but generally convex . . . . . **nigrescens arelate** Banks
24. Length about 10 mm.; denticles on the clypeal border very indistinct (California and adjoining states) . . . . . **nigrescens munda** Mickel  
(probably also *aequalis aequalis* Provancher, *varians* Mickel, *dentifrons* Cresson)  
Length about 13 mm.; denticles on clypeal border more distinct . . . . . 25
25. Seventh tergum with yellow to the sides of the pygidium (West Coast States) . . . . . **tepaneca** Saussure  
Seventh tergum immaculate (Central Plains States) . . . . . **sexta** Say  
(also *posticata* Banks, *rhois* Rohwer)

<sup>4</sup> The males of *morata* Cresson and *vicina* Cresson so far are inseparable except by association with the females.

<sup>5</sup> The type of *posticata* Banks runs to couplet 18b. It is a unique that may be *sexta* Say with an abnormally wide band on tergum 2. The type of *rhois* Rohwer, which also runs to this couplet, could be the male of *clypeata gnarina* Banks, but the type locality is out of the known range of that species.

- 26. Length 14 to 15 mm. (North Central States) . . . . . *stigmatosalis* Banks  
 Length 9 to 10 mm. . . . . 27
- 27. Propodeum immaculate (Northern States from coast to coast).  
*nigrescens nigrescens* F. Smith  
 Propodeum with large white patches . . . . . 28
- 28. Enclosure smooth (eastern slope of the Rocky Mountains).  
*calochorti* Rohwer  
 Enclosure more or less coarsely ridged (southern California).  
*macswaini* Scullen

GROUP I

- 1. Showing shades of ferruginous or red on the first abdominal tergum and bordering areas . . . . . 2  
 Colors black with yellow, white, or cream markings only, no ferruginous or red markings . . . . . 6
- 2. Markings creamy white or white . . . . . 3  
 Markings yellow . . . . . 5
- 3. Terga 2, 3, and 4 with broad bands of creamy white, in some specimens the fourth showing slight emargination; punctation sparse (known only from southern California and southern Arizona) . . . *bridwelli* Scullen  
 Wide bands on terga 2 and 3 only, or all bands subequal and of medium width; punctation crowded or average . . . . . 4
- 4. Bands on terga 2 and 3 broad medially but narrowing laterally, bands on 4 and 5 narrow; punctation medium (known only from southwestern Arizona and southern Texas) . . . . . *crotonella* Viereck and Cockerell  
 Bands on terga 2 to 6 subequal and of medium width; punctation crowded (general over western arid sections but more common in the Southwest).  
*conifrons* Mickel
- 5. Band on tergum 2 with a deep V-shaped emargination, bands on terga 3 to 6 broad but deeply emarginate and often completely divided (extreme Southeastern States) . . . . . *blakei* Cresson  
 Band on tergum 2 broad and with little or no emargination, bands on terga 3 to 6 of medium width with broad and moderately deep emarginations (recorded from most states except the New England States, the Great Lake Area and the extreme Southeast) . . . *rufinoda rufinoda* Cresson  
 (also *echo echo* Mickel;<sup>6</sup> *argia* Mickel and *irene* Banks, when recognized, probably will run to this couplet also)
- 6. Markings on the abdomen creamy . . . . . 7  
 Markings on the abdomen yellow . . . . . 12
- 7. Propodeum with medium patches of creamy white; usually two small spots near the apex of the enclosure; first tergum cream except for a black patch at the base (southern Arizona, New Mexico, and Texas).  
*truncata* Cameron  
 Propodeum and enclosure immaculate; tergum 1 either immaculate or with only a small cream patch on the dorsum . . . . . 8

---

<sup>6</sup> The males of *rufinoda rufinoda* Cresson and *echo echo* Mickel so far are indistinguishable except as they are associated with the females. Some specimens of males taken at the same time and place as some females of *echo echo* Mickel are more cream than the males usually accepted as the males of *rufinoda rufinoda* Cresson. These forms with lighter markings may prove to be the males of *echo echo* Mickel.

- 8. Band on tergum 3 missing, a broken line, or divided into three sections; spot on first tergum very small or absent; lateral lobes of the clypeus black . . . 9
- Band on tergum 3 unbroken but emarginate . . . . . 10
- 9. Band on tergum 3 divided at two points to form three parts subequal in length (in some specimens these divisions are represented by indentations only); entire face black except for two large frontal eye patches; medial denticle on the clypeal margin more prominent than the others (west of the Rocky Mountains from British Columbia to Texas).  
  - convergens** Viereck and Cockerell (in part)
  - Band on tergum 3 usually a broken or evanescent line; lateral lobes and lower margin of the medial lobe of the clypeus black; frontal area black with a small evanescent spot of cream (Southwestern States).  
    - kennicottii beali** Scullen
- 10. Tergum 1 immaculate; apex of median lobe and lateral lobes of clypeus black; face otherwise creamy yellow . . . . . **cleome** Rohwer
- Tergum 1 with a distinct patch . . . . . 11
- 11. Clypeal denticles clearly defined; tegulae showing a tendency to be elevated and inflated; light apical end of the third femora demarked somewhat obliquely (Southwestern States) . . . . . **finitima vierecki** Banks
- Clypeal denticles less elevated and distinct; tegulae not elevated or inflated; light apical end of the third femora demarked nearly at right angle to the femur . . . . . 12
- 12. Scutellum immaculate; pygidium nearly as broad as it is long.  
  - crandelli** Scullen
  - Scutellum with two cream patches; pygidium about one and one-half as long as it is broad . . . . . **acanthophila** Cockerell  
    - (also *carrizoensis* Banks, *cockerelli* Viereck)
- 13. Tegulae elevated . . . . . 14
- Tegulae not elevated . . . . . 16
- 14. Tegulae smooth; enclosure smooth except for a medial groove and a limited number of deep pits along the lateral margins (southern Arizona).  
  - krombeini** Scullen
  - Tegulae pitted; enclosure heavily regose or ridged subparallel to the anterior border . . . . . 15
- 15. Band on tergum 3 deeply emarginate; no yellow marks on the genae or occiput (more common in the Eastern States but ranges into California).  
  - finitima finitima** Cresson <sup>7</sup>
  - Broad band on terga 2, 3, and often 4 with little or no emargination; commonly large yellow patches back of the eyes and a broken band on the occiput (southern and central California) . . . **finitima citrina** Scullen
- 16. Band on tergum 3 divided at two points to form three parts subequal in length (in some specimens these divisions are represented by indentations only); entire face black except for two large frontal eye patches; medial denticle on the clypeal margin more prominent than the others (west of the Rocky Mountains from British Columbia to Texas).  
  - convergens** Viereck and Cockerell (in part)
  - Band on tergum 3 reduced to a broken evanescent line or completely eliminated medially; lateral lobes of the clypeus black; apical border of the medial lobe of the clypeus black; frons black (recorded from most of the Eastern States and Southwest) . . . **kennicottii kennicottii** Cresson

---

<sup>7</sup> *C. arizonella* Banks appears to be a form between *C. f. finitima* Cresson and *C. f. citrina* Scullen.



## GROUP II

1. Tergum 2 black or with more or less ferruginous . . . . . 2  
Tergum 2 all yellow or with a broad yellow band . . . . . 3
2. Terga 1 and 2 black, basal half of tergum 3 black; posterior half of tergum 3 and remaining posterior terga brownish yellow (Arizona, New Mexico, and southern Texas) . . . . . **dilatata dilatata** Spinola  
Black of basal abdominal segments more or less replaced with red (Big Bend National Park and Davis Mts. in Texas, southern New Mexico, and southern Arizona) . . . . . **dilatata chisosensis** Scullen
3. All terga of the abdomen yellow or very light fulvous except for a trace of emargination at the base . . . . . 4  
Bands on terga 3 to 6 deeply emarginate anteriorly in middle . . . . . 6
4. Thorax black to dark fuscous background; first abdominal segment may show more or less red . . . . . **californica californica** Cresson (in part)  
Thoracic background fulvous . . . . . 5
5. About 10 mm. in length; enclosure lightly ridged (southern California and adjoining areas) . . . . . **californica arno** Banks  
About 14 mm. in length; enclosure relatively smooth but with a few pits in the lateral angles (southern California and adjoining areas).  
**grandis grandis** Banks
6. Length about 10 mm.; legs amber and yellow (this species shows great variation in amounts and shades of yellow and red throughout its range west of the Rocky Mountains from British Columbia to Texas).  
**californica californica** Cresson (in part)  
Length about 12 to 15 mm.; legs black and yellow; emarginations on terga usually narrow but deep, that on tergum 2 with a tendency to be enclosed by yellow (California and southwestern Oregon) . . . **completa** Banks

## GROUP III

1. Broad bands with little or no emargination on terga 3 to 6 . . . . . 2  
Bands on terga 3 to 6 either greatly reduced or with deep emarginations . . 3
2. Background black or dark fuscous (southern California).  
**sandiegensis** Scullen  
Background ferruginous (southern Arizona and adjoining areas).  
**cochisi** Scullen
3. Black with yellow and/or fulvous markings, no red or ferruginous . . . . 5  
Black with red and/or ferruginous markings (Florida and adjoining areas) . 4
4. Marginal extension of the clypeus about as wide as half the length of the epistomal suture; mandibular denticles strong; enclosure smooth.  
**flavofasciata floridensis** Banks  
Marginal extension of the clypeus about equal in width to the length of the epistomal suture; mandibular denticles small; enclosure ridged.  
**rufopicta** F. Smith<sup>8</sup>
5. Lower part of the clypeus showing considerable black and the yellow area of the medial lobe tapering apically to an acute point; metanotum yellow (common through the Eastern States from southern Minnesota, southern Wisconsin, southern Michigan, and New England south to the Gulf of Mexico and west to Utah and the Southwest) . . **compacta compacta** Cresson

<sup>8</sup> Field observations may prove *C. rufopicta* F. Smith to be the male of *C. robertsonii emmitosus* Scullen or *C. robertsonii mitlosus* Scullen.

- Face yellow with little or no black margin on the clypeus; yellow of face does not end apically in an acute point; metanotum immaculate or with very little yellow . . . . . 6
6. Bands on terga 3 to 6 reduced to an evanescent line or to small lateral patches (scattering through the East from Kansas and Nebraska to the Atlantic States). . . . . **flavofasciata flavofasciata** H. S. Smith
- Bands on terga solid but relatively narrow lines (distribution similar to the latter species) . . . . . **robertsonii robertsonii** Fox  
(probably *robertsonii bifidus* Scullen, *mandibularis* Patton)

## GROUP IV

1. Length about 15 mm.; markings dark fuscous, ferruginous, and yellow.  
**macrosticta** Vireek and Cockerell
- Length about 11 mm.; markings black and creamy white.  
**femurrubrum** Viereck and Cockerell

## GROUP V

1. Markings black with rufous (Florida) . . . . . **rufa** Scullen  
Markings black and yellow or creamy white . . . . . 2
2. Tergum 2 immaculate or with small lateral spots only . . . . . 3  
Tergum 2 with a solid but narrow band (general over Eastern States from Nebraska, Kansas, and Texas to the Atlantic Coast).  
**compar compar** Cresson
3. Without a mesosternal process or ridge (southern Arizona).  
**compar orestes** Banks  
(Probably *zelica* Banks)
- With a mesosternal process or ridge (sometimes very slight) . . . . . 4
4. Mesosternal process broad and considerably extended; markings yellow (only one recorded from southern Arizona). **compar geniculata** Cameron  
Mesosternal process reduced to a slight ridge . . . . . 5
5. Markings yellow (Eastern States from the Missouri River and Texas to the Atlantic States) . . . . . **insolita insolita** Cresson  
Markings creamy white (southern Arizona, New Mexico, and southwestern Texas) . . . . . **insolita albida** Scullen

(Additional male belonging to Group V but not yet known:

*insolita atrafemori* Scullen)

## Group I

This group<sup>9</sup> is distinguished by the following characters: (1) small size, (2) very dark stigma, (3) punctation usually very crowded, (4) anterior abdominal segments and propodeum often more or less reddish, (5) mandibles of female with two denticles, (6) mesosternal tubercle on the female, (7) small and widely separated hair lobes on the male, (8) apical segment of the antennae normal in the male.

<sup>9</sup> This group is the one Banks (1947, p. 26) calls *Apiraptrix* (Shestakov). Banks misspelled this "*Apiratrix*." In a personal letter, de Beaumont informs the present writer that this group is not *Apiraptrix* (Shestakov). The latter is related to *C. rybyensis* (Linnaeus) Schletterer.

1. *Cerceris acanthophila* Cockerell

FIGURES 1, 108a,b,c

*Cerceris acanthophila* Cockerell, 1897, p. 135.—Ashmead, 1899, p. 296.—Viereck and Cockerell, 1904, p. 138.—Viereck, 1906b, p. 234.—Banks, 1947, p. 30.—Scullen, 1951, p. 1004; 1960, p. 75.

*Cerceris minax* Mickel, 1917a, p. 339.—Banks, 1947, p. 34.—Scullen, 1951, p. 1009.

*Cerceris huachuca* Banks, 1947, p. 29.—Scullen, 1951, p. 1008.

**FEMALE.**—Length 8 to 9 mm. Black with yellow to creamy-white markings, normally pitted, clothed with short silvery hairs.

Head slightly wider than the thorax; front creamy white below antennae except apical borders, which are dark; vertex, occiput, and genae black except for small spots back of compound eyes, which are creamy white; clypeal border slightly sinuate; clypeal elevation close to the anterior border, very short and subequal in width to the extension of the clypeal border, slightly emarginate; mandibles with two separated, centrally located subequal denticles; yellow at the base becoming dark amber apically; antennae normal in form, creamy-white patch on the scape, pedicel dark amber, flagellum light amber below, dark amber above.

Thorax black except for two elongate patches on the pronotum, the metanotum, and the tegulae, which are creamy white; propodeum immaculate, heavily and closely pitted except for the enclosure, which is moderately rugose; mesosternal tubercle small and black; legs black except for apical ends of femora, fore- and midtibiae, fore- and midtarsi, basal two-thirds of the hindtibiae, and basal third of the hindtarsi, which are light yellow; wings subhyaline, stigma medium dark (lighter than is usual in the group).

Abdomen: terga 1 to 5 black with creamy-white bands deeply emarginate on 2 to 5; venter black except lateral yellow spots on sternites 3 and 4 (immaculate in some specimens); pygidium pyriform, widest near the base, narrowed apically with a cluster of small bristles on each side inserted on the apical sternite.

**MALE.**—Length 7 mm. Black with creamy-white markings; punctuation and pubescence average.

Head slightly wider than the thorax; black except for the entire face, basal part of mandibles, and the scape, all of which are creamy white; peduncle and flagellum ferruginous above and light fulvous below; three clypeal border denticles distinct but not prominent; hair lobes narrow; mandibles smooth with a slight medial elevation.

Thorax black except for a divided band on the pronotum, the scutellum, the metanotum, a small spot on the pleuron, and a patch on the tegulae, all of which are creamy white; mesosternal tubercle

absent; legs black basally to the apical ends of all femora; fore- and midlegs are creamy white apically except the tarsi, which become light fulvous; the hindlegs are creamy white on the apical end of the femora and basal half of the tibiae, beyond which they are largely black; wings subhyaline but slightly clouded apically.

Abdomen black except for a small patch on tergum 1, broad band on tergum 2, narrower and emarginate bands on terga 3, 4, and 5 and a small spot on tergum 6, all of which are creamy white; venter immaculate; pygidium with sides slightly convex, ends subequal in width and broadly rounded.

Many of the specimens show the markings more yellow than white. The lighter forms are more common in the Pacific Northwest and in the southwestern desert area. It is possible subspecies should be recognized. The extent of the light markings varies. In some specimens spots appear below the wing attachments and on the mesosternal tubercles.

The clypeal process easily distinguishes the female of *acanthophila* Cockerell from closely related species such as *finitima* Cresson.

TYPES.—A male of *C. acanthophila* Cockerell is in the Philadelphia Academy of Natural History, ANSP type no. 10038, from Deming, N. Mex. This is considered the lectotype designated by Cresson in 1928. Another male, apparently from the same series, is in the National Museum, Washington, D.C., type no. 3409. A second specimen with a blue ANSP paratype label 10038 is also in the Philadelphia Academy of Natural History.

The holotype female and allotype male of *C. minax* Mickel from Sacramento, Calif., are at the University of Nebraska. Three paratype females from Auburn, Calif., are also at the University of Nebraska.

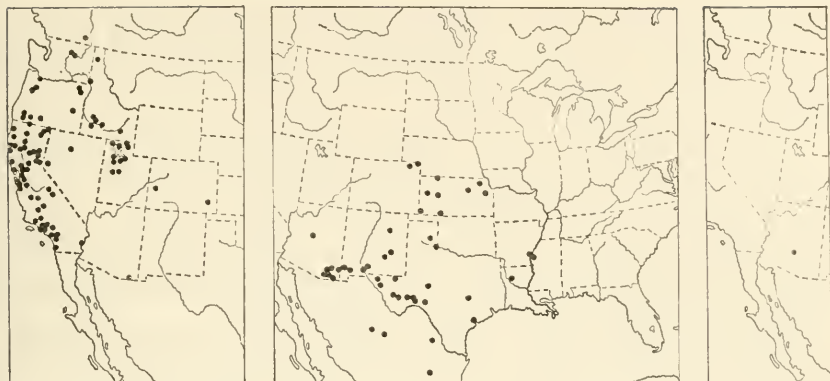
The holotype male of *C. huachuca* Banks from Patagonia, Ariz., is in the Museum of Comparative Zoology, Harvard University, type no. 27636.

DISTRIBUTION.—West of the Continental Divide from British Columbia into Mexico.

PREY RECORD.—None.

PLANT RECORD.—*Achillea* (Idaho, Oregon), *Achillea millefolium* (Oregon), *Asclepias mexicana* (Oregon), *Boerhaavia erecta* (New Mexico), *Daucus carota* (California, Idaho, Oregon), *Eriogonum* (California, Idaho, Oregon), *Eriogonum fasciculatum* var. *polifolium* (California), *Foeniculum vulgare* (California), *Harmizonia fasciculatum* (California), *Helianthus* (Idaho), *Melilotus* (California), *Melilotus alba* (Oregon), *Pastinaca sativa* (Utah), *Rhamnus* (California), *Salsola kali tenuifolia* (Utah), *Solidago* (New Mexico, Oregon), *Tamerix* (Utah), *Zizyphus lycioides* (New Mexico).





FIGURES 1-3.—Localities of: 1, *C. acanthophila* Cockerell; 2, *C. argia* Mickel (females only); 3, *C. arizonella* Banks.

## 2. *Cerckeris argia* Mickel

FIGURES 2, 109a,b,c

*Cerckeris argia* Mickel, 1916, p. 412; 1917b, p. 453.—Scullen, 1951, p. 1005.

**FEMALE.**—Length 9 to 10 mm. Black with yellow markings except the propodeum and the basal end of the abdomen, which are reddish amber; more closely and finely pitted than most species; clothed with short silvery hairs.

Head about one-sixth wider than the thorax, normally pitted, clothed with very short silvery hairs; front yellow below the antennae except for the anterior third of the clypeus, which is amber; occiput immaculate, black in the type (many specimens show two converging, elongate yellow patches); genae black with a yellow spot back of each compound eye; clypeal border irregularly sinuate; clypeal process low with a single rounded end pointing ventrad, yellow with the free border amber; mandibles with two separated, centrally located subequal denticles, yellow at the base, amber apically; antennae normal in form, yellow area on scape, peduncle amber, flagellum light amber below, dark amber above.

Thorax closely pitted except on the scutellum, the metanotum, and the enclosure, clothed with short silvery hairs, black except for two elongate patches on the pronotum, two oval patches on the scutellum, the metanotum, a patch on the pleura, and the tegulae, all of which are light yellow; tegulae elevated and lightly pitted; the propodeum is reddish amber except for the enclosure, which is black; enclosure is smooth except for a mesal groove and lateral ridges, which are set at about a 45° angle to the mesal groove; mesosternal tubercles small and black; legs largely light amber except for yellow

areas on apical ends of the forefemora, the entire foretibiae, foretarsi, apical ends of the midfemora, basal ends of midtibiae, and traces of yellow on apical segments of the hindlegs; wings subhyaline, stigma lighter than normal for the group.

Abdomen finely and closely pitted; first tergum and anterior half of the second tergum reddish amber; broad yellow bands on terga 2 to 5 deeply emarginate; anterior halves of terga 3 to 5 black; sternum light amber, becoming darker apically; pygidium broad at the base, gradually narrowing apically to a rounded end; small clusters of bristles on each side inserted on the apical sternite.

MALE.—Length 8 mm. Black with light yellow and dark ferruginous markings; punctation crowded; pubescence very short.

Head subequal in width to the thorax; black except for the large frontal eye patches, most of the medial lobe of the clypeus, and the frons, all of which are light yellow; lateral lobes of the clypeus and the free border of the medial lobe of the clypeus are black; medial clypeal lobe with a small medial denticle and two less distinct lateral denticles; hair lobes extending onto the medial lobe; mandibles without denticles; antennae normal in form with a small yellow patch on the scape, the peduncle dark and the flagellum fulvous below becoming darker above.

Thorax black except for a divided band on the pronotum, most of the tegulae, and a small spot on the pleuron below the wing, all of which are light yellow; tegulae slightly elevated and with scattered pits; enclosure deeply and coarsely pitted; mesosternal tubercles absent; legs black except the apical ends of all femora and the more apical segments, which are yellow infused with darker areas; the third trochanter and the adjoining end of the femur dark ferruginous; wings subhyaline, somewhat clouded at the apex and the stigma dark.

Abdomen black except the first segment and the anterior margin of the second sternite, which are dark ferruginous, and a broad convex band on tergum 2, narrower emarginate bands on terga 3, 4, and 5, and a small patch on tergum 6, all of which are light yellow; venter all black except sternite 1 and the anterior border of sternite 2, which are dark ferruginous; pygidium deeply pitted, strongly convex laterally, proximal end rounded and distal end truncate.

A study of many specimens from the same area shows the elongate yellow spots on the vertex are common and vary in size. The tegulae may also vary in elevation and smoothness. The female of *C. argia* Mickel resembles others of the *rufinoda* group but is distinguished easily by the clypeal process.

TYPE.—The type female of *C. argia* Mickel is at the University of Nebraska.

DISTRIBUTION.—From Kansas and eastern Colorado southwest through Texas, Louisiana, New Mexico, and Arizona into Mexico.

PREY RECORD.—None.

PLANT RECORD.—*Euphorbia marginata* (Texas), *Lepidium* (Arizona), *Solidago* sp. (Nebraska).

### 3. *Cerceris arizonella* Banks

#### FIGURE 3

*Cerceris arizonella* Banks, 1947, pp. 32-33.—Scullen, 1951, p. 1005.

MALE.—Length 4 mm. Black with yellow markings except for the face, which is cream colored. Band on tergum 2 somewhat wider than the others.

This species is known only from the type, which is close to *finitima* Cresson. It may prove to be an abnormally small specimen of that species. Until more positive characters for separating males are found, the author will let it remain a valid species.

TYPE.—The type male, from Tempe, Ariz., is at the Museum of Comparative Zoology, no. 23538.

PREY RECORD.—None.

PLANT RECORD.—None.

### 4. *Cerceris blakei* Cresson

#### FIGURES 4, 110a,b,c

*Cerceris blakei* Cresson, 1865, p. 121.—Packard, 1866, p. 61.—Cresson, 1887, p. 282.—Dalla Torre, 1897, p. 454.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Banks, 1912a, p. 26.—Scullen, 1951, p. 1005.—Krombein, 1952c, p. 336; 1954b, p. 235; 1955, p. 234.—Scullen, 1961, p. 45.<sup>10</sup>

*Cerceris elegans* F. Smith, 1856, p. 467.—Cresson, 1865, p. 131.—Packard, 1866, p. 64.—Cresson, 1887, p. 282.—Dalla Torre, 1890, p. 200.—Ashmead, 1899, p. 295.

*Cerceris blackii* [sic] Schletterer, 1887, p. 487.

FEMALE.—Length 9 to 10 mm. Black with reddish-amber markings, the amber markings becoming yellow centrally in certain areas; deeply and closely pitted; clothed with very short silvery hairs.

Head about one-third wider than the thorax, black except sides of face, front, dorsal surface of the clypeal process, and small spots back of the compound eyes, all of which are yellow, and the clypeus below the process, which is amber; clypeal border sinuate, depressed medially; clypeal process scoop shaped with lateral sides subparallel and apical border smooth and uniformly curved; mandibles with two

<sup>10</sup> *Cerceris elegantissima* Schletterer, 1887, was a new name proposed for *Eucerceris elegans* Cresson and not for *C. elegans* F. Smith as stated by Scullen (1961, p. 45).

separated, centrally located denticles, the apical one much the larger; antennae normal in form, amber except the scape, which is yellow.

Thorax black except two patches on the pronotum, two small spots on the propodeum, two small spots on the scutellum, and the tegulae, all of which are yellow, and the metanotum, which is yellow to amber; tegulae elevated and lightly pitted; enclosure smooth except for a longitudinal groove and pitted lateral borders; mesosternal tubercle small and black; legs yellow except for basal portions of femora, coxae, and trochanters, which are amber; wings uniformly clouded except for the stigma, which is dark amber.

Abdomen: tergum 1 light amber; tergum 2 yellow, deeply emarginate with light amber; terga 3, 4, and 5 with anterior emarginations amber and deep, dividing, or almost dividing, the yellow into lateral triangular areas; venter light amber basally becoming dark apically; pygidium oval with the apical end truncate and the basal end rounded.

The extent of the yellow markings varies. Yellow spots on the head and thorax may disappear completely in some specimens. Yellow and amber areas on the abdomen show much variation in their width and emargination.

MALE.—Length 8 mm. General coloration, punctation, and pubescence similar to the female.

Head about one-third wider than the thorax; face yellow at the sides and below the antennae, remainder of head black; three amber denticles on the clypeal border, the medial one more broad and rounded than the lateral ones.

Thorax black except for two patches on the pronotum, two spots on the scutellum, narrow band on the metanotum, and the tegulae, all of which are yellow; tegulae elevated and lightly pitted; enclosure deeply pitted to rugose; mesosternal tubercle absent; legs yellow except for basal two-thirds of femora, trochanters, and coxae, which are amber to black; antennae normal; wings uniformly clouded except for the stigma, which is dark amber.

Abdomen: tergum 1 black with a broad divided amber band; terga 2 to 6 light amber to yellow, deeply emarginate anteriorly with black; venter dark amber, immaculate; pygidium slightly oval, truncate apically, rounded basally.

The males are most apt to be confused with the males of *finitima finitima* Cresson and *kennicottii kennicottii* Cresson. *C. finitima finitima* Cresson lacks the amber shading. *C. kennicottii kennicottii* Cresson has the tegulae unelevated, smooth, and is black and yellow, without amber.

TYPE.—The type female, from southwest Georgia (Charles A. Blake), is at the Philadelphia Academy of Natural Sciences, no. 1947.

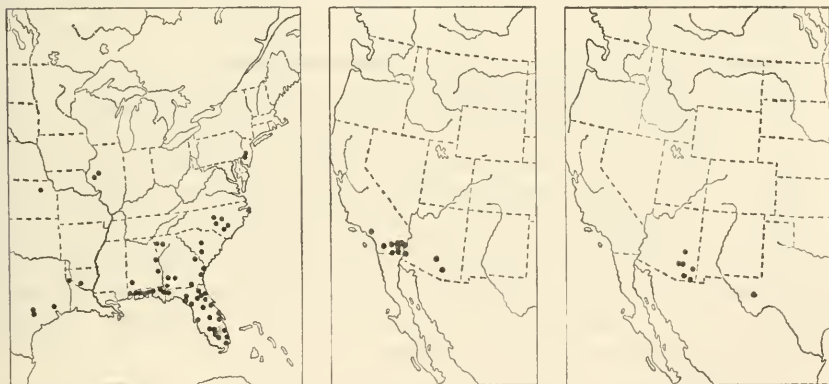


DISTRIBUTION.—Mostly in the Southeastern States from eastern Texas to North Carolina and isolated records as follows:

ILLINOIS: Havans, Aug. 30, 1917; Meredosia, Aug. 22, 1898 (F.M.McE.) Aug. 1899. KANSAS: Riley Co., July 17 (Popenoe). NEW JERSEY: Camden Co. (Wm. J. Fox); Pemberton, Sept. 1, 1907.

PREY RECORDS.—*Derelomus basalis* LeConte, *Limnobaris confusa* Bochehan, *Anthonomus sexguttatus* Dietz and *Hyperodes* sp. (all weevils). *C. blakei* Cresson seems to prefer the first species. Less commonly taken were the chrysomelid *Graphops floridana* Blake and the tenebrionid *Blakstinus interruptis* (Say). All records are by Krombein (1963) from Florida.

PLANT RECORDS.—*Aldenella tenuifolia* (Florida, for nectar?), *Asclepias* (North Carolina), *Bidens bipinnata* (North Carolina), *Borieria* (Florida), *Cyanotis* (Alabama), *Erigeron quercifolius* (Florida), *Eriogonum tomentosum* (Florida), *Koellia* (North Carolina), lemon balm (Florida), *Pinus serotina* (North Carolina), *Polygonum hydropiperoides* (Florida), *Quercus virginiana* (North Carolina), *Sabal eltonia* (Florida, for prey), *Satureia hortensis* (Louisiana).



FIGURES 4-6.—Localities of: 4, *C. blakei* Cresson; 5, *C. bridwelli* Scullen; 6, *C. butleri* Scullen.

##### 5. *Cerceris bridwelli*, new species

FIGURES 5, 111a,b,c

FEMALE.—Length 8 mm. Black with creamy-yellow and amber markings; normally pitted, clothed with short silvery hairs.

Head about 50% wider than the thorax; black except sides of face, compressed strip between the antennae, the clypeus, two round spots behind the compound eyes, proximal half of the mandibles, and the scape of the antennae, all of which are creamy yellow; clypeal border extended and sinuate; clypeal process prominent, rounded, and

deeply depressed on the anterior side with the free border curved and ending on each side as a dark amber apex; mandibles with two separated denticles, the apical one very much the larger; antennae normal in form, amber except the scape, which is creamy yellow.

Thorax black except band on the pronotum, scutellum, metanotum, the tegulae, and two patches on the pleura, which are creamy yellow; tegulae smooth and not elevated; propodeum largely amber with a yellow patch on each side; enclosure black, lightly ridged at a 45° angle to the medial row of deep pits; mesosternal tubercle prominent and marked with creamy yellow; legs amber basally, changing to creamy yellow midway on the femora; wings subhyaline except the stigma, which is dark amber.

Abdomen more sparsely but deeply pitted than the head and thorax; tergum 1 light amber with a partly divided yellow patch; terga 2 to 5 creamy yellow with a dark amber emargination on the anterior sides; pygidium oval with both ends rounded but narrowing apically; venter amber except two small spots on sternite 2 and narrow bands on sternites 3 and 4, which are creamy yellow.

MALE.—Length 7 mm. Black with creamy-white markings and limited ferruginous on the first two abdominal segments; punctation more widely spaced than average; pubescence short.

Head black except for the face, minute spot back of the eye, base of the mandibles, and most of the scape, all of which are creamy white; clypeal border with three denticles on the medial lobe, the medial denticle more prominent than the lateral ones; surface of the medial lobe convex; hair lobes extend to the margin of the medial lobe of the clypeus; mandibles with slight evidence of a low, broad elevation but no distinct denticle; antennae with the apical segment slightly curved and slightly flattened on the apical end, fulvous beyond the peduncle, which is darker.

Thorax black except for a divided band on the pronotum, two patches on the scutellum, the metanotum, a prominent patch on the pleuron, and the tegulae, all of which are creamy white; tegulae low and smooth; enclosure with a deeply pitted medial groove and deeply pitted lateral margins; mesosternal tubercles absent; legs dark fuscous over the basal parts and largely creamy white over the apical ends of the femora and the more apical segments; the trochanter of the midleg shows a tendency to be lighter than the adjoining leg segments; wings subhyaline, stigma very dark.

Abdomen black except the entire first segment is ferruginous and terga 2, 3, and 4 have broad bands, tergum 5 has a narrow band and tergum 6 a narrow broken line, all of which are creamy white; venter with lateral creamy-white patches on sternites 2, 3, and 4 (that on 2

very much smaller); pygidium with sides convex and the apical end slightly smaller than the basal end.

The male of *bridwelli* Scullen is very close to the male of *crotonella* Viereck and Cockerell in size, surface sculpturing, and color pattern except there are three broad bands on the terga of the former and two broad bands on the terga of the latter; however, the band on tergum 3 of the former occasionally shows a slight emargination or medial evanescent black spot.

Yellow areas on both sexes show some variation in extent and smaller spots may disappear in some specimens; band on tergum 4 may be more or less emarginate.

**TYPES.**—Type female and allotype male, from Imperial Co., Calif., June 1911 (J. C. Bridwell), are at the U.S. National Museum, no. 66154. Paratypes are as follows:

**ARIZONA:** 2 ♀ ♀, 25 mi. W. Blythe, June 1937 (J. C. Elmore); 2 ♂ ♂, 11 mi. SW. Eloy, Pinal Co., June 19, 1953 (T. R. Haig); ♀, 3 ♂ ♂, 10 mi. S. Toltec, Pinal Co., June 15, 21, 1953 (T. R. Haig); ♀, Tucson, Apr. 25, 1940 (R. H. Crandall); ♀, Yuma, May 4, 1918 (J. C. Bradley); ♀, Yuma, May 6, 1939 (M. R. Bohart). **CALIFORNIA:** ♀, Blythe, Riverside Co., May 8, 1947 (J. W. MacSwain, F. G. Linsley); ♀, Borego, San Diego Co., Apr. 5, 1940 (R. M. Bohart); 5 ♀ ♀, 11 ♂ ♂, Borego, San Diego Co., Apr. 25, 26, 27, 30, 1954, *Croton californicus*, *Eriogonum inflatum* (M. Wasbauer); ♂, Borego, San Diego Co., May 2, 1952 (P. D. Hurd); 4 ♀ ♀, 5 ♂ ♂, Borego Valley, San Diego Co., May 26, 1954 (F. X. Williams); ♂, Calexico, Aug. (Bequaert); ♀, Colorado Desert, May 12, 1935 (G. E. Bohart); ♀, ♂, Desert Center, May 22, 1939 (E. P. Van Dyke); ♀, Dos Palms, Riverside Co., Apr. 3, 1934 (G. E. Bohart); 44 ♀ ♀, 57 ♂ ♂, Imperial Co., Experiment Farm, April, May, and June 1911, May and June 1912, *Baccharis glutinosa* (J. C. Bridwell); 7 ♀ ♀, 35 ♂ ♂, 4 mi. E. Mecca, Riverside Co., July 16, 21, Aug. 15, 1956, *Croton californicus* (M. Wasbauer); ♀, San Felipe Creek, San Diego Co., July 8, 1933 (G. E. Bohart); ♀, ♂, Westmorland, May 1932 (G. E. Bohart). **MEXICO:** Baja California: ♀, Los Animas Gulf, May 8, 1921 (E. P. Van Duzee).

**DISTRIBUTION.**—Southern Arizona and southern California.

**PREY RECORD.**—None.

**PLANT RECORD.**—As listed under paratypes.

### 6. *Cerceris butleri*, new species

FIGURES 6, 112a,b,c

**FEMALE.**—Length 7 mm. Black with creamy-white markings; normally pitted; clothed with very short silvery hairs.

Head slightly wider than the thorax, black except for the frontal eye patches, which are creamy white; clypeal border with a medial denticle and two lateral denticles appearing just below and laterad of the clypeal process; clypeal process very short and low with a tendency to be emarginate on some specimens, subequal in width to

the space between the antennae; mandibles with centrally located elevations barely evident; antennae normal in form, dark amber basally, becoming lighter on the flagellum.

Thorax black except for two patches on the pronotum, two small patches on the scutellum, the metanotum, patches on the tegulae, a small patch on the pleuron, all of which are creamy white; enclosure deeply and sparsely rugose; mesosternal tubercle small and black; legs black except for apical parts of fore- and midfemora and patches on all tibiae, which are creamy white to amber; wings are subhyaline, becoming cloudy at the apex.

Abdomen: tergum 1 with a broad triangular patch; tergum 2 with a broad band curving away from the posterior border of the tergum on each side of the center, giving the band a sinuate effect; terga 3 and 4 with narrower emarginate bands; tergum 5 with an elongate patch; venter black, immaculate; pygidium oval but somewhat broader basally.

MALE.—Unknown. Possibly it is being confused with the male of *C. acanthophila* Cockerell, *C. convergens* Viereck and Cockerell, or a closely related species.

Very similar in general appearance to *C. acanthophila* Cockerell, *C. convergens* Viereck and Cockerell, *C. neahminax* Scullen, and other closely related species. The female of *C. butleri* Scullen may be recognized by the distinct clypeal process, the sinuate band on the second abdominal tergum, and the form of the pygidium as well as other characters listed in the description.

TYPES.—Type female, taken 30 miles south of Safford, Ariz., Sept. 24, 1956, on a yellow composite (G. D. Butler), is at the U.S. National Museum, no. 66155. Paratypes are as follows:

ARIZONA: ♀, Canelo, July 30, 1956 (G. D. Butler); ♀, 6 mi. E. Douglas, Cochise Co., Sept. 8, 1958, at *Heplopappus hartwegi* (P. D. Hurd); ♀, Graham Mts., 3500–4500 ft., Aug. 18, 1954 (R. M. Bohart); ♀, Portal, July 23–31, 1959 (K. V. Krombein); ♀, Portal, Chiricahua Mts., Aug. 3, 1956 (R. M. Bohart); 3 ♀ ♀, 2 mi. NE. Portal, July 30, Aug. 1, 3, 1959 (M. Statham); ♀, 4 mi. SE. Portal, July 28 1959 (M. Statham); ♀, Rosemont, Pima Co., Oct. 9, 1954, at *Baccharis* sp. (F. G. Werner); ♀, San Carlos, Sept. 6, 1933 (Parker); ♀, Tanque Verde, Sept. 12, 1954, at *Aplopappus* sp. (F. Werner); ♀, Tucson, Oct. 19, 1939 (R. H. Crandall); ♀, Tucson, Nov. 1, 1940 (Bryant). TEXAS: ♀, Alpine, July 8, 1952 (H. A. Scullen).

DISTRIBUTION.—Southern Arizona and the one record from Alpine, Tex.

PREY RECORD.—None.

PLANT RECORD.—As listed under paratypes.



7. *Cerceris carrizonensis* Banks

## FIGURE 7

*Cerceris carrizonensis* Banks, 1915, 403.—Scullen, 1951, p. 1006.

MALE.—Length 6 mm. Black with creamy-white markings. Tegulae smooth and not elevated. In color and size it is close to *acanthrophila* Cockerell. Markings of the type are discolored with cyanide to some extent.

This species is known only from the type. It may prove to be a synonym, but the writer will retain it as a valid species until more positive characters are found to separate these closely related species.

TYPE.—The type male, from "Uvalde, Texas, June 18–20, 1930, Wickham," is at the Museum of Comparative Zoology, no. 13772.

8. *Cerceris chilopsidis* Viereck and Cockerell

## FIGURES 8, 113a,b,c

*Cerceris chilopsidis* Viereck and Cockerell, 1904, p. 136.—Scullen, 1951, p. 1006.

FEMALE.—Length 10 mm. Color black with creamy-yellow markings; normally pitted; clothed with short silvery hairs.

Head about one-sixth wider than the thorax; black except for large frontal eye patches, the clypeus, basal half of the mandibles, and a small spot on the front, all of which are creamy yellow, and two round spots on the occiput, which are yellow; clypeal border slightly extended medially, sinuate; clypeal process scoop shaped but broader than long, with the free border black and curved down at the extremities; mandibles with two separate, subequal denticles dividing the mandible into three subequal parts; antennae normal in form, scape largely yellow, peduncle and apical end of scape amber, flagellum light below and dark above.

Thorax black except for two elongate patches on the pronotum, two patches on the scutellum, the metanotum, patch below the wing base, patches on the mesosternal tubercle, and the tegulae, all of which are yellow; tegulae smooth and not elevated; enclosure minutely laced, with a central groove and pitted at the borders; mesosternal tubercles prominent and largely yellow; legs dark amber basally to near the apical ends of all femora, remaining parts of legs yellow except for patches of amber on all tibiae and the medial tarsi; wings subhyaline except for a clouded area at the apex and the stigma, which is dark amber.

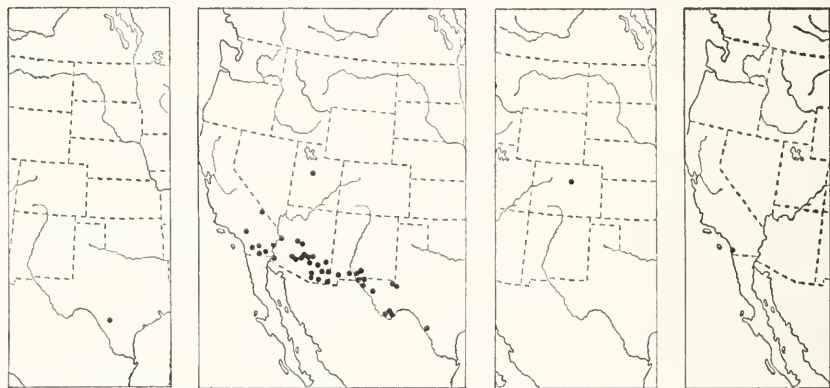
Abdomen black except for a semidivided patch on tergum 1; subequal bands on the posterior half of terga 2 to 5 broadly emarginate;

tergum 6 with venter immaculate; pygidium oval with the apical end only slightly narrower than the basal, both ends rounded.

MALE.—Unknown. Possibly it is being confused with the male of *C. convergens* Viereck and Cockerell.

*C. chilopsidis* Viereck and Cockerell is close to *C. convergens* Viereck and Cockerell, from which it can be separated by the form of the clypeal process and the form of the pygidium. The band on tergum 3 is never broken as it usually is in *C. convergens* Viereck and Cockerell.

TYPES.—The type female of *C. chilopsidis* Viereck and Cockerell, taken at Rincon, N. Mex. (Cockerell), July 5, at flowers of *Chilopsis saligna*, is at the Philadelphia Academy of Natural Sciences, no. 10375.



FIGURES 7-10.—Localities of: 7, *C. carrizonensis* Banks; 8, *C. chilopsidis* Viereck and Cockerell; 9, *C. cleomae* Rohwer; 10, *C. cockerelli* Viereck.

DISTRIBUTION.—Southern California, southern Arizona, southern New Mexico, southwestern Texas to Laredo, and into Mexico.

PREY RECORD.—None.

PLANT RECORD.—Alfalfa (California), *Baccharis glutinosa* (California), *Chilopsis saligna* (New Mexico), *Helianthus annuus* (Arizona, California), *Prosopis* sp. (California), *Prosopis pubescens* (locality not recorded), *Sasola pestifer* (New Mexico), *Strombocarpus pubescens* (Texas), *Tamarix gallica* (California), *Verbesina encelioides* (Arizona), *Wislizenia* sp. (Arizona).

#### 9. *Cerceris cleomae* Rohwer

FIGURE 9

*Cerceris cleomae* Rohwer, 1908, p. 325.—Scullen, 1951, 1006.

MALE.—Length about 5 mm. Black with yellow and yellowish-white markings; punctation and pubescence close to the males of the *rufinoda-echo* group.

This species is known only from the type, which is in poor condition. It closely resembles the males of *C. rufinoda* Cresson and *C. echo* Mickel, which, so far, are indistinguishable from each other. It may prove to be a synonym of one of these species when better characters are found for separating these closely related males. The writer is retaining it as a valid species for the present. (See discussion under *C. rufinoda rufinoda* Cresson, p. 394.)

TYPE.—The type male of *C. cleomae* Rohwer, from Denver, Colo., July 20, 1907, on cleome (Denning), is at the U.S. National Museum, no. 25483.

#### 10. *Cerceris cockerelli* Viereck

##### FIGURE 10

*Cerceris cockerelli* Viereck, 1902, p. 731.—Banks, 1947, p. 31.—Scullen, 1951, p. 1006.

MALE.—Length 7.5 mm. Black with creamy-white markings; tegulae smooth and not elevated. It is close to *C. acanthophila* Cockerell and *C. cleomae* Rohwer in color and size. The species is known only from the two cotype males. It may prove to be the same as some closely related form. Until more positive characters are found to separate the males of these closely related species, it will be retained as a valid species.

TYPE.—The cotype males of *C. cockerelli* Viereck, from La Jolla, Calif., August 1901 (T.D.A. Cockerell), are at the Philadelphia Academy of Natural Sciences, no. 10037.

#### 11. *Cerceris conifrons* Mickel

##### FIGURES 11, 114a,b,c

*Cerceris conifrons* Mickel, 1916, p. 410.—Mickel, 1917b, p. 450.—Banks, 1947, p. 31.—Scullen, 1951, p. 1006.

*Cerceris rufinoda crucis* H. S. Smith, 1908, p. 370 (in part).—Scullen, 1951, p. 1010.

FEMALE.—Length 8 to 9 mm. Black with creamy-white and yellow markings except anterior parts of abdomen and the propodeum, exclusive of the enclosure, which are reddish amber; closely and deeply pitted; clothed with very short silvery hairs.

Head one-fifth wider than the thorax; black except for the frontal eye patches, the medial clypeal lobe, patches on the lateral clypeal lobes, small patch on the lower frons, two round spots back of the compound eyes, the basal half of the mandibles, and the scape, all of which are creamy white; clypeal border with three processes, the medial one broad and somewhat rounded, the two lateral ones that are just laterad of the two curved surface denticles are smaller and more pointed; clypeus with a centrally located, low, cone-shaped elevation, below which are two black, prominent, curved denticles close to the clypeal border; mandibles with two centrally located

denticles, the apical one much the larger; antennae normal in form, scape yellow, flagellum light below and dark above.

Thorax, exclusive of the propodeum, is black except for two elongate patches on the pronotum, patches on the pleuron below the wing base, and the tegulae, all of which are creamy white; propodeum reddish amber except for the enclosure, which is black; tegulae smooth and not elevated; enclosure heavily ridged with the ridges subparallel to the metanotum and with the lateral ends curving posteriorly, mesal groove present; mesosternal tubercle prominent with a trace of yellow on the tip; forelegs and midlegs amber to near the apical ends of the femora, the remainder of the above legs yellow and amber; hindlegs light amber to the apical ends of femora, yellow changing to dark amber beyond.

Abdomen: terga 1 and 2 reddish amber; tergum 2 with a creamy-white band, terga 3 to 5 dark amber with creamy-white bands, tergum 6 dark amber, immaculate; pygidium broader basally but narrowing and truncate at both ends; venter light amber anteriorly, becoming dark posteriorly, immaculate.

MALE.—Length 6 to 7 mm. Black with creamy-white and ferruginous markings; punctation crowded; pubescence short.

Head slightly wider than the thorax; black with the exception of the face, small evanescent spots back of the eyes, base of mandibles, and most of the scape, all of which are creamy white; clypeal border with three indistinct, denticle-like extensions on the medial lobe; surface of the medial lobe of the clypeus convex; hair lobes subequal in width to the lateral lobes of the clypeus; mandibles without denticles but with a very low, broad elevation medially; antennae normal in form, scape creamy white, fulvous beyond the peduncle, which is dark.

Thorax black except for two widely separated patches on the pronotum, two spots on the scutellum, the metanotum, patch on the pleuron, and the tegulae, all of which are creamy white (in some specimens the ferruginous of the abdomen spreads more or less onto the propodeum); tegulae relatively smooth and showing little or no elevation; enclosure with heavy horizontal ridges curving laterally and a prominent medial groove; mesosternal tubercles absent; fore- and midlegs dark fuscous basally to beyond the center of the femora, beyond which they are largely creamy white; hindlegs are dark fuscous on the coxae, more or less ferruginous on the trochanters, dark fuscous over the femora except the apical end, which is creamy white, the tibiae fuscous except for a large creamy-white patch and the tarsi ferruginous; wings subhyaline, stigma black.

Abdomen black except the first tergum and basal two-thirds of the second tergum, which are ferruginous, subequal bands of creamy



white on the posterior margins of terga 2 to 6 (in some specimens an evanescent, narrow, dark line appears on tergum 2 between the yellow band and the ferruginous portion; in some specimens, also, the 6th tergum is immaculate); venter ferruginous over most of sternites 1 and 2 but dark and immaculate over the remaining sternites; pygidium with the sides convex and ends subequal in width.

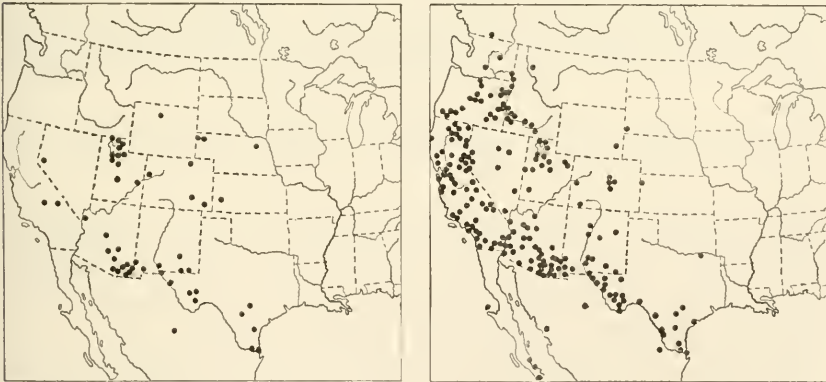
The males of *C. conifrons* Mickel may be confused with the males of other closely related forms showing ferruginous or reddish coloring on the basal segments of the abdomen. The distinctions between creamy-white and yellow markings are not always very marked.

**TYPE.**—The type female of *C. conifrons* Mickel is at the University of Nebraska.

**DISTRIBUTION.**—Except for one female taken at Medicine Hat, Alberta, on Aug. 13, 1939, by E. H. Strickland, *C. conifrons* Mickel has been taken only in the western states of Arizona, California, Colorado, Nebraska, Nevada, New Mexico, Texas, Wyoming, and Utah. It has been taken also in the state of Chihuahua, Mexico. (Due to the fact that males of this species sometimes are difficult to distinguish from closely related forms, distribution records are based only on females.)

**PREY RECORD.**—None.

**PLANT RECORD.**—*Aster* sp. (Utah), *Daucus carota* (Utah), *Chrysothamnus* sp. (New Mexico), *Helianthus* sp. (Nebraska), *Lepidium* sp. (Arizona), *Norta* sp. (Utah), *Wislizenia* sp. (Arizona).



FIGURES 11, 12.—Localities of: 11, *C. conifrons* Mickel; 12, *C. convergens* Viereck and Cockerell.

## 12. *Cerceris convergens* Viereck and Cockerell

FIGURES 12, 115a,b,c

*Cerceris convergens* Viereck and Cockerell, 1904, p. 136.—Scullen, 1942, p. 188.—Banks, 1947, p. 29.—Scullen, 1951, p. 1006.

*Cerceris rinconis* Viereck and Cockerell, 1904, p. 137.

*Cerceris hesperina* Banks, 1917, p. 115.

*Cerceris pudorosa* Mickel, 1917a, p. 338.

*Cerceris snowi* Banks, 1919, p. 84.

FEMALE.—Length 8 to 9 mm. Color black with light yellow markings; normally pitted; clothed with short silvery hairs.

Head one-fifth wider than the thorax; black except for large yellow frontal eye patches, the clypeus, and basal part of mandibles, which are light yellow; clypeal border slightly extended at the center and sinuate; clypeal process low and very short, close to clypeal border, divided into two rounded extensions, which are thin at the apex; mandibles with two subequal denticles medially located; antennae normal in form, scape yellow, peduncle dark amber, flagellum light below and dark above.

Thorax black except for two elongate patches on the pronotum, two spots on the scutellum, the metanotum, a patch on each pleuron, and the tegulae, all of which are light yellow; tegulae are smooth and not elevated; enclosure smooth except for a light medial groove and pitted borders; mesosternal tubercle prominent and tipped with yellow; legs dark amber basally to near the apical ends of all femora, the remainder of each leg being mostly yellow except for an amber patch on the apical end of the hindtibiae; wings subhyaline with a slight clouded area at the apex.

Abdomen black except for a semidivided patch on tergum 1, a broad band on tergum 2, band on tergum 3, which is usually broken into three sections, narrow bands on terga 4 and 5, all of which are yellow; venter immaculate; pygidium with the basal end broadly rounded and the apical end considerably narrowed to a small rounded point.

MALE.—Length 8 mm. Black with yellow to cream markings; normally to thinly pitted; clothed with short silvery hairs.

Head one-fourth wider than the thorax; black except for two yellow frontal eye patches; clypeal border with three centrally located denticles, the medial one slightly more pronounced; mandibles without distinct denticles; antennae normal in form, scape yellow, peduncle dark amber, flagellum light below and dark above.

Thorax black except for two elongate patches on the pronotum, the metanotum, and the tegulae, which are light yellow; tegulae smooth and not elevated; enclosure smooth except for an indistinct central groove; mesosternal tubercle absent; legs black basally to near the apical ends of all femora, remainder of all legs yellow except for black patches on apical ends of hindtibiae and darkened tarsi; wings subhyaline except for clouded area at apex.

Abdomen black except broad band on tergum 2, double broken

band on tergum 3, and narrow bands on terga 4, 5, and 6; venter black, immaculate; pygidium oval with both ends broadly rounded.

In the male of *C. convergens* Viereck and Cockerell, the medial lobe of the clypeus is usually black but in many specimens more or less yellow appears on it. In both sexes it is common to find the band on tergum 3 showing slight indentations at the points where it is usually broken. In some cases even these indentations disappear.

*C. convergens* Viereck and Cockerell is superficially similar to several closely related species. The female can be recognized by the clypeal structures and the male by its facial colors and clypeal denticles. Both sexes usually show the breaks in the band on the third tergum of the abdomen.

**TYPES.**—The type female of *C. convergens* Viereck and Cockerell, from Alamogordo, N. Mex., May 13, 1902 (Viereck), is at the Philadelphia Academy of Natural Sciences, no. 10376. The type female of *C. hespirina* Banks, taken at Yakima, Wash., July 1882 (Samuel Henshaw), is at the Museum of Comparative Zoology, Harvard University, no. 10,031. No allotype male was indicated. The type female and allotype male of *C. pudorosa* Mickel, both taken at Auburn, Calif., Sept. 20, 1916 (L. Bruner), are at Nebraska State University. The type female of *C. rinconis* Viereck and Cockerell, from Rincon, N. Mex., July 5, at flowers of *Chilopsis saligna*, is at the Philadelphia Academy of Natural Sciences, no. 10386. The lectotype male of *C. snowi* Banks, from Tucson, Ariz. (Snow), is at the Museum of Comparative Zoology, Harvard University, no. 13764.

**DISTRIBUTION.**—This is one of the most widely distributed species of the Pacific Slope. It ranges east through the Southern States to eastern Texas. Records of males taken at Sherman Co., Kans., and Yankton, S. Dak., may be open to question.

**PREY RECORD.**—*Bruchus* sp., Alhambra, Calif., July 14, 1921 (A. O. Larson).

**PLANT RECORD.**—*Acacia* sp. (Arizona, New Mexico), *Acacia angustissima* (Arizona), *Acacia greggii* (Arizona), *Achilles* sp. (Idaho), *Adenostom* sp. (California), alfalfa (Arizona, Utah), *Aplopappus* sp. (Arizona), *Asclepias* sp. (Arizona, California), *Atriplex* sp. (Utah), *Baccharis* sp. (Arizona), *Baccharis douglasii* (California), *Baccharis emeryi* (California), *Chilopsis saligna* (New Mexico), *Chilopsis linearis* (Arizona), *Chrysothamnus* sp. (California, Utah), *Cissus trifoliata* (Arizona), *Cleomeia* sp. (Idaho), *Cleome lutea* (Oregon), *Condalia* sp. (Arizona), cotton (Arizona), *Croton californicus* (California), *Eriogonum* sp. (Idaho, Oregon, Utah), *Eriogonum* (annual, California), *Eriogonum eletum* (Oregon), *Eriogonum fasciculatum* (California), *Eriogonum fasciculatum polifolium* (California), *Eriogonum gracile* (California), *Eriogonum inflatum* (California), *Gaillardia amblyodon*

(Texas), *Gnaphalium* sp. (California), *Gnaphalium beneolens* (California), *Gutierrezia sarothrae* (California), *Helianthus* sp. (Idaho), *Helianthus annuus* (California), *Larrea* sp. (California), *Polygonum* sp. (Arizona), *Polygonum lapathifolium* (California), *Salix taxifolia* (Arizona), *Salsola kali* (Utah), *Sapindus saponari* (Arizona), *Solan elegans* (Arizona), *Solidago* sp. (California, Oregon), *Tamerix gallica* (California), *Xanthium spinosum* (California).

### 13. *Cerceris crandalli*, new species

FIGURES 13, 116a,b,c

FEMALE.—Length 8 mm. Black to dark amber with creamy-white and light yellow markings; normally pitted and clothed with very short silvery hairs.

Head about one-fifth wider than the thorax; black except for large frontal eye patches, small spot on the clypeal process, oval spots back of the compound eyes, elongate patches on the vertex back of the ocelli, patches on the mandibles and the scape, all of which are creamy white; clypeal border with a broad rounded slight extension mesad, on each side of which is a small denticle; clypeal process scoop shaped but much broader than long with the free border deeply emarginate; mandibles with two distinct, centrally located denticles, the apical one much the larger and more rounded; antennae normal in form, scape creamy white, peduncle and flagellum amber.

Thorax black except for two elongate patches on the pronotum, two spots on the scutellum, the metanotum, patches on the pleuron below the wing base, the tegulae, and the apex of the mesosternal tubercle, all of which are creamy white; tegulae smooth and not elevated; enclosure deeply ridged subparallel to the metanotum; mesosternal tubercle medium in size; legs dark amber to near the apical ends of the femora, the remainder of the leg parts are yellow to light amber except for dark patches on all tibiae; wings subhyaline, cloudy at the apex.

Abdomen black except for a small patch on tergum 1, a broad band on the posterior half of tergum 2, narrow bands on terga 3 and 4, and a small patch on tergum 5, all of which are light yellow; venter black, immaculate; pygidium with sides convex, basal end about one-half the greatest width, and the apical end broadly rounded.

MALE.—Length 7 mm. Black with creamy-white to light yellow markings; punctuation average; pubescence short.

Head about one-fifth wider than the thorax; black except for large frontal eye patches and the scape, which are light yellow; clypeal



border with three small denticles, the medial one the largest; hair lobes subequal to the lateral clypeal lobes; mandibles without denticles; antennae normal in form, fulvous but slightly darker above.

Thorax black except for a divided band on the pronotum, the metanotum, a minute spot on the pleuron below the wing, and a patch on the tegulae, all of which are creamy white; tegulae smooth and not elevated; enclosure deeply ridged subparallel to the metanotum; mesosternal tubercles absent; legs black basally to near the apical ends of the femora, which are creamy white; tibiae and other apical segments creamy white except for the apical half of the 3rd tibia, which is dark fuscous to black; the light tip of the 3rd femur cut off from the dark area abruptly at right angles to the femur as in *C. acanthophila* Cockerell; wings subhyaline but clouded apically; stigma dark.

Abdomen black with a small semidivided spot on tergum 1, a broad band on the posterior half of tergum 2, narrow bands on the posterior margins of terga 3, 4, and 5, and a small patch on tergum 6, all of which are creamy white; venter black, immaculate; pygidium with sides convex and both ends rounded.

The male is very near that of *C. acanthophila* Cockerell, from which it may be distinguished by a creamy-white face and the relatively smooth enclosure of the latter species.

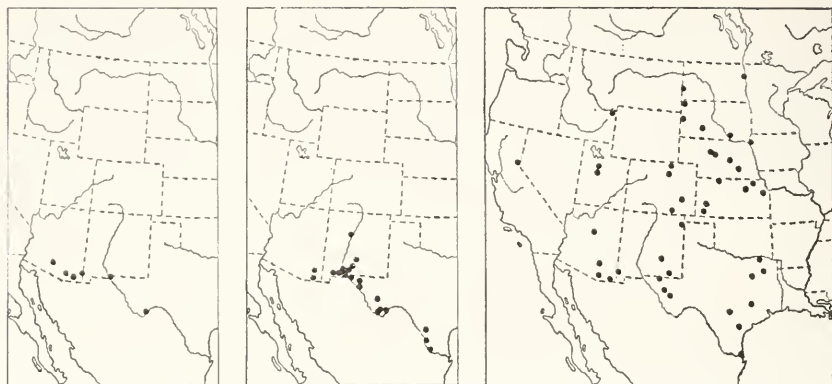
**TYPES.**—The type female from Tucson, Ariz., June 13, 1938, (R. H. Crandall), is deposited at the U.S. National Museum, no. 66156. The allotype male, from 8 miles southeast of Elota, Sinaloa, Mexico, 1962 (F. D. Parker), is deposited at the University of California, Davis, Calif.

**ARIZONA:** ♀, 10 mi. E. Gila Bend, June 15, 1955 (G. D. Butler); 4 ♀ ♀, 2 mi. NE. Portal, Cochise Co., July 30–Aug. 5, 1959, *Baccharis* (M. Statham); ♀, Sahuarita, July 5, 1956 (G. D. Butler); 3 ♀ ♀, Toltec, Pinal Co., June 14–15, 1953 (T. R. Haig); ♀, Tombstone, July 27, 1955, *Mortonia scalrella* (Butler-Werner); 2 ♀ ♀, Tucson, June 10, 13, 1938 (R. H. Crandall); ♀, Tucson (F. H. Snow). **TEXAS:** ♀, Boquillas, Brewster Co., June 30, 1928 (F. M. Gage); ♀, 20 mi. N. El Paso, June 19, 1942 (H. A. Scullen). **MEXICO:** *Sinaloa:* 5 ♀ ♀, 16 ♂ ♂, 8 mi. SE. Elota, May 18–19, 1962 (F. D. Parker, L. A. Stange); 2 ♀ ♀, 3 ♂ ♂, Cocorit, May 23, 1962 (F. D. Parker, L. A. Stange); ♀, 2 ♂ ♂, 5 mi. S. Magdalena, May 25, 1962 (F. D. Parker, L. A. Stange); ♀, ♂, 5 mi. W. Santa Ana, June 10, 1962 (F. D. Parker).

**DISTRIBUTION.**—Southern Arizona, western Texas, and northwestern Mexico.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Baccharis* (Arizona), *Mortonia scalrella* (Arizona).



FIGURES 13-15.—Localities of: 13, *C. crandalli* Scullen; 14, *C. crotonella* Viereck and Cockerell; 15, *C. echo echo* Mickel.

#### 14. *Cerceris crotonella* Viereck and Cockerell

FIGURES 14, 117a,b,c

*Cerceris crotonella* Viereck and Cockerell, 1904, p. 139.—Scullen, 1951, p. 1007.

FEMALE.—Length 8 mm. Color black and reddish amber, marked with creamy white; normally pitted; clothed with very short silvery hairs.

Head one-fourth wider than the thorax; black except for large frontal eye patches, the clypeus, basal half of mandibles, patch on the front, round spots back of the compound eyes, and the scape, all of which are creamy white; clypeal border with five subequally spaced low denticle-like processes; process on the clypeal surface extended to form a truncate cone with the end slightly broadened and black; mandibles with two separate, subequal denticles, medially located; antennae normal in form, scape creamy white, peduncle and flagellum light amber below, darker above.

Thorax, exclusive of the propodeum, black except for two elongate patches on the pronotum, two patches on the scutellum, the metanotum, patches on the pleuron below the wing attachments, and the tegulae, all of which are creamy white; tegulae smooth and not elevated; propodeum reddish amber except the enclosure, which is black; enclosure deeply pitted along the border and along the central groove with a few incomplete ridges next to the mentanotum; mesosternal tubercle absent; legs dark amber basally to a little beyond the middle of the femora; apical ends of femora, the fore- and mid-tibiae, and the hindtibiae in part, creamy white; tarsi amber, becoming darker on the mid- and hindlegs; wings subhyaline.

Abdomen: terga 1 to 3 reddish amber with narrow creamy-white bands; terga 4 to 5 black with creamy-white bands; tergum 6 black,

immaculate; venter reddish amber anteriorly, becoming dark amber posteriorly; pygidium broader basally and rounded, the apical end narrowing and truncate.

MALE.—Length 6 to 7 mm. Black with creamy-white and ferruginous markings; punctation more widely spaced than average; pubescence short.

Head slightly wider than the thorax; black except for the face, base of mandibles, and scape, all of which are creamy white; clypeal border with three subequal low denticles on the medial lobe; hair lobes extend over about three-fourths of the lateral clypeal lobes; surface of the medial lobe convex; mandibles without denticles; antennae normal in form, scape largely creamy white, flagellum largely fulvous.

Thorax black except for two elongate patches on the pronotum, two large spots on the scutellum, the metanotum, a small patch on the pleuron, and the tegulae, all of which are creamy white; tegulae low and smooth; enclosure with a pitted medial groove and deeply rugose laterally; mesosternal tubercle absent; legs black to the apical ends of the femora, beyond which they are creamy white except for the apical segments of the tarsi, which become darker; the hindtibiae and the hindtarsi dark except for a large, creamy patch on the tibiae; wings are subhyaline, stigma black.

Abdomen black or dark fuscous except the first segment and the basal part of the second segment, which are ferruginous, and the following creamy-white markings: broad bands on terga 2 and 3, which have the anteriolateral corners darkened, narrow bands on terga 4 and 5, an evanescent patch on tergum 6; venter with minute, creamy spots laterally on sternites 3 and 4; pygidium with sides convex and the apical end slightly smaller than the basal end.

The male of *crotonella* Viereck and Cockerell is close to the males of *C. conifrons* Mickel and *C. bridwelli* Scullen. They are distinguished from *conifrons* by the more closely crowded punctation and narrow light bands on the abdomen of the latter. They are distinguished from *bridwelli* by having only two broad bands on the abdomen while the latter has three. The surface punctation is similar to *bridwelli*.

TYPE.—The type female of *C. crotonella* Viereck and Cockerell, taken at Las Cruces, N. Mex., on Sept. 25, 1895, *Croton neomexicanum* (Cockerell), is at the Philadelphia Academy of Natural Sciences, no. 10039.

DISTRIBUTION.—Southern Arizona, New Mexico, and southwestern Texas.

PREY RECORD.—None.

PLANT RECORD.—*Acacia augustissima* (Arizona), *Chilopsis* sp. (New Mexico), *Crotonella neomexicanum* (New Mexico), *Larrea tridentata* (Texas), *Opuntia* sp. (Texas), *Pectis pepposa* (New Mexico).

15a. *Cerceris echo echo* Mickel

FIGURES 15, 118a,b,c

*Cerceris echo* Mickel, 1916, p. 412.—Mickel, 1917b, p. 453.—Scullen, 1951, p. 1007.  
*Cerceris rufinoda crucis* H. S. Smith, 1908, p. 370 (in part).

FEMALE.—Length 9 to 10 mm. Color black and reddish amber with yellow markings; closely and deeply punctate; clothed with very short silvery hairs.

Head one-sixth wider than the thorax, black except large lateral eye patches, small spots back of the compound eyes, basal end of mandibles, and patch on scape, which are yellow; clypeal border with two widely separated broad extensions, between which is a single denticle, and laterad of each extension is a low denticle-like process; clypeal surface process is in the form of a low transverse ridge with the extremities dentiform; mandibles with one centrally located denticle, more apicad of which is a low rounded elevation; antennae normal in form, scape yellow to light amber, peduncle amber, flagellum light amber below, dark above.

Thorax, exclusive of the propodeum, black except for two elongate patches on the pronotum, two spots on the metanotum, and patch on the tegulae, all of which are yellow; tegulae sparsely pitted and slightly elevated; propodeum dorsally reddish amber except for the enclosure, which is black; enclosure deeply pitted and rugose with a prominent central groove; mesosternal tubercle small and black; legs largely amber basally, becoming more yellow beyond the middle of the femora; wings slightly clouded.

Abdomen: tergum 1 reddish amber; terga 2 to 5 black with bands of light yellow, that on tergum 2 broader and not emarginate as are the others; venter black except for the first sternite, which is reddish amber; pygidium oval, narrowing, and rounded at both ends.

MALE.—Unknown. It may be confused with closely related species. (See note under *rufinoda rufinoda* Cresson, p. 394.)

TYPE.—The type female, taken at Monroe Canyon, Sioux Co., Nebr., Aug. 4, 1908 (C. H. Gable), is at the University of Nebraska.

DISTRIBUTION.—Widely distributed but not collected in any great numbers over the Central Plains States from southern Canada to the Mexican border. Recorded from Alberta, Idaho, Montana, North Dakota, South Dakota, Minnesota, Iowa, Nebraska, Kansas,



Colorado, California, Utah, Arizona, New Mexico, and Texas. An isolated record from Independence Lake, Sierra Co., Calif., July 20, 1954 (R. C. Blaylock), is of special interest.

PREY RECORD.—None.

PLANT RECORD.—*Aster* sp. (Kansas), *Baccharis* sp. (Texas), *Chrysothamnus* sp. (Utah), *Eupatorium serotinum* (Texas), parsnip (Texas), *Pastinaca sativa* (Texas), *Solidago* sp. (New Mexico), *Thelesperma gracile* (Kansas).

### 15b. *Cerceris echo atrata*, new subspecies

FIGURE 16

FEMALE.—This is the same in structure and color pattern as *C. echo echo* Mickel except that the markings are light yellow and it lacks the reddish amber on the propodeum and the first abdominal segment so characteristic of the latter.

MALE.—Unknown. It may be confused with the male of *C. rufinoda rufinoda* Cresson, with which it is closely related.

This is the eastern form of *C. echo* Mickel. From manuscript labels by Banks found on some specimens, it is evident he had at one time expected to describe this form as a new species under the name of *nigroris*.

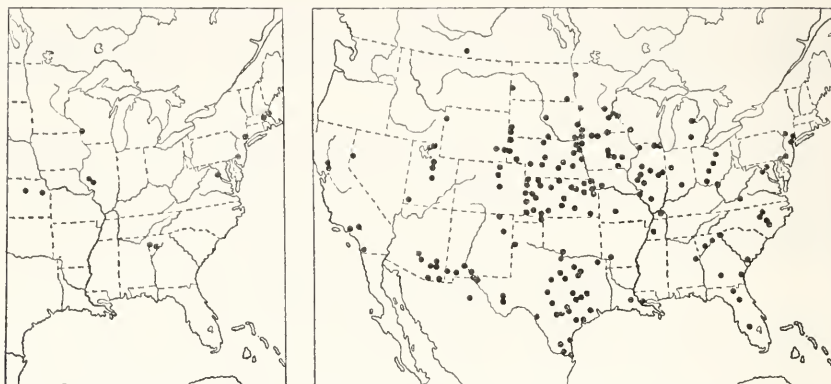
TYPES.—The type female, from Camden Co., N.J., July 12, 1891 (Wm. J. Fox), is at the Philadelphia Academy of Natural Sciences, no. 5039. Paratypes are as follows:

GEORGIA: 4 ♀ ♀, Atlanta, June 14, 1936 (P. W. Fattig); ♀, Cedartown, June 7, 1936 (P. W. Fattig). ILLINOIS: ♀, Carlinville (Charles Robertson, 6129); ♀, Meredosia, Aug. 22, 1917, sand pit. IOWA: ♀, Sioux City, Aug. 11, 1928 (C. N. Ainslie). KANSAS: ♀, Baldwin, July (Bridwell); ♀, Douglas Co., 900 ft., (F. H. Snow); 2 ♀ ♀, Riley Co., July 14, 25 (Peponoe, 5342). MASSACHUSETTS: ♀, Forest Hills, July 1913 (F. X. Williams); ♀, Hopkinton Forest, Aug. 22; ♀, Reading, July 14, 1935, Umbelliferae flowers (Richard Dow). MAINE: ♀, Desert of Maine, Aug. 13, 1950. NORTH CAROLINA: ♂, (Cresson). NEW JERSEY, 6 ♀ ♀, Camden Co., July 12, 1891 (Wm. J. Fox). NEW YORK: ♀, Ardsley, Westchester Co., Aug. 9, 1958 (G. R. Ferguson); ♀, Bedford, Westchester Co., July 20, 1957 (G. R. Ferguson); 2 ♀ ♀, Hartsdale, Westchester Co., July 14, 1957 (G. R. Ferguson); 2 ♀ ♀, Pound Ridge, Westchester Co., July 21, Aug. 17, 1957 (G. R. Ferguson). VIRGINIA: ♀, East Falls Church, July 20 (S. A. Rohwer); ♀, Vienna, Aug. 11, 1935 (J. C. Bridwell). WISCONSIN: ♀, Genoa, Vernon Co., July 7-12, 1911 (53145).

DISTRIBUTION.—Limited through the Eastern States east of the Mississippi River.

PREY RECORD.—None.

PLANT RECORD.—Umbelliferae (Massachusetts).



FIGURES 16, 17.—Localities of: 16, *C. echo atrata* Scullen; 17, *C. finitima finitima* Cresson.

### 16a. *Cerceris finitima finitima* Cresson

FIGURES 17, 119a,b,c

*Cerceris finitima* Cresson, 1865, p. 125.—Packard, 1866, p. 61.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 491.—Robertson, 1890, p. 200; 1891, p. 570; 1892b, p. 108; 1892c, p. 274; 1894a, pp. 455, 457.—Dalla Torre, 1897, p. 460.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Viereck and Cockerell, 1904, p. 138.—Smith, H. S., 1908, p. 370.—Banks, 1912a, p. 27.—Stevens, 1917, p. 422.—Rohwer, 1917, p. 244.—Mickel, 1917b, p. 453.—Rau, 1928, p. 338.—Strandtmann, 1945, p. 312.—Scullen, 1951, p. 1007.

*Cerceris finitima* var. *nigroris* Banks, 1912a, p. 27.—Mickel, 1917b, p. 453.—Scullen, 1951, p. 1008.

FEMALE.—Length 7 to 8 mm. Color black and yellow, closely and deeply pitted, clothed with very short silvery hairs.

Head one-fourth wider than the thorax, black except large frontal eye patches on the face, the clypeus, patch on front above the clypeus, basal part of the mandibles, the scape, spots back of the compound eyes, all of which are yellow; markings on face lighter than other markings; clypeal border with two widely separated denticles; clypeal surface with a very low, broad ridge ending laterally in two slightly extended subhyaline points appearing just above and mesad of the two dark border denticles; mandibles with two subequal denticles distinctly separated and medially located; antennae normal in form, scape yellow, peduncle dark amber, flagellum light amber below and darker above.

Thorax black except for two elongate patches on the pronotum, two patches on the scutellum, the metanotum, a dot on the pleuron below the wing base, and the tegulae, all of which are yellow; tegulae elevated and pitted; enclosure transversely rugose; mesosternal tubercles small and black; legs dark amber to middle of the femora or beyond, yellow beyond to the tarsi, which are light amber; wings subhyaline except the stigma, which is dark amber.

Abdomen with deeply emarginate bands of yellow on terga 1 to 5, wider on tergum 3; venter immaculate; pygidium oval with both ends rounded, the basal end more acute.

MALE.—Length 6 to 7 mm. Color black and yellow, closely and deeply pitted, clothed with very short silvery hairs.

Head about one-fifth wider than the thorax; black except for the face, which is yellow; clypeal border with three subequal, centrally located denticles; mandibles smooth; antennae normal in form, scape yellow, peduncle dark amber and flagellum light amber below, dark above.

Thorax black except for elongate patches on the pronotum, two patches on the scutellum, the metanotum, small spots on the pleuron below the wing bases and the tegulae, all of which are yellow; tegulae elevated and pitted; enclosure deeply rugose transversely; mesopleural tubercle absent; legs dark amber basally to the middle of the femora or a little beyond, yellow beyond, becoming light amber on the tarsi; wings subhyaline.

Abdomen black except for a patch on the first tergum, broad band on tergum 2, narrow bands on terga 3 to 6 emarginate, which are yellow; venter dark amber with a tendency for yellow spots to appear laterally on sternites 3 to 5; pygidium oval with the basal end rounded, apical end more truncate.

TYPES.—The type female of *C. finitima* Cresson, from Illinois (Dr. Lewis), is at the Philadelphia Academy of Natural Sciences, no. 1948. The type male of *C. finitima* var. *nigroris* Banks, from Falls Church, Va., is at the Museum of Comparative Zoology, Harvard University, no. 13768.

The writer does not consider the variety *nigroris* Banks distinctive enough to recognize it as a subspecies.

DISTRIBUTION.—Widely distributed throughout the states east of the Rocky Mountains except in New England. It ranges from southern Canada to the Mexican border. It is found also in California, from Davis south, and into Arizona and New Mexico.

PREY RECORD.—*Chaetocnema pulicaria*, a flea beetle (Chrysomelidae), Columbus, Ohio (Strandtmann, 1945, p. 312).

PLANT RECORD.—*Acacia* sp. (Texas), *Asclepias* sp. (Arizona, Nebraska, New Mexico), *Aster* sp. (Kansas), *Bifora americana* (Texas), *Cassia* sp. (Texas), celery (Utah), *Cleome serrulata* (Nebraska), clover (Illinois), cowpeas (Arkansas), *Croton californicus* (California), *Daucus carota* (Ohio), *Diehro phyllum* (Colorado), *Erigeron quercifolius* (Florida), *Grindelia* sp. (South Dakota), *Grindelia squarrosa* (Utah), *Helianthus pumilus* (Colorado), *Kuhnistera oligophylla* (North Dakota), *Melilotus alba* (Nebraska), *Monarda citriodora* (Texas), pea vine (Ohio), *Polygonum auberti* (California), *Sambucus canadensis* (Ohio),

*Solidago* sp. (Colorado, Iowa, Kansas, Nebraska, Texas), *Telesperma gracile* (Utah).

16b. *Cerceris finitima citrina*, new subspecies

FIGURE 18

FEMALE.—Length 6 to 7 mm. Color black with yellow markings covering over fifty per cent of the body surface; deeply and closely pitted; clothed with short silvery hairs.

Head about one-fifth wider than the thorax; black but with the yellow markings covering most of the face, basal half of the mandibles, scape, and large irregular patch extending from one gena through vertex to the opposite gena; clypeal border with two widely separated denticles; clypeal surface with a very low, broad ridge ending laterally in two slightly extended subhyaline points appearing just above and mesad of the two dark border denticles; mandibles with two centrally located but distinctly separated denticles, the more apical one much the larger and pointing distally; antennae normal in form, the scape yellow, peduncle amber and the flagellum light amber below but darker above.

Thorax black except for a broad band on the pronotum, two short stripes on the scutum, the scutellum, the metanotum, large patches on the propodeum, two large patches on each pleuron, two small spots on the sternum, and the tegulae, all of which are yellow; tegulae elevated and lightly pitted; enclosure black, transversely rugose; mesosternal tubercle present, partly yellow; legs largely yellow except for small dark patches on the basal areas of each leg; wings subhyaline except the stigma, which is amber.

Abdomen with broad yellow bands on terga 1 to 5, those on terga 3 to 5 somewhat emarginate; pygidium oval, broader basally, apical end rounded, basal end truncate; venter dark amber except for a mesal and two lateral yellow patches on sternites 2 to 4.

MALE.—Length 6 to 7 mm. Color black with yellow markings; deeply and closely pitted; clothed with short silvery hairs.

Head about one-third wider than the thorax; black except entire face, elongate patches on the genae, the vertex, basal two-thirds of the mandibles, and the scape, all of which are yellow; border of clypeus sinuate with two lateral and one medial slight extensions; clypeal surface convex; mandibles smooth; antennae normal in form, scape yellow, peduncle amber, flagellum light amber below, darker above.

Thorax black except for two elongate patches on the pronotum, the scutellum, the metanotum, large triangular patches on the propodeum, two patches on the pleuron, and the tegulae, all of which are yellow; mesosternal tubercle absent; tegulae elevated and lightly

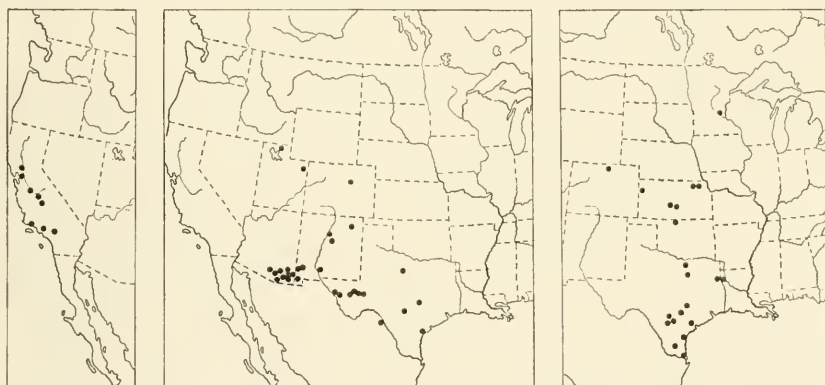


pitted; enclosure heavily rugose transversely; legs yellow except for small patches of amber on the following: coxae, all femora, the hindtibiae, and hindtarsi; wings subhyaline except the stigma, which is dark amber.

Abdomen with broad yellow bands on terga 1 to 6, those on terga 5 and 6 emarginate; venter amber with yellow bands on sternites 2 to 4 and two yellow patches on sternite 5; pygidium with sides convex and both ends subtruncate.

The extent of the yellow markings vary in both sexes. This is especially true of the yellow line on the genae, venter, and scutellum. Smaller patches may disappear. The subspecies *citrina* has far more yellow than the typical form *C. finitima finitima* Cresson.

**TYPES.**—The type female, from Riverside, Calif., Aug. 29, 1926, on *Polygonum lapathifolium* (P. H. Timberlake), and the allotype male,



FIGURES 18-20.—Localities of: 18, *C. finitima citrina* Scullen; 19, *C. finitima vierecki* Banks; 20, *C. irene* Banks.

from Riverside, Calif., Aug. 26, 1927 (P. H. Timberlake), are at the California Academy of Sciences. Paratypes are as follows:

**CALIFORNIA:** ♀, Antioch, Sept. 18, 1938 (J. W. MacSwain); ♀, Claremont (Baker); ♀, Colton, Aug. 10, 1951 (J. C. Hall); 2 ♀♀, Davis, Aug. 24, 1939 (G. E. Bohart); ♀, Davis, July 11, 1951 (E. I. Schlinger); ♂, Davis, July 11, 1954 (J. O. Downey); ♂, Davis, Aug. 20, 1950 (R. C. Bechtel); ♂, Lindsay, 1909, on *Asclepias* (W. A. Davidson); ♀, Patterson, Stanislaus Co., June (T. F. Leigh); ♀, Riverside, Sept. 23, 1924, on annual *Eriogonum* (P. H. Timberlake); ♀, Riverside, Aug. 16, 1927, on *Eriogonum gracile* (P. H. Timberlake); ♀, Riverside, Aug. 29, 1926, on *Polygonum lapathifolium* (P. H. Timberlake); ♀, Riverside, Oct. 1, 1928, on *Euphorbia albomarginata* (P. H. Timberlake); ♀, Riverside, July 17, 1940 (C. Dammers); ♂, Riverside, Sept. 20, 1933, on *Erigeron linifolius* (P. H. Timberlake); ♂, Santa Barbara, June 1907 (W. M. Giffard); ♂, Visalia, 1927, on privet (P. R. Jones).

DISTRIBUTION.—Recorded only from Davis and southern California.

PREY RECORDS.—None.

PLANT RECORDS.—As indicated under type material.

16c. *Cerceris finitima vierecki* Banks, new status

FIGURE 19

*Cerceris vierecki* Banks, 1947, p. 30.—Scullen, 1951, p. 1011.

*Cerceris finitima vierecki* Scullen, 1960, p. 80.

FEMALE.—Length 8 mm. Colors black with creamy-white markings; finely and moderately pitted; pubescence average.

Head about one-fifth wider than the thorax; black except for face and round spots back of the compound eyes, which are creamy white; clypeal border with two widely separated pointed extensions; clypeal surface slightly convex without special elevations; mandibles with two subequal denticles distinctly separated, the apical one much the larger; antennae normal in form, scape creamy white, peduncle dark amber, flagellum light amber below and darker above.

Thorax black except for two elongate patches on the pronotum, two patches on the scutellum, the metanotum, large patch on the pleuron below the wing attachment, and patches on the tegulae, all of which are creamy white; tegulae more smooth and less elevated than in *C. finitima finitima* Cresson; enclosure smooth except for the central groove, which is pitted, and the lateral borders, which are slightly rugose; mesosternal tubercle extremely inconspicuous; legs black basally to beyond the middle of the femora, creamy white beyond except for an amber patch on the mesal side and apical end of the hindtibiae and the tarsi, which are darker; wings subhyaline except the stigma, which is dark amber.

Abdomen black except for a patch on tergum 1, and emarginate bands on terga 2 to 5, which are creamy white; venter black, immaculate; pygidium oval with both ends rounded.

MALE.—The males taken in the same localities as the females of *C. finitima vierecki* are of the typical form and color pattern of *C. finitima finitima* but the markings tend to be more creamy white as is true of the females.

TYPE.—The type female of *Cerceris vierecki* Banks, taken at Tempe, Ariz., Aug. 1 (Bequaert), is at the Museum of Comparative Zoology, no. 23544.

DISTRIBUTION.—Largely throughout the Southwestern desert area of Arizona, New Mexico, and Texas; rare in Colorado and Utah.

PREY RECORD.—None.

PLANT RECORD.—*Acacia* sp. (Arizona), *Asclepias subverticillata* (Arizona), *Baccharis glutinosa* (Arizona), cotton (New Mexico),

*Eriogonum abertianum neomexicana* (Arizona), yellow composit (Arizona).

17. *Cerceris irene* Banks

FIGURES 20, 120a,b,c

*Cerceris irene* Banks, 1912a, p. 26—Scullen, 1951, p. 1008.

FEMALE.—Length 7 to 8 mm. Color dark amber, reddish amber and yellow; closely and deeply pitted; clothed with very short silvery hairs.

Head one-fifth wider than thorax; amber except face, basal half of mandibles, scape, patch on gena, and elongate patches on vertex, which are yellow; ocellar area dark amber; clypeal border with one central denticle-like process, to each side of which is a broad extension of the clypeal border; clypeal process with a broad rounded base narrowing to a truncate point; mandibles with two centrally located denticles, the apical one the larger; antennae normal in form, scape yellow, peduncle and flagellum light amber.

Thorax reddish amber below to dark amber or black above except two elongate patches on the pronotum, two patches on the scutellum, the metanotum, patch on the pleuron, and the tegulae, all of which are yellow somewhat infused with light amber; tegulae elevated and somewhat pitted; enclosure reddish amber to dark amber, deeply rugose transversely; propodeum reddish amber to amber; mesosternal tubercle present; legs reddish amber; wings subhyaline except the stigma, which is darker.

Abdomen, tergum 1 reddish amber with a broad emarginate yellow to amber patch; terga 2 to 5 with broad emarginate bands of yellow infused with amber; venter reddish amber to dark amber with reddish amber bands on sternites 2 to 3; pygidium with convex sides and truncate ends.

MALE.—The male of *irene* has not been isolated. It is probably being confused with the males of closely related species (see note under *rufinoda rufinoda* Cresson, p. 394).

*C. irene* Banks is extremely variable in color shade and the extent of color markings. The ground color varies from black to medium amber. The yellow patches on the pronotum and the scutellum may fuse to form bands on the respective parts.

TYPE.—The type female, from Fedor, Lee Co., Tex., June 25 (Birkman), is at the Museum of Comparative Zoology, Harvard University, no. 13781.

DISTRIBUTION.—Except for the one Minnesota record, *C. irene* Banks is found only in the Western and South Central States of Wyoming, Colorado, Kansas, Oklahoma, Texas, and Louisiana. Specimens are as follows:

COLORADO: ♀, Larimer Co., Aug. 13, 1952 (R. R. Dreisbach). KANSAS: 2 ♀ ♀, Blackjack Creek, Pottawatomie Co., July 2, 14, 1953 (Evans, Lin, Yoshimoto); ♀, Blackjack Creek, July 9, 1954 (H. E. and M. A. Evans); ♀, Madero, June 21, 1936 (W. O. Field); ♀, Madero, July 7, 1953 (H. E. Evans); ♀, Riley Co., Sept. 12 (J. B. Norton); 3 ♀ ♀, Riley Co., Sept. 17, 19 (Popenoe); ♀, Reno Co., Aug. 13-20, 1917; ♀, Stafford Co., Salt Flat Area, July 11, 1957 (H. E. and M. A. Evans); ♀, Wallace Co., 3440 ft. (F. X. Williams). LOUISIANA: ♀, Keatchie, June 14, 1905. MINNESOTA: ♀, Fridley Sand Dunes, Anoka Co., July 22, 1927 (R. W. Dawson). OKLAHOMA: ♀, Alfalfa Co., Aug. 10, 1932 (Deonier and Pritchard). TEXAS: ♀, Ballinger, Aug. 3, 1931 (R. H. Painter); ♀, Bexar Co., May 1, 1929 (H. B. Parks); ♀, Brooks Co., July 25, 1928 (R. H. Beamer); ♀, Brooks Co., July 25, 1928 (J. G. Shaw); ♀, Corpus Christi, June 28, 1942 (E. S. Ross); ♀, Fedor, Lee Co., May 7, 1909; ♀, Fedor, July 23, 1897 (Birkmann); ♀, Fort Worth, May 31, 1937 (Heard and Berjim); 4 ♀ ♀, Gillette, Karles Co., July 25, 1917; ♀, Kendall Co., July 22, 1928 (R. H. Beamer); 4 ♀ ♀, Lee Co., May 30, Sept. 21, 1906; ♀, McBade, Bastrop Co., May 12, 1934 (J. E. Gillaspay); ♀, Neuceest, April 28, 1896 (Morlatt); 4 ♀ ♀, Port Isabel, Cameron Co., June 23-27, 1956 (H. E. Evans and E. G. Matthews); ♀, Reno Co., Aug. 13-20, 1917; ♀, Rosser, July 6, 1905 (C. R. Jones); ♀, Victoria, June 24, 1917; ♀, Wallace Co., 3440 ft. (F. X. Williams). WYOMING: ♀, Summit, 8835 ft., Aug. 16, 1940 (H. E. Milliron).

PREY RECORD.—None.

PLANT RECORD.—*Gaillardia amblyodon* (Texas).

### 18a. *Cerceris kennicottii kennicottii* Cresson

FIGURES 21, 121a,b,c

*Cerceris kennicottii* Cresson, 1865, p. 128.—Packard, 1866, p. 63.—Cresson, 1872, p. 231; 1887, p. 282.—Schletterer, 1887, p. 495.—Robertson, 1890, p. 200; 1894a, pp. 457, 471; 1896b, p. 73.—Dalla Torre, 1897, p. 464.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Banks, 1912a, p. 25.—Mickel, 1917b, p. 452.—Hendrickson, 1930, p. 159.—Banks, 1947, p. 30.—Scullen, 1951, p. 1008.

*Cerceris eriogoni* Viereck and Cockerell, 1904, p. 139.—Scullen, 1951, p. 1007 (new synonymy).

FEMALE.—Length 8 to 10 mm. Black with yellow markings; normally pitted; clothed with very short silvery hairs.

Head about one-fifth wider than thorax; black except for large frontal eye patches, patch on clypeal process, basal part of mandibles, and scape, all of which are yellow; clypeal border with five equally spaced small processes, the central one denticle-like, the two lateral ones also denticle-like but smaller, the other two somewhat broader; clypeal process broad at the base, converging distally to a semitruncate apical end, which is sinuate, showing a small medial and two small lateral extensions; mandibles with two subequal, centrally located denticles; antennae normal in form, scape light yellow in front, peduncle dark amber, flagellum light amber below and dark above.

Thorax black except for two elongate patches on the pronotum, band on the scutellum, minute spot on the mesosternal tubercle, and



the tegulae, which are light yellow; tegulae smooth and not elevated; enclosure minutely rugose transversely, with a prominent medial groove; mesosternal tubercle present; legs black or dark amber to the apical ends of the femora, beyond which they are yellow, again becoming darker on the tibiae; hindfemora may be all black or show a lighter amber apical end; wings subhyaline except for the stigma, which is darker.

Abdomen black except for a small patch on tergum 1, deeply emarginate band on terga 2 and 4, two lateral patches on tergum 3, which may be joined to each other by a narrow or broken line, solid narrow or broken band on tergum 5; pygidium with a broad rounded base narrowing to a much smaller rounded apical end, surface appearing velvet-like; venter dark amber, immaculate.

MALE.—Length 7 mm. Black and light yellow; deeply pitted; clothed with short silvery hairs.

Head about one-fifth wider than the thorax, black except for large frontal eye patches, a patch on the medial lobe of the clypeus, base of mandibles, and scape, all of which are light yellow; clypeal border with three subequal denticles on the medial lobe; clypeal surface convex; mandibles smooth; antennae normal in form, scape yellow, peduncle light amber, flagellum light amber below, darker above.

Thorax black except for elongate patches on the pronotum, the scutellum, and tegulae, which are light yellow; tegulae smooth and not elevated; enclosure minutely rugose transversely, with a prominent medial groove; legs dark amber apically to the middle of the femora, light amber beyond, becoming darker on the tarsi; wings subhyaline except the stigma, which is amber.

Abdomen black with small patch on tergum 1, broad band on tergum 2, two lateral patches connected by a broken line on tergum 3, narrow bands on terga 4 to 5, elongate patch on tergum 6, all of which are light yellow; pygidium oval with both ends rounded and subequal, surface pitted; venter dark amber, immaculate.

*C. kennicottii* Cresson is quite variable over its extensive range. It varies in size, shade of yellow, and extent of yellow markings. The yellow markings are more yellow in the Eastern States (*C. kennicottii kennicottii* Cresson) and more white in the southern and western specimens (*C. kennicottii belai* Scullen). In the Southeast, the female of *C. kennicottii kennicottii* Cresson is nearest to *C. blakei* Cresson. They can be separated by the reddish amber of *C. blakei*, by the terminal border of the clypeal process, and by the difference in the tegulae. The male of *C. kennicottii kennicottii* Cresson is close to the male of *C. finitima finitima* Cresson. These usually can be separated by the elevated tegulae on *C. finitima finitima* Cresson. In the West, the female of *C. kennicottii beali* Scullen can be separated from *C. con-*

*vergens* Viereck and Cockerell and other closely related species by the differences in the clypeal process. The relative size of the clypeal process on the female varies. The males are difficult or impossible to separate in some cases.

TYPES.—The type male of *C. kennicottii* Cresson, from Louisiana (Robert Kennicott), is at the Philadelphia Academy of Natural Sciences, no. 1952. The type male of *C. eriogoni* Viereck and Cockerell, from Dripping Springs, Organ Mts., N. Mex., at flowers of *Eriogonum* (Cockerell), is at the Philadelphia Academy of Natural Sciences, no. 10377.

DISTRIBUTION.—Although not taken in any large numbers, this species is recorded from most of the states east of the Rocky Mountains, from southern Canada and Massachusetts south to the Gulf of Mexico, and west to Arizona. It is much more common in the South Central States.

PREY RECORD.—None.

PLANT RECORD.—*Acacia* sp. (Arizona), *Cassia* sp. (Nebraska, Texas), *Ceanothus* sp. (Virginia), *Chaerophyllum tointurieri* (Texas), *Chamaecrista fasciculata* (Nebraska), *Cicuta* sp. (Virginia), *Cicuta maculata* (Colorado, Virginia), cotton (Arizona, Texas), *Daucus carota* (North Carolina, Ohio, Virginia), *Empatorium* sp. (Texas), *Euphorbia bicolor* (Texas), *Euphorbia marginata* (Missouri), *Helianthus tuberosa* (Kansas), *Melilotus alba* (Ohio), *Pastinaca sativa* (Colorado), *Solidago* sp. (Colorado, Texas), *Tamarix gallica* (Texas), willow (*Salix*), (Texas).



FIGURES 21, 22.—Localities of: 21, *C. kennicottii kennicottii* Cresson; 22, *C. kennicottii beali* Scullen.

18b. *Corcercis kennicottii beali*, new subspecies

FIGURE 22

FEMALE.—Length 8 mm. Black with creamy-yellow to white markings; otherwise, very close to *C. kennicottii kennicottii* Cresson.

The female type shows two breaks in the band on tergum 2 similar to the female of *C. convergens* Viereck and Cockerell but the clypeal processes are very different. Other females taken at the same time and place show the above bands varying from a solid line to a series of evanescent spots.

**MALE.**—Length 6 to 7 mm. Black with creamy-yellow markings; otherwise, very close to *C. kennicottii kennicottii* Cresson.

**TYPES.**—The holotype female and the allotype male, from Scottsdale, Ariz., May 13, 1961 (R. S. Beal), taken in copula, are deposited at the U.S. National Museum, no. 66157. Paratypes are as follows:

**ARIZONA:** ♀, Amado, July 3, 1957, cotton (G. D. Butler); ♂, Apache, Cochise Co., 5000 ft., Aug. 4, 1955 (R. R. Dreisbach); ♀, ♂, Avra Valley, July 6, 1955, July 5, 1957, cotton (Butler-Werner); ♀, Camp Verde, Sept. 4, 1957 (T. R. Haig); ♀, 5 ♂♂, Canelo, July 30, 1956, May 18, 1957, June 21, 1958 (G. D. Butler); 2 ♀♀, Casa Grande, May 26, 1955 (G. D. Butler); ♀, 2 ♂♂, same locality, June 20, July 17, 18, 1956, alfalfa (C. Williams); 2 ♂♂, Continental, June 14, 1955, desert willow (G. D. Butler); 2 ♀♀, Continental, July 27, 1956, alfalfa (C. Williams); 4 ♂♂, Coolidge, May 29, 1955, *Acacia* sp. (G. D. Butler); ♂, Coolidge, July 24, 1946 (H. A. Scullen); ♀, Eloy, Sept. 28, 1955, alfalfa (G. D. Butler); ♀, Eloy, June 20, 1956, alfalfa (G. D. Butler); ♀, Kansas Settlement, July 28, 1955 (Butler-Werner); ♀, Litchfield Park, June 11, 1954, alfalfa (G. D. Butler); ♀, ♂, Marana, July 6, 1956, July 5, 1957, mesquite, mustard (G. D. Butler); ♂, Marana, July 27, 1956, cotton (C. Williams); 5 ♂♂, Marinette, July 6, 1950 (R. H. Beamer); 2 ♀♀, Mesa, June 9, 1955, alfalfa (G. D. Butler); ♂, Oak Creek Canyon, July 9, 1952 (R. H. Beamer and party); ♀, Patagonia, May 21, 1955, mustard (G. D. Butler); ♀, Phoenix, Sept. 17, 1933 (R. H. Crandall); ♂, Phoenix, Aug. 8, 1950 (R. S. Beal); ♂, Phoenix, May 27, 1938 (Christenson); ♀, Phoenix, 1100 ft., Aug. 10, 1946 (H. A. Scullen); ♀, Portal, June 10, 1961 (H. A. Scullen); ♂, Portal, 5000 ft., Aug. 5, 1955 (R. R. Dreisbach); ♀, Queen Creek, July 13, 1956, cotton (C. Williams); ♀, Safford, June 24, 1954 (G. D. Butler); 4 ♀♀, 4 ♂♂, Scottsdale, June 12, 1961 (R. S. Beal); ♀, 9 mi. E. Superior, July 23, 1956 (Butler-Gerhardt); ♀, Superior, Boyce Thompson Arboretum, July 23, 1955 (G. D. Butler); ♂, Tempe, Aug. 20, 1956, alfalfa (C. Williams); ♀, Vernon, July 25, 1956 (Butler-Gerhardt); ♀, Yarnell to Prescott, July 23, 1942 (H. A. Scullen); ♀, Yuma, July 31, 1956, vetch (C. Williams); 2 ♂♂, Yuma Valley, June 14, 1957, July 11, 1956 (G. D. Butler). **CALIFORNIA:** ♂, Blythe, Riverside Co., July 8, 1956 (L. A. Stange); 2 ♂♂, Calexico, Imperial Co., July 11, 1957, Sept. 23, 1957 (E. I. Schlinger); ♂, Gordons Wells, Imperial Co., Aug. 29, 1957 (E. I. Schlinger); ♀, Ripley, Riverside Co., Aug. 16, 1946, *Helianthus annuus* (P. D. Hurd); ♀, 4 ♂♂, Secley, July 17, 1940 (R. H. Beamer and party). **NEW MEXICO:** ♂, Rodeo, 4000 ft., Aug. 3, 1959 (H. E. Evans). **TEXAS:** 2 ♂♂, Alpine, July 8, 1942 (H. A. Scullen); ♂, Austin; ♂, Bexar Co., 535 ft., April 1929, *Gaillardia amblyodom* (H. B. Parks); ♂, Brownsville, 1921 (J. C. Bridwell); ♂, Brownsville, July 11, 1945, cotton; 2 ♂♂, Brownsville, May 17, 1952 (Michener and party); ♂, Dallas, Dallas Co., Oct. 4, 1952, *Solidago altissima* (L. H. Shinner); ♂, Davis Mts., July 9, 10, 1942 (E. C. Van Dyke); 2 ♀♀, Davis Mts., July 9, 1942 (H. A. Scullen); ♀, 2 ♂♂, El Paso, July 11, 1917 (J. Bequaert); ♂, Williams Co., Aug. 25, 1933 (J. E. Gillaspay).

DISTRIBUTION.—Arizona, New Mexico, and adjoining areas.

PREY RECORD.—None.

PLANT RECORD.—As indicated under paratypes.

19. *Cerceris krombeini*, new species

FIGURES 23, 122a,b,c,

FEMALE.—Length 10 mm. Black with yellow markings; punctation coarse; pubescence very short.

Head slightly wider than the thorax; black except large frontal eye patches, patch on the upper surface of the clypeal process, patch back of the eye, base of mandibles, and a patch on the scape, all of which are yellow; clypeal border with four denticles, the medial pair separated from each other by a deep depression and somewhat larger than the lateral pair; clypeal process with the free margins converging to a blunt point, below which is a pair of prominent denticles; mandibles with one distinct denticle flanked on each side by a low and indistinct denticle; antennae normal in form.

Thorax black except for a divided band on the pronotum, two patches on the scutellum, the metanotum, a small patch on the pleuron, and the tegulae, all of which are yellow; tegulae slightly inflated and smooth; enclosure smooth except for a medial groove and deep pits in the lateral angles; mesosternal tubercles small but very acute; legs black on the basal segments to or just beyond the middle of the fore- and midfemora, beyond which they are yellow, the hindfemora entirely black or fuscous, the hindtibiae yellow basally, fuscous apically, and the hindtarsi fuscous; wings subhyaline, clouded apically, and the stigma black.

Abdomen with a semidivided patch on tergum 1, a broad band with rectangular emargination on the basal end of tergum 2, broad but deeply emarginate bands on terga 3 and 4, a broad band on tergum 5; venter immaculate; pygidium with the sides convex and the ends subequal and rounded.

MALE.—Length 8 mm. Black with light yellow markings; punctation coarse; pubescence very short.

Head about one-sixth wider than the thorax; black except for the entire face, base of mandibles, and scape, all of which are light yellow; clypeal margin with three denticles on the medial lobe, the medial denticle slightly the largest; hair lobes subequal in width to the lateral clypeal lobes; surface of the medial clypeal lobe normally convex; mandibles with two very low denticles; antennae normal in form.

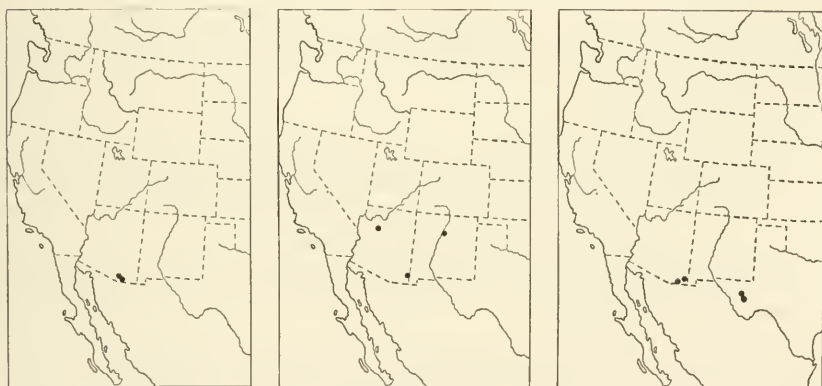
Thorax black except for a divided band on the pronotum, two spots on the scutellum, the metanotum, and the tegulae, all of which are light yellow; tegulae distinctly elevated but smooth; enclosure



smooth except for a medial groove and a few deep lateral pits; mesosternal tubercles absent; all legs black basally to near the apical ends of the femora, beyond which they are yellow except for a dark patch on the hindtibiae and the apical tarsal segments, which become darker; wings subhyaline but lightly clouded apically.

Abdomen black except for a small semidivided patch on tergum 1, a broad band on tergum 2, broad but deeply emarginate bands on terga 3, 4, and 5, and a band on tergum 6, all of which are yellow; pygidium with sides convex and both ends rounded and subequal in width.

The female of *C. krombeini* Scullen is very close in size, structure, and color pattern to the female of *C. astarte* Banks but it can be distinguished by the differences in the clypeal denticles, the form of the pygidium, and the color of the stigma of the wing, which is very light in the latter and black in the former.



FIGURES 23-25.—Localities of: 23, *C. krombeini* Scullen; 24, *C. neahminax* Scullen; 25, *C. poculum* Scullen.

**TYPES.**—The type female and allotype male of *C. krombeini* Scullen, both from Continental, Ariz., Aug. 24, 1959 (K. V. Krombein), are in the U.S. National Museum, no. 66158. Paratypes are as follows:

ARIZONA: 4 ♀♀, Continental, Aug. 2-4, 1959 (K. V. Krombein); 2 ♀♀, Madera Canyon, Santa Rita Mts., July 31, 1958 (R. M. Bohart); ♀, 10 mi. E. Nogales, Sept. 2, 1957 (T. R. Haig); ♀, 13 mi. NW. Nogales, Sept. 3, 1957 (T. R. Haig).

**DISTRIBUTION.**—This species is known only from 10 specimens taken in a limited area in southern Arizona.

**PREY RECORD.**—None.

**PLANT RECORD.**—None.

20. *Cerceris neahminax*, new species

FIGURES 24, 123a,b,c

FEMALE.—Length 8 mm. Color black and creamy yellow; normally pitted; clothed with short silvery hairs.

Head slightly wider than the thorax, mandibles with two centrally located subequal denticles, black except for sides of face, spot on center of front, and the clypeus, which are creamy yellow; clypeal border slightly extended centrally without denticles; clypeal process in the form of a short, thin ridge with the border approximately straight, half the width of the border extension and with a dark amber border; antennae normal in form, scape creamy yellow, peduncle dark amber, flagellum light amber below and dark amber above.

Thorax black except for two elongate patches on the pronotum, the metanotum, and the tegulae, which are creamy yellow; tegulae smooth and not elevated; enclosure smooth except for a central groove and pitted lateral borders; mesosternal tubercles absent; legs black except foretibiae, foretarsi, midtrochanter, midtibiae, midtarsi, hindtrochanter, and basal ends of hindtibiae, which are creamy yellow; wings subhyaline except for a clouded area at the apex and the stigma, which is dark amber.

Abdomen black except for a small elongate patch on tergum 1, narrow bands on terga 2 to 5, and lateral patches on sternites 3 and 4, which are creamy yellow; pygidium suboval with the basal end narrowed to a point and the apical end rounded.

MALE.—Unknown. It is probably close to the male of *C. acanthophila* Cockerell.

*C. neahminax* Scullen is very close to *C. acanthophila* Cockerell, from which it may be separated by the following characters:

	<i>acanthophila</i>	<i>neahminax</i>
pygidium:	pyriform	oval
mesosternal tubercle:	small, black	absent
mid- and hindfemora:	yellow apically	black, immaculate
mid- and hindtrochanter:	black	cream
clypeal process:	subequal in width to clypeal border ex- tension	about half the width of the clypeal extension
clypeal border extension:	margin sinuate	margin not sinuate

TYPES.—The type female from Sante Fe, N. Mex., June 11, 1935 (E. C. Van Dyke), is at the California Academy of Sciences. Paratypes are as follows:

ARIZONA: ♀, Ashfork, July 22, 1932 (R. H. Painter); ♀, Chiricahua Mts., July 27, 1957 (D. J. and J. N. Knull). NEW MEXICO: ♀, Mountain Park, June 27, 1940 (L. C. Kuitert). UTAH: ♀, Fool Creek Pass, Aug. 17, 1938 (G. F. Knowlton, F. C. Hermston).

DISTRIBUTION.—Very rare. Arizona, New Mexico, and Utah.

PREY RECORD.—None.

PLANT RECORD.—None.

21. *Cerceris poculum*, new species

FIGURES 25, 124a,b,c

FEMALE.—Length 9 to 10 mm. Black and creamy yellow; normally pitted; clothed with silvery hairs.

Head slightly wider than the thorax; black except for large frontal eye patches, the clypeus exclusive of the free border, patch on frons, all of which are creamy yellow; clypeal border with a broad extension at the base of the process; clypeal process broad and short with the sides strongly curved downward, black along the border; mandibles with two closely joined denticles subequal in size; antennae normal in form, scape and peduncle black, flagellum amber below, dark above.

Thorax black except for two elongate patches on the pronotum, two spots on the scutellum, the metanotum, and the tegulae, all of which are creamy yellow; tegulae smooth and not elevated; enclosure faintly ridged transversely along the medial groove, sparsely pitted laterally; mesosternal tubercle absent; mid- and hindlegs black basally to near the apical ends of the femora, beyond which they are creamy yellow except for an elongate patch of dark amber on each tibia and the tarsi, which become light amber; hindlegs have coxae black, trochanters creamy yellow, femora black, tibiae yellow with a dark amber patch and tarsi amber; wings subhyaline except for the stigma, which is amber.

Abdomen black except for creamy-yellow bands on terga 1 to 5, broadly emarginate on terga 2 to 5, two lateral patches on sternites 3 and 4; pygidium long, broader, and abruptly pointed basally, gradually narrowing and rounded apically.

MALE.—Unknown.

TYPES.—The type female, taken 23 mi. NE. Douglas, Ariz., 4450 ft., Aug. 1, 1946 (H. A. Scullen), is in the U.S. National Museum, no. 66159. Paratypes are as follows :

ARIZONA: ♀, Herford, Cochise Co. (W. M. Mann). TEXAS: ♀, Alpine, July 8, 1942 (H. A. Scullen); ♀, Davis Mts., Jeff Davis Co., June 27, 1942 (H. A. Scullen).

DISTRIBUTION.—Recorded only from southern Arizona and western Texas.

PREY RECORD.—None.

PLANT RECORD.—None.

**22a. *Cerceris rufinoda rufinoda* Cresson**

FIGURES 27; 125a,b,c

*Cerceris rufinoda* Cresson, 1865, p. 121.—Packard, 1866, p. 61.—Cresson, 1887, p. 286.—Schletterer, 1887, p. 491.—Robertson, 1889b, p. 303.—Ashmead, 1890, p. 32.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Viereck and Cockerell, 1904, p. 138.—Smith, H. S., 1908, p. 370.—Banks, 1912a, p. 26.—Stevens, 1917, p. 422.—Mickel, 1917b, p. 452.—Strandtmann, 1945, p. 311.—Scullen, 1951, p. 1010.

FEMALE.—Length 9 to 10 mm. Black and reddish amber with light yellow markings; deeply and closely pitted; clothed with very short silvery hairs.

Head slightly wider than the thorax; black except for two large frontal eye patches, round spots back of the compound eyes, base of mandibles and small patch on scape, all of which are light yellow; medial lobe of the clypeal border divided into an upper and lower part, the lower part is sinuate with a distinct, medial, denticle-like process, laterad of which are two less distinct extensions; the upper part of the clypeal border appears as two semidivided rounded processes (which appear to be on the lower part of the free surface, but closer examination shows them to be embodied in the divided border as indicated above); mandibles with two subequal denticles medially located (not evident on worn mandibles); antennae normal in form, scape amber with a yellow patch, peduncle dark amber, flagellum light amber below, darker above.

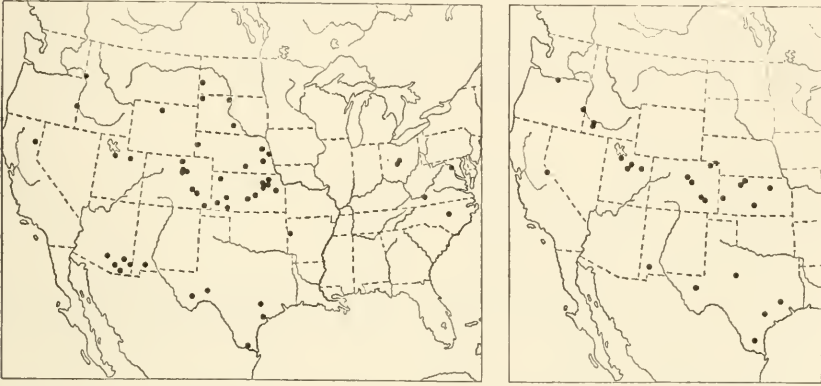
Thorax black with occasional infusions of red on the propodeum and marked with light yellow as follows: elongate patches on the pronotum, two spots on the scutellum, the metanotum, spot on the pleuron, and on the tegulae; tegulae somewhat elevated and pitted; enclosure deeply pitted and with a medial groove; mesosternal tubercles small; fore- and midlegs dark amber to near the apical ends of the femora, beyond which they are yellow, turning to light amber apically; posterior legs with coxae dark amber; trochanters, femora, and remaining parts varying shades of amber; wings subhyaline except the stigma, which is darker.

Abdomen black, except first tergum is reddish amber, tergum 2 with a broad yellow band emarginate (in some specimens the reddish amber coloration extends onto the anterior part of the second tergum), terga 3 to 5 with narrow emarginate bands of yellow; venter dark amber, immaculate; pygidium narrowing basally to a small rounded point, apical end broad and subtruncate.

MALE.—Length 9 to 10 mm. Black and reddish amber with yellow markings; deeply and closely pitted; clothed with very short silvery hairs.



Head about one-fifth wider than the thorax, black except most of face below antennal scrobes, minute spots back of compound eyes, mandibles except tips, and the scapes, all of which are yellow (in some specimens the lower clypeal border has considerable black); clypeal border with three black denticles on the medial lobe; hair lobes normal in width; clypeal surface convex; mandibles smooth except for a single slight elevation, variable in size; antennae normal in form, scape yellow; peduncle dark amber, flagellum light amber below, darker above.



FIGURES 26, 27.—Localities of: 26, *C. rufinoda rufinoda* Cresson (females only); 27, *C. rufinoda crucis* Banks.

Thorax black except for two elongate patches on the pronotum, two patches on the scutellum, the metanotum, patch on the pleuron, and the tegulae, all of which are yellow; tegulae elevated to a variable amount and very lightly pitted; enclosure transversely rugose and with a medial groove; mesosternal tubercles absent; legs dark amber to amber basally to near the apical end of femora, the remainder of leg parts yellow, becoming darker on the tarsi, amber patch on apical end of hindtibiae; wings subhyaline, cloudy at apex.

Abdomen black except first tergum, which is reddish amber with a semidivided yellow patch, tergum 2 with a broad yellow band (basal black may be replaced with amber), terga 3 to 6 with narrower bands of yellow somewhat emarginate; venter reddish amber anteriorly, dark amber posteriorly; pygidium sides convex with both ends subtruncate.

The extent of the reddish amber varies considerably in different specimens. Those with the red covering most of the propodeum were described as the variety *C. rufinoda crucis* by Viereck and Cockerell. The present writer has given this form the rating of a subspecies, but this may be open to question.

A shadow of uncertainty must remain in regard to the correct identification of the males of *rufinoda* Cresson and those of closely related species (until some worker can find a positive method of separating these and other difficult males) for the following reasons: (1) After extended studies, the writer has so far found no satisfactory characters to separate the males of *rufinoda* Cresson from the males of *echo* Mickel or other unknown, closely related species. (2) The species *rufinoda* Cresson was described from a male taken in an area (Colorado) where the females of both *echo* Mickel and the female long accepted as, but not proven to be, the female of *rufinoda* Cresson have been recorded in numerous localities. (3) Finally, two other closely related species, *irene* Banks and *argia* Mickel, of which the males are inseparable without association with the females, also are recorded from Colorado although less commonly. All of the above females are readily separated.

TYPE.—The type male of *C. rufinoda* Cresson, from the Rocky Mountains, Colorado Territory (Riding), is in the Philadelphia Academy of Natural Sciences, no. 1955.

DISTRIBUTION.—This widely distributed species is recorded mostly through the Central States of Kansas, Nebraska, South Dakota, and Colorado. The following records show the extremities and diversity of its range:

ALBERTA: 2 ♀ ♀, Medicine Hat, Aug. 9, 1939 (E. H. Strickland). ARIZONA: ♂, 11 mi. SW. Eloy, Pima Co., June 19, 1953 (T. R. Haig); 4 ♂ ♂, 11 mi. NW. Ft. Huachuca, July 10, 1952 (Beamer, Liang, La Berge); ♂, Santa Rita Mts., July 10, 1952 (Beamer, Liang, La Berge); ♂, 8 mi. S. Wilcox, July 12, 1952 (Beamer, Liang, La Berge). ARKANSAS: ♀, Ouachita Mts., 25 mi. N. Ft. Smith, Aug. 30, 1939 (E. C. Van Dyke). CALIFORNIA: ♀, Hallelujah Junction, Lassen Co., July 7, 1949 (P. D. Hurd). IDAHO: ♀, Lewiston, July 18, 1925 (C. L. Fox). ILLINOIS: ♀, Carlinville, 1902 (Robertson); ♀, White Heath, Aug. 7, 1915. MONTANA: 3 ♀ ♀. NORTH CAROLINA: 4 ♀ ♀, June 14, 1927, July 16, 1926, Aug. 3, 1926, Sept. 8, 1921 (C. S. Brimley). NORTH DAKOTA: ♀, Beach, Aug. 25, 1923 (C. N. Ainslie). NEW JERSEY: ♀, Melage, Sept. 15, 1907. NEW MEXICO: ♀, 20 mi. E. Deming, 4000 ft., Aug. 2, 1946 (H. A. Scullen). OHIO: 2 ♀ ♀, Columbus, July 21, Aug. 2, 1941 (J. E. Gillaspay); 2 ♀ ♀, Franklin Co., July 17, 1942 (R. W. Strandtmann); ♀, Madison Co., June 28, 1942 (R. W. Strandtmann). OREGON: ♀, Ontario, 2150 ft., Aug. 2, 1929 (H. A. Scullen). TEXAS: ♀, Belfrage; ♀, Donna, July 21, 1933 (J. W. Monk); 2 ♀ ♀, Fedor; ♀, Ft. Hancock, July 9, 1917; ♀, Lee Co., June; ♀, Victoria, Victoria Co., July 25, 1917. UTAH: ♀, Lincoln, July 22, 1949 (G. F. Knowlton); ♂, Tooele, July 22, 1952 (G. F. Knowlton). VIRGINIA: ♀, Clifton, Aug. 6, 1933 (J. C. Bridwell); ♀, Falls Church, July 24, 1913 (Wm. Middleton). WYOMING: ♀, Grey Bull, Aug. 16, 1927 (H. H. Knight).

PREY RECORD.—*Tychius picirostris* (Fabricius), Madison Co., Ohio, June 29, 1942 (Strandtmann, 1945, p. 311); *Smicronyx squalidus* Casey, Columbus, Ohio.

PLANT RECORD.—*Aster* sp. (Kansas), *Ceanothus americanus* (Ill-

nois), *Chamaecrista fasciculata* (Nebraska), *Daucus carota* (Ohio), *Euphorbia* sp. (Nebraska), *Euphorbia marginata* (Kansas), *Helianthus* sp. (Nebraska), *Sium circutaefolium* (North Dakota), *Solidago* sp. (Kansas), *Thelesperma gracile* (Kansas).

**22b. *Cerceris rufinoda crucis* Viereck and Cockerell, new status**

FIGURE 27

*Cerceris rufinoda* var. *crucis* Viereck and Cockerell, 1904, p. 139.—Smith, H. S., 1908, 370.—Banks, 1912a, p. 26.—Stevens, 1917, p. 422.—Mickel, 1917b, p. 453.—Scullen, 1951, p. 1010.

**FEMALE.**—Length 9 to 10 mm. Black and reddish amber with light yellow markings; deeply and closely pitted; clothed with very short silvery hairs.

Head as for *C. rufinoda rufinoda* Cresson.

Thorax black except for the propodeum, which is reddish amber exclusive of the enclosure, which is black; yellow markings as follows: two elongate patches on the pronotum, broken band on the scutellum, the metanotum, patch on the pleuron, and the tegulae; tegulae elevated and pitted; enclosure rugose; mesosternal tubercle small; legs amber; wings subhyaline, clouded at the apex.

Abdomen black except tergum 1, which is reddish amber with a semidivided yellow patch; tergum 2 with a broad yellow band; terga 3 to 5 with deeply emarginate yellow bands; venter amber anteriorly becoming darker posteriorly.

**MALE.**—Indistinguishable.

This is being raised from a variety to a subspecies.

**TYPE.**—The type female, from Las Cruces, N. Mex., Sept. 25, 1895 (Cockerell), is at the Philadelphia Academy of Natural Sciences, no. 10393.

**DISTRIBUTION.**—Mostly in the Rocky Mountain area and occasionally west. Specimens are as follows:

**CALIFORNIA:** ♀, Topaz Lake, Mono Co., July 17, 1951 (A. T. McClay). **COLORADO:** ♀, Boulder Co., Sept. 10, 18, 1925 (C. P. Custer); ♀, Crowley Co., Aug. 4, 1933; ♀, Denver, Sept. 5, 1920; ♀, White Rock, near Boulder, 5100 ft., Aug. 13, 1919; ♀, Julesburg, Aug. 4, 1899; ♀, Jumbo Rs. [sic], Crook [Logan Co.], Aug. 12, 1901 (Sandhouse); ♀, LaJunta, 4100 ft., Aug. 12, 1920. **IDAHO:** ♀, Bruneau, Owyhee Co., July 22, 1952 (W. F. Barr); Hot Creek Falls, Owyhee Co., July 22, 1952 (W. F. Barr). **KANSAS:** ♀, McKinney Lake, Kearny Co., July 12, 13, 1954 (H. E. and M. A. Evens); ♀, Norton Co., 2270 ft., Aug. 24, 1912 (F. X. Williams); ♀, Phillips Co., 1940 ft., Aug. 30, 1912 (F. X. Williams); 4 ♀♀, Riley Co., Aug. 30, Sept. 3, 4 (J. B. Norton); ♀, Riley Co., Sept. (Marlatt). **NEW MEXICO:** ♀, Deming, 4000 ft., Aug. 2, 1946 (H. A. Scullen). **OREGON:** ♀, Ontario, 2150 ft., Aug. 2, 1929 (H. A. Scullen); ♀, 14 mi. E. The Dalles, July 17, 1929 (H. A. Scullen). **TEXAS:** ♀, Davis Mts., Jeff Davis Co., July 9, 1942 (H. A. Scullen); ♀, Fabens, Oct. 17, 1943 (R. W. Strandtmann); ♀, Fedor, Sept. 23, 1897 (Birkmann). **UTAH:** ♀, Goshen, Aug. 12, 1949 (George Bohart);

♀, Myton, Duches Co., June 30, 1958 (J. W. MacSwain); ♀, Provo (O. E. Johnson); ♀, Tooele, Aug. 23, 1937 (L. L. Hanson).

PREY RECORD.—None.

PLANT RECORD.—*Croton neomexicanum* (New Mexico), *Euphorbia* sp. (Kansas), *Helianthus* sp. (Idaho), *Solidago* sp. (Utah).

### 23. *Cerceris truncata* Cameron

FIGURES 28, 126a,b,c

*Cerceris truncata* Cameron, 1890, p. 121.

FEMALE.—Length 10 mm. Black with creamy-yellow markings; closely and deeply pitted; clothed with short silvery hairs, longer on the propodeum.

Head subequal in width to the thorax; black except for frontal eye patches, clypeal process, lower portion of the clypeus, narrow patch between the antennae, spots back of compound eyes, and base of mandibles, all of which are very light yellow; clypeal border with a broad emarginate extension mesad, laterad of which are two much smaller, irregular, denticle-like processes; clypeal process only slightly convex, about as broad as long, with the free border almost straight, smooth, rounded at the corners and amber; mandibles with two small subequal denticles; antennae dark amber except the flagellum, which is somewhat lighter below.

Thorax black except for a broken band on the pronotum, two spots on the scutellum, the metanotum, two triangular patches on the enclosure, two triangular areas on the propodeum, patch on the tegulae, and small spot on the mesosternal tubercle, all of which are light yellow; tegulae minutely pitted and not elevated; enclosure minutely pitted and faintly rugose transversely; mesosternal tubercle prominent; legs dark amber except for elongate yellow areas on all tibiae, the fore- and midtarsi; wings subhyaline except for a clouded area along the anterior half and the stigma, which is dark amber.

Abdomen black except for a broad band on tergum 1, narrow band on terga 2, 4, and 5, lateral spots on tergum 3, sternite 1, and most of sternite 2, small lateral spots on sternites 3, 4, and 5, all of which are light yellow; elevated area on the anterior part of sternite 3; pygidium somewhat pyriform with both ends rounded.

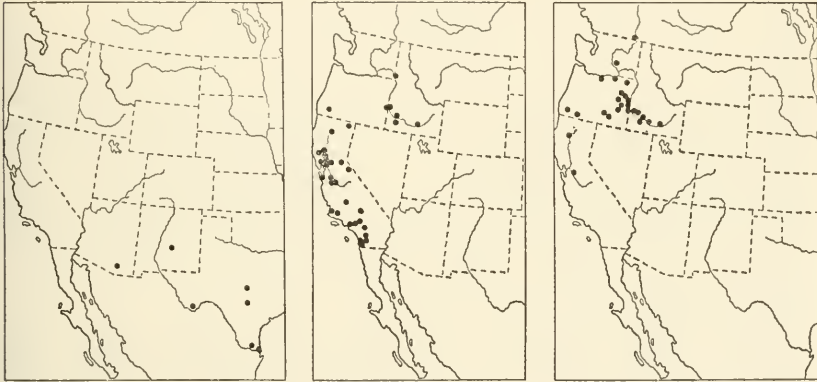
MALE.—Length 9 mm. Black with creamy-yellow markings; closely and deeply pitted; clothed with short silvery hairs; longer on the propodeum.

Head about one-fifth wider than the thorax; black except for large frontal eye patches, a large central patch on the clypeus, and minute evanescent spots back of the compound eyes, all of which are creamy yellow; clypeal border with a broad extension on the median lobe,



which has a sinuate margin but no distinct denticles; mandibles smooth; antennae normal in form, dark amber except the lower surface of the flagellum, which is lighter.

Thorax black except for a divided band on the pronotum, two spots on the scutellum, the metanotum, two spots on the enclosure, two triangular areas on the propodeum, small evanescent spot on the pleuron, and a patch on the tegula, all of which are light yellow; tegulae lightly pitted and not elevated; enclosure relatively smooth except for a central groove and a few deep pits along the lateral borders; mesosternal tubercle absent; legs black except for elongate areas on the sides of the tibiae and the basal parts of the tarsi; wings subhyaline except for a clouded area along the anterior half and the stigma, which is dark amber.



FIGURES 28-30.—Localities of: 28, *C. truncata* Cameron; 29, *C. vanduzeei vanduzeei* Banks; 30, *C. vanduzeei eburnea* Scullen.

Abdomen black except for a broad band on tergum 1, narrow bands on terga 2, 4, 5, and 6, small lateral spots on tergum 3, sternite 1, and small lateral spots on sternites 2 to 6, all of which are light yellow; pygidium oval with ends subequal and rounded; light yellow patches to the sides of the pygidium.

The extent of the light markings varies in both sexes. Some specimens may show little or no yellow on the face, and the spots on the enclosure may disappear.

*C. truncata* Cameron closely resembles *C. convergens* Viereck and Cockerell and *C. kennicottii* Cresson. In both cases the clypeal process is the best distinguishing character.

TYPE.—The type female of *C. truncata* Cameron, from Temax, Yucatan, Mexico (Gaumer), is at the British Museum, no. 21.1,433.

DISTRIBUTION.—Southern Arizona, southern New Mexico, and southern Texas.

PREY RECORD.—*Algarobius prospis* (LeConte), *Mimosestes amicus* (Horn), *Mimosestes protractus* (Horn), *Neltumius arizonensis* (Schaefer), all from Tucson, Ariz., in 1957–1958, by F. Werner (1960, pp. 43–44), taken on Mexican palo verde (*Parkinsonia*).

PLANT RECORD.—Casually about oleander (Arizona).

**24a. *Cerceris vanduzeei vanduzeei* Banks**

FIGURES 29, 127a,b,c

*Cerceris vanduzeei* Banks, 1917, p. 114; 1947, p. 32.—Scullen, 1951, p. 1010; 1960, p. 80.

*Cerceris complanata* Mickel, 1917a, p. 340.—Banks, 1947, p. 31.—Scullen, 1951, p. 1006.

FEMALE.—Length 8 to 9 mm. Black with yellow markings; closely and deeply pitted; clothed with very short silvery hairs.

Head slightly wider than the thorax; black except for large frontal eye patches, most of the central lobe and side lobes of clypeus, spot back of compound eyes, basal half of mandibles, and patch on the scape, all of which are yellow; clypeal border showing five distinct denticle-like extensions; clypeal surface with a medially located low, blunt elevation, below which is a pair of erect black denticles; mandibles with two denticles, the more apical one somewhat the larger; antennae normal in form, scape with a yellow patch, peduncle amber, flagellum light amber below, dark above.

Thorax black except for two elongate patches on the pronotum, two spots on the scutellum, the metanotum, variable patch (which may be divided) on the propodeum, patches on the pleuron, and the tegulae, all of which are yellow; tegulae smooth and not elevated; enclosure heavily ridged at 45° angle to central groove; mesosternal tubercle small; legs black basally to near apical ends of femora, beyond which they are largely yellow except for patches of amber on the tibiae, tarsi becoming darker; forefemora with a pronounced depressed area on the posterior side; wings subhyaline except for the stigma, which is amber.

Abdomen black with yellow emarginate bands on terga 1 to 5; bands on terga 2 to 5 broadly and deeply emarginate, band on tergum 2 broader than others; venter dark amber, immaculate or showing very small yellow spots laterally on some sternites; pygidium suboval with both ends rounded.

MALE.—Indistinguishable. Probably it is being confused with closely related species.

The entire face of the female may be black except for the frontal eye patches. Mandibular denticles may be worn off so that the mandibles appear smooth. The clypeal elevation and surface denticles

are similar to those of *C. conifrons* Mickel, but the two species are very distinct in other respects.

**TYPES.**—The type female, from San Diego, Calif., June (E. P. Van Duzee), is at the Museum of Comparative Zoology, Harvard, no. 10030. The type female of *C. complanata* Mickel, taken at Auburn, Calif., Sept. 20, 1916 (L. Bruner), is at the University of Nebraska. The allotype male of *C. complanata* Mickel, taken at the same location and date, is also at the University of Nebraska.

**DISTRIBUTION.**—The subspecies *C. vanduzeei vanduzeei* Banks is recorded only from California.

**PREY RECORD.**—None.

**PLANT RECORD.**—Chaparel (California), *Croton californicus* (California), *Eriogonum fasciculatum* (California).

#### 24b. *Cerceris vanduzeei eburnea*, new subspecies

##### FIGURE 30

**FEMALE.**—Length 9 to 10 mm. Black with white markings; closely and deeply pitted; clothed with very short silvery hairs.

Head about one-fifth wider than the thorax; black except for large frontal eye patches, large spot on medial lobe of clypeus, small spot back of compound eyes, basal part of mandible, and patch on scape, all of which are white; clypeal border with five distinct denticle-like extensions on the medial section; clypeal surface with a centrally located low, blunt elevation, below which are two black denticles very close to the clypeal border; mandibles with one prominent denticle, basal of which is a very small evanescent denticle; antennae normal in form, scape with a creamy-white patch, peduncle amber, flagellum light amber below and darker above.

Thorax black except for two elongate patches on the pronotum, two spots on the scutellum, the metanotum, patch on the pleuron, and patch on the tegulae, all of which are creamy white; tegulae smooth and not elevated; enclosure heavily and irregularly ridged at a 45° angle to the medial groove and deeply pitted laterally; mesosternal tubercle present; legs black to near the apical ends of the femora, beyond which they are creamy white except for patches of amber on the tibiae and the tarsi, which are darker; wings subhyaline, becoming cloudy at the apex, except the stigma, which is amber.

Abdomen black with white bands on terga 1 to 5; bands on terga 2 to 5 emarginate; band on tergum 2 broader than others; pygidium suboval with both ends rounded; venter dark amber, immaculate.

**MALE.**—Unknown. Probably it is being confused with closely related forms.

The females show considerable variation in the amount of white on the face. It is common for all of the white on the face to disappear

except the frontal eye patches, which may be greatly reduced. The smaller denticle on the mandibles often is not evident.

The subspecies *C. vanduzeei eburnea* Scullen is similar in structure and color pattern to *C. vanduzeei vanduzeei* Banks except that the markings of the former are white while those of the latter are yellow.

**TYPES.**—The type female, from North Powder, Union Co., Oreg., July 24, 1938, *Solidago* (H. A. Scullen), is deposited with the U.S. National Museum, no. 66160. Paratypes are as follows:

**BRITISH COLUMBIA:** ♀, Vernon, July 18, 1947 (Hugh B. Leech). **CALIFORNIA:** ♀, Turlock, Stanislaus Co., June 3, 1955 (P. D. Hurd). **IDAHO:** 2 ♀ ♀, Acequia, Minidoka Co., June 30, 1957 (W. F. Barr); ♀, Bliss, Gooding Co., July 23, 1955 (J. E. Gillaspay); ♀, 2 mi. W. Gardens, Boise Co., July 3, 1956 (W. F. Barr); ♀, Glens Ferry, July 8, 1927; ♀, Hagerman, July 1, 1930; 4 ♀ ♀, Hot Springs, Owyhee Co., July 4, 1951, July 12, 1952, July 5, 1956 (W. F. Barr); ♀, Kiler, Sept. 7, 1923 (Carl D. Duncan); 2 ♀ ♀, Melba, Canyon Co., July 10, 19, 1957 (H. W. Homan); ♀, Mountain Home, 3138 ft., Sept. 1, 1952 (W. F. Barr); ♀, 12 mi. NW. Regina, Ada Co., July 11, 1952 (W. F. Barr). **OREGON:** 2 ♀ ♀, 5 mi. NW. Adrian, Malheur Co., June 25, 1958 (R. K. Eppley); ♀, Alvord Desert, Andrews, Harney Co., 4200 ft., July 4, 1927 (H. A. Scullen); 3 ♀ ♀, 36 mi. E. Baker, Baker Co., 2450 ft., July 31, 1929 (H. A. Scullen); ♀, Blitzen Valley, Harney Co., July 16, 1936 (S. Jewett, Jr.); 3 ♀ ♀, 3 mi. S. Elgin, Union Co., Aug. 18, 1937 (Bolinger and Jewett); 6 ♀ ♀, Grants Pass, Josephine Co., Aug. 7, 1950 (H. A. Scullen); ♀, Herford, Baker Co., 3650 ft., July 21, 1940 (H. A. Scullen); ♀, 12 mi. W. Huntington, Baker Co., 2225 ft., July 22, 1936 (H. A. Scullen); 3 ♀ ♀, 4 mi. E. Juntura, Malheur Co., 1440 ft., July 14, 1940 (H. A. Scullen); 2 ♀ ♀, Klamath Falls (Algoma), Klamath Co., Aug. 23, 1958 (Joe Schuh); ♀, North Powder, Baker Co., July 24, 1938 (H. A. Scullen); 4 ♀ ♀, Ontario, Malheur Co., July 16, 1940, *Solidago* sp. (H. A. Scullen); 6 ♀ ♀, Powder River, 26 mi. E. Baker, 3000 ft., Aug. 9, 1937 (Bolinger and Jewett); ♀, Prairie City, Grant Co., 3250 ft., Aug. 12, 1929 (H. A. Scullen); ♀, Rowena, Wasco Co., July 15, 1923 (Carl D. Duncan); ♀, Umatilla, Umatilla Co., July 14, 1931 (J. Nottingham); ♀, Unity, Baker Co., 5800 ft., July 21, 1940 (H. A. Scullen); ♀, Wilderville, Josephine Co., Aug. 4, 1949 (H. A. Scullen). **UTAH:** ♀, Forest Grove, Aug. 8, 1949 (G. F. Knowlton). **WASHINGTON:** 3 ♀ ♀, Stratford, Grant Co., July 4, 1920 (R. C. Shannon).

**DISTRIBUTION.**—Pacific Northwest.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Achillea* sp. (Idaho, Oregon), *Chrysothamnus* sp. (Idaho), *Cleomella* sp. (Idaho), *Daucus carota* (Idaho, Oregon), *Eriogonum* sp. (Idaho), *Eriogonum elatum* (Oregon), *Helianthus* sp. (Idaho), *Melilotus* sp. (Idaho), *Solidago* sp. (Oregon).

## Group II

This group is distinguished by the following characters: (1) There is no prominent elevation on the surface of the medial lobe of the clypeus; however, two small papilliform structures are just above the clypeal border. (2) The second abdominal segment is much broader than the first, especially noticeable on the female. (3) The meso-



sternal tubercle is absent from both sexes. (4) The terminal segment of the male antenna is distorted slightly. (5) The males have relatively inconspicuous denticles on the clypeal border or none at all. (6) The male hair lobes are normal in width. (7) Buprestidae are used as prey.<sup>11</sup>

25a. *Cerceris californica californica* Cresson

FIGURES 31, 128a,b,c

- Cerceris californica* Cresson, 1865, p. 128.—Packard, 1866, pp. 60, 63.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 487.—Dalla Torre, 1897, p. 454.—Ashmead, 1899, p. 295.—Woodworth, 1913, p. 94.—Rohwer, 1917, p. 244.—Banks, 1947, p. 20.—Scullen, 1951, p. 1006.—Linsley and MacSwain, 1956, pp. 71-84.—Krombein, 1958a, p. 197.—Scullen, 1960, pp. 75-77.
- Cerceris ferruginior* Viereck and Cockerell, 1904, p. 134.—Viereck, 1960b, p. 234.—Johnson and Ledig, 1918, p. 24.—Banks, 1947, p. 25.—Scullen, 1951, p. 1007.
- Cerceris garciana* Viereck and Cockerell, 1904, p. 135.—Scullen, 1951, p. 1008.
- Cerceris populorum* Viereck and Cockerell, 1904, p. 135.—Banks, 1947, p. 25.—Scullen, 1951, p. 1009.
- Cerceris cognata* Mickel, 1916, p. 408.—Scullen, 1951, p. 1006.
- Cerceris denticularis* Banks, 1917, p. 113; 1947, p. 20.—Scullen, 1951, p. 1007.
- Cerceris interjecta* Banks, 1919, p. 84.—Scullen, 1951, p. 1009.
- Cerceris calodera* Banks, 1947, pp. 22-23.—Scullen, 1951, p. 1006.
- Cerceris illota* Banks, 1947, p. 23.—Scullen, 1951, p. 1008.
- Cerceris isolde* Banks, 1947, p. 24.—Scullen, 1951, p. 1008.
- Cerceris californica californica* Scullen, 1961, p. 46.

FEMALE.—Length 13 mm. Black with yellow markings, which may become amber in limited areas; closely and moderately pitted; clothed with short silvery hairs.

Head subequal in width to the thorax; face, area back of eyes, two patches on vertex, base of mandibles, scape of antennae, all are yellow; clypeal margin slightly extended from the medial lobe, emarginate in the center; clypeal surface slightly convex; clypeal surface denticles barely evident; mandibles with two denticles, the more apical one much the smaller and undivided, the more basal one larger and with two distinct apices, and the more basal of these two apices much the smaller; antennae normal in form.

Thorax black except the pronotum, tegulae, patch on pleuron, scutellum, metanotum, most of propodeum, and small spots on the enclosure, all of which are yellow with limited amber margins; tegulae not elevated, and relatively smooth except for many minute pits; enclosure finely rugose; mesosternal tubercle absent; legs yellow with some margins showing amber; wings subhyaline, cloudy in the anterior area.

<sup>11</sup> Bridwell has reported an exception that occurs when buprestids are not available. See under *C. fumipennis* Say (p. 412).

Abdomen with broad bands more or less emarginate with black on anterior center, margins with some amber; venter largely yellow with limited amber; pygidium broad basally, tapering gradually to a narrow rounded end apically.

MALE.—Length 10 mm. Black to amber with yellow markings; close and moderately deep pits; clothed with short silvery hairs.

Head one-sixth wider than the thorax; face yellow below antennae except clypeal margin, which is dark amber; clypeal border slightly extended from the middle lobe with three very indistinct denticle-like extensions; clypeal surface slightly convex; mandibles without denticles; antennae normal in form except for a slight curvature of the apical segment.

Thorax black to amber with yellow markings; divided yellow band on the pronotum; scutellum black or with light spots; metanotum yellow or with a broken yellow band; tegulae not elevated, relatively smooth, yellow; enclosure smooth except for minute pits and a few large pits in the lateral angles; mesosternal tubercles absent; propodeum black to reddish amber; legs black to light amber to the apical end of the femora, largely yellow beyond; wings subhyaline, clouded along anterior border and apex.

Abdomen black with broad bands on terga 2 to 6, more or less emarginate on terga 3 to 6; tergum 1 black becoming reddish amber on some specimens; anterior half of tergum 2 becoming reddish on some specimens; venter black to more or less infused with amber and yellow; pygidium with sides subparallel and the apical end rounded.

VARIATION.—*C. californica* Cresson varies in color from the black and yellow form of the Northwest and the Rocky Mountains, represented by the type of the species, to the extremely light forms represented by *C. arno* Banks. In these lightest forms, the black has been replaced completely by very light amber to yellow. The latter are found mostly in the southwestern desert areas of California and Arizona. It is no doubt largely due to this extreme variation in color that so many species have been erected by former workers who have seen relatively few specimens representing limited areas. It is a matter of opinion which of them, if any, should be considered subspecies. The present author herein has designated the extreme lighter forms, which are more limited in their distribution, as the subspecies *C. californica arno* Banks. *Cerceris californica* Cresson may be confused with related species found in the same area such as *C. completa* Banks and *C. grandis* Banks. These are best separated by the characters given in the key.

TYPES.—The type male of *C. californica* Cresson, from California is at the Philadelphia Academy of Natural Sciences, no. 1953. The type male of *C. ferruginior* Viereck and Cockerell, from Deming,

N. Mex., is at the Philadelphia Academy of Natural Sciences, no. 10378. The type male of *C. garciana* Viereck and Cockerell, from New Mexico, is at the Philadelphia Academy of Natural Sciences, no. 10380. The type male of *C. populorum* Viereck and Cockerell, from New Mexico, is at the Philadelphia Academy of Natural Sciences, no. 10385. The type female of *C. cognata* Mickel, from Worland, Wyo., July 10, 1911 (L. Bruner), is at the University of Nebraska. The type female and allotype male of *C. denticularis* Banks, from Umatilla, Oreg., June 1882 (Samuel Henshaw), are at the Museum of Comparative Zoology, Harvard, no. 10028. The type male of *C. interjecta* Banks, from Utah, is at the Museum of Comparative Zoology, Harvard, no. 13767. The type male of *C. calodera* Banks, from Jacumba, Calif., Aug. 12, 1917 (W. M. Wheeler), is at the Museum of Comparative Zoology, Harvard, no. 27622. The type male of *C. illota* Banks, from Arizona, is at the Museum of Comparative Zoology, Harvard, no. 23541. The type male of *C. isolde* Banks, from Arizona, is at the Museum of Comparative Zoology, Harvard, no. 23540.

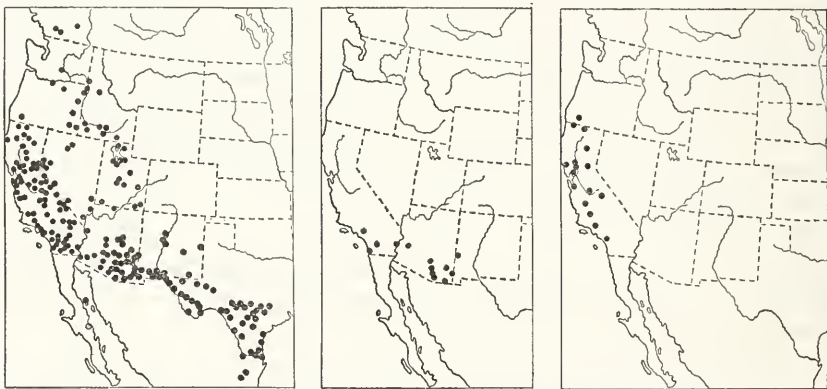
DISTRIBUTION.—*C. californica californica* Cresson, in its numerous color variations, ranges from Idaho and Utah on the east to the Pacific Ocean, and from British Columbia to southern and western Texas. Approximately 2000 specimens of this common species have been studied by the writer.

PREY RECORD.—The only intensive studies of the nesting habits and prey of this species were published by Linsley and MacSwain (1956). As would be expected, the prey was species of the beetle family Buprestidae.

The following species were found to be collected by *C. californica californica* Cresson at Tanbark Flat, San Dimas Experimental Forest, in the San Gabriel Mountains of Southern California: *Acmaeodera acuta* LeConte, *A. adenostomae* Cazier, *A. angelica* Fall, *A. coquilletti* Fall, *A. dohrni* Horn, *A. dolorosa* Fall, *A. fenyesi* Fall, *A. gemina* Horn, *A. hepburni* LeConte, *A. holsteni* White, *A. jocosa* Fall, *A. nexa* Fall, *A. perlanosa* Timberlake, *A. plagiaticauda* Horn, *A. prorsa* Fall, *A. quadriseriata* Fall, *A. sinuata* VanDyke, *Agrilus angelicus* Horn, *A. blandus* Horn, *A. politus* (Say), *Anthaxia aeneogaster* Cast, *Chrysobothris deleta* LeConte, *C. lucana* Horn, *C. femorata* (Oliver).

PLANT RECORD.—*Acacia* sp. (Chihuahua, Mexico), *A. augustissima* (Arizona), *A. greggii* (Arizona, Texas), alfalfa (Arizona), *Asclepias* sp. (Arizona, New Mexico), *A. erosa* (California), *A. mexicana* (California), *A. speciosa* (Utah), *Baccharis* sp. (Texas), *B. glutinosa* (Arizona, California), *Bebbia juncea* (California), *Cercidium texanus* (Texas), *Cleome lutea* (Oregon), *Chaenactis* sp. (California), *Chilopsis linearis*, desert willow (Arizona), *Chrysothamnus* sp. (California),

*Colubbrina texensis* (Texas), *Condalia* sp. (Arizona), *C. obtusifolia* (Texas), *Croton* sp. (Arizona), *C. californicus* (California), *Dalea emoryi* (California), *D. schottii* (California), *Daucus carota* (Oregon), *Dithyrea wislizeni* (New Mexico), *Eriogonum* sp. (California), *E. elatum* (Oregon), *E. fasciculatum* (California), *E. inflatum* (California), *Grindelia* sp. (California), *Helianthus* sp. (Oregon), hollyhock (Texas), *Hyptis emoryi* (California), *Isocoma heterophylla* (California), *Lepidium medium* (Arizona), *Melilotus* sp. (California), *M. alba* (Arizona, Idaho, Oregon), *Monarda* sp. (Texas), *Mortonia sacbrella* (Arizona), *Pithecolobium* sp. (Texas), *Polygonum auberti* (California), *Prosopis* sp. (California, Texas), *Rhamnus crocea* (California), *Rhus* sp. (Texas), *Salsola pestifer* (Utah), *Sapindus saponaria* (Arizona), *Solanum elaeagnifolium* (Arizona), *Solidago* sp. (Oregon), *Tamarix* sp. (Utah), *Verbesina encelioides exauriculata* (Arizona), water hemlock (Oregon), *Wislizenia refracta* (Arizona), *Yucca* sp. (New Mexico).



FIGURES 31-33.—Localities of: 31, *C. californica californica* Cresson; 32, *C. californica arno* Banks; 33, *C. completa* Banks.

25b. *Cerceris californica arno* Banks, new status

FIGURE 32

*Cerceris arno* Banks, 1947, p. 19.—Scullen, 1951, p. 1005; 1960, pp. 75-76.

*Cerceris argyrotricha* Rohwer, 1908, p. 324.—Scullen, 1951, p. 1005; 1960, pp. 75-76.

FEMALE.—Structurally the subspecies *C. c. arno* Banks is like the typical form of *californica* Cresson. *C. c. arno* Banks represents the extreme lighter form found in the southwestern desert area. In the lighter forms the black is more or less replaced by light amber or yellow.

Head largely yellow bordered with amber; vertex may become very



dark amber in the ocellar area; the gena and occiput are mottled with yellow and amber.

Thorax largely yellow and amber, which becomes mottled with darker shades or becomes very dark amber on the dorsum of some specimens; scutellum, metanotum, and propodeum, including the enclosure, vary from all yellow to mottled with yellow and light amber; legs have variable amounts of yellow and light amber.

Abdomen almost entirely yellow with some light amber margins.

MALE.—Males follow very much the color pattern and shades of the females.

Head largely yellow with light amber areas about the ocelli and back of the eyes.

Thorax mostly yellow with light amber areas on the scutum, becoming very dark on some specimens; legs yellow and light amber.

Abdomen largely yellow with light amber borders.

*Cerceris californica* Cresson is easily confused with related species found in the same areas, such as *C. completa* Banks and *C. grandis* Banks. These are best separated by the characters given in the key. The males of *C. californica arno* Banks and *C. grandis* Banks especially are difficult to separate. The surface sculpturing of the enclosure has been found most useful by the author. The enclosure of the male *grandis* shows evidence of ridges which become prominent in the females of that species, while the enclosure of the male of *californica arno* is relatively smooth except for a few pits in the lateral angles.

TYPES.—The type female of *C. arno* Banks is at the Museum of Comparative Zoology, Harvard, no. 23541, and the type female of *C. argyrotricha* Rohwer is at the U.S. National Museum, no. 28485.

DISTRIBUTION.—Southwestern desert area of California and Arizona.

PREY RECORD.—None.

PLANT RECORD.—*Baccharis glutinosa* (Arizona), cotton (Arizona), *Croton* (California), *Eriogonum albertianum neomexicanum* (Arizona), *Prosopis juliflora* (Arizona).

## 26. *Cerceris completa* Banks

FIGURES 33, 129a,b,c

*Cerceris completa* Banks, 1919, p. 83; 1947, p. 17.—Scullen, 1951, p. 1006.

FEMALE.—Length 15 mm. Black with yellow markings; normally pitted; clothed with short silvery hairs, which are somewhat longer in the region of the propodeum and the first abdominal segment.

Head slightly wider than the thorax; black except the entire face below the antennae other than the clypeal margin, base of the mandibles, the scape, two elongate patches on the vertex, and patch on the

genae bordering the compound eye, all of which are yellow; clypeal surface without elevations except two minute clypeal surface denticles just above the margin; clypeal margin with four denticle-like extensions, the lateral ones somewhat more acute than the two medial ones, which are definitely rounded; mandibles with two centrally located denticles, the basal one being the larger and more acute; antennae normal in form.

Thorax black, except for two wide patches on the pronotum, small spots on the scutellum, the metanotum, patches on the propodeum, and patches on the pleuron, all of which are yellow; enclosure deeply ridged; mesosternal tubercle absent; legs yellow except for irregular patches on the dorsal sides of the femora and limited irregular areas on the coxae and trochanters; wings subhyaline.

Abdomen: tergum 1 with lateral yellow patches; tergum 2 yellow, which all but surrounds a black area connected with the black anterior border; terga 3, 4, and 5 deeply emarginate anteriorly with a black area; tergum 6 yellow, exclusive of the pygidium, which is amber; venter largely yellow; pygidium pyriform with the apical end rounded.

MALE.—Length 11 to 15 mm. The type is smaller than most specimens examined by the author. Black with yellow markings; normally pitted; clothed with short silvery hairs, which are somewhat longer in the region of the propodeum and the first abdominal segment.

Head slightly wider than the thorax; black except the entire face below the antennae, large patch on the scape, and the base of the mandibles, all of which are yellow; clypeal surface slightly convex; clypeal border slightly extended from the medial portion and somewhat sinuate; mandibles without denticles; antennae with apical segment slightly curved.

Thorax black except widely separated patches on the pronotum, the tegulae, and a divided band on the scutellum, all of which are yellow; enclosure lightly ridged in the lateral angles; mesosternal tubercle absent; legs mostly black to near the middle of the femora, beyond which they are yellow; wings subhyaline but somewhat clouded along the anterior border; stigma light amber.

Abdomen: tergum 1 black; tergum 2 yellow with a broad black patch in the center and a black anterior margin; terga 3 and 4 with yellow partly surrounding a broad black area in the center; terga 5 and 6 largely yellow but deeply emarginate with black anteriorly; tergum 7 with yellow patches to the sides of the pygidium; venter largely yellow; pygidium with sides slightly converging to a truncate apical end.

The female is here described for the first time. *C. completa* Banks closely resembles the darker specimens of *C. californica* Cresson,

from which it can be separated by the form of the pygidium, the sculpture of the enclosure, and the color pattern of the terga.

**TYPES.**—The type male of *C. completa* Banks, from Claremont, Calif., is at the Museum of Comparative Zoology, Harvard, no. 13767.

**DISTRIBUTION.**—Scattered records through California and one record from southern Oregon. Specimens are as follows:

**CALIFORNIA:** ♂, Acton, Los Angeles Co., Aug. 25, 1958 (E. I. Schlinger); ♂, Auburn, 1919 (L. Bruner); 2♂♂, Buttonwillow, Kern Co., June 17, 1957; ♂, Cache Creek Canyon, Yolo Co., May 30, 1955 (E. I. Schlinger); ♂, Davis, July 11, 1948 (Brad Stevens); ♂, Deep Spring, Inyo Co., July 16, 1953 (R. M. Bohart); ♂, Deep Spring, July 16, 1953 (E. I. Schlinger); ♂, Deep Spring, July 17, 1953 (N. Malley); ♂, Deep Spring, July 17, 1953 (W. D. McLellan); ♀, Geyserville, July 31, 1927 (J. C. Bradley); ♂, Gorman, Los Angeles Co., July 13, 1956, *Asclepias mexicana* (E. G. Linsley); ♂, Gorman, Los Angeles Co., July 13, 1956 (P. D. Hurd); 2♂♂, Grass Lake, Siskiyou Co., 5000 ft., July 4, 1952 (M. Cazier and party); 2♂♂, Happy Camp, Siskiyou Co., July 8, 1958 (J. Powell); ♀, Kern Co., northwest corner of county, on U.S. 41, June 20, 1952 (W. D. Murray); ♂, Kernville, July 24, 1940 (L. S. Lipovsky); ♂, 20 mi. S. Livermore, Alameda Co., June 6, 1959 (D. J. Burdick); ♂, Lodoga, Colusa Co., July 12, 1955 (E. A. Kurtz); 3♂♂, 3 mi. N. Lone Pine, Inyo Co., July 3, 1953 (J. W. MacSwain); ♂, 2 mi. N. Lone Pine, Inyo Co., July 13, 1953 (W. D. McLellan); ♂, Los Angeles Co.; ♂, Los Gatos Creek, Mt. Diablo Range, Fresno Co., June 6–8, 1907 (Bradley); ♂, 15 mi. W. Mineral, June 16, 1941 (D. J. and J. N. Knull); ♂, Ridge Rute, Los Angeles Co., 3000–4000 ft., June 13, 1931 (Don Prentiss); ♂, Ridge Rute, June 13, 1931 (H. A. Scullen); ♂, 7 mi. S. San Antonio Ranger Station, Santa Clara Co., June 27, 1953 (R. O. Schuster); ♂, Santa Monica Mts., July 9, 1912 (J. C. Bridwell); 2♂♂, Three Rivers, 600–800 ft., July 12–14, 1907. **OREGON:** 2♂♂, Gold Hill, July 12, 1930 (H. A. Scullen).

**PREY RECORDS.**—None.

**PLANT RECORDS.**—*Asclepias mexicana* (California).

### 27a. *Cerceris dilatata dilatata* Spinola

FIGURES 34, 130a,b,c

*Cerceris dilatata* Spinola, 1841, p. 118.—Dalla Torre, 1897, p. 457.—Scullen, 1961, p. 46; 1962, pp. 57–8.

*Cerceris maximiliani* Saussure, 1867, pl. 1, p. 94.—Cameron, 1890, p. 111.—Dalla Torre, 1897, p. 467.

*Cerceris contracta* Taschenberg, 1875, p. 396.—Schletterer, 1887, p. 489.—Dalla Torre, 1897, p. 456.

*Cerceris olymponis* Strand, 1910, p. 140.

*Cerceris semiatra* Banks, 1947, p. 25.—Scullen, 1951, p. 1005.

**FEMALE.**—Length 13 mm. Color black with brownish yellow markings; normal to closely pitted; clothed with short silvery hairs.

Head slightly wider than the thorax, black except for narrow frontal eye patches and base of mandibles, all of which are brownish yellow, and the first three or four segments of the flagellum, which are light brown below; clypeal border is smooth, slightly extended, and emarginate in the center; clypeal surface is elevated slightly in the

center but without a process; clypeal surface denticles almost indistinguishable; mandibles with two separated, centrally located denticles, the more apical one the smaller; antennae normal in form.

Thorax black except for two small patches of brownish yellow on the pronotum; tegulae not elevated, with many minute pits and a few large pits; enclosure surface with many minute pits and a few scattered large pits in the lateral angles; mesosternal tubercle absent; legs black except for small stripes on the tibiae and first tarsal segments of the first and second pairs of legs; wings subhyaline with a more clouded area along the anterior borders of the first pair.

Abdomen black except for a band on the posterior border of the third tergum, wide emarginate bands on terga 4 and 5, patches laterad of the pygidium on tergum 6 and most of sternites 3, 4, and 5, all of which are brownish yellow; pygidium semioval with the apical end somewhat smaller.

MALE.—Length 9–10 mm. Black with brownish-yellow markings; deeply and closely pitted; clothed with short silvery hairs.

Head slightly wider than the thorax, black except for elongate, narrow frontal eye patches; clypeal border slightly extended on the medial lobe, ending in three distinct, subequal denticles; hair lobes of the usual narrow type; mandibles without denticles; antennae largely black, terminal segments slightly curved.

Thorax black except for two irregular small patches on the pronotum; tegulae not elevated, with a few deep pits, between which are many minute pits; enclosure with an indistinct central groove, a few deep pits in the lateral angles and the general surface covered with scattered minute pits; mesosternal tubercles absent; legs black except for narrow stripes on the first two pair of tarsi; wings clouded along the anterior area.

Abdomen black except for the apical half of tergum 3, most of terga 4 to 7, and sternites 4 to 6, all of which are brownish yellow; pygidium with sides slightly convex and apical end truncate.

TYPES.—A neotype male of *C. dilatata* Spinola, designated by the writer, is at the Instituto e Museo di Zoologia, Università di Torino, Italy. The male and a female, both apparently determined by Spinola, are from Cayenne, French Guiana. A lectotype female of *C. maximiliani* Saussure, from Mexico, designated by the writer, is at the Museum Histoire Naturelle, Geneva, Switzerland. A lectotype female of *C. contracta* Taschenberg, from Brazil, designated by the writer, is at the Zoologisches Institut, Martin-Luther-Universität Halle (Saale), Germany. The holotype female of *C. olymponis* Strand, from Paraguay, is at the Zoologisches Museum, Humboldt Universität, Berlin. The type male of *C. semiatra* Banks, from Pati-

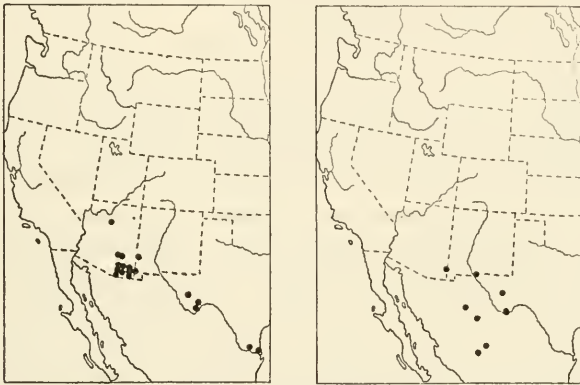


gonia, Ariz., is at the Museum of Comparative Zoology, Harvard, no. 27620.

**DISTRIBUTION.**—This species has been taken from southern Arizona, through southern New Mexico, and southern Texas. It ranges south through Mexico and Central America and into South America.

**PREY RECORD.**—None.

**PLANT RECORD.**—(All from Arizona) *Acacia* sp., *Baccharis glutinosa*, *Cephalanthus* sp., *Chilopsis linearis* (desert willow), *Cissus trifoliata*, *Condalia lycioides*, *Croton* sp., *Erigeron canadensis*, *Eriogonum* sp., *Lepidium* sp., *Melilotus alba*, *Prosopis* sp. (mesquite), *Sapindus saponaris*, *Wislizenia refracts* (jackass clover).



FIGURES 34, 35.—Localities of: 34, *C. dilatata dilatata* Spinola; 35, *C. dilatata chisosensis* Scullen.

**27b. *Cerceris dilatata chisosensis*, new subspecies**

FIGURE 35

**FEMALE.**—Length 13 mm. Black with reddish-amber and brownish-yellow markings; structurally like *C. dilatata dilatata* Spinola but colors depart from the typical subspecies by having considerable reddish amber covering most of the propodeum exclusive of the enclosure, the first abdominal segment, and extending onto the second tergum. The legs are amber and not black. Color marking otherwise more extended as indicated below.

Head black except for two large frontal eye patches and most of the medial clypeal lobe, base of mandibles, and the antennal scape, all of which are brownish yellow; clypeal margin and clypeal surface denticles are amber.

Thorax black except for two elongate patches on the pronotum, the tegulae, and the metanotum, which are brownish yellow to amber, and the propodeum, which is largely reddish; enclosure black; legs amber; wings clouded with light amber.

Abdomen differs from that of *dilatata dilatata* Spinola by having the first abdominal segment reddish with the red extending irregularly onto the second tergum; the second tergum also has a broad irregular patch of yellow along the posterior border; venter largely yellow to amber; pygidium and remainder of tergum 6 is amber.

MALE.—Length 9–10 mm. Black with reddish-amber and brownish-yellow markings; structure like that of the subspecies *dilatata dilatata* Spinola.

Head coloration typical of the subspecies *dilatata dilatata* Spinola except the antennae are somewhat lighter.

Thorax coloration pattern follows very much that of the female except the red of the propodeum is somewhat less in extent; legs are light amber; wings are light amber.

Abdominal coloration follows the pattern of the female of the subspecies.

TYPES.—The type female and allotype male, from Chisos Mts., Big Bend National Park, July 6, 1942 (H. A. Scullen), are in the U.S. National Museum, no. 66161. Paratypes are as follows:

ARIZONA: ♀, southern Arizona, August 1902 (F. H. Snow); 2 ♂♂, 5 mi. W. Southwestern Research Station, Portal, 5400 ft., July 18, 1956, *Melilotus alba* (M. Cazier); ♀, same locality, Aug. 24, 1956 (E. Ordway). TEXAS: 7 ♂♂, Chisos Mts., Big Bend National Park (J. Bequaert); ♂, same locality, July 6, 1942 (E. C. Van Dyke); 7 ♀♀, 16 ♂♂, same locality, July 3–6, 1942 (H. A. Scullen); ♂, Davis Mts., Jeff Davis Co., Aug. 22, 1936 (J. N. Knull); ♀, ♂, Davis Mts., July 10, 1942 (E. C. Van Dyke); 10 ♂♂, Davis Mts., June 21, 29, July 9, 1942 (H. A. Scullen); 2 ♂♂, Davis Mts., Madera Canyon Park, July 20, 1950 (Ray F. Smith); ♀, El Paso, June 23, 1942 (E. C. Van Dyke). MEXICO: ♀, Chihuahua, Chih., Aug. 12, 1951, *Baccharis glutinosa* (P. D. Hurd); 2 ♂♂, 18 mi. W. Jimenez, Chih., Aug. 10, 1951, *Baccharis* sp. (H. E. Evans); ♂, 33 mi. S. Hidalgo del Parral, 6400 ft., Oct. 24, 1957 (H. A. Scullen); ♀, 10 mi. W. Namiquipa, Chih., 6600 ft., July 3, 1947 (C. D. Michener); ♀, San Juan Del Rio, Durango, 5200 ft., July 30, 1947 (C. D. Michener).

DISTRIBUTION.—This subspecies has been taken mostly in the Chisos Mountains of the Big Bend National Park, Texas, but limited numbers have been collected in nearby mountains and in northern Mexico.

PREY RECORD.—None.

PLANT RECORD.—*Baccharis glutinosa* (Chihuahua, Mexico), *Melilotus alba* (Arizona).

### 28. *Cerceris fumipennis* Say

FIGURES 36, 131a,b,c

*Cerceris fumipennis* Say, 1837, p. 381.—Dahlbom, 1845, p. 204.—Smith, F., 1856, p. 465.—LeConte, 1883, p. 762.—Cresson, 1865, p. 113.—Packard, 1866, p. 60.—Cresson, 1872, p. 227.—Taschenberg, 1875, pp. 397–8.—Schletterer, 1887, p. 493.—Cresson, 1887, p. 282.—Marlatt, 1890, p. 147.—

Robertson, 1892, p. 105.—Ashmead, 1894, p. 60.—Robertson, 1896, p. 73.—Dalla Torre, 1897, p. 462.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Peckham, 1900, p. 90.—Smith, J. B., 1900, p. 519.—Viereck, 1903, p. 120.—Hartman, 1905, p. 66.—Smith, H. S., 1908, p. 366.—Smith, J. B., 1910, p. 678.—Grossbeck, 1912, pp. 135, 299.—Banks, 1912a, p. 17.—Viereck, 1916, pp. 695, 696.—Mickel, 1917b, p. 447.—Britton, 1920, p. 342.—Rau, 1922, pp. 30–31; 1928, p. 338.—Cartwright, 1931, pp. 269–270.—Scullen, 1951, p. 1008.—Krombein, 1952b, p. 95.—Linsley and MacSwain, 1956, p. 74.—Evans, 1957, pp. 84–85, pl. 11.—Krombein, 1958b, pp. 101, 110.—Evans, 1959, p. 156.

*Cerceris cincta* Dahlbom, 1845, p. 204.—Smith, F., 1856, p. 438.—Cresson, 1887, p. 282.

*Cerceris unicineta* Taschenberg, 1875, p. 397.—Patton, 1880, p. 403.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 505.—Dalla Torre, 1897, p. 462.—Ashmead, 1899, p. 295.

**FEMALE.**—Length 15 mm. Black with very limited creamy-yellow markings; deeply and closely pitted; clothed with short silvery hairs.

Head subequal in width to thorax; black except for large patches mesad of the compound eyes, a patch on the medial lobe of the clypeus, and base of mandibles, all of which are light yellow; clypeal border with two widely separated denticles, between which is a broad extension emarginate in the center; clypeal surface denticles inconspicuous; mandibles with two distinct, medially located denticles, the basal one much the larger; antennae normal in form, black.

Thorax black except for two patches on the pronotum and the metanotum, which are creamy yellow; tegulae smooth except for a few scattered pits, not elevated; enclosure covered with minute pits, a few scattered lateral large pits, and a central groove; mesosternal tubercles absent; legs black except for elongate blotchy patches on all tibiae; wings clouded.

Abdomen black except for a broad band on tergite 2 and small lateral patches on tergite 3, which are creamy yellow, more or less blotched with black; venter black, immaculate; pygidium somewhat pyriform with the surface rugose.

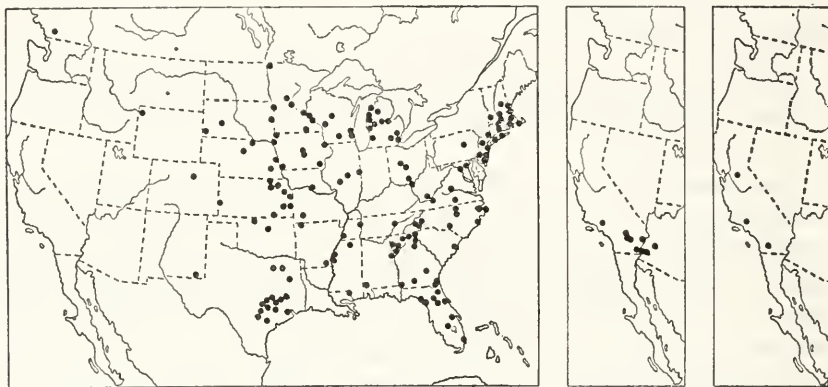
**MALE.**—Length 10–12 mm. Black with creamy-yellow markings; normally pitted and clothed with short silvery hairs.

Head slightly wider than the thorax, black except for large eye patches on the face; clypeal border slightly extended, with a straight margin except for a slight medial denticle; mandibles without distinct denticles; antennae black, normal in form.

Thorax black except for a broken band on the prothorax and the metanotum, which are creamy yellow; tegulae lightly pitted and not elevated; enclosure with many minute pits and a few large pits; mesosternal tubercle absent; legs black except for creamy-yellow areas on all tibiae; wings clouded.

Abdomen black with a broad band on tergum 2 and lateral patches on terga 3, 4, and 5, which may be connected by a broken line along the posterior margins of the terga; venter black, pygidium slender and elongate with both ends blunt.

Structurally, *C. fumipennis* Say is very close to *C. californica* Cresson and *C. dilatata* Spinola, but the color patterns are quite different.



FIGURES 36-38.—Localities of: 36, *C. fumipennis* Say; 37, *C. grandis grandis* Banks; 38, *C. grandis perena* Scullen.

**TYPES.**—Say's type male, from Indiana, apparently is lost. A neotype male, from 3 miles west of Kaskaskia River, Boulder, Ill., June 21, 1938 (D. Bolinger), has been designated by the writer and is deposited at the U.S. National Museum. The type male of *C. cincta* Dahlbom, from "America," is at the Universitets Zoologiska Institution, Lund, Sweden. The type female of *C. uncinata* Taschenberg, from "Tenn.," should be at the Zoologisches Institut, Martin-Luther-Universität, Halle (Saale), Germany.

**DISTRIBUTION.**—East of the Rocky Mountains to the Atlantic States and from southern Canada to the Gulf of Mexico.

**PREY RECORD.**—The prey-collecting habits of *C. fumipennis* Say have been observed by more workers than any other species of *Cerceris*. With the exception reported below by Bridwell, the prey always has been some species of Buprestidae. The following quotation from unpublished notes by J. C. Bridwell, on file at the U.S. National Museum, is of special interest in this connection:

This species belongs to a natural group in *Cerceris*, of which the species in many parts of the world all, so far as known, store their nests with adult Buprestidae.

The season of flight for Buprestidae ends about August 1st but the wasps are then still active. The material below illustrates the substitute used when Buprestidae are no longer present.



After the conclusion of the flight of the Buprestidae in 1933, the colony of *Cerceris fumipennis* under observation at Clifton, Virginia, stored their nests with adult beetles of the genus *Chlamisus*, Chrysomelid beetles resembling Buprestidae only in their hard integuments and in their metallic luster.

Other observers have found *C. fumipennis* Say collecting Buprestidae much later in the fall. No other observers have recorded the species collecting anything but Buprestidae.

The following species of Buprestidae have been recorded or otherwise indicated as prey of *C. fumipennis* Say: *Acmeodera pulchella* (Herbst) (Scullen, from Iowa), *Actenodes acornis* (Say) (Cartright, from S.C.), *Agilus arcuatus* (Say) (Cartright, from S.C.), *A. bilineatus* (Weber) (Cartright, from S.C.), *A. abjectus* Horn (Rau, from Kansas), *A. ruficollis* (Fabricius), *Buprestis consularis* Gory, *B. fasciata* Fabricius, (Cartright, from S.C.), *B. lineata* Fabricius (Cartright, from S.C.), *B. maculipennis* Gory (Cartright, from S.C.), *B. rufipes* (Oliver) (Cartright, from S.C.), *B. striata* Fabricius (Cartright, from S.C.), *Chrysobothris azurea* LeConte (Evans, from Ark.), *C. blanchardi* Horn (Cartright, from S.C.), *C. dentipes* (Germer) (Cartright, from S.C.), *C. femorata* (Oliver) (Bridwell, from Kansas; Cartright, from S.C.; Scullen, from Iowa), *C. floricola* Gory (Cartright, from S.C.), *C. lesueurii* Castelnau (Cartright, from S.C.), *C. purpureovittata* Horn (Evans, from Ark.), *C. quadrimpressa* Castelnau (Peckham, from Wis.), *C. sexsignata* (Say) (Cartright, from S.C.; Scullen, from Iowa), *C. verdigripennis* Frost (Cartright, from S.C.), *Cinyra gracilipes* (Melsheimer) (Evans, from Ark.), *Conotrachelus* sp., (Hartman, from Tex.), *Dicerca caudata* LeConte (Evans, from Ind.), *D. americana* (Herbst) (Cartright, from S.C.), *D. nuttalli* var. *consularis* Gory (Cartright, from S.C.), *D. divaricata* (Say) (Scullen, from Iowa; Evans, from Ark.), *D. lurida* Fabricius (Scullen, from Iowa; Krombein, from N.C.; Cartright, from S.C.), *D. obscura* (Fabricius) (Bridwell, from Kansas), *D. punctulata* (Schönherr) (Cartright, from S.C.; Grossbeck, from Long Island, N.Y.; Robinson, from Va.), *D. spreata* (Gory), *D. tuberculata* (Castelnau) (Cartright, from S.C.).

PLANT RECORD.—*Ammi majus* (Texas), *Ampelopsis arborea* (Texas), *Ceanothus* sp. (North Carolina), *C. americana* (Massachusetts), *C. canadensis* (Massachusetts), *Chinquapin* sp. (Florida), *Circuta maculata* (Ohio), *Cyrilla racemiflora* (Florida), *Daucus carota* (Florida, Ohio), *Erigeron quercifloris* (Florida), hydrangia (North Carolina), *Melilotus alba* (Florida, Iowa, Kansas, Ohio, Texas), *Monarda citriodora* (Texas, New Jersey), tea (Florida), *Polygonum hydropiperoides* (Florida), *Polytaenia nuttallii* (Ohio), *Ptilimais capillaceum* (Florida), *Quercus virginiana* (North Carolina), *Rhus copallinum* (North Carolina), *Salix* sp. (Texas), *Solidago* sp. (North Carolina), *Spiraea telici-*

*folia* (Massachusetts), *Stillingia sylvatica* (Texas), water parsnip (Texas), *Vitex negundo* (Texas).

29a. *Cerceris grandis grandis* Banks

FIGURES 37, 132a,b,c

*Cerceris grandis* Banks, 1913b, p. 423; 1947, p. 10.—Scullen, 1951, p. 1008.

FEMALE.—Length 19 mm. Light yellow amber with limited markings of medium amber; punctation sparse and shallow; pubescence very short except in the region of the propodeum and first abdominal segment.

Head subequal in width to the thorax; light yellow amber except patch in ocellar area, small patch on occiput and clypeal margin, all of which are light amber, and the apical part of the mandibles, which are dark amber; clypeal margin with two acute denticles opposite the junction of the middle and lateral lobes of the clypeus, and two mesal denticles that are broad and flat; clypeal surface convex with two conspicuous small surface denticles just above the clypeal border; mandibles with one broad but pointed denticle, apicad of which is a depression; antennae normal in form with the scape mostly yellow and the remaining segments light amber.

Thorax largely light yellow amber with a broad mesal stripe and two narrow lateral stripes of amber on the mesotergum and more or less amber along all sutures; enclosure heavily ridged at 45° angle to the base; legs yellow; wings subhyaline.

Abdomen all yellow; pygidium with sides narrowing abruptly to a rounded apical point.

MALE.—Length 14 mm. Coloration close to that of the female but with somewhat more amber; punctation and pubescence as in the female.

Head subequal in width to the thorax; largely yellow with dark amber stripes between the antennal scrobes and ocelli, and an irregular area of amber on the vertex; clypeal surface convex; clypeal margin extended on the medial lobe with the margin showing three inconspicuous denticle-like points; mandibles smooth; antennae normal except the apical segment, which is slightly curved.

Thorax largely light yellow amber except the mesotergum, which is light amber; tegulae not elevated and relatively smooth; enclosure smooth except for inconspicuous ridges that appear in the lateral angles.

Abdomen entirely yellow except for slight amber shading along some sutures; pygidium with sides converging slightly to a truncate apex.

*C. grandis grandis* Banks is very close to *C. californica arno* Banks,

from which it may be distinguished by the characters given in the key. The males especially are difficult to separate, and the writer has not yet found characters that are dependable in separating them.

**TYPE.**—The type female of *C. grandis* Banks, taken at Fort Yuma, Ariz., is in the American Museum of Natural History, New York, no. 21181.

**DISTRIBUTION.**—Southern California and adjoining areas. Specimens are as follows:

**ARIZONA:** ♂, Arlington, July 12, 1956, cotton (G. D. Butler); ♀, ♂, Roll, June 24, 1955 (G. D. Butler); ♂, Wellton, July 12, 1956, cotton (G. D. Butler); ♂, Yuma, July 1940 (K. D. Snyder); ♂, Yuma Valley, June 14, 1957 (G. D. Butler). **CALIFORNIA:** ♂, Blythe, June 23, 1946 (W. F. Barr, R. F. Smith); ♂, Coachella Valley, June 26, 1933; ♀, Imperial Co., June 1911 (J. C. Bridwell); ♀, Indio, June 27, 1936 (E. S. Ross); ♂, same locality, 1954 (G. E. Bohart); 2 ♂♂, 15 mi. S. Indio, June 27, 1936 (M. Cazier); ♀, northern end of Salton Sea, May 25, 1940; ♂, Thermal, Riverside Co., July 2, 1956, *Melilotus alba* (M. Wasbauer).

**PREY RECORDS.**—None.

**PLANT RECORDS.**—None.

#### 29b. *Cerceris grandis percna*, new subspecies

##### FIGURE 38

**FEMALE.**—Length 19 mm. Structurally like *C. grandis grandis* Banks in all respects except for color. The subspecies *percna* is black with yellow markings and a limited amount of amber.

Head black or amber except face below antennal scrobes, base of mandibles, broken areas back of compound eyes, and two small patches on the vertex, all of which are yellow; entire genae outside of the above yellow areas back of the compound eyes are amber in the type but black on the paratypes; scape amber but remainder of antennae almost black.

Thorax black except for a divided band on the pronotum, two small spots on the scutellum, the entire metanotum, two large areas on the propodeum, and a small patch on the mesopleuron, all of which are yellow bordered with amber; an amber area covers much of the mesosternum; legs largely amber; wings subhyaline.

Abdomen largely yellow except for black patches in the center of all terga joining the basal border but becoming very small on the 6th tergum; venter largely yellow infused with amber.

The type appears to be somewhat discolored with cyanide. The paratype from San Diego is almost entirely black and yellow with relatively little amber.

**MALE.**—Unknown.

Types.—The type female, taken at Mokelumne Hill, Calaveras Co., Calif., 1500 ft. elevation (F. E. Blaisdell), is at the U.S. National Museum, no. 66162. Paratypes are as follows:

CALIFORNIA: ♀, Werner's, San Diego Co., Aug. 1, 1921; ♀, Los Angeles Co.

DISTRIBUTION.—Southern California.

PREY RECORD.—None.

PLANT RECORD.—None.

### Group III

This group is distinguished by the following characters: (1) A distinct lamella (or lamellae) appears on the free margin of the medial clypeal process. (2) The extension of the medial clypeal lobe on the male is noticeably narrow, with three more or less distinct denticles on its margin. (3) Mesosternal tubercles are absent from both sexes or are very small. (4) The terminal segment of the male antenna is distorted slightly. (5) Chrysomelidae are used as prey to feed the young, as recorded for three species (*compacta* Cresson, *flavofasciata* H. S. Smith, and *robertsonii* Fox).

#### 30. *Cerceris cochisi*, new species

##### FIGURE 39

FEMALE.—Length 14 mm. Amber and yellow with little or no black or dark amber, punctuation and pubescence normal. Structurally near the female or *C. compacta compacta* Cresson except that specimens of the former are slightly larger. Enclosure somewhat smoother.

Head yellow below the antennal scrobes, two yellow spots on the vertex, and yellow patches back of the compound eyes; small dark areas between the ocelli; basal two-thirds of mandibles yellow, apical third and denticles dark amber; scape yellow and amber, remaining segments of antennae amber becoming darker apically.

Thorax amber except pronotum, scutellum, metanotum, and tegulae, which are yellow; legs light amber; wings shaded with amber.

Abdomen yellow except for tergum 1, anterior half of tergum 2, most of first 2 sternites, and the sixth segment, all of which are light amber.

MALE.—Length 12 mm. Amber and yellow with little or no black or dark amber, punctuation and pubescence normal. Structurally near the male of *C. compacta* Cresson, except that specimens average slightly larger. Enclosure somewhat smoother.

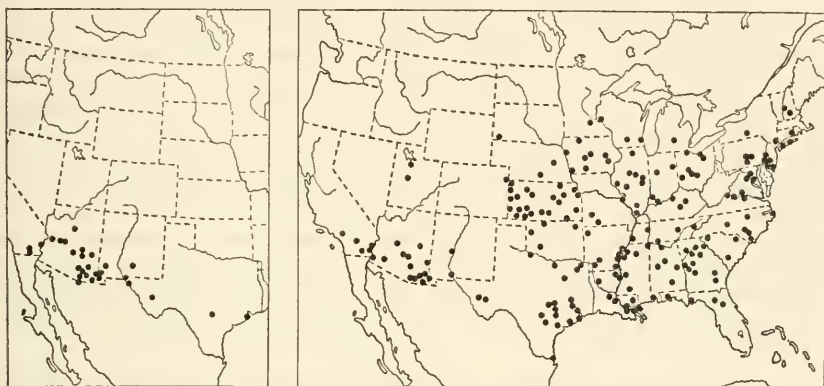
Head yellow below the antennal scrobes and patches back of the compound eyes; small black ocellar area; basal half of mandibles yellow, apical half dark; scape yellowish amber, basal half of antennae amber, apical half very dark.



Thorax dark amber, clouded with variable amounts of very dark amber; pronotum, scutellum, metanotum, and tegulae yellowish amber; legs light amber; wings lightly shaded with amber.

Abdomen yellow except first and second segments, which are largely amber.

Some males show considerably more dark amber on the thorax and anterior abdominal segments than the type.



FIGURES 39, 40.—Localities of: 39, *C. cochisi* Scullen; 40, *C. compacta compacta* Cresson.

**TYPES.**—The type female, Lordsburg to Silver City, N. Mex., over 5000 ft., June 17, 1942 (H. A. Scullen), and the allotype male, 2 mi. NE. Portal, Ariz., June 5, 1961, *Condalia lycioides* (H. A. Scullen), both at the U.S. National Museum, no. 66163. Paratypes are as follows:

**ARIZONA:** ♂, 3 to 5 mi. SW. Apache, Aug. 8, 1959, *Baccharis glutinosa* (H. E. Evans); ♂, Bill Williams Fork, August (F. H. Snow); 4 ♂♂, Boyce Thompson Arboretum, Superior, July 23, 1955, *Condalia*, *Acacia greggii* (G. D. Butler); 2 ♂♂, 3 mi. NW. Casabel, July 17, 1960, *Prosopis juliflora* (J. E. Gillaspay); ♂, Cedar Creek, 15 mi. W. Apache, June 21, 1957 (Butler-Werner); ♂, Congress Junction, July; ♂, Continental, Aug. 12, 1957 (G. D. Butler); ♀, 6 mi. E. Douglas, Cochise Co., Sept. 5, 1958 (M. A. Cazier); ♂, 5 mi. W. Fort Apache, June 21, 1957 (Butler-Werner); ♂, Fort Thomas, Graham Co., 2700 ft., Aug. 7, 1946 (H. A. Scullen); ♀, Granite Dells, July 5, 1950, *Nolina microcarpa* (J. G. Rozen); ♂, 15 mi. E. Pearce, July 10, 1955, *Sapindus* (Butler-Werner); ♂, Phoenix, July 11, 1932; ♂, Portal 4800 ft., Aug. 4, 1959 (H. E. Evans); 2 ♀♀, 5 mi. E. Portal, Cochise Co., Oct. 14, 1955 (C. and M. Cazier); 3 ♀♀, 12 ♂♂, 2 mi. NE. Portal, Cochise Co., 4700 ft., July 2, 1961, *Condalia lycioides* (H. A. Scullen); ♂, same locality, July 11, 1961, *Acacia greggii* (H. A. Scullen); 2 ♂♂, same locality, July 8, 11, 1961 (H. A. Scullen); 7 ♂♂, same locality, July 30, 1959, Aug. 1, 3, 1959, *Baccharis glutinosa* (M. Statham); ♀, Prescott, July 29 (J. N. Knull); 2 ♂♂, Sabino Canyon, Santa Catalina Mts., Pima Co., June 29, 1955, *Condalia*, *Cephalanthus* (Butler-Werner); ♂, Sedonia, June 29, 1950 (J. G. Rozen); ♂, Sedonia, June 29, 1950 (L. D. Beamer); 2 ♂♂, Seneca, Salt River Bridge, July 15, 1956, salt cedar (G. D. Butler); ♂, southern Arizona (Bequaert);

♂, Texas Pass, Dragoon Mts., July 19-21, 1917 (R. C. Shannon); ♂, Tombstone, July 27, 1955 (Butler-Werner); ♀, 5 mi. NW. Tombstone, Cochise Co., 4200 ft., July 25, 1937 (Rehn, Pate, Rehn); 5 ♂♂, Tucson (F. H. Snow); ♂, Tucson, May 7, 1957 (G. D. Butler); ♂, 9 mi. N. Tucson, July 25, 1946 (H. A. Scullen); ♂, 20 mi. NW. Tucson, July 6, 1955 (Butler-Werner); ♀, 20 mi. E. Tucson, Oct. 26, 1958 (G. and A. Ferguson); ♂, White Mts., June 19, 1950 (H. O. Wright). CALIFORNIA: ♀, Anza, Riverside Co., July 5, 1956 (R. M. Bohart); ♂, Blythe, Riverside Co., July 30, 1947, *Tamarix gallica* (J. W. MacSwain); ♂, Devils Canyon, Cochell Valley, May 7, 1932; ♂, Experimental Farm, Imperial Co., June 1912 (J. C. Bridwell); ♂, Imperial Co., May 1911 (J. C. Bridwell); ♂, Morango Valley, San Bernardino Co., Aug. 29, 1934 (C. D. Michener); ♂, Winterhaven, Imperial Co., June 16, 1956 (G. R. Ferguson). NEW MEXICO: 2 ♂♂, Alamogordo, July 7, 1902; ♂, 10 mi. NE. Lordsburg, June 17, 1942 (E. C. Van Dyke); ♀, Lordsburg to Silver City, 5000 ft., June 17, 1942 (H. A. Scullen); ♀, Rodeo, Hidalgo Co., July 29, 1959 (M. Statham). TEXAS: ♂, Bexar Co., May 2, 1930 (H. B. Parks); ♀, Davis Mts., Aug. 29, 1947 (D. J. and J. N. Knull); ♂, Davis Mts., July 6, 1936 (J. N. Knull); ♀, Devils River, May 3, 1907 (F. C. Bishop); ♀, El Paso, June 29, 1921 (Carl D. Duncan); ♂, Galveston, June 1900; ♀, McNary, Hudspeth Co., June 24, 1942 (H. A. Scullen). MEXICO: ♂, Las Parras, Baja, October 1923 (W. M. Mann); ♂, 20 mi. N. Mesquital, Baja, Sept. 27, 1941 (Ross and Bohart); ♂, Mulege, Baja, May 14, 1921 (E. P. Van Duzee); ♂, Nogales, Mar. 5, 1951; ♂, 10 mi. E. San Ignacio, Baja, Sept. 30, 1941 (Ross and Bohart).

DISTRIBUTION.—Southern Arizona, southern New Mexico, southwestern Texas and northern Mexico.

PREY RECORD.—None.

PLANT RECORD.—*Acacia greggii* (Arizona), *Baccharis glutinosa* (Arizona), *Cephalanthus* sp. (Arizona), *Condalia lycioides* (Arizona), *Nolina microcarpa* (Arizona), *Prosopis juliflora* (Arizona), *Sapindus* sp. (Arizona).

### 31. *Cerceris compacta compacta* Cresson

FIGURES 40, 133a,b,c

*Cerceris compacta* Cresson, 1865, p. 127.—Packard, 1866, p. 63.—Cresson, 1872, p. 230; 1887, p. 282.—Robertson, 1887, p. 201.—Schletter, 1887, p. 488.—Robertson, 1889, pp. 297-304; 1891, pp. 570-571; 1894a, pp. 439, 455, 464; 1894b, p. 112.—Dalla Torre, 1897, p. 456.—Ashmead, 1899, p. 295.—Smith, J. B., 1900, p. 519; 1910, p. 519.—Banks, 1912a, p. 17; 1912b, p. 107.—Viereck, 1916, pp. 695, 696.—Mickel, 1917b, p. 448.—Scullen, 1951, p. 1006; 1960, p. 77.

*Cerceris solidaginis* Rohwer, 1908, p. 323.—Banks, 1947, p. 15.—Scullen, 1951, p. 1010.

*Cerceris belfragei* Banks, 1917, p. 114.—Scullen, 1951, p. 1005.

FEMALE.—Length 10 mm. Black with yellow markings, normally pitted and clothed with short silvery hairs.

Head subequal in width to thorax, black except center of face between antennal scrobes, clypeal process margin, small spots back of the eyes, and basal part of mandibles, all of which are yellow; clypeal margin extended on the medial portion, without denticles;

clypeal process lunar shaped with two oval lamellae attached to the border; mandibles with two prominent denticles, between which is a much smaller but distinct denticle; antennae normal in form with the scape yellow and remaining segments amber.

Thorax black except for a divided band on the pronotum, two large patches or a divided band on the scutellum, the metanotum, two patches on the propodeum, patch on the mesopleuron (on some), and the tegulae, all of which are yellow; enclosure ridged at a 45° angle to the base; tegulae not elevated and sparsely pitted; mesosternal tubercles absent; legs dark amber basally, becoming light amber on the femora and yellow to amber beyond; wings subhyaline, but lightly clouded along the anterior margins.

Abdomen: tergum 1 with a small yellow medial patch, tergum 2 with a broad band on the posterior half; terga 3, 4, and 5 with deeply emarginate bands quite variable in the amount of yellow; tergum 6 with a trace of yellow to the sides of the pygidium; venter dark amber; pygidium broadly rounded basally with the sides narrowing to a smaller rounded apical end.

MALE.—Length 10 mm. Black with yellow markings; normally pitted; clothed with short silvery hairs.

Head subequal to thorax in width, black except for entire face below antennal scrobes, minute spots back of eyes, basal part of mandibles, and scape, all of which are yellow; clypeal border dark amber with a very narrow extension slightly swollen in the center; hair lobes normal; clypeal surface slightly convex; mandibles with one large, acute denticle; antennae normal in form.

Thorax black except a widely divided band on the pronotum, two small patches on the scutellum, band on the metanotum, occasional patches on the propodeum, occasional patches on the mesopleuron, and the tegulae, all of which are yellow; tegulae not elevated and nearly smooth; enclosure smooth except for a deep central groove with deep pits along the lateral borders; mesosternal tubercles absent; legs very dark on the coxae, becoming amber on the femora and light amber on the tarsi; wings subhyaline becoming lightly clouded along the anterior margins.

Abdomen: tergum 1 with a small yellow patch; tergum 2 with a broad band along the posterior margin or largely covering the entire tergum; terga 3 to 6 with a more or less deeply emarginate band; venter dark amber; pygidium broadly rounded basally, tapering to a narrower rounded apical end.

Specimens of both sexes show considerable variation in the extent of the yellow markings; those from the more northern and eastern areas are inclined to be darker. Those from the southwestern areas may have considerably more yellow.

TYPES.—The type female of *C. compacta* Cresson, from Illinois, is at the Philadelphia Academy of Natural Sciences, no. 1940. The type male of *C. solidaginis* Rohwer, from Las Cruces, N. Mex., is at the U.S. National Museum, no. 28486. The type female of *C. belfragi* Banks, from Texas, is at the Museum of Comparative Zoology, Harvard, no. 10029.

DISTRIBUTION.—Throughout the eastern and central states and southwest to southern California.

PREY RECORD.—*Colaspis brunnea* (Fabricius), Chrysomelidae, Clifton, Va. (Bridwell).

PLANT RECORD.—Alfalfa (California, Arizona), *Ampelopsis arborea* (Texas), *Asclepias* sp. (New Mexico, Texas), *Asclepias verticillata* (Iowa), *Baccharis* sp. (Arizona), *Baccharis salicina* (Texas), *Bisora americana* (Texas), *Ceanothus* sp. (Virginia, North Carolina), *Chernoth americanus* (Virginia, Illinois), *Cicuta maculata* (Ohio, Virginia), cotton (Texas, Louisiana, Arizona, New Mexico), *Croton lindheimeri* (Florida), *Daucus carota* (Ohio, Texas), *Euphorbia marginata* (Kansas), *Helianthus annuus* (California), *Ligustrum* sp. (Florida), *Melilotus alba* (Ohio, Illinois, California, Utah, Arizona), parsnip (Texas), peach (Georgia), *Polytaenia nuttallii* (Texas), *Pycnanthemum* (North Carolina), *Quercus virginiana* (North Carolina), *Rhus copallina* (Florida), *Solanum elaeagnifolium* (Arizona), *Solidago* sp. (Texas, Kentucky), *Tamarix gallica* (Kansas, California, Utah).

### 32a. *Cerceris flavofasciata flavofasciata* H. S. Smith

FIGURES 41, 134a,b,c

*Cerceris flavofasciata* H. S. Smith, 1908, p. 364.—Smith, J. B., 1910, p. 678.—Mickel, 1916, p. 409; 1917b, p. 448.—Rau, 1922, p. 31.—Scullen, 1951, p. 1007.—Krombein, 1953, pp. 114, 123, 124, 125, 134; 1959, p. 197.  
*Cerceris natalenus* Brimley, 1927, p. 238.—Scullen, 1951, p. 1007.

FEMALE.—Length 14 mm. Black with yellow markings, punctuation normal, pubescence normal.

Head slightly wider than the thorax; black except for large frontal eye patches, a small patch between the antennae, and the basal part of the mandibles, all of which are yellow; clypeal border with two widely separated denticles, between which the margin is depressed slightly but otherwise smooth; clypeal process is in the form of a very broad crescent-shaped elevation equal to about seven-eighths of the distance between the eyes; on the margin of the process there is a lamellae consisting of two distinct oval membranes; mandibles with three distinct denticles, the more apical one being very large, the



basal one medium in size, and the middle one very small but very acute; antennae normal in form.

Thorax black except for a yellow band on the pronotum semi-divided at the center and two small patches on the scutellum, which are amber; metanotum black; tegulae smooth, amber, and not elevated; enclosure relatively smooth except for a slight medial groove; mesosternal tubercle present but small; legs black basally, dark amber on the femora, becoming lighter amber on the apical parts; wings somewhat more clouded than in most species.

Abdomen entirely black in most specimens except for a broad yellow band on the posterior half of tergum 2; on some specimens small lateral yellow spots appear on terga 1 and 3; venter black; pygidium oval with the apical end somewhat narrowed and both ends rounded.

MALE.—Length 10 mm. Black with yellow markings; punctation and pubescence normal.

Head subequal in width to the thorax, black except large frontal eye patches, interantennal carina, variable amounts on the medial lobe of the clypeus, base of mandibles, and an evanescent spot on the scape, all of which are light yellow; clypeal extension on the medial lobe of the clypeus narrow, subequal in width to the length of the epistomal suture, and with three subequal small denticles; clypeal surface convex, mandibles with one denticle; antennae normal in form.

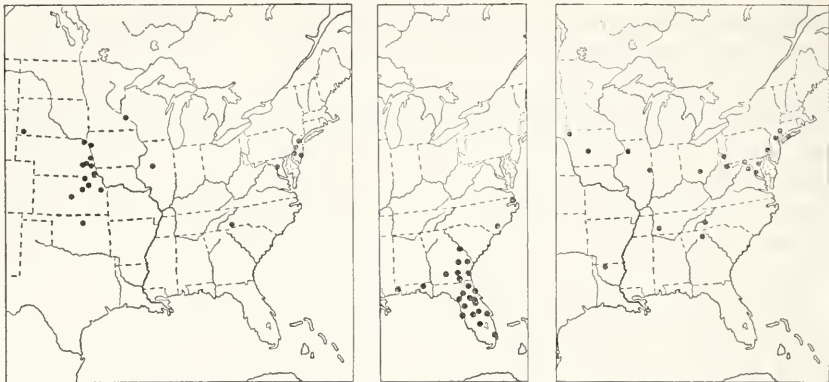
Thorax black except for a broken band on the pronotum and divided band on the scutellum; tegulae amber, smooth, and not elevated; enclosure with a light medial groove, relatively smooth but with distinct pubescence laterally; legs amber, coxae and trochanters very dark; wings somewhat clouded.

Abdomen with little or no yellow on tergum 1; a broad band on the posterior half of tergum 2; narrow yellow lines along posterior margins of terga 3 to 6; venter dark amber; pygidium oval but with the apical end truncate.

Superficially, both the female and male of *C. flavofasciata* Smith look much like *C. fumipennis* Say, but they are readily separated by the clypeal structure in each case. The female of *C. fumipennis* Say has no elevated process on the clypeus. The male of the latter has a very narrow extension on the medial lobe.

TYPES.—The type female of *C. flavofasciata* Smith is at the University of Nebraska. The type female of *C. natallenus* Brimley is at the U.S. National Museum, no. 40792.

DISTRIBUTION.—Rare through the Eastern States from South Dakota, Nebraska, and Kansas to the Atlantic Coast States; from Minnesota south to North Carolina. Specimens are as follows:



FIGURES 41-43.—Localities of: 41, *C. flavofasciata flavofasciata* H. S. Smith; 42, *C. flavofasciata floridensis* Banks; 43, *C. mandibularis* Patton.

ARKANSAS: ♀, Hot Springs, Oct. 6 (Andreas Bolter). ILLINOIS: ♀ Hanna City, July 21, 1940. IOWA: ♀, Sioux City, Aug. 10, 1917 (A. W. Lindsey). KANSAS: 3 ♀♀, Baldwin Co., July 8, Aug. 1, 1906 (J. C. Bridwell); ♀, Black Jack Creek, Pottawatomic Co., July 2, 1953 (Evans and party); ♀, Black Jack Creek, July 9, 1959 (H. E. and M. A. Evans); ♀, Lawrence, June 18, 1922 (C. H. Curran); ♀, Marshall Co., June 30, 1950 (R. L. Fischer); ♀, Pottawatomic Co., July 25, 1952 (H. E. Evans); 3 ♀♀, Riley Co., July 12, (J. B. Norton); 2 ♀♀, Riley Co., July 23 (Popenoe); ♀, Saline Co., July 16, 1923, (L. C. Woodruff). MINNESOTA: ♂, Lake City, July 7, 1921 (A. A. Nichol). NEBRASKA: ♀, Lincoln, July; ♂, North Bend, June 30, 1915 (E. G. Anderson). NEBRASKA: Child's Point, Lincoln, Maskell, Monroe Canyon, Omaha, Rulo, and South Bend, June 30 to Aug. 20, 1917a, on flowers of *Melilotus alba*, *Ceanothus americanus*, and *Amorpha canescens* (all by Mickel). NEW JERSEY: ♀, Camden, July 12, 1891 (Wm. J. Fox); 2 ♀♀, 5 mi. W. Lake Wood, Ocean Co., Sept. 6, 1954 (G. Ferguson); ♀, Lebanon State Forest, Burlington Co., Aug. 19, 1958 (Evans, Beneway); ♀, Lucaston, Sept. 9, 1906. NORTH CAROLINA: ♀, Bastie, July 7, 1921 (T. B. Mitchell); 15 ♀♀ 10 ♂♂, Kill Devil Hills, Dare Co., July 31, Aug. 1, 3, 1952, July 26, 1955, Aug. 3, 4, 7, 8, 9, 1958 (K. V. Krombein); ♂, Kill Devil Hills, Aug. 7, 1958 (T. B. Mitchell). OKLAHOMA: ♀, Pawnee Co., July 12, 1932 (Deonier, Pritchard). SOUTH DAKOTA: ♂, Hot Springs, July 12, 1924 (R. C. Severin). VIRGINIA: ♀, Camp Peary, Sept. 7, 1943 (G. E. and R. M. Bohart). MARYLAND: ♀, 30 mi. S. Washington, D.C., July 7, 1931 (J. C. Bridwell).

PREY RECORD.—*Cryptocephalus guttulatus* Oliver, *C. notatus* Fabricius, *C. notatus fulvipennis* Hald (all from Baldwin, Kansas). Krombein (1959, pp. 197-198), who studied the biology of this wasp at Kill Devil Hills, N.C., found *Cerceris flavofasciata* H. S. Smith collecting the following chrysomelids: *Chlamisus* sp. (probably *plicata* (Fabricius)), *Cryptocephalus mutabilis* Melsheimer, *Cryptocephalus guttulatus* Oliver, *Cryptocephalus* sp. (probably *quadrifasciatus* Say), *Bassareus clathratus* (Melsheimer), and *Bassareus* sp. (probably *sellatus* Suffrian).

PLANT RECORD.—*Amorpha canescens* (Nebraska), *Ceanothus americanus* (Nebraska), *Melilotus alba* (Nebraska).

32b. *Cerceris flavofasciata floridensis* Banks (new status)

## FIGURE 42

*Cerceris austrina* Fox (male only), 1893, p. 556.—Dalla Torre, 1897, p. 453.—Ashmead, 1899, p. 296.—Scullen, 1951, p. 1005.—Krombein, 1954b, p. 235; 1956, p. 234 (new synonymy).

*Cerceris floridensis* Banks, 1915, p. 403.—Scullen, 1951, p. 1008.—Krombein, 1954b, p. 235.

FEMALE.—Length 12 mm. Black with ferruginous markings; punctuation and pubescence average for the genus. Structurally like *C. flavofasciata flavofasciata* H. S. Smith.

Head reddish amber except for dark amber to black patches just above the antennal scrobes, the ocellar area, patches on the vertex bordering the eyes and the lower genal area, and the following parts, which are yellowish amber: large frontal eye patches, frons above the clypeal process, lateral lobes of the clypeus, and the basal part of the mandibles; apical part of mandibles and mandibular denticles dark amber; antennae ferruginous becoming dark apically.

Thorax black except the pronotum, scutellum, metanotum, most of the propodeum exclusive of the enclosure, patch on the pleuron, and the tegulae, all of which are ferruginous; legs reddish amber; wings clouded with amber.

Abdomen: tergum 1 and 2 reddish amber with a narrow yellowish line on the posterior half of tergum 2; terga 3 to 6 black with a trace of dark amber on the anterior part of tergum 3; sternites 1, 2, and 3 largely ferruginous.

MALE.—Length 10–12 mm. Black with dark ferruginous markings showing some yellowing; punctuation and pubescence average; structurally like the nominate subspecies male.

Head black except for the face, which is light ferruginous medially, becoming darker on the clypeus; genae and vertex largely ferruginous; width of the clypeal extension on the medial lobe about one-half the length of the epistomal suture, with three subequal small denticles on the margin; mandibles with one prominent acute denticle; antennae normal in form.

Thorax black except for a broad band on the pronotum, scutellum, metanotum, and large patches on the propodeum, all of which are dark ferruginous; enclosure smooth except for a light medial groove; legs amber; wings clouded.

Abdomen black except for the first two segments, which are dark ferruginous with a narrow yellowish band on the apical border of the second tergum.

The males of several closely related species and subspecies in Florida and adjoining areas have been confused by earlier workers.

Only recently has the present writer been able to clear up some of this confusion. A study of type material in the British Museum, in this country, and field studies by Dr. Krombein have helped to associate correctly some of the sexes concerned. In describing *C. austrina*, Fox evidently had the two sexes wrongly associated. His type female of the latter species is accepted here as the type of *austrina* Fox. The present writer here considers *C. austrina* Fox a synonym of *C. robertsonii robertsonii* Fox. The form described by him as the male of *C. austrina* Fox has been found recently by Dr. Krombein to be the male of a ferruginous color form of *C. flavofasciata* H. S. Smith. As the name *austrina* is preoccupied, this color form is given the name *C. flavofasciata floridensis* Banks. Banks described a male of this form under the name of *floridensis*.

The male of *C. rufopicta* F. Smith, which is very close to the male of *C. flavofasciata floridensis* Banks, frequently has been confused with it by the writer and other workers in earlier studies.

**TYPES.**—The allotype male of *C. austrina* Fox from Florida is at the Philadelphia Academy of Natural Sciences, no. 4756. The type male of *C. floridensis* Banks, from Gulfport, Florida (Reynolds), is at the Museum of Comparative Zoology, no. 13765.

**DISTRIBUTION.**—Southeastern States, North Carolina to Florida and west to Alabama. Specimens are as follows:

**ALABAMA:** ♀, Mobile, June 1949 (H. P. Loding). **FLORIDA:** 2 ♀ ♀, ♂, Cocoa, July 1944 (G. E. Bohart); ♂, Flagler Co., July 30, 1955 (H. V. Weems, Jr.); ♀, Gainesville, Alachua Co., April 16, 1952; ♀, 2 ♂ ♂, Gainesville, April 29, May 3, 5, 1919 (P. W. Fattig); ♀, Gainesville, May 4, 1923 (Alexander, Walker); ♂, Gainesville, May 11, 1928 (G. B. Merrill); ♂, Gainesville, May 13 (Debna, Weems); 2 ♂ ♂, Gainesville, Aug. 28, 1960 (P. M. Marsh); ♂, Haines City, Sept. 17, 1954 (H. V. Weems, Jr.); ♂, Hollywood, May 6, 1927 (S. Greenicher); 8 ♂ ♂, Inverness, 1892, 1918 (C. Robertson); ♀, Jacksonville, Oct. 6-9, 1941 (Howard E. Evans); ♀, ♂, Lake Placid, Archbold Biological Station, March 28, 29, 1957 (H. E. Evans); 4 ♂ ♂, Lake Placid, April 1, 1954, June 22, 25, 28, 1962 (K. V. Krombein); ♂, Levy Co., July 13, 1954 (H. V. Weems, Jr.); ♀, Newman's Lake, Alachua Co., Sept. 4-6, 1929 (T. H. Hubbell); 2 ♀ ♀, Orlando, March (R. and G. Bohart); ♂, Orlando, April 11, 1925 (O. C. McBride); ♀, Ponce de Leon, July 13, 1934 (M. E. Griffith); ♂, Sanford, May 2, 1955 (H. E. and M. A. Evans); ♂, Silver Springs, July 28, 1962 (F. Jacot-Guillarmod); ♀, Tutusville, April 25, 1923; ♂, Wagner, April 10, 1941 (H. T. Fernald); ♂, Winter Park, May 27, 1942 (H. T. Fernald); ♀, "Florida." **GEORGIA:** ♂, Augusta, Richmond Co., May 30, 1959 (R. R. Snelling); ♀, Groveland, Cannoche River, July 28, 1913 (J. C. Bradley); 3 ♀ ♀, ♂, "N. Georgia"; 2 ♀ ♀, Okefenokee Swamp, July 10, 1934, July 27, 1939 (R. H. Beamer); ♀, Spring Creek, Decatur Co., Aug. 10, 1946 (P. W. Fattig); ♂, St. Simons Island, May 13, 1932 (P. W. Fattig); 2 ♂ ♂, Tifton, May 30, 1946; 3 ♀ ♀, Vidalia, Aug. 29, 31, 1937, Aug. 20, 1946 (P. W. Fattig); ♀, Wayercross, July 16, 1916. **NORTH CAROLINA:** ♀, Burgaw, Aug. 19, 1948 (T. B. Mitchell); ♂, Kill Devil Hills, June 30, 1950 (K. V. Krombein)



PREY RECORDS.—None.

PLANT RECORDS.—*Ceanothus americanus* (New Jersey Tea), *Ilex opaca*, mango trees, avocado (Florida).

### 33. *Cerceris mandibularis* Patton

FIGURES 43, 135a,b,c

*Cerceris mandibularis* Patton, 1880, p. 403.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 496.—Dalla Torre, 1897, p. 467.—Ashmead, 1899, p. 295.—Banks, 1912, p. 17.—Mickel, 1918, p. 447.—Cartwright, 1931, pp. 269-270.—Scullen, 1951, p. 1009.

FEMALE.—Length 11 mm. Black with yellow markings, punctuation somewhat widely separated and shallow, pubescence short and silvery.

Head subequal in width to the thorax; black except for most of the face below the antennal scrobes, base of mandibles, and scape, all of which are yellow; lower clypeal area and margin dark amber; margin of medial lobe slightly extended with two lateral denticles, between which is a broad extension; clypeal process broad and lunar shaped with a short but broad uniform lamination attached to the margin; mandibles with a broad expansion on the inner edge, the margin of which shows three indistinct denticles; antennae normal in form.

Thorax black except for two widely separated narrow patches on the prothorax, two small patches on the scutellum, and the tegulae, all of which are yellow; tegulae smooth and not elevated; enclosure with a central groove and ridged at a 45° angle; mesosternal tubercles absent; legs dark basally, gradually becoming light amber to yellow apically; wings subhyaline.

Abdomen: tergum 1 with a small divided patch of yellow; tergum 2 with a broad deeply emarginate band on the posterior half; terga 3, 4, and 5 with narrow emarginate bands on the posterior margin; tergum 6 black; venter black; pygidium oval with the apical part somewhat narrowed and both ends rounded.

MALE.—Unknown.

TYPE.—As the original type of *Cerceris mandibularis* Patton has apparently been lost, a neotype has been designated. Taken at Glenside, Pa., July 5, 1905 (G. M. Green), it is deposited at the U.S. National Museum.

The neotype selected is 2 mm. longer than the indicated length in the original description of the species and has more yellow. Structurally it agrees with the original description and is representative of the species as recognized by later workers (Cresson and Banks). The male has never been identified. It is doubtless close to the males of related species, with which it probably has been confused. The female of *mandibularis* Patton closely resembles such related species as

*robertsonii* Fox but the clypeal processes and their lamellae easily separate them.

DISTRIBUTION.—This species has been taken mostly in the Eastern States from New York south to Georgia and west to Iowa. Even though widely distributed in the East, collection records are relatively few. The following specimens have been recorded by the writer:

ALABAMA: ♀, Kushla. DISTRICT OF COLUMBIA: ♀, Washington, June 22, 1951 (N. Banks). GEORGIA: ♀, Tallulah Falls, June 19–25, 1909 (J. C. Bradley). ILLINOIS: ♀, Danville, August 31, 1924 (A.S.B.); ♀, Prophetstown, July 7, 1925 (T. H. Frison). IOWA: ♀, Ledges State Park, Boone Co., July 29, 1950 (Jean LaFoon); ♀, Lyon Co., July 7, 1936 (H. E. Jaques); 2 ♀♀, Lyon Co., July 7, 1936 (D. Milsbaugh). LOUISIANA: ♀, Claiborne Co., May 22, 1931. MARYLAND: ♀, Baltimore, July 1914 (F. E. Blaisdell); ♀, Baltimore, July 1909; ♀, Thomas Road, near Cumberland, June 28, 1953 (L. M. Walker). NEW JERSEY: ♀, Riverdale, July 24, 1909 (L. B. Woodruff). NEW YORK: ♀, Bohemia, June 20, 1937 (K. V. Krombein); ♀, White Plains, June 29, 1918 (J. Bequaert). NORTH CAROLINA: ♀, Mars Hill, July 6, 1928 (J. B. Mitchell). OHIO: ♀, Hocking Co., May 20 (D. J. and J. N. Knull); ♀, S. Bloomingville, July 2, 1946 (U. N. Lanham). PENNSYLVANIA: ♀, Glenside, July 5, 1909 (G. M. Greene); ♀, Leighgap, July 1, 1897; ♀, Pittsburg, June 15, 1911 (Hugo Kahl). TENNESSEE: ♀, Tennessee City. VIRGINIA: ♀, Dunn Loring, July 28, 1951 (K. V. Krombein); 3 ♀♀, Falls Church, June 7, 27, July 6 (N. Banks). WEST VIRGINIA: ♀, Monongalia Co., June.

PREY RECORD.—The only information available relative to the prey collected by *Cerceris mandibularis* Patton is reported by Cartwright (1931, p. 269), who reports the wasps collecting a grasshopper nymph. This recorded observation is open to question unless verified by later reports.

PLANT RECORD.—None.

### 34a. *Cerceris robertsonii robertsonii* Fox

FIGURES 44, 136a,b,c

*Cerceris robertsonii* Fox, 1893 p. 55.—Robertson, 1894a, p. 464; 1894b, p. 112.—Ashmead, 1899, p. 296.—Smith, J. B., 1900, p. 519; 1910, p. 678.—Banks, 1912a, p. 17; 1912b, p. 107.—Viereck, 1916, p. 695.—Britton, 1920, p. 342.—Krombein, 1949, p. 271; 1950, p. 148.—Scullen, 1951, p. 1010.—Krombein, 1952c, pp. 288–295; 1952b, p. 95; 1953, pp. 119–121, 122, 123; 1954b, p. 235; 1955, p. 234.—Linsley and MacSwain, 1956, pp. 77, 79.—Evans, 1957, p. 86, pl. 12.—Krombein, 1958a, p. 197.—Evans, 1959, pp. 156–7.

*Cerceris austrina* Fox (female only),<sup>12</sup> 1893, p. 556.—Dalla Torre, 1897, p. 453.—Ashmead, 1899, p. 296.—Scullen, 1951, p. 1005.—Krombein, 1954b, p. 235; 1956, p. 234 (new synonymy).

*Cerceris pleuralis* H. S. Smith, 1908, p. 366.—Mickel, 1918, p. 452.

FEMALE.—Length 12 to 13 mm. Black with yellow markings; punctuation average; pubescence short.

<sup>12</sup> For a discussion of this species, see under *C. f. floridensis* Banks (p. 424).

Head subequal in width to the thorax; black except most of the face, a small patch back of the eye, base of the mandible, and a patch on the scape, all of which are yellow; clypeal border with four extensions, the medial two in the form of rounded carina and the two lateral ones denticle-like; the clypeal surface elevation broad, uniformly convex, and with a lamella on the free margin, the lamella more or less emarginate but not divided; mandibles with three denticles, the most apical one the largest and pointing apically; antennae normal in form.

Thorax black except for a divided band on the pronotum, two oval patches on the scutellum, small spot on the pleuron, and spot on the tegulae, all of which are yellow; tegulae low and smooth; enclosure with a light medial groove and light ridges at about a 45° angle to the base; mesosternal tubercle small; legs yellow to fulvous with a darker area on the base of the femora and on the two basal segments.

Abdomen with terga 1 and 6 immaculate, tergum 2 with a broad band on the posterior half, terga 3, 4, and 5 with narrow bands deeply emarginate; venter immaculate; pygidium oval with the apical end the narrower.

MALE.—Length 10 to 11 mm. Black with yellow markings; punctation average; pubescence short.

Head subequal in width to the thorax; black except for the entire face, basal half of mandibles, and the scape, all of which are yellow; extension on the medial lobe of the clypeus narrow with three indistinct denticles; clypeal surface convex; hair lobes very narrow, less than the width of the lateral clypeal lobes; lateral clypeal lobes covered with prominent setae; mandibles with one small acute medial denticle; antennae with the apical segment slightly curved.

Thorax black except for a divided band on the pronotum; a semi-divided band on the scutellum, spot on the pleuron, and a spot on the tegulae, all of which are yellow; tegulae low and smooth; enclosure without the usual medial groove, somewhat punctate laterally and lightly rugose along the anterior margin; mesosternal tubercle absent; fore- and midlegs with the first two segments black and yellow, the femora very dark basally, becoming light apically, remaining segments yellow; hindlegs with the coxae black and yellow, trochanters yellow, femora black basally, and the remaining segments largely amber with darker areas; wings subhyaline but clouded.

Abdomen with terga 1 and 7 immaculate, tergum 2 with a broad band on the posterior half; terga 3 to 6 with narrow emarginate bands; venter with traces of yellow laterally on sternites 2, 3, and 4; pygidium with convex sides converging to a truncate apical end.

Superficially, *C. robertsonii robertsonii* Fox closely resembles *C. clypeata* Dahlbom, *C. atramontensis* Banks, and other related forms in

size and coloring, but the females can be separated easily by the form of the clypeal process, and the males, by the extension on the medial clypeal lobe.

**TYPES.**—The type female of *C. robertsonii* Fox, from Smithville, S. Dak. (J. T. Aldrich), is at the Philadelphia Academy of Natural Sciences, no. 4755. The type female of *C. austrina* Fox, from southern Florida, is at the Philadelphia Academy of Natural Sciences, no. 4756. The type female, from Rock Co., Nebr., July 22, 1902, on *Helianthus* sp. (W. D. Pierce), and the allotype male, from Glen, Sioux Co., Nebr., 4000 ft., Aug. 19, 1906 (P. R. Jones), of *C. pleuralis* H. S. Smith, are at the University of Nebraska.

**DISTRIBUTION.**—Throughout the Eastern States, from Nebraska and Kansas east to the Atlantic States and from southern Canada south to North Carolina, with one record from Texas.

**PREY RECORD.**—*Rhabdopterus picipes* (Oliver), *Cryptocephalus notatus* Fabricius, *Pachybrachys dilatatus* Suffrian. All are chrysomelids, reported by Krombein (1953) from North Carolina.

**PLANT RECORD.**—*Melilotus alba* (Kansas), parsnip (Minnesota), *Quercus marilandica* (North Carolina), *Q. virginiana* (North Carolina), *Liquidambar styraciflua* (North Carolina).



FIGURES 44-46.—Localities of: 44, *C. robertsonii robertsonii* Fox; 45, *C. robertsonii bifidus* Scullen; 46, *C. robertsonii emmitosus* Scullen.

### 34b. *Cerceris robertsonii bifidus*, new subspecies

FIGURES 45, 137a,b,c

**FEMALE.**—Length 12 mm. Black with yellow and ferruginous markings; structurally like the nominate subspecies *C. robertsonii robertsonii* Fox except as indicated below.

Head as in the nominate subspecies except that the clypeal lamella is divided completely to the base.



Thorax like the nominate subspecies except that the yellow patches on the scutellum are fused lightly at the meson and the yellow markings on the legs replaced largely by ferruginous.

Abdomen shows no important differences from the nominate subspecies.

MALE.—Unknown.

TYPES.—The type female, from Kill Devil Hills, N. C., Aug. 4, 1952 (K. V. Krombein), is at the U.S. National Museum, no. 66165. Paratypes are as follows:

GEORGIA: ♀, Head River, July 24, 1936 (P. W. Fattig). INDIANA: ♀, Mineral Springs, July 29, 1923 (Owen Bryant). NORTH CAROLINA: ♀, Aberdeen, July 16, 1951 (Beamer, Weed, Price); 5 ♀♀, Kill Devil Hills, June 27, July 1, 11, 14, 1950, Aug. 3, 1952 (K. V. Krombein); ♀, Raleigh, July 23, 1924 (C. S. Brimley). VIRGINIA: ♀, Princess Anne Co., Aug. 1, 1928.

PREY RECORD.—None.

PLANT RECORD.—None.

### 34c. *Cerceris robertsonii emmiltosus* Scullen

FIGURE 46

*Cerceris robertsonii emmiltosus* Scullen, 1964, p. 144.

This subspecies is very similar to *C. robertsonii miltosus* except for the form of the lamella on the clypeal process. The lamella of *emmiltosus* has little or no emargination and is never completely divided at the meson as *miltosus*. Both subspecies are found in the Florida area.

TYPE.—The type female of *C. robertsonii emmiltosus* Scullen, from Miami, Fla., March 29–30, 1953 (K. V. Krombein), is at the U.S. National Museum, no. 66166.

DISTRIBUTION.—Florida and Georgia.

PREY RECORD.—None.

PLANT RECORD.—None.

### 34d. *Cerceris robertsonii miltosus*, new subspecies

FIGURE 47

FEMALE.—Length 11 mm. Black with yellow and ferruginous markings; structurally like the nominate subspecies except as indicated below.

Head black except the face, basal two-thirds of the mandibles, and the scape, all of which are yellow; clypeal lamella divided medially to the base.

Thorax black except the entire pronotum, scutellum, metanotum, and the tegulae, all of which are ferruginous; legs ferruginous, becoming more yellowish apically, wings clouded.

Abdomen with tergum 1 ferruginous, tergum 2 ferruginous except for a broad black area anteriorly, tergum 3 with a narrow band, which becomes broad laterally, tergum 4 with a broken line posteriorly, tergum 5 with lateral patches only; all abdominal markings become progressively more yellow posteriorly.

MALE.—Unknown (See note under *C. f. floridensis* Banks, p. 424).

This subspecies is very similar to *C. robertsonii emmitosus* Scullen, from which it may be distinguished by the form of the clypeal lamella.

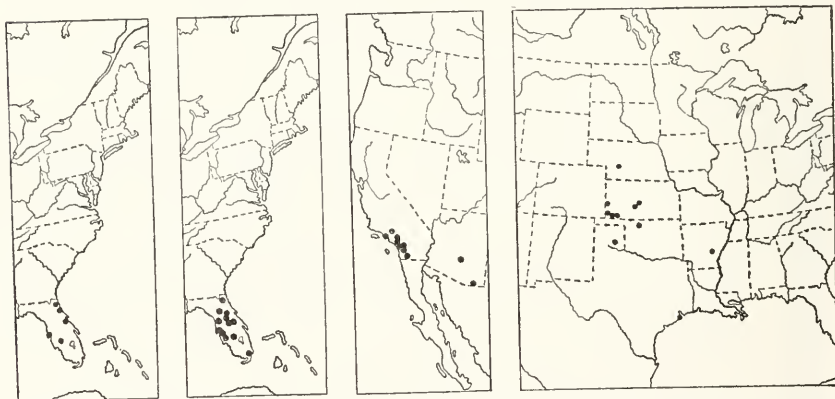
TYPE.—The type female, from Arcadia, Fla., April 23, 1953, on sand (K. V. Krombein), is at the U.S. National Museum, no. 66167. Paratypes are as follows:

FLORIDA: ♀, Augustine; ♀, Cocoa, June 1944 (G. E. Bohart); ♀, Jacksonville; ♀, St. Petersburg, July 1957 (G. Heinrich).

DISTRIBUTION.—Florida.

PREY RECORD.—None.

PLANT RECORD.—None.



FIGURES 47-50.—Localities of: 47, *C. robertsonii miltosus* Scullen; 48, *C. rufopicta* F. Smith; 49, *C. sandiegensis* Scullen; 50, *C. squamulifera* Mickel.

### 35. *Cerceris rufopicta* F. Smith

FIGURES 48, 138

*Cerceris rufopicta* Smith, F., 1856, p. 467.—Cresson, 1865, p. 131.—Packard, 1866, p. 61.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 501.—Dalla Torre, 1897, p. 471.—Ashmead, 1899, p. 295.—Scullen, 1951, p. 1010.

FEMALE.—Unknown.

MALE.—Length 10 mm. Black with yellow and ferruginous markings; punctuation and pubescence average.

Head subequal in width to the thorax; black except the entire face, basal two-thirds of mandibles, and a patch on the scape, all of which are yellow clouded with amber; extension of the medial clypeal lobe subequal in width to the length of the epistomal suture, with three low denticles; medial clypeal lobe convex; hair lobes narrow, covering slightly over half the lateral clypeal lobes; mandibles with one small denticle; antennae normal in form; flagellum ferruginous basally, becoming dark fuscous apically.

Thorax black except for the entire pronotum, the scutellum, metanotum, tegulae, and patches on the propodeum, all of which are ferruginous; tegulae low and smooth; enclosure rugose with a deep medial groove and coarsely pitted laterally; mesosternal tubercle absent; legs ferruginous; wings subhyaline but clouded.

Abdomen with the two anterior terga ferruginous with a yellowish line along the posterior border of tergum 2, terga 3 to 7 black with evanescent ferruginous lines along posterior margins of terga 3 and 4, becoming broader laterally, trace of ferruginous laterally on tergum 5; venter black except the two anterior sternites, which are ferruginous, and a trace of ferruginous laterally on sternite 3; pygidium with sides convex and with ends subequal in width.

For a discussion on the identification of the male of *C. rufopicta*, see note under *C. flavofasciata floridensis* Banks (p. 424). *C. rufopicta* F. Smith may prove to be the male of *C. robertsonii emmitosus* Scullen or *C. robertsonii mitosus* Scullen.

DISTRIBUTION.—Florida and adjoining states north to North Carolina. Specimens are as follows:

FLORIDA: ♂, Arcadia, May 11, 1961 (H. E. Evans); ♂, Gainesville, May 24, 1928 (G. B. Merrill); ♂, Gainesville, May 17, 1959 (H. V. Weems, Jr.); ♂, Hillsboro Co., April 5, 1930 (C. L. Rabb); 40 ♂♂, Inverness, 1892 (Robertson); 2 ♂♂, Nov. 5 (Andreas Bolter); 2 ♂♂, Juniper Springs, Marion Co., May 12-14, 1954 (Karl V. Krombein); ♂, Key Largo, April 27, 1946 (N. Mason); 26 ♂♂, April 1, 1954, June 22, 26, 1962 (Karl V. Krombein); 2 ♂♂, Lake Placid, Archbold Biological Station, April 15, 1947 (J. G. Needham); ♂, same locality, April 6, 1956 (H. V. Weems, Jr.); 8 ♂♂, same locality, March 17, 25, April 1, 2, 7, 1961 (S. W. Frost); ♂, same locality, May 28, 1961 (H. E. and M. A. Evans); ♂, Miami, (P. W. Popenoe); ♂, Miami, April 13, 1944 (D. C. Denning); ♂, 10 mi. SW. Ocala, Sept. 2, 1938 (Hubbell-Friauf); ♂, Orange Co., April 12, 1930 (N. W. Knowles); ♂, Orlando, March 1944 (R. and G. Bohart); 4 ♂♂, Sanford, May 2, 1955 (H. E. and M. A. Evans); ♂, Tampa; ♂, Wagner, April 10, 1941 (H. T. Fernald); ♂, Welake, April 18-20, 1955 (H. E. and M. A. Evans); ♂, Winter Park, April 29, 1936. GEORGIA: 2 ♂♂, "Georgia" (Cresson); ♂, "Georgia" (Morrison); 4 ♂♂, "Georgia"; ♂, "Georgia," February 1877.

PREY RECORDS.—None.

PLANT RECORDS.—*Ceanothus americanus* (New Jersey Tea), avocado (Florida).

36. *Cerceris sandiegensis*, new species

## FIGURE 49

FEMALE.—Length 14 mm. Black with yellow markings; very little amber; punctation and pubescence normal; structurally near the female of *C. compacta compacta* Cresson except it averages slightly longer and more slender. Enclosure somewhat smoother.

Head black except face below antennal scrobies, two spots on the vertex, patch back of the compound eye, basal two-thirds of mandibles, and scape, all of which are yellow; apical third and denticles of mandibles very dark; peduncle and basal segments of flagellum amber, apical segments darker.

Thorax black except band on pronotum, scutellum, narrow patch on metanotum, patch on the propodeum, tegulae, and spot on the pleuron, all of which are yellow; legs largely yellow with the femora becoming amber to dark amber dorsally; wings subhyaline with a more clouded area along the anterior part.

Abdomen almost entirely yellow except anterior part of terga 1 and 2, sternite 1, and anterior part of sternite 2, all of which are very dark amber to black.

Many females have the patch on the propodeum C-shaped and some are intermediate.

MALE.—Length 12 mm. Black with yellow markings; punctation and pubescence normal; structurally near the male of *C. compacta compacta* Cresson except it averages slightly larger; enclosure somewhat smoother.

Head black except for the face, two small spots back of the eyes, anterior two-thirds of mandibles, and scape, all of which are yellow; apical third of mandibles very dark; antennae beyond scape amber for the first 2 or 3 segments, gradually changing to a very dark amber.

Thorax black except for a broken band on the pronotum, two small patches on the scutellum, patch on the propodeum, small patch on the pleuron, and the tegulae, all of which are yellow; enclosure relatively smooth; legs black and yellow; posterior trochanter largely yellow; all femora mostly dark amber to black; tibiae and tarsi mostly yellow, becoming amber on the apical tarsal segments; wings subhyaline with a more clouded area along the anterior part.

Abdomen almost entirely yellow except the anterior part of terga 1 and 2, sternite 1, and anterior part of sternite 2, all of which are dark amber to black.

TYPES.—The type female, from two miles east of Anza, Riverside Co., Calif., July 14, 1956, on *Croton californica* (M. Wasbauer), and allotype male, Idyllwild, Riverside Co., Calif., June 27, 1956, on



*Eriogonum fasciculatum* var. *polifolium* (M. Wasbauer), both deposited at the California Academy of Sciences. Paratypes are as follows:

ARIZONA: ♂, Hereford, Cochise Co. (W. M. Mann); ♂, Tempe, Aug. 4, 1917.  
 CALIFORNIA: ♀, ♂, Anza, Riverside Co., July 3, 1956 (L. A. Stange); ♀, Anza, July 7, 1956, *Eriogonum fasciculatum* var. *polifolium* (E. G. Linsley); ♀, Anza, July 14, 1956 (M. Wasbauer); 2 ♂♂, 4 mi. N. Cajon, San Bernardino Co., June 17, 1956 (G. R. Ferguson); 2 ♂♂, 4 mi. N. Cajon Junction, San Bernardino Co., July 14, 1958 (E. I. Schlinger); ♂, same locality, July 1, 1958 (J. C. Hall); ♂, Cajon Pass, San Bernardino Co., June 24, 1949 (H. E. Scott); ♂, Cajon Pass, July 19, 1956 (H. R. Moffitt); ♂, Cuyamaca, July 17, 1949 (D. J. and J. N. Knull); ♀, Groveland, Aug. 20, 1953 (R. H. Goodwin); ♂, Idyllwild, San Jacinto Mts., June 17, 1940 (E. C. Van Dyke); ♂, Idyllwild, Aug. 3, 1935 (Jean Russell); ♀, ♂, Idyllwild, June 19, 1951 (G. C. Bechtel); ♂, Idyllwild, June 27, 1956, *Eriogonum fasciculatum* var. *polifolium* (M. Wasbauer); ♂, Jacomba, June 19, 1954 (D. J. and J. N. Knull); 3 ♂♂, Los Angeles (Coquillett); ♂, Los Angeles, June 22, 1926 (Chas. H. Hicks); ♂, Newton, July 14, 1949 (D. J. and J. N. Knull); ♀, ♂, Oak Glen Lodge, San Bernardino Co., 5000 ft., July; ♀, 4 ♂♂, Oak Grove, San Diego Co., June 6, 1940 (C. D. Michener); 9 ♀♀, 12 ♂♂, Pine Valley, San Diego Co., Aug. 2, 1926, Aug. 1, June 27, 1927 (F. W. Kelsey); ♂, Riverside, May 15, 1925 (Timberlake); 3 ♂♂, Riverside, May 27 and June 1, 1954 (J. C. Hall); 2 ♀♀, 7 ♂♂, San Jacinto Mts., July 1912, July 14, 1912 (J. C. Bridwell); ♂, San Jacinto Mts., Herkey Creek, June 20, 1940 (Fred H. Rindge); ♀, Tanbark Flat, Los Angeles Co., July 7, 1950 (H. F. Robinson); ♀, Temecula, Riverside Co., July 4, 1950 (J. W. MacSwain); ♂, Warner Springs, San Diego Co., July 8, 1956, *Eriogonum fasciculatum* var. *polifolium* (P. D. Hurd); 2 ♂♂, Warner Springs, Aug. 8, 1957, June 12, 1958 (H. R. Moffitt); ♂, Warner Springs, July 4, 1956 (R. W. Bushing); ♂, Warner Springs, June 12, 1958 (J. C. Hall); ♂, Warner Springs, July 4, 1956 (R. M. Bohart); ♂, 9 mi. S. Warner Springs, July 4, 1956 (R. M. Bohart); ♂, Wrightwood, San Bernardino Co., 5500 ft., July 1, 1956 (L. A. Stange); ♂, Wrightwood, June 1, 1950 (H. R. Moffitt); ♀, Yucaipa, San Bernardino Co., June 25, 1952 (L. D. Beamer and party). NEW MEXICO: ♂, Taos Co., June 14, 1956 (R. and K. Dreisbach).

DISTRIBUTION.—Southern California, southern Arizona, and southwestern New Mexico.

PREY RECORD.—None.

PLANT RECORD.—*Croton californica* (California), *Eriogonum fasciculatum* var. *polifolium* (California).

### 37. *Cerceris squamulifera* Mickel

FIGURES 50, 139a,b,c

*Cerceris squamulifera* Mickel, 1916, p. 411; 1917b, p. 451.—Scullen, 1951, p. 1010.

FEMALE.—Length 10 mm. Black with yellow and amber markings; normal punctation, normal pubescence.

Head subequal in width to the thorax; black except for the face below the antennal scrobes, large patches back of the compound eyes, the basal two-thirds of the mandibles, and the scape, all of which are yellow; clypeal border slightly extended on the medial

lobe sinuate but without distinct denticles; clypeal process low and with the free margin equal to about one-third of the distance between the eyes; the clypeal lamellae not divided but slightly emarginate on the free margin and bent to about a 45° angle from the plane of the process surface; mandibles with three denticles, the more apical one very large, the medial one very small, and basal ones medium in size; antennae normal in form.

Thorax black except for a broad band on the pronotum, the scutellum, a narrow patch on the metanotum, a large comma-shaped area on the propodeum, and the tegulae, all of which are yellow; tegulae smooth and not elevated; enclosure smooth except for minute punctuation and marginal deep pits; legs largely light amber, becoming yellow on the more apical parts of the first and second pair; wings subhyaline.

Abdomen largely yellow; first and second terga with the anterior one-third amber and posterior two-thirds yellow; terga 3, 4, and 5 with broad yellow bands slightly emarginate, with black anteriorly; tergum 6 very dark amber; venter amber except for lateral yellow patches on sternites 3 and 4; pygidium oval, narrowing apically.

MALE.—Unknown.

This species is very close to *C. robertsonii* Fox, but they can be separated easily by the form of the clypeal process.

TYPE.—The type female of *C. squamulifera* Mickel from Imperial, Nebr., is at the University of Nebraska.

DISTRIBUTION.—Through the Western-Central States, from Nebraska south through Kansas, Arkansas, Oklahoma, and into Texas. Specimens are as follows:

ARKANSAS: ♀, Arkansas River, June 8, 1956 (H. E. Evans, E. G. Matthews). KANSAS: 3 ♀ ♀, Hamilton Co. (F. H. Snow); ♀, Meade Co., August 14, 1945 (R. H. Beamer); 2 ♀ ♀, Medora, July 7, 1953 (Evans, Lin and Vashimoto); ♀, Morton Co., (F. H. Snow); ♀, Seward Co., August 16, 1911 (F. X. Williams); ♀, Stafford Co., June 30, 1934 (R. H. Painter). NEBRASKA: 3 ♀ ♀, Wallace Co., July 7, 1931, July 2, 3, 1933 (R. Roberts). NORTH CAROLINA: ♀, Southern Pines, June 13, 1918. OKLAHOMA: ♀, Alfalfa Co., August 8, 1932 (C. C. Dennier). TEXAS: ♀, Clarendon Co., August 11, 1905 (Hunter); ♀, Cypress Mills; ♀, Galveston, Galveston Co.; ♀, Galveston, May (F. H. Snow); ♀, Galveston, June 24, 1924 (Trotter); 3 ♀ ♀, Galveston, June 1900.

PREY RECORD.—None.

PLANT RECORD.—None.

#### Group IV

This group is distinguished by the following characters: (1) The females have a prominent cone-shaped process on the medial clypeal lobe, which is flanked on each side by a much smaller process attached to the lateral clypeal lobe. (2) The males have the medial denticle

on the clypeal margin bicuspidate. (3) The pygidium of the male is very broad, almost oval. (4) The hair lobes of the male are very broad, almost meeting medially. (5) Tenebrionidae are used as prey by both species.

**38a. *Cerceris femurrubrum femurrubrum* Viereck and Cockerell**

FIGURES 51, 53, 140a,b,c,d,e,f

*Cerceris femurrubrum* Viereck and Cockerell, 1904, p. 135.—Viereck, 1906b, p. 234.—Mickel, 1917b, p. 451.—Banks, 1947, p. 15.—Scullen, 1951, p. 1007; 1960, p. 78.

*Cerceris thione* Banks, 1947, pp. 18-19.—Scullen, 1951, p. 1007.

**FEMALE.**—Length 12 mm. Amber with light yellow markings, very little black; structurally like *C. femurrubrum athene* Banks in all respects, except for color.

Head all but totally amber except for a variable amount of yellow on the face mesad of the eyes.

Thorax all amber to dark amber except for variable amounts of yellow on the prothorax, the scutellum, the metanotum, the propodeum, and the pleuron.

Abdomen amber with subequal emarginate bands on the terga along the posterior margins, all of which are yellow; venter amber.

**MALE.**—Length 11 mm. Black with creamy-white markings and some amber parts; punctuation and pubescence average.

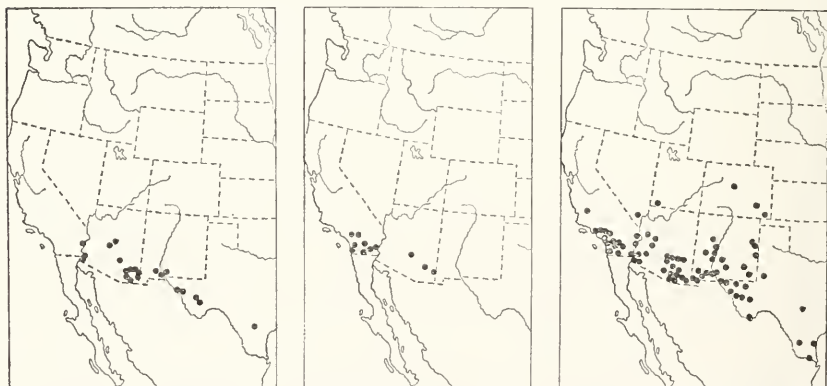
Head slightly wider than the thorax; black except for the face, basal half of mandibles, very small spot back of the eye, and the scape, all of which are creamy white; clypeal margin with four denticles, the medial pair being fused at the base; hair lobes very broad, extending from the lateral denticles to the eyes; clypeal process surface slightly convex; mandibles with one prominent denticle; apical antennal segments blunt and slightly curved; antennae amber except for a yellow patch on the scape.

Thorax black except for a divided band on the pronotum and an emarginate or divided band on the scutellum, an evanescent patch on the metanotum, patches on the propodeum, patch on the pleuron, and the tegulae, all of which are creamy white; tegulae low and smooth; enclosure smooth except for a prominent medial groove and lateral pits; mesosternal tubercles absent; legs variable in color, forelegs light to dark amber basally to the apical part of femora, beyond which they are creamy white; midlegs largely creamy white except most of the femora, which are light to dark amber; hindlegs light to dark amber except the coxae, trochanter, basal part of tibiae, and most of the tarsi, all of which are creamy white; wings subhyaline, slightly clouded toward the apex.

Abdomen black with subequal creamy-white bands covering about one-third of each tergum; venter black with creamy-white spots laterally on 3rd, 4th, and 5th sternites; pygidium oval with the apical end truncate.

*C. femurrubrum* Viereck and Cockerell is very different from all other species but in several structural characters is close to *C. macrosticta* Viereck and Cockerell. Both species have been known to use Tenebrionidae as prey for their young.

The males of *C. femurrubrum* Viereck and Cockerell show little variation in color throughout the range of the species; however, the females show two distinct color forms, which are recognized here as separate subspecies. The reddish form has been found only from the Colorado River area east. Since the type male of *C. femurrubrum* Viereck and Cockerell is from Albuquerque, N. Mex., this reddish form of female is placed under the subspecies *femurrubrum femurrubrum* Viereck and Cockerell. The black and yellow form of female is taken almost exclusively in southern California. This is the color form of the female described as *C. athene* Banks from Claremont, California. This is placed under the subspecies *C. femurrubrum athene* Banks.



FIGURES 51-53.—Localities of: 51, *C. femurrubrum femurrubrum* Viereck and Cockerell (females only); 52, *C. femurrubrum athene* Banks (females only); 53, *C. femurrubrum* Viereck and Cockerell (males only).

**TYPES.**—The type male of *C. femurrubrum* Viereck and Cockerell, from Albuquerque, N. Mex., June 30 (Cockerell), is at the Philadelphia Academy of Natural Sciences, no. 10040. The type male of *C. thione* Banks, from Colton, Calif. (Pilate), is at the Museum of Comparative Zoology, Harvard, no. 23593.

**DISTRIBUTION.**—Southern Nevada, southern Utah, southern Colo-



rado, and south into Arizona, New Mexico, and southwestern Texas.

PREY RECORDS.—None.

PLANT RECORDS.—*Acacia* sp. (Arizona), *A. augustissima* (Arizona), alfalfa (Arizona), *Aplopappus* sp. (Arizona), *Asclepias* sp. (New Mexico), *A. subverticillata* (Arizona), *Baccharis* sp. (Arizona), *B. glutinosa* (Arizona), *Cissus trifoliata* (Arizona), *Cleome* sp. (Arizona), cotton (Arizona), *Croton* sp. (Arizona, New Mexico), *Dondia nigra* (Nevada), *Eriogonum* sp. (Arizona, New Mexico), *E. abertianum neomexicanum* (Arizona), *E. thomasi* (Arizona), *Gutierrezia* sp. (Arizona), *Haplopappus hartwegi* (Arizona), *Helianthus* sp. (Arizona), *Lepidium* sp. (Arizona), *Melilotus alba* (Arizona), *Mimosa* sp. (Arizona), pigweed leaves (Arizona), *Sapindus saponari* (Arizona), *Wislizenia* sp. (Arizona), *W. refracta* (Arizona).

### 33b. *Cerceris femurrubrum athene* Banks, new status

#### FIGURE 52

*Cerceris athene* Banks, 1947, pp. 20-21.—Scullen, 1951, p. 1005.—Wasbauer, 1957, p. 131.—Scullen, 1960, p. 78.

FEMALE.—Length 12 mm. Black, yellow, and amber; punctation small and somewhat sparse; pubescence average.

Head slightly wider than the thorax; black except for large frontal eye patches on the face, small spots on the lateral clypeal lobes, two elongate patches on the vertex, small round patches back of the eye, and base of mandibles, all of which are yellow; most of the clypeus and most of the mandibles are dark amber; clypeal margin with a broad extension on the medial lobe flanked by a distinct denticle on each side and laterad of each of these denticles is another separate and much larger denticle; a cone-shaped process on the surface of the medial lobe of the clypeus pointing ventrad; mandibles with a single basal denticles, apicad of which is a prominent ridge; antennae normal in form, amber, becoming darker apically.

Thorax black except for an emarginate band on the prothorax, the scutellum, the metanotum, very large areas on the propodeum, a patch on the pleuron, and the tegulae, all of which are yellow; tegulae are low and smooth; enclosure smooth except for a faint medial groove and small pits along the lateral sides; mesosternal tubercles absent; legs largely amber; wings subhyaline but somewhat clouded toward the apex.

Abdomen: all terga yellow emarginate with black anteriorly; venter dark amber; pygidium with sides convex, slightly converging apically and the apical end truncate.

MALE.—Indistinguishable from the male of *femurrubrum femurrubrum* Viereck and Cockerell.

**TYPES.**—The type female of *C. athene* Banks, from Claremont, Calif. (C. F. Baker), is at the Museum of Comparative Zoology, Harvard, no. 23537.

**DISTRIBUTION.**—Southern California, with a few scattered records east of the Colorado River in Arizona, New Mexico, and Texas.

**PREY RECORD.**—*Eurymetopon rufipes* Escholtz (Tenebrionidae) at Mecca, Riverside Co., Calif., July 23, 1956 (Wasbauer, 1957, p. 131).

**PLANT RECORD.**—*Asclepias* sp. (California), *Baccharis* sp. (Texas), *B. glutinosa* (California), *Coyote melon* (California), *Croton californicus* (California), *Eremocarpus setigerus* (California), *Eriogonum fasciculatum* (California), *Gnaphalium beneolens* (California), *Melilotus alba* (California), *Salix* sp. (California), *Tamarix gallica* (California).

### 39. *Cerceris macrosticta* Viereck and Cockerell

FIGURES 54, 141a,b,c,d,e,f

*Cerceris macrosticta* Viereck and Cockerell, 1904, p. 133.—Viereck, 1906b, p. 234.—Scullen, 1942, p. 187.—Banks, 1947, p. 9.—Scullen, 1951, p. 1009.  
*Cerceris ampla* Banks, 1912a, p. 16.

**FEMALE.**—Length 18–20 mm. Black, dark amber, amber, and yellow; punctation coarse and deep; pubescence normal.

Head subequal in width to thorax; upper part of face above antennal scrobes, apical one-third and denticles of mandibles, and apical segments of antennae, all dark amber to black; lower part of face, basal two-thirds of mandibles, and large patch back of eye yellow infused with amber; remaining parts of head variable shades of amber; clypeal margin considerably extended from the central lobe, an extension that is deeply emarginate medially, with clusters of bristles just above the lateral angles, and the sides of this extension showing deep incisions, which are bordered by heavy corinae; clypeal surface process cone shaped with the apex blunt; mandibles with two large, separated denticles; antennae normal in form.

Thorax largely reddish amber with the more elevated areas showing yellow and depressed areas becoming dark amber to black; pronotum, metanotum, patches on the enclosure, most of the propodeum, irregular areas on the pro- and mesopleuron, and the tegulae, all are yellow tinged with light amber; tegulae smooth and not elevated; enclosure with a light medial groove, and the surface largely covered with deep pits; legs largely amber, becoming more or less yellow on the apical parts; wings clouded with amber.

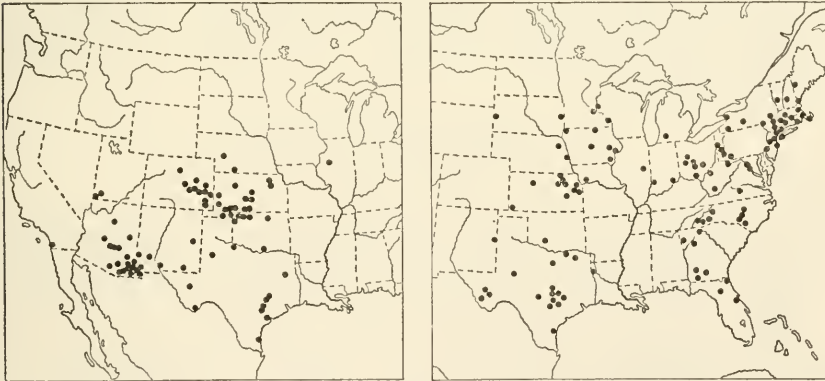
Abdomen largely yellow but in some specimens the more basal terga shows an amber-shaded area in the center; venter yellowish amber; pygidium with the sides slightly convex and both ends truncate.

MALE.—Length 16–18 mm. Black, dark amber, amber, and yellow; punctation coarse and deep; pubescence normal.

Head subequal in width to the thorax; face yellow below antennal scrobes; black to dark amber above the antennal scrobes and most of the vertex; large yellow patches back of the eyes; head otherwise reddish amber; clypeal margin with a broad extension on the medial lobe emarginate, on each side of the extension a low denticle-like process; hair lobes very broad; mandibles dark at the apical end and with a single prominent denticle dark at the apex; antennae with each of the two apical segments about twice the length of the other segments of the flagellum, the terminal one being somewhat curved and blunt.

Thorax largely reddish amber with the more elevated parts yellowish and the depressed parts inclined to be dark; the following parts are yellow infused with amber: divided band on the prothorax, two spots on the scutellum, the metanotum, large patches on the propodeum, patches on the pro- and mesopleuron, and the tegulae; legs largely amber, becoming more yellow apically; wings clouded with amber.

Abdomen largely yellow with light amber on the anterior half of the terga; venter yellow; pygidium almost round with the apical end flattened.



FIGURES 54, 55.—Localities of: 54, *C. macrosticta* Viereck and Cockerell; 55, *C. compar compar* Cresson.

TYPES.—The type male of *C. macrosticta* Viereck and Cockerell, taken in New Mexico, is at the Philadelphia Academy of Natural Sciences, no. 10381. The type male and allotype female of *C. ampla* Banks, taken at Fedor, Lee Co., Texas (Birkmann) are at the Museum of Comparative Zoology, no. 13769.

DISTRIBUTION.—*C. macrosticta* Viereck and Cockerell has been recorded from as far east as central Illinois, north to Nebraska, and west to southern Utah and southern California. It is most abundant in eastern Colorado, Kansas, and south throughout Oklahoma, Texas, New Mexico, and Arizona. Closely related forms are found through Central America and into South America. These may prove to be subspecies.

PREY RECORD.—One record of "beetle, Tenebrionidae," Boulder, Colo., July 26, 1934 (C. H. Hicks); *Metopoloba pruinosa* (Horn) (Tenebrionidae), Baboquivari Mts., Pima Co., Ariz., Aug. 18, 1955 (F. G. Werner-G. D. Butler).

PLANT RECORD.—*Acacia augustissima* (Arizona), *Asclepias* sp. (Arizona), *A. subverticillata* (New Mexico), *Baccharis glutinosa* (Arizona), *B. salicina* (Texas), cotton (New Mexico, Texas), *Eriogonum* sp. (Arizona), *Eupatorium serotinum* (Texas), *Lepidium* sp. (Arizona), *Melilotus* sp. (New Mexico), *M. alba* (Arizona), *Mortonia scabella* (Arizona), *Salix taxifolia* (Arizona), salt cedar (Arizona), *Sapindus* sp. (Arizona), *Verbesina encelioides* (Arizona).

### Group V

This group is distinguished by the following characters: (1) The females have a low, cone-like clypeal elevation, which may be reduced to little more than a pronounced convex surface. (2) The hair lobes of the male are very broad, almost meeting medially. (3) The male pygidium is much longer than broad. (4) There are no known prey records for this group.

#### 40a. *Cerceris compar compar* Cresson

FIGURES 55, 142a,b,c

*Cerceris compar* Cresson, 1865, p. 126.—Packard, 1866, p. 63.—Patton, 1880, p. 404.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 488.—Robertson, 1889, p. 303; 1891, p. 577; 1896c, p. 156.—Ashmead, 1899, p. 295.—Bridwell, 1898, p. 209.—Smith, H. S., 1908, p. 368.—Banks, 1912a, p. 25.—Viereck, 1916, p. 695.—Mickel, 1917b, p. 452.—Britton, 1920, p. 341.—Hendrickson, 1930, p. 160.—Scullen, 1951, p. 1006; 1960, pp. 77–78.

*Cerceris jucunda* Cresson, 1872, p. 231; 1887, p. 282.—Schletterer, 1887, p. 495.—Ashmead, 1899, p. 295.—Banks, 1912a, p. 26.—Scullen, 1951, p. 1006.

*Cerceris jacunda* [sic] Hendrickson, 1930, p. 160.

*Cerceris jucunda carolina* Banks, 1912a, p. 26.—Scullen, 1951, p. 1006.

*Cerceris catawba* Banks, 1912a, p. 25.—Mickel, 1917b, p. 452.—Scullen, 1951, p. 1006.

FEMALE.—Length 10 mm. Black with yellow markings; punctuation and pubescence average.

Head subequal in width to thorax; black except entire face below the antennal scrobes, small spot back of the compound eye, basal



half of the mandibles, and the scape, all of which are yellow; clypeal margin with five closely placed, denticle-like processes, the two lateral ones being much lower and broader than the medial three, which are subequal to each other; the clypeal process reduced to a low rounded elevation slightly more than an exaggerated convex area; mandibles with three closely placed denticles, the most apical one very large; antennae normal in form, fulvous below on the flagellum and darker above.

Thorax black except for two elongate patches on the pronotum, band on the scutellum, an elongate patch on the propodeum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure smooth except for a limited number of deep pits along the lateral borders; mesosternal tubercles absent; legs largely dark fuscous basally to or beyond the middle of the femora, beyond which they are mostly yellow; wings subhyaline but lightly clouded toward the apex.

Abdomen black except for a uniform band on tergum 1 and subequal emarginate bands on terga 2 to 5, all of which are light yellow; venter immaculate; pygidium with the sides convex and the apical end somewhat wider than the basal end.

MALE.—Length 10 mm. Black with yellow markings; punctation and pubescence average.

Head subequal in width to the thorax; black except for the entire face, a minute spot back of the compound eye, small spot on the mandible, and a patch on the scape, all of which are yellow; clypeal border slightly extended, showing three indistinct undulations; hair lobes very wide and almost meeting at the meson; mandibles with one denticle on a broad base; antennae normal in form.

Thorax black except for two elongate patches on the pronotum, a semidivided band on the scutellum, and a patch on the tegulae, all of which are yellow; enclosure smooth except for a slight medial groove and coarse punctations along the lateral margins; mesosternal tubercles very prominent and acute with the points extending toward the posterior; legs colored as follows: forelegs dark to apical end of the femora, beyond which they are largely yellow; the midlegs with the two basal segments dark above and yellow below, the femora dark except for a small yellow spot near the apical end, the tibiae and tarsi yellow except for a dark patch on the tibiae; the hindlegs with the two basal segments largely yellow, the femora dark, and the tibiae and tarsi largely yellow except for a large dark patch on the tibiae; wings subhyaline but clouded near the apex.

Abdomen with subequal light yellow bands on all terga 1 to 6; venter with variable light yellow lines on sternites 2 and 3; pygidium with

sides slightly convex; and the truncate apical end somewhat wider than the basal end.

*C. compar* Cresson was described from the male. From specimens of females determined as *C. compar* by H. S. Smith at the University of Nebraska, it would appear that Smith was in error in his determination of the females of this species. The writer has accepted the determination of Bridwell, Banks, and others as the correct form. So far as the writer can determine, the two sexes have not been taken associated.

The males of *C. compar compar* Cresson are very close to the males of *C. zelica* Banks. At present they are not separable with any conclusiveness.

**TYPES.**—The type male of *C. compar* Cresson, from Illinois, is at the Philadelphia Academy of Natural Sciences, no. 1949. The type male of *C. jucunda* Cresson, from Texas, is at the Philadelphia Academy of Natural Sciences, no. 1716. The type male of *C. jucunda carolina* Banks, from Southern Pines, N.C., is at the Museum of Comparative Zoology, Harvard, no. 13785. The type female and allotype male of *C. catawba* Banks, from Southern Pines, N.C., are at the Museum of Comparative Zoology, Harvard, no. 13787.

**DISTRIBUTION.**—This species is found in limited numbers in most states east of the Rocky Mountains.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Apocynum cannabinum* (West Virginia), *Asclepias* sp. (New Mexico), *Berteroa incana* (Massachusetts), *Ceanothus* sp. (North Carolina), Chinquapin (Virginia), *Cicuta maculata* (Iowa), *Colubrina texensis* (Texas), *Hydrangea arborescens* (North Carolina), *Kochia* sp. (North Carolina), *Melilotus alba* (Kansas), *Pastinaca sativa* (New York), *Polytaenia nuttallii* (Texas), Queen Anne's lace (Ohio), rose (Nebraska), *Trifolium* sp. (North Carolina), *Solidago* sp. (Connecticut), *Spiraea* (Connecticut), *Umbelliferae* (Massachusetts).

#### 40b. *Cerceris compar geniculata* Cameron

##### FIGURE 56

*Cerceris geniculata* Cameron, 1890, p. 113.—Dalla Torre, 1897, p. 462.—Ashmead, 1899, p. 296.

*Cerceris feralis* Cameron, 1890, pp. 113-4.—Dalla Torre, 1897, p. 459.—Ashmead, 1899, p. 296.

*Cerceris compar geniculata* Scullen, 1962, p. 57.

**FEMALE.**—Length 10 to 11 mm. Structurally like *C. compar compar* Cresson except for the variations in color pattern as indicated below; it averages slightly larger than the latter subspecies.

Head in all respects like that of the nominate subspecies.

Thorax in all respects like the nominate subspecies except the

hindfemora, which are black with a large yellow area over the apical third.

Abdomen as in the nominate subspecies except there is a patch laterally on the posterior border of the second tergum.

MALE.—Length 10 to 11 mm. Black with yellow markings; punctuation average; pubescence short.

Head subequal in width to the thorax; black except for the entire face, basal two-thirds of the mandibles, and the scape, all of which are yellow; clypeal surface slightly convex; margin of the medial clypeal lobe with three dark denticles; hair lobes broad, extending from the eyes to mesad of the lateral denticles; mandibles with two medial denticles, one above and one below, each on a broad base; antennae normal in form.

Thorax black except for a broad divided band on the pronotum, evanescent small spots on the propodeum, and the tegulae, all of which are yellow; tegulae smooth and slightly expanded laterally; mesosternal tubercle prominent and semitruncate; fore- and hindlegs largely yellow with black areas dorsally on the coxae, trochanter, and basal end of the femora; the hindlegs with the femora largely black but with a yellow patch apically; the remaining parts of the hindlegs similar in color to the corresponding parts on the first two pairs of legs; wings subhyaline but clouded along the anterior border.

Abdomen with broad posterior bands on terga 1 and 3, tergum 2 immaculate except for a trace of yellow laterally; terga 4, 5, and 6 with narrow emarginate bands; terga 7 immaculate; sternum black except for an irregular narrow band on sternite 3 and evanescent lateral spots on sterna 4 and 5; pygidium with sides slightly convex, the apical end truncate and slightly broader than the basal end.

This subspecies is distinguished from the other subspecies by the blacker legs of both sexes and the more prominent mesosternal process on the male.

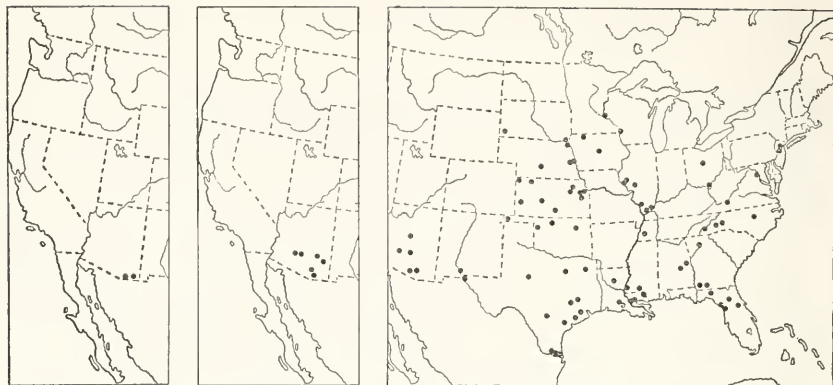
TYPES.—The type female of *C. geniculata* Cameron and type male of *C. feralis* Cameron, both from Mexico, are at the British Museum, nos. 21.1,366 and 21.1,372, respectively.

DISTRIBUTION.—This subspecies is primarily a Mexican form but the following records are from near the Mexican border. Specimens are as follows:

ARIZONA: ♀, 3 ♂♂, Canelo, Santa Cruz Co., July 30, 1956 (G. D. Butler); ♂, 8 mi. N. Douglas, 4300 ft., Aug. 7, 1946 (H. A. Scullen); ♂, Douglas, 4000 ft., July 30, 1959 (H. E. Evans).

PREY RECORD.—None.

PLANT RECORD.—None.



FIGURES 56-58.—Localities of: 56, *C. compar geniculata* Cameron; 57, *C. compar orestes* Banks; 58, *C. insolita insolita* Cresson.

#### 40c. *Cerceris compar orestes* Banks

FIGURE 57

*Cerceris orestes* Banks, 1947, pp. 13-14.

*Cerceris compar orestes* Scullen, 1962, p. 57.

**FEMALE.**—10 mm. Black with light yellow or cream-colored markings; punctation and pubescence average.

Head subequal to or slightly narrower in width than the thorax; entire face, spot back of compound eyes, two small spots on vertex back of the ocelli and a little to one side, the basal half of the mandibles, and a patch on the scape, all are cream colored; clypeal border with three denticles, the medial one more acute than the others; clypeal process reduced to a low rounded elevation slightly more than an exaggerated convex area; mandibles with two denticles, the more apical one broad and blunt, and a low rounded ridge basad of the denticles; antennae normal in form.

Thorax black except for a divided band on the pronotum, band on the scutellum, a large hook-shaped patch on the propodeum, and the tegulae, all of which are light yellow; tegulae low and smooth; mesosternal tubercle absent; legs largely black to or slightly beyond the middle of the femora, beyond which they are largely creamy yellow with elongate dark stripes on the tibiae and the hindtarsi; wings subhyaline with a clouded area along the anterior margins.

Abdomen with broad bands on terga 1 and 3, tergum 2 black except for yellow lateral patches, broad but deeply emarginate bands on terga 4 and 5; venter with variable amounts of yellow on all sternites but more pronounced on 1, 3, and 4; pygidium with sides convex and ends subequal and rounded.

**MALE.**—Not recognized.



The female of *C. compar orestes* Banks closely resembles *C. compar compar* Cresson, but the former can be separated by the absence of a band of yellow on its tergum 2 and the presence of a hook-shaped patch on its propodeum. It also resembles *C. insolita*, but the former can be separated by the shape and size of its clypeal process and its hook-shaped yellow patch on the propodeum.

TYPE.—The type female of *C. orestes* Banks, from Patagonia, Ariz., August 1-4 (Bequaert), is at the Museum of Comparative Zoology, Harvard, no. 27637.

DISTRIBUTION.—This subspecies has been taken largely in Arizona and northern Mexico. Specimens are as follows:

ARIZONA: 2 ♀ ♀, 3 ♂ ♂, Canelo, July 30, 1956 (G. D. Butler); ♂, Cortaro, July 28, 1956, cotton (T. Dees); ♂, 3 mi. NE. Cottonwood, July 7, 1952 (L. D. Beamer and party); 2 ♂ ♂, Fort Thomas, Graham Co., 2700 ft., Aug. 7, 1946 (H. A. Scullen); ♂, Hassayampa, Maricopa Co., Aug. 26 (J. C. Bradley); ♂, Patagonia, Santa Cruz Co., Aug. 20 (J. Bequaert); 12 ♂ ♂, Patagonia, Aug. 24, 25, 1955, *Cleome jonesii* (G. D. Butler, F. G. Werner); ♀, Patagonia, Aug. 24, 1954; 4 ♀ ♀, Patagonia, Aug. 24, 1938, Aug. 25, 1955, Aug. 10, 1958 (F. G. Werner); ♂, Phoenix, June 1, 1927 (A. A. Nichol); 7 ♂ ♂, Tempe, July 30 to Aug. 2 (J. Bequaert); 11 ♂ ♂, Tempe, Aug. 4, 5, 1917; 3 ♂ ♂, Tucson, July 13, 1954, July 14, 17, 1955, alfalfa, *Wislizenia* sp. (G. D. Butler); 5 ♂ ♂, 10 mi. E. Tucson, July 30, 1955, *Croton* sp., *Lepidium* sp. (G. D. Butler); ♂, Sahuarita, July 5, 1956, cotton (Butler and Williams); ♂, San Carlos, July 15, 1955, alfalfa (N. J. Nerney); ♂, St. David, July 27, 1955, alfalfa (Butler and Werner).

PREY RECORD.—None.

PLANT RECORD.—Alfalfa, *Cleome jonesii*, cotton, *Croton* sp., *Lepidium* sp., *Wislizenia* sp. (all in Arizona).

#### 41a. *Cerceris insolita insolita* Cresson

FIGURE 58

*Cerceris insolita* Cresson, 1865, p. 129.—Packard, 1866, p. 63.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 494.—Ashmead, 1899, p. 295.—Smith, H. S., 1903, p. 270.—Banks, 1912a, p. 23.—Mickel, 1917b, p. 451.—Banks, 1947, p. 15.—Scullen, 1951, p. 1008; 1962, p. 57.

*Cerceris intractibilis* Mickel, 1916, p. 411; 1917b, p. 451.—Scullen, 1951, p. 1008.

FEMALE.—Length 10 mm. Black with yellow markings; punctuation and pubescence average.

Head subequal in width to thorax, black except for the frontal eye patches, the apex of the clypeal process, a spot above the process, base of mandibles, a minute evanescent spot back of the ocelli, and the scape, all of which are yellow; extension of the clypeal border shows five subequal small denticles; clypeal elevation somewhat cone shaped with a blunt point and a smooth, slightly concave lower surface; mandibles with three denticles, the most apical one much the largest and the most basal one the smallest; antennae normal in form.

Thorax black except for two elongate patches on the pronotum, band on the scutellum, small patches on the propodeum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure with a light medial groove and deep pits laterally; mesosternal tubercle absent; legs largely amber to nearly black toward the base, becoming lighter on the more apical segments; wings subhyaline but clouded along the anterior margin.

Abdomen black except for a wide band on tergum 1, a wide emarginate band on tergum 3, narrow lines on terga 4 and 5, all of which are yellow; venter immaculate; pygidium with sides convex and both ends rounded and subequal.

There is a tendency for the band on tergum 3 to become less emarginate and the legs to become darker in specimens from the South Central States; small spots of yellow may appear laterally on some sternites.

MALE.—Length 10 mm. Black with yellow markings; punctation somewhat coarser than average; pubescence average.

Head subequal in width to thorax; black except entire face below antennal scrobes and patch on the scape, which are yellow; clypeal border with three indistinct denticles; hair lobes broad, almost meeting; mandibles without denticles but with a carina medially.

Thorax black except for two elongate patches on the pronotum, the scutellum, small patch on the propodeum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure with a light medial groove and deeply pitted laterally; mesosternal tubercle absent; fore- and midlegs dark to near the apical end of the femora, beyond which they are light amber; basal two segments of the hindlegs largely yellow, femora dark amber, remaining segments lighter amber infused with yellow; wings subhyaline, clouded along the anterior margins.

Abdomen black except medium wide bands on terga 1 and 3, broken lines on terga 4, 5, and 6, all of which are yellow; venter with a yellow band on sternite 3; pygidium with sides subparallel and ends subequal in width.

The male of *C. insolita* Cresson is close to male of *C. zelica* Banks, from which the former can be separated by the immaculate second tergum of its abdomen. The female is close to *C. compar orestes* Banks, from which the former can be separated by the form of its clypeal elevation. Males from the southwest are difficult or impossible to separate at present from males of *C. compar orestes* Banks. Females of *C. compar orestes* Banks are distinct and have been taken only in the southwestern desert area. *C. insolita insolita* Cresson can be confused with *C. tolteca* Saussure, which it superficially resembles.

The males of these species may be separated by the form of the pygidium and the females by the clypeal processes.

**TYPES.**—The type male of *C. insolita* Cresson, from Illinois, is at the Philadelphia Academy of Natural Sciences, no. 1954. The type female of *C. intractibilis* Mickel, from Child's Point, Nebr., July 14, 1915 (E. M. Partridge), is at the University of Nebraska.

**DISTRIBUTION.**—Throughout the Central and Eastern States.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Achillea* sp. (Texas), *Ambrosia psilostachya* (Mississippi), *Ampelopsis arborea* (Texas), cotton (Texas), *Eupatorium* (Texas), *Hydrangea arborescens* (North Carolina), *Melilotus alba* (Florida), peach (Mississippi), *Rhus glabra* (Florida), *Solidago* (Kansas), sumac (Texas), *Tamarix gallica* (Kansas).

#### 41b. *Cerceris insolita albida*, new subspecies

FIGURE 59

**FEMALE.**—Length 10 mm. Black with creamy-white markings; structurally like the nominate subspecies *C. insolita insolita* Cresson except for the color and extent of the markings.

Head black except for the face below the antennal scrobes, with an irregular dark line about the base of the clypeal elevation, small spot back of the eye, basal half of the mandibles, and a patch on the scape, all of which are creamy white.

Thorax black except for two elongate patches on the pronotum, band on the scutellum, evanescent patches on the metanotum, patches on the propodeum, and a small patch on the tegulae, all of which are creamy white; legs black to fuscous on the two basal segments, the femora fulvous to black with creamy-white markings, and the more apical segments creamy white, fulvous, and fuscous in variable amounts.

Abdomen with a medium width band on terga 1 and 3, narrow bands on terga 4 and 5, evanescent small patches on the lateral posterior angles of tergum 2; bands on terga 3, 4, and 5 deeply emarginate; venter immaculate; pygidium fulvous.

**MALE.**—The color and color patterns of the male follow those of the female with the exception that the entire face is creamy white and bands of creamy white appear on sternites 3, 4, 5, and 6; the band on tergum 3 is inclined to be less emarginate on the male than on the female. Structural characters other than the colors are the same as for the nominate subspecies.

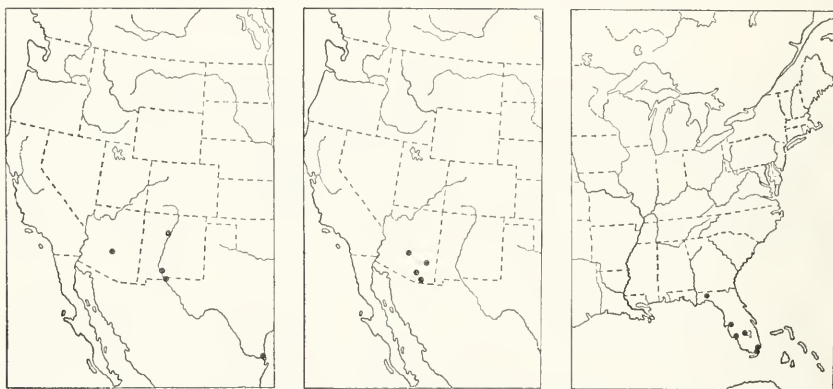
**TYPES.**—The type female and allotype male, from Las Cruces, N. Mex., 3880 ft. elevation, June 18, 1942 (H. A. Scullen), are at the U.S. National Museum, no. 66168. Paratypes are as follows:

ARIZONA: ♂, Tempe, Aug. 4, 1917. NEW MEXICO: 10 ♂♂, Albuquerque, 5000 ft., June 27, 1931 (H. A. Scullen); 2 ♂♂, Albuquerque (Don Prentiss); 3 ♂♂, Las Cruces, Aug. 7, 28 (Cockerell); ♀, ♂, Albuquerque, June 18-19, 1942 (E. C. Van Dyke); 5 ♂♂, Albuquerque, June 18, 1942 (H. A. Scullen); ♀, Albuquerque, 3950 ft., Aug. 2, 1946 (H. A. Scullen); ♂, Albuquerque, June 12, 1950 (L. D. Beamer); 2 ♂♂, Albuquerque, July 15, 1952 (C. Laing, W. LaBerge, R. H. and L. D. Beamer); ♂, Mesilla, Aug. 23 (Cockerell). TEXAS: 3 ♂♂, El Paso, July 17, 1917 (Bequaert); 2 ♂♂, El Paso, 3700 ft., June 20, 1942 (H. A. Scullen); ♂, Santa Elena Canyon, Big Bend National Park, 2145 ft., Aug. 25, 1954 (R. M. Bohart).

DISTRIBUTION.—Southern Arizona, southern New Mexico, and southwestern Texas.

PREY RECORD.—None.

PLANT RECORD.—None.



FIGURES 59-61.—Localities of: 59, *C. insolita albida* Scullen; 60, *C. insolita atrafemori* Scullen; 61, *C. rufa* Scullen.

#### 41c. *Cerceris insolita atrafemori*, new subspecies

FIGURES 60, 143a,b,c

FEMALE.—Length 11 mm. Structurally like the nominate subspecies *C. insolita insolita* Cresson except for variations in the color markings as given below.

Head markings are creamy white and not yellow as in the nominate subspecies.

Thorax shows a small secondary evanescent yellow spot on the propodeum near the apex of the enclosure; the metanotum shows more or less yellow; legs are black with creamy-white markings; hindfemora are black with a creamy-white patch near the apical end.

Abdomen with the band on tergum 3 broad with little or no emargination; other abdominal bands nearly equal to half the tergum and



with slight emargination; venter with little or no markings; pygidium ferruginous.

MALE.—Unknown.

TYPES.—The type female, from Phoenix, Ariz., 1100 ft., Aug. 10, 1946 (H. A. Scullen), is at the U.S. National Museum, no. 66169. Paratypes are as follows:

ARIZONA: ♂, Canelo, July 30, 1956 (G. D. Butler); ♀, Cortaro, July 28, 1956, cotton (T. Dees); ♀, Ft. Thomas, Graham Co., 2700 ft., Aug. 7, 1946 (H. A. Scullen); ♀, Tucson, 2500 ft., Aug. 13, 1946 (H. A. Scullen); ♀, 10 mi. E. Tucson, July 30, 1955, *Croton* (G. D. Butler); ♀, S. Tucson, July 26, 1956, cotton (C. Williams).

DISTRIBUTION.—Known only from Arizona.

PREY RECORD.—None.

PLANT RECORD.—Cotton (Arizona), *Croton* sp. (Arizona).

#### 42. *Cerceris rufa*, new species

##### FIGURE 61

FEMALE.—Length 10 mm. Black with yellow and rufous markings; punctation and pubescence average.

Head subequal in width to the thorax; black except the entire face below the antennal scrobes, small spot back of the eye, and the basal two-thirds of the mandibles, all of which are yellow, heavily infused with fulvous; clypeal border with three blunt denticles, to the side of each lateral denticle a slight carina; the clypeal process is reduced to a low rounded elevation slightly more than an exaggerated convex area; mandibles with three denticles, the most apical one very large with a deep incision at its apical side and the most basal one low and broad; antennae normal in form.

Thorax black except for a semidivided band on the pronotum, the scutellum, most of the propodeum exclusive of the enclosure, and the tegulae, all of which are ferruginous; tegulae low and smooth; enclosure with a medial groove and deep pits along the lateral margins; mesosternal tubercle absent; legs ferruginous; wings subhyaline clouded with ferruginous.

Abdomen with the first three terga rufous and the posterior three black; venter with the first two sternites rufous, the third sternite black and rufous, and the remaining sternites black; pygidium with the sides slightly convex and ends subequal in width.

MALE.—Length 10 mm. General coloring as on the female; punctation and pubescence as on the female.

Head black except the entire face below the antennal scrobes and the basal half of the mandibles, which are yellow infused with fulvous; clypeal border with three low denticles; hair lobes broad, extending

from the eye to the lateral border denticles; mandibles with a single denticle having a broad base; antennae normal in form.

Thorax black except for a divided band on the pronotum, the scutellum, a large area on the propodeum, and the tegulae, all of which are ferruginous; tegulae low and smooth; enclosure with a light medial groove and deep punctation over most of the side areas; mesosternal tubercle very prominent and acute, with the points extending toward the posterior; legs fulvous with some parts becoming more yellow; wings subhyaline clouded with ferruginous.

Abdomen with the first three tergites rufous and a trace of fulvous to yellow lines along the anterior margins of terga 2 and 3, the remaining four terga black; venter black except for sternites 1, 2, and patches on 3, which are rufous; pygidium with sides slightly convex and the ends subequal in width.

Both sexes of *C. rufa* are very close in structure to *C. compar* Cresson and possibly should be considered a subspecies of the latter. On the basis of its very different color and color pattern, it is considered here a distinct species.

TYPES.—The type female and the allotype male, taken at South Miami, Fla., by S. Graenicher, on May 26, 1927, and March 14, 1927, respectively, are in the U.S. National Museum, no. 66170. Paratypes are as follows:

FLORIDA: ♀, Cleveland, Apr. 3 1938 (D. M. DeLong); 5♂♂, S. Miami, Mar. 14, 1927 (S. Graenicher); 4♂♂, Homestead, June 22, 1951 (Beamer-Wood); ♂, Lutz, Mar. 31, 1927 (Krautwurm), Carnegie Museum, no. 8096; ♂, Monticello, May 25 (G. Fairchild); ♂, Brighton, April 7, 1937 (J. G. Franclemont).

DISTRIBUTION.—Florida.

PREY RECORD.—None.

PLANT RECORD.—None.

#### 43. *Cerceris zelica* Banks

FIGURES 62, 144a,b,c,d

*Cerceris zelica* Banks, 1912a, p. 23.—Scullen, 1951, p. 1011.

FEMALE.—Length 12 mm. Black with yellow markings; legs fulvous; punctation and pubescence normal.

Head subequal in width to thorax; black except large frontal eye patches, lateral lobes of the clypeus, clypeal elevation, patch above the elevation, small spot back of the eye, and the basal half of the mandibles, all of which are yellow; clypeal border with three blunt denticles; clypeal elevation cone shaped with a smooth flattened area on the lower surface; mandibles with three denticles fused at the base, the apical one much the largest; antennae normal in form, fuliginous below and darker above.

Thorax black except for a divided band on the pronotum, a semi-divided band on the scutellum, a small patch on the propodeum, and a spot on the tegulae, all of which are yellow; tegulae low, smooth, and fulvous, with a yellow spot; enclosure with a slight medial groove and deep pits along the lateral margins; mesosternal tubercle absent; legs fulvous except for limited darker areas on the forefemora and all basal segments; wings subhyaline, tinged with amber and darker along the anterior margin.

Abdomen with bands on all terga, but those on terga 1 and 2 broader, that on 2 deeply emarginate, those on 3, 4, and 5 narrow; venter immaculate; pygidium long and narrow with the basal end the smaller.

MALE.—Length 12 mm. Black with yellow markings; legs fulvous and yellow; punctation and pubescence average.

Head black except the entire face, small spot back of the eye, small spot on the base of the mandible, and patch on the scape, all of which are yellow; clypeal border with three low denticles; hair lobes very broad and almost meeting medially; mandibles with a single denticle, which has a very broad base; antennae normal in form.

Thorax black except for a divided band on the pronotum, semi-divided band on the scutellum, and a small patch on the tegulae, all of which are yellow; tegulae low and smooth; enclosure pitted along the lateral margins; mesosternal tubercle in the form of a carina extending to a point apically; forelegs dark to beyond the middle of the femora, beyond which they are yellow infused with amber; mid- and hindlegs with the femora fulvous and the remaining parts largely yellow; wings subhyaline, tinged with amber and darker along the anterior margins.

Abdomen with subequal bands on all terga; venter with elongate yellow patches on sternites 2 and 3; pygidium long with the basal end the smaller.

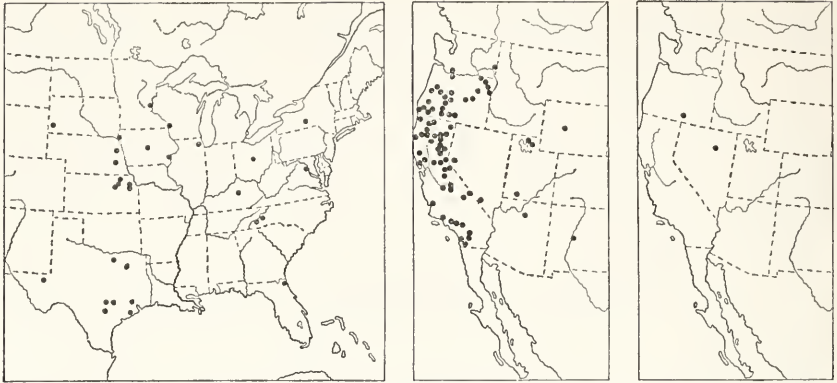
*C. zelica* Banks is similar to *C. compar* Cresson in size and coloring but the form of the clypeal elevation will separate the females. No satisfactory characters have been found to separate the males of the two species. No doubt the males of the two species have been confused. The description of the male is based on the type and specimens determined by Banks from the type locality.

TYPES.—The type male and the allotype female of *C. zelica* Banks, from Fedor, Lee Co., Tex., June 7 (Beckmann), are at the Museum of Comparative Zoology, Harvard, no. 13773.

DISTRIBUTION.—Throughout the Eastern and Central States.

PREY RECORD.—None.

PLANT RECORD.—None.



FIGURES 62-64.—Localities of: 62, *C. zelica* Banks; 63, *C. aequalis aequalis* Provancher; 64, *C. aequalis bolingeri* Scullen.

### Ungrouped Species

The following species have not been separated into distinct groups as yet. There is a distinct affiliation between certain species, however, and further study may warrant the recognition of new, isolated groups.

#### 44a. *Cerceris aequalis aequalis* Provancher

FIGURES 63, 145a,b,c

*Cerceris aequalis* Provancher, 1888, ♀, p. 417; 1889, new species ♀, pp. 417-8, 450.—Dalla Torre, 1897, p. 449.—Ashmead, 1899, p. 296.—Gahan and Rohwer, 1917, p. 335.—Banks, 1947, pp. 16-17.—Scullen, 1951, p. 1004.  
*Cerceris vicinoides* Viereck and Cockerell, 1904, p. 140.—Scullen, 1951, p. 1004.  
*Cerceris psamathe* Banks, 1912a, p. 21.—Scullen, 1951, p. 1004.

**FEMALE.**—Length 11 mm. Black with yellow markings; punctuation fine and more scattered than average; pubescence average.

Head subequal in width to the thorax, black except for large frontal eye patches, dorsal surface of the clypeal process, lateral lobes of the clypeus, base of the mandibles, spot back of the eye, and patch on the scape, all of which are yellow; clypeal border with an extension from the medial lobe that has a sinuate margin and a smooth depressed area above the margin; clypeal process with sides converging to a rounded end that points ventrad at about a 45° angle, concave and black below, yellow above with a black apical margin, mandibles with two subequal denticles fused at the base, basad of which appears a small evanescent denticle in some specimens; antennae normal in form.

Thorax black except for two widely separated patches on the pronotum, the metanotum, large patch on the propodeum, and the



tegulae, all of which are yellow; tegulae low and smooth; enclosure finely rugose with the ridges running at an angle to the base; mesosternal tubercles absent; legs largely yellow with the two basal segments, base of femora, and apical end of the midfemora black; wings subhyaline, slightly clouded apically.

Abdomen with a broad divided band on tergum 1, broad deeply emarginate bands on terga 2 to 5; broad bands on sternites 2 to 4, and a divided broad band on sternite 5; pygidium wedge shaped, with the basal end broad and the apical end very small and rounded.

MALE.—Unrecognizable. In the *aequalis*-*varians* complex.

The female of *C. aequalis* Provancher closely resembles the female of *C. varians* Mickel in size, structure, and color pattern, from which it is separated easily by the form of the clypeal process. So far the present author has been unable to distinguish the males.

TYPES.—The lectotype female of *C. aequalis* Provancher, from California, is at the U.S. National Museum, no. 1974. The type female (not a male as indicated in the original description), of *C. vicinoides* Viereck and Cockerell, from Pecos, N. Mex., June 25, 1903, on *Fallugia* (W. P. Cockerell), is at the Philadelphia Academy of Natural Sciences, no. 10387. The type female of *C. psamathe* Banks, Lee Co., Tex. (Birkmann), is at the Museum of Comparative Zoology, Harvard, no. 13780.

DISTRIBUTION.—The nominate subspecies is taken mostly in California and Oregon, with limited records from adjoining states.

PREY RECORD.—None.

PLANT RECORD.—*Achillea* sp. (Oregon), *Anaphalis margaritacea* (California), *Ceanothus fendleri* (Arizona), *Eriogonum* (California, Oregon), *Lotus glaber* (California), *Ranunculus* sp. (California).

#### 44b. *Cerceris aequalis bolingeri*, new subspecies

FIGURES 64, 146a,b,c

FEMALE.—Length 11–12 mm. Black with white to creamy-white markings; punctation fine and not crowded; pubescence average; like nominate subspecies *C. aequalis aequalis* Provancher in all respects except as indicated.

Head markings white; clypeal process almost verticle to the plane of the face, much longer than on the nominate subspecies, with sides subparallel and the apical end rounded.

Thorax color pattern and structures as in the nominate subspecies except colors are white to creamy white; legs are immaculate to the apical ends of all femora, remaining segments white and black in variable amounts.

Abdomen as in the nominate subspecies except the markings are white and the venter is immaculate.

**TYPES.**—The type female, from Jacob's Cabin, Hart Mt., Lake Co., Oreg., 6600 ft., July 16, 1937 (Bolinger and Jewett), in the U.S. National Museum, no. 66171. Paratypes are as follows:

OREGON: ♀, Jacob's Cabin, Hart Mt., Lake Co., 6600 ft., July 16, 1937 (Bolinger and Jewett); ♀, Hart Mt., July 16, 1937. NEVADA: ♀, Emigrant Pass, Eureka Co., June 19, 1952 (E. I. Schlinger).

**DISTRIBUTION.**—This subspecies has been taken only on Hart Mt., Lake Co., Oreg., and one specimen in Nevada as indicated above.

**PREY RECORD.**—None.

**PLANT RECORD.**—None.

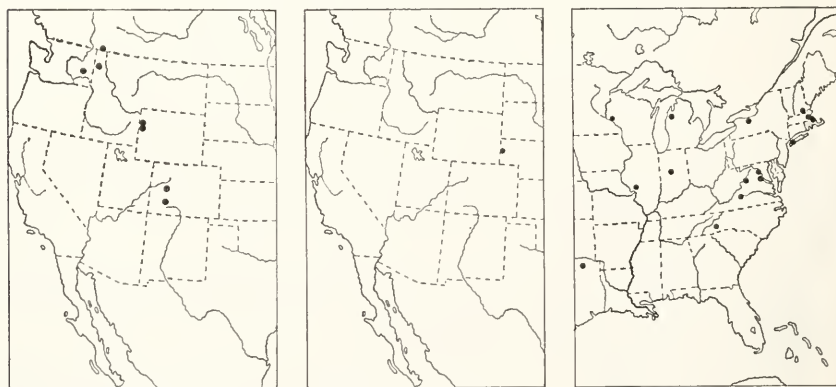
#### 44c. *Cerceris aequalis idahoensis*, new subspecies

FIGURES 65, 147a,b,c

**FEMALE.**—Length 11 mm. Black with creamy-yellow markings; structurally like the nominate subspecies *aequalis aequalis* Provancher except for the more acute clypeal process and the much lighter and more limited yellow markings.

Head with medium-sized frontal eye patches, patch on the clypeal process, spot back of the eye, base of mandibles and spot on the scape, all of which are creamy yellow; clypeal border as in the nominate subspecies; mandibles with the basal denticle somewhat more distinct than in the nominate subspecies but much smaller than the other denticles.

Thorax black except for two small variable spots on the pronotum, small evanescent spots on the metanotum, and small patches on the tegulae, all of which are creamy yellow; legs black to the apical ends



FIGURES 65-67.—Localities of: 65, *C. aequalis idahoensis* Scullen; 66, *C. alceste* Mickel; 67, *C. astarte* Banks.

of femora, beyond which there are variable amounts of light yellow and amber.

Abdomen with two small patches on tergum 1, a broken emarginate line on tergum 2, emarginate narrow bands on terga 3 and 4, and small evanescent lateral patches on tergum 5; venter immaculate.

MALE.—Unknown.

TYPES.—The type female of *C. aequalis idahoensis* Scullen, from Craig's Mt., Idaho (Wm. J. Fox), is at the Philadelphia Academy of Natural Sciences, no. 5040. Paratypes are as follows:

BRITISH COLUMBIA: ♀, Chilcotin, June 15, 1929 (G. J. Spencer); ♀, Creston, 2816 ft., 1924 (C. S. Lallamand). COLORADO: ♀, 5 mi. N. Cedaredge, July 11, 1938 (U. Lanham); ♀, Lake City, June 29, 1937 (R. H. Beamer). IDAHO: ♀, Craig's Mt. (Wm. J. Fox); ♀, Chileo, Kootenai Co., July 2, 1952 *Achillea* sp., (W. F. Barr). OREGON: ♀, Lick Creek Ranger Station, Wallowa National Forest, 4600 ft., Aug. 16, 1937 (Bolinger and Jewett); ♀, Ochoco Pass, Ochoco National Forest, 5000 ft., July 10, 1955 (J. F. G. Clarke). WASHINGTON: ♀, Ritzville, June 16, 1920 (R. C. Shannon). WYOMING: 2 ♀ ♀, Jackson, 6300 ft., July 13, 1920; 2 ♀ ♀, Jenny Lake, Grand Teton National Park, June 1941 (G. E. Bohart).

DISTRIBUTION.—Largely in the northern Rocky Mountains area, Idaho, and bordering states.

PREY RECORD.—None.

PLANT RECORD.—*Achillea* sp. (Oregon).

#### 45. *Cerceris alceste* Mickel

FIGURES 66, 148a,b,c

*Cerceris alceste* Mickel, 1917a, p. 333; 1917b, p. 449.—Scullen, 1951, p. 1005.

FEMALE.—Length 18 mm. Black with yellowish-white markings and variable shades of reddish brown.

Head black except face and sports back of the compound eyes, which are yellowish white, the vertex and genae, which are ferruginous; clypeal border with a medial extension on the sides, on which are two slightly rounded denticles opposite the points of the clypeal process; clypeal process somewhat lunar in shape with a lateral secondary projection on each side; mandibles with three low denticles, the medial one being much more acute than the other two, which are low and broad; antennae ferruginous at the base, becoming fulvous apically.

Thorax largely black except divided band on pronotum, scutellum, metanotum, large patches on the propodium, spot on the pleuron, and the tegulae, all of which are yellowish white; most of the light markings show a ferruginous border; enclosure with fine longitudinal lines tending to radiate to the side; legs ferruginous; wings subhyaline, becoming darker at the apex.

Abdomen largely ferruginous with yellowish-white markings; semidivided patches of yellowish white on tergum 1; terga 2 to 5 with broad yellowish white bands deeply emarginate with ferruginous anteriorly and the basal margins of all terga black; venter light amber with yellow spots on sternites 2 to 5; pygidium narrowing apically to a rounded end.

MALE.—Unknown. Mickel (1918, p. 336) indicated *C. fugatrix* Mickel might be the male of *C. alceste* Mickel.

The secondary process on the sides of the clypeal process of the unique holotype of *C. alceste* Mickel and its greater amount of ferruginous markings are the only characters that separate it from specimens of *C. stigmosalis* Banks (*C. fugatrix* Mickel). This similarity to the latter species and the fact that *C. alceste* Mickel is represented only by the unique holotype, which was taken at Mitchell, Nebr., on the same date as the male type of *C. fugatrix* Mickel, indicates the holotype female of *C. alceste* Mickel is only an extreme abnormality of *C. stigmosalis* Banks. This view is supported further by the fact that some female specimens of *C. stigmosalis* Banks show slight indications of elevations on the sides of the clypeal process.

TYPE.—The holotype female of *C. alceste* Mickel, from Mitchell, Nebr., Aug. 4, 1916 (C. E. Mickel), is at the University of Nebraska.

DISTRIBUTION.—The species is known only from the type locality of Mitchell, Nebr.

PREY RECORD.—None.

PLANT RECORD.—None.

#### 46. *Cerceris astarte* Banks

FIGURES 67, 149a,b,c

*Cerceris astarte* Banks, 1913b, p. 424, pl. 1, fig. 12.—Scullen, 1951, p. 1005.

FEMALE.—Length 10 mm. Black with yellow markings; punctuation and pubescence average.

Head subequal in width to the thorax; black except for large frontal eye patches, spot on the clypeal process, and evanescent small spot back of compound eye, and small spot on the scape, all of which are yellow; border of the clypeus with four prominent denticles, the mesal pair somewhat the larger, the clypeal process short, with the sides converging to a rounded apex; mandibles with two denticles that are broad and low, the more basal one bifid; antennae normal in form, dark except for a small yellow spot on the scape.

Thorax black except for two widely separated spots on the pronotum, the metanotum, large patches on the propodeum, and patches on the tegulae, all of which are yellow; tegulae low and smooth; enclosure faintly ridged longitudinally in the center but with ridges more pronounced laterally and with a medial groove; mesosternal



tubercles absent; legs dark to or near the apical ends of the femora, beyond which they are yellow infused with brown; wings subhyaline clouded with amber and darker toward the apex.

Abdomen with subequal bands covering about the posterior third of terga 2 to 5; tergum 1 with the band broken into two patches; venter immaculate; pygidium with the sides subparallel and the apical end rounded.

MALE.—Length 9 mm. Black to dark fuscous with light yellow (almost cream) markings; punctation somewhat less crowded than average; pubescence slightly longer than average.

Head slightly wider than the thorax; black except for the face, base of mandibles, and the scape, all of which are yellow; clypeal border with two distinct, widely separated denticles, which are black; hair lobes subequal in width to the width of the lateral lobes; surface of the medial lobe of the clypeus depressed but not concave; manibles with a low sinuate carina but no distinct denticles; antennae with the apical segment blunt and slightly curved.

Thorax black except two patches on the pronotum, the metanotum, two patches on the propodeum, and the tegulae, all of which are light yellow; tegulae low and smooth; enclosure smooth except for a central groove and limited ridges in the lateral angles; mesosternal tubercles absent; first pair of legs dark over the basal parts to the apical ends of the femora, otherwise yellow shaded with fulvous; the second pair of legs yellow shaded with fulvous except for a dark area on the basal half of the femora; the third pair of legs are dark except the basal parts to middle of the femora and the basal half of the tibiae, which are yellow clouded with fulvous; wings subhyaline except for the usual clouded area at the apex.

Abdomen dark except for two lateral patches on the first tergum, subequal narrow bands on terga 2 to 6, and small lateral patches on sternites 2 to 4, all of which are light yellow; pygidium with sides subparallel but slightly convex, the apical end truncate and the lateral angles slightly rounded.

The identification of the males is based on specimens collected by Dr. K. V. Krombein at Powder Mills, N.C.

The female of *C. astarte* Banks closely resembles the female of *C. nigrescens arelate* Banks in size and color pattern as well as in its distribution, but the form of the clypeal process and the pygidium will easily separate them.

TYPES.—The type female of *C. astarte* Banks, from Falls Church, Va., Sept. 7, 8, 1912, is at the Museum of Comparative Zoology, Harvard, no. 13788.

DISTRIBUTION.—This rare species has been taken in the Northeast-

ern States, from Wisconsin and Illinois east to New England and south to North Carolina. Specimens are as follows:

ILLINOIS: 4 ♀ ♀, Carlinville, 1901, (Robertson); ♀, Muncie, Sept. 21, 1930. IOWA: ♀, Lodges State Park, Boone, Aug. 22, 1934 (Scullen). MASSACHUSETTS: ♀, Millon, Aug. 14, 1898 (P. G. Bolster); ♀, Natick, Sept. 1, 1934 (C. A. Frost); ♀, Wollaston, June 1, 1895 (F. H. Sprague). MICHIGAN: ♀, Lake Co., 1947 (R. R. Dreisbach). NEW HAMPSHIRE: ♀, Pelham, Aug. 29, 1905 (Bridwell); 6 ♀ ♀, Pelham, Sept. 5, 1905. NEW YORK: ♀, Montauk, Long Island, Sept. 4, 1953 (Roy Latham); ♀, Northwest, Long Island, June 3, 1947 (Roy Latham); 2 ♀ ♀, Powder Mills, Aug. 24, 1955 (K. V. Krombein). NORTH CAROLINA: ♂, Black Mts., Mount Mitchell, 5000-6711 ft., Sept. 6, 1930 (N. Banks); ♀, Valley of Black Mts., Sept. 11, 1906 (W. Beutenmuller). VIRGINIA: ♀, Brushy Mts., Rockbridge, Sept. 17, 1934 (L. K. Gloyd); ♀, 2 ♂ ♂, Dunn Loring, Aug. 28, 1948, Aug. 21, 1949 (K. V. Krombein); 2 ♀ ♀, Falls Church, Sept. 1 (N. Banks). WEST VIRGINIA: ♀, Cheat Mt., Aug. 23. WISCONSIN: ♀, Maiden Rock, Aug. 4-10, 1910.

PREY RECORD.—None.

PLANT RECORD.—None.

#### 47. *Cerceris atramontensis* Banks

FIGURES 68, 150a,b,c

*Cerceris atramontensis* Banks, 1913b, p. 425, pl. 1, fig. 8.—Scullen, 1951, p. 1005.—Krombein, 1956, p. 43; 1958a, p. 197.

*Cerceris arbuscula* Mickel, 1916, p. 410; 1917b, p. 450.—Scullen, 1951, p. 1005.

FEMALE.—Length 13 mm. Black with yellow markings; punctation and pubescence average.

Head slightly wider than the thorax; black except for medium-sized frontal eye patches and patch on the clypeal process, which are yellow; clypeal border with two widely separated, large, blunt denticles; clypeal process with the width and length subequal, sides slightly converging and ending in denticle-like lateral extensions and the apical margin concave between the lateral extensions; mandibles with two denticles, the apical one the larger; antennae normal in form, dark fuscous.

Thorax black except for two elongate patches on the pronotum and the metanotum, which are yellow; tegulae low, smooth, and fulvous with a trace of yellow; enclosure deeply ridged longitudinally with the ridges spreading slightly apically; mesosternal tubercle absent; legs fuliginous basally over most of each femora, becoming fulvous on the tibiae and tarsi; wings subhyaline but clouded.

Abdomen black with two lateral patches on tergum 1; tergum 2 with a broad but deeply emarginate band on the posterior half; narrow lines on terga 3, 4, and 5; venter immaculate; pygidium with sides slightly convex and narrowing to a rounded apical end.

MALE.—So far indistinguishable from other closely related species. It is probably being confused with the male of *C. clypeata* Dahlbom.

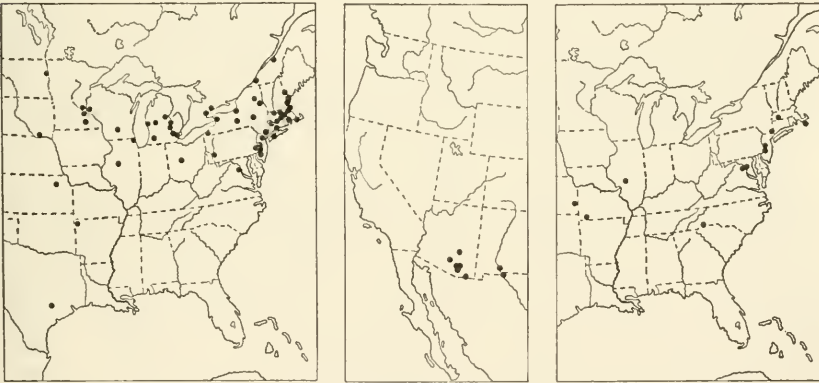
*C. atramontensis* Banks is very close to *C. clypeata* Dahlbom in size and color but is easily distinguished by the form of the clypeal process of the female.

**TYPES.**—The type female of *C. atramontensis* Banks, from Valley of Black Mountains, N.C., July 23, 1906 (Beutenmuller), is at the Museum of Comparative Zoology, Harvard, no. 21180. The type female of *C. arbuscula* Mickel, from Omaha, Nebr., July 23, 1913 (L. T. Williams), is at the University of Nebraska.

**DISTRIBUTION.**—North Central and Northeastern States, from eastern North Dakota to New England and south to North Carolina, Arkansas, and central Texas.

**PREY RECORD.**—*Conotrachelus naso* Leconte (Krombein, 1956, Virginia), *C. nenuphar* (Herbst) (J. C. Bridwell, New Hampshire). *C. posticatus* Boheman (Krombein, 1956, Virginia).

**PLANT RECORD.**—*Daucus carota* (New York), *Eupatorium scrotinum* (Missouri), *Liriodendron tulipifera* (Virginia), *Melilotus alba* (Ohio), *Veronica apicata* (Missouri).



FIGURES 68-70.—Localities of: 68, *C. atramontensis* Banks; 69, *C. azteca* Saussure; 70, *C. banksi* Scullen.

#### 48. *Cerceris azteca* Saussure

FIGURES 69, 151a,b,c,d

*Cerceris azteca* Saussure, 1867, p. 97.—Schletterer, 1887, p. 486.—Dalla Torre, 1897, p. 453.—Ashmead, 1899, p. 296.—Scullen, 1961, p. 45.

*Cerceris seminigra* Banks, 1947, pp. 33-34.—Scullen, 1951, p. 1010.

**FEMALE.**—Length 9-10 mm. Black with dark yellow, fulvous, and creamy-white markings; punctation somewhat coarser than average; pubescence very short.

Head subequal in width to the thorax; black except two medium-sized frontal eye patches, the clypeal process, spots back of the eyes, and base of mandibles, all of which are dark yellow; clypeal margin with a broad, blunt process medially flanked by single denticles approximately opposite the attachments of the sides of the clypeal process; clypeal process slightly shorter than broad, the free margin deeply emarginate and the lateral points smoothly rounded; mandibles with two denticles connected by a carina; antennae normal in form; scape and peduncle dark; flagellum dark above and fulvous below.

Thorax with prominent points on the dorsolateral angles of the pronotum; black except elongate patches on the pronotum, a divided band on the scutellum, and the tegulae, all of which are dark yellow; tegulae low and smooth; enclosure smooth except for a medial groove and a few deep pits laterally; mesosternal tubercles absent; legs black to or near the apical ends of the femora, beyond which they tend to be dark on the posterior sides and yellow on the anterior sides; wings subhyaline but clouded, becoming darker apically.

Abdomen with a creamy-white border along the lateral sides and apical margin of tergum 1; tergum 2 black except for an evanescent small patch; terga 3 to 6 dark yellow to fulvous with small dark spots laterally on tergum 3; venter dark except for a medial and two lateral spots on sternite 3 and wide bands on sternites 4 and 5; pygidium with the sides slightly convex and converging from a broad apical end to a narrow rounded basal end.

MALE.—Length 7 mm. Black with dark yellow, fulvous, and creamy-white markings; punctation coarse; pubescence very short.

Head black except large frontal eye patches, medial clypeal lobe, spot just above the latter, small spot back of the eyes, base of the mandibles, and patch on the scape, all of which are dark yellow; clypeal margin extended from the medial lobe, showing a slight denticle-like medial point and similar points at the lateral angles of the extension; hair lobes very broad, meeting at the meson, mandibles without denticles; antennae normal in form.

Thorax with prominent points on the dorsolateral angles of the pronotum; black except trace of yellow just mesad of the above points on the pronotum, a divided band on the scutellum, and most of the tegulae, all of which are yellow; tegulae chevron shaped and with scattered pits; enclosure smooth except for a medial groove and a limited number of deep pits laterally; legs black to the apical ends of femora, yellow beyond except for dark areas on the posterior sides of most segments; wings subhyaline but slightly clouded and darker at the apex.

Abdomen with a creamy-yellow border along the lateral sides and posterior border of tergum 1, tergum 2 black, terga 3 to 7 dark



yellow to fulvous with a small dark spot laterally on tergum 3; venter black with wide emarginate bands of fulvous on sternites 3, 4, and 5; pygidium with the basal end somewhat smaller than the apical end.

*C. azteca* Saussure closely resembles *C. dilatata* Spinola in general color pattern but belongs to a different group. The clypeal process and the wedge-shaped pygidium of the former will readily separate the females. The extremely wide hair lobes of the former will separate the males.

TYPES.—The type female of *C. azteca* Saussure is at the Naturhistorisches Museum, Vienna, Austria, with the following label: "In Agro Mexicano frequens. In partes calidas provinciae urbis Mexico prope Yautepec et Cuautla 8 ♀ in Julio cepi, et in Orizaba 2 ♀ in Martio." The type male of *C. seminigra* Banks, from Patagonia, Ariz., Aug. 20 (Bequaert), is at the Museum of Comparative Zoology, Harvard, no. 27621.

DISTRIBUTION.—This species has been taken in limited numbers in Arizona, New Mexico, and Texas, but it is more common in Mexico. Specimens are as follows:

ARIZONA: ♀, Continental, Pima Co., July 19, 1942 (H. A. Scullen); ♂, Douglas, Aug. 7, 1933 (W. W. Jones); ♂, Douglas, July 22, 1940 (W. W. Jones); ♀, 11 mi. SW. Eloy, Pinal Co., July 16, 1953 (T. R. Haig); ♂, Fort Thomas, Graham Co., 2700 ft., Aug. 7, 1946 (H. A. Scullen); ♀, Tucson, June 10, 1938 (R. H. Crandall); ♂, 10 mi. E. Tucson, July 30, 1955 (G. D. Butler); ♀, Sahuarita, July 18, 1950 (W. J. Arnold); ♀, Wilcox, Aug. 9, 1933 (Bryant). NEW MEXICO: ♀, Las Cruces, July 15, 1952 (R. H. and L. D. Beamer, C. Liang, and W. La Berge). TEXAS: 2 ♀♀, El Paso, July 1, 1921 (Carl Duncan); ♂, El Paso, July 14, 1942 (H. A. Scullen).

PREY RECORD.—None.

PLANT RECORD.—*Croton* (Arizona).

#### 49. *Cerceris banksi*, new species

FIGURES 70, 152a,b,c

FEMALE.—Length 13 mm. Black with yellow markings; punctuation and pubescence average.

Head slightly wider than the thorax; black except large frontal eye patches, dorsal surface of the clypeal process, small spot back of the eye, base of the mandibles, and small patch on the scape, all of which are yellow; clypeal border with a broad extension medially, to each side of which is a small denticle-like elevation; clypeal process flat with the lateral margins turned down, slightly broader than long, and the free margin emarginate with a small medial extension; mandibles with two low denticles; antennae normal in form.

Thorax black except for two widely separated patches on the pronotum, the metanotum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure smooth except for a very faint medial groove; mesosternal tubercle absent; legs fuscous to near the apical ends of all femora, beyond which they are fulvous; wings subhyaline but somewhat clouded with amber.

Abdomen with a broad but divided band on tergum 1, a broad band with variable amounts of emargination on terga 2, subequal narrower bands on terga 3 to 5; venter immaculate; pygidium with sides subparallel, ends subequal, and the apical one rounded laterally.

MALE.—Unknown. It may be confused with the males of closely related species.

From specimens named by Banks, it appears he considered this the female of *C. deserta* Say; however, it is not the female of that species (see discussion under *C. deserta* Say).

TYPES.—The type female, from Falls Church, Va., June 18 (N. Banks), is deposited at the Museum of Comparative Zoology, Harvard, no. 30447. Paratypes are as follows:

CONNECTICUT: ♀, Black Point, July 8, 1896. DISTRICT OF COLUMBIA: ♀, June 13, 1886 (T. P. Pergande). ILLINOIS: ♀, Carlingville (Charles Robertson). KANSAS: 2 ♀♀, Burbon Co., 800 ft. (R. H. Beamer). MASSACHUSETTS: ♀, Nantucket, July 16, 1926 (C. W. Johnson); ♀, Southampton, July 14, 1894. MARYLAND: ♀, Indian Hdw. [Head?], Aug. 27, 1902 (J. C. Bridwell). MISSOURI: ♀, Berry Co., June 2, 1936 (B. Frank Blair). NORTH CAROLINA: ♀, Tryon, juniper (W. F. Fiske). NEW JERSEY: ♀, Riverton, July 18, 1909 (G. M. Greene); ♀, Trenton, July 5. NEW YORK: ♀, White Plains, June 29, 1918 (J. Bequaert). VIRGINIA: ♀ (T. Pergande); ♀, July 1, 1883 (T. Pergande); ♀, Glencarlyn, July 2, *Ceanothus* (N. Banks); ♀, Rosslyn (Chittenden); 2 ♀♀ [no data].

DISTRIBUTION.—Scattered records over the Eastern States, west to Missouri.

PREY RECORD.—None.

PLANT RECORD.—None.

#### 50a. *Cerceris bicornuta bicornuta* Guérin

FIGURES 71, 153a,b,c,d,e

*Cerceris bicornuta* Guérin, 1845, p. 443.—Smith, F., 1856, p. 466.—Cresson, 1865, p. 117.—Packard, 1866, p. 61.—Saussure, 1867, p. 100, pl. 4, fig. 58.—Cresson, 1872, p. 227; 1875, p. 717.—Robertson, 1887, pp. 202–216, 246.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 486.—Cameron, 1890, p. 127.—Robertson, 1891, p. 570.—Dalla Torre, 1897, p. 453.—Bridwell, 1898, p. 209.—Smith, J. B., 1900, p. 519.—Viereck, 1903, p. 120.—Viereck and Cockerell, 1904, p. 130.—Smith, J. B., 1910, p. 678.—Banks, 1912a, p. 16.—Mickel, 1917b, p. 446.—Bequaert, 1928, p. 62.—Rau, 1928, pp. 337–341, pl. 24.—Cartright, 1929, p. 35.—Scullen, 1942, p. 188.—Guiglia, 1948, p. 179.—Scullen, 1951, p. 1005.

*Cerceris dufourii* Guérin, 1845, p. 443.—Smith, F., 1856, p. 466.—Cresson, 1865, p. 131.—Packard, 1866, p. 64.—Cresson, 1875, p. 717; 1887, p. 282.—Schletterer, 1887, p. 490.—Dalla Torre, 1897, p. 457.—Ashmead, 1899, p. 295.—Smith, J. B., 1900, p. 519; 1910, p. 678.—Scullen, 1942, p. 188.—Guiglia, 1948, p. 179.—Scullen, 1951, p. 1005.

*Cerceris venator* Cresson, 1865, p. 116.—Packard, 1866, p. 61.—Cresson, 1872, p. 228; 1875, p. 717 (= *bicornuta* Guérin); 1887, p. 282.—Schletterer, 1887, p. 505.—Ashmead, 1894, p. 60.—Dalla Torre, 1897, p. 480.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Smith, J. B., 1900, p. 519.—Cockerell, 1901, p. 42.—Viereck and Cockerell, 1904, p. 130.—Viereck, 1906b, p. 223.—Smith, H. S., 1908, p. 364.—Smith, J. B., 1910, p. 678.—Mickel, 1917b, p. 447.—Hendrickson, 1930, p. 160.—Scullen, 1942, p. 188; 1951, p. 1005.

*Cerceris curvicornis* Cameron, 1890, p. 124.—Ashmead, 1899, p. 296.

*Cerceris bicornis* [sic] Ashmead, 1899, p. 295.

*Cerceris serripes*<sup>13</sup> Bequaert, 1928, p. 62.—Scullen, 1942, p. 188.—Strandtmann, 1945, p. 311.

*Cerceris bicornuta bicornuta* Krombein, 1952c, p. 336; 1953, pp. 118–119, 123, 124, 125, 134; 1954b, p. 235; 1958, p. 197; 1958b, p. 101.—Scullen, 1961, p. 45.

FEMALE.—Length 20 mm. Black, fuscous, ferruginous, and yellow infused with brown; punctuation and pubescence average.

Head subequal in width to thorax; largely ferruginous with lighter, irregular frontal eye patches and black ocellar area; clypeal border with two low, broad denticles opposite the two lateral apices of the clypeal process; clypeal process low and lunar-shaped; mandibles with a medial ridge showing three indistinct, low denticle-like elevations; antennae ferruginous basally, becoming fuscous apically, normal in form.

Thorax black except the pronotum, limited patch on the scutum, the scutellum, the propodeum, and the tegulae, all of which are dark ferruginous, and the metanotum, which is yellow infused with brown; tegulae low and smooth; enclosure black and smooth except for a medial groove and pitted areas in the lateral angles; mesosternal tubercles absent; legs largely ferruginous; wings fuscous.

Abdomen dark ferruginous to fuscous except for large lateral yellow patches on terga 1 and 2; venter fuscous with the more anterior sternites somewhat lighter; denticle-like elevations appear on the posteriolateral angles of sternite 5; pygidium broader medially, the basal end a rounded point and the apical end broadly truncate.

MALE.—Length 17 mm. Black with yellow and ferruginous markings; punctuation and pubescence average.

Head subequal in width to thorax; black except for face, which is yellow; clypeal border with a medial extension with three small denticles; hair lobes narrow; clypeal surface slightly convex; mandibles smooth except for a very slight indication of a single denticle; an-

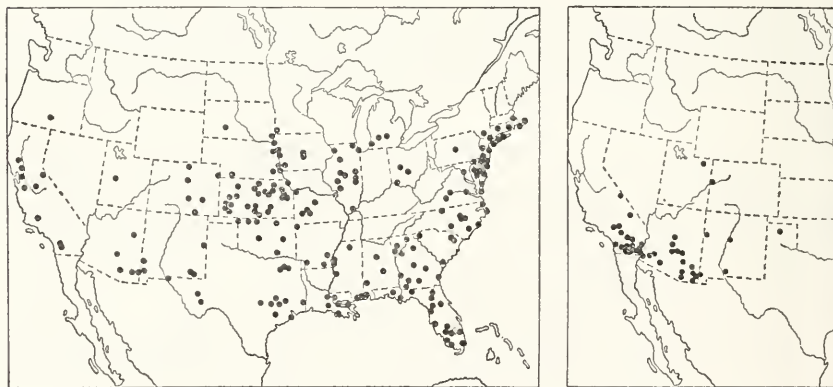
<sup>13</sup> See *C. serripes* Fabricius (pp. 503–505) for a discussion of its misidentification as *C. bicornuta* Guérin.

tennae with the terminal segment strongly hooked, ferruginous basally, and fuscous apically with a trace of yellow on the scape.

Thorax black except for two patches on the pronotum, the metanotum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure smooth except for a medial groove and pits in the lateral angles; mesosternal tubercles absent; legs fulvous; wings subhyaline shaded with brown.

Abdomen with tergum 1 black to fulvous; terga 2 to 6 with yellow bands variable in width and emargination, the emarginations more or less bordered with fulvous; venter dark, more or less marked with fulvous; pygidium narrowing apically and ending in a broad medial extension flanked by lateral acute denticles.

Both sexes show color pattern variation but these are more conspicuous in the females and are related geographically. The first tergum of the male varies from black to fulvous. The abdomen of the female in the nominate subspecies has the yellow confined to the large patches on the first two terga. In the subspecies *fidelis*, the entire tergum is yellow. In the extreme Southeast, the yellow on the terga disappears on most specimens.



FIGURES 71, 72.—Localities of: 71, *C. bicornuta bicornuta* Guérin; 72, *C. bicornuta fidelis* Viereck and Cockerell.

**TYPES.**—The type female of *C. bicornuta* Guérin and the type male of *C. dufourii* Guérin, both from New Orleans, La., are at the Museo Civico di Storia Naturale, Genoa, Italy. The type male of *C. venator* Cresson, from Illinois, is at the Philadelphia Academy of Natural Sciences, no. 1937. The type male of *C. curvicornis* Cameron, from Mexico, Presidio de Mazatlan (Forrer), is at the British Museum of Natural History, no. 21.1,430.

**DISTRIBUTION.**—General over most of the United States and northern Mexico. More common in the Central and Southern States.



PREY RECORD.—*Calendra* sp. (= *Sphenophorus*) (Strandtmann, 1945, Ohio), *C. aequalis* Gyllenhal (Latham, Long Island, N.Y.), *C. cariosus* (Oliver) (Krombein, 1953, North Carolina), *C. cultellatus* Horn (Missouri), *C. maidis* Chittenden (Blackman, Cartwright, 1929, South Carolina), *C. marinus* Chittenden (Latham, Long Island, N.Y.), *C. parvulus* Gyllenhal (Rau, 1928, Missouri; Latham, Long Island, N.Y.), *C. pertinax* (Oliver) (Latham, Long Island, N.Y.), *C. placidus* (Say) (Rau, 1928, Missouri), *C. setiger* Chittenden (Latham, Long Island, N.Y.), *C. venatus* (Say) (Krombein, 1953, North Carolina; Latham, Long Island, N.Y.), *C. zae* Walsh (Rau, 1928; Latham, Long Island, N.Y.).

PLANT RECORD.—*Acacia* sp. (Texas), *Amelopsis arborea* (Louisiana, Texas), *Apocynum cannabinum* var. *pubescens* (Kansas), *Asclepias* sp. (Arizona, New Mexico, New York, Ohio), *A. verticillata* (New Mexico), *Baccharis sarothroides* (Arizona), *Cardiospermum halicacabum* (balloon vine, Texas), *Cassia* sp. (Texas), *Ceanothus* sp. (North Carolina), *Chrysothamnus* sp. (Utah), cotton (Texas), *Daucus carota* (Ohio), *Desmanthus illinoensis* (Texas), *Erigeron elongatum* (Illinois), *Eriogonum* sp. (Arizona, California), *Euphorbia marginata* (Kansas), horsemint (Texas), honey vine (Texas), hammock (Florida), *Melilotus alba* (Kansas, New Mexico, Texas), *Monarda* sp. (Texas), parsnip (Texas), *Petalostemum* sp. (Oklahoma), *P. multiflorum* (Texas), *Pluchea* sp. (North Carolina), *Quercus virginiana* (North Carolina), *Rhus* sp. (Kansas), *Sapindus drummondii* (Texas), *Salix* sp. (Texas), *Sambucus canadensis* (Ohio), *Solidago* sp. (California, Kansas, Texas), *Spiraea* sp. (North Carolina), *Tamarix* sp. (Kansas), *T. gallica* (California), *Wislizenia* sp. (Arizona), *Xanthium spinosum* (Illinois).

#### 50b. *Cerceris bicornuta fidelis* Viereck and Cockerell

##### FIGURE 72

*Cerceris fidelis* Viereck and Cockerell, 1904, p. 132.—Banks, 1947, p. 15.

*Cerceris bicornuta fidelis* Scullen, 1951, p. 1005.

FEMALE.—Length 20 mm. Structurally like *C. bicornuta bicornuta* Guérin female except the colors are much lighter.

Head ferruginous on the face, ocellar area black bordered with fuscous, occiput and genae mottled with shades of brown.

Thorax variable from ferruginous to dark fuscous; pronotum with two separated, indistinct yellow patches; scutum variable shades of brown; scutellum ferruginous; metanotum fulvous to yellow; tegulae fuliginous; propodeum fulvous except the enclosure, which is dark medially but somewhat lighter in the lateral pitted area; legs ferruginous but with the lateral surfaces fulvous to yellow; wings fuscous.

Abdomen largely yellow on the terga with small ferruginous patches laterally on terga 2, 3, and 4; venter ferruginous with lateral yellow patches on sternites 2, 3, and 4.

MALE.—Length 14–15 mm. Structurally like *C. bicornuta bicornuta* Guérin but colors are lighter.

Head yellow on the face, ocellar area black, occiput and genae ferruginous.

Thorax ferruginous and yellow; pronotum with a yellow band slightly emarginate; metanotum and tegulae yellow; propodeum and enclosure ferruginous; legs ferruginous with the basal parts largely yellow; wings shaded with ferruginous.

Abdomen with the terga largely yellow except for lateral ferruginous patches on terga 2, 3, and 4; venter largely yellow emarginate or divided by ferruginous.

TYPE.—The type female of *C. fidelis* Viereck and Cockerell, from Santa Fe, N. Mex. (Cockerell), is at the Philadelphia Academy of Natural Sciences, no. 10378.

DISTRIBUTION.—Southwestern desert areas.

PREY RECORD.—*Eupagoderes* sp. (Krombein, 1959, 1960).

PLANT RECORD.—Alfalfa (Arizona, California), *Asclepias* sp. (California), *Baccharis sarothroides* (Arizona), cotton (Arizona), *Eriogonum* sp. (Arizona), *Helianthus* sp. (Arizona), *Melilotus* sp. (California), *Phacelia* sp. (California), *Sphaeralcea* sp. (Arizona), *Tamarix gallica* (California).

#### 51. *Cerceris boharti*, new species

FIGURES 73, 154a,b,c

FEMALE.—Length 10 mm. Black with light yellow markings; punctuation coarse; pubescence average.

Head slightly wider than the thorax; black except for the entire face below the antennal scrobes and basal two-thirds of the mandibles, which are light yellow; clypeal border with a medial broad extension flanked laterally by single rounded denticles; clypeal surface process in the form of a low horizontal ridge with the extremities slightly dentiform; mandibles with three low and inconspicuous elevations, the medial one the most evident; antennae normal in form.

Thorax black except for two widely separated patches on the pronotum and a divided band on the metanotum, which are light yellow; tegulae low, smooth, and fuliginous; enclosure smooth except for a medial groove; mesosternal tubercles absent; legs are black to near the apical ends of all femora, apical ends of femora are ferruginous, tibiae and tarsi are all yellow, tinged with amber except the apical end of the midtibiae and midtarsi, which are dark; wings are subhyaline with the apical margin clouded and the stigma very light.

Abdomen black except subequal medium-width bands, slightly emarginate on terga 2 to 5; venter with lateral yellow patches on sternites 3 and 4; pygidium with sides convex, apical end rounded and basal end acute.

MALE.—Unknown.

The female of *C. boharti* Scullen is very similar in size and color pattern to *C. astart* Banks and *C. krombeini* Scullen but can be separated easily from each by the clypeal structures. The form of the clypeal process of the female of *C. boharti* Scullen is very similar to that of *C. echo* Mickel but the two species are very different in other respects.

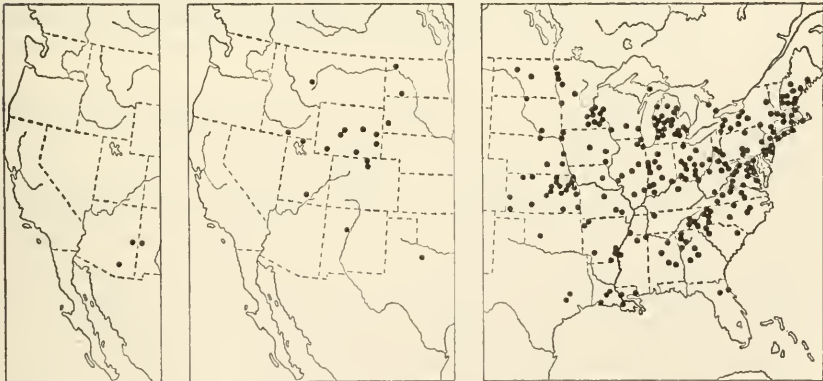
TYPES.—The type female of *C. boharti* Scullen, from Mt. Lemmon Lodge, Santa Catalina Mts., Ariz., Aug. 15, 1954 (R. M. Bohart), is at the University of California at Davis. Paratypes are as follows:

ARIZONA: ♀, Catalina Mts., 1954, *Gnaphalium* (G. D. Butler); 2 ♀ ♀, Mount Lemmon Lodge, Santa Catalina Mts., Aug. 15, 1954 (R. M. Bohart); ♀, Webber's Cabin, 7500–8500 ft., Santa Catalina Mts., July 27, 1917; ♀, White Mts., June 19, 1950 (R. H. Beamer). NEW MEXICO: ♀, South Fork, Eagle Creek, White Mts., 8000 ft., Aug. 18 (Townsend). MEXICO: ♀, Meadow VI [June?], (Townsend).

DISTRIBUTION.—Only eight records are known, seven from the Santa Catalina Mts. and White Mts. of Arizona and New Mexico and one from Mexico.

PREY RECORD.—None.

PLANT RECORD.—*Gnaphalium* sp. (Arizona).



FIGURES 73–75.—Localities of: 73, *C. boharti* Scullen; 74, *C. calochorti* Rohwer; 75, *C. clypeata clypeata* Dahlbom.

52. *Cerceris calochorti* Rohwer

FIGURES 74, 155a,b,c

*Cerceris calochorti* Rohwer, 1908, p. 322.—Scullen, 1951, p. 1006.

FEMALE.—Length 10 mm. Black with cream-colored markings; punctuation and pubescence average.

Head slightly wider than the thorax; black except for the entire face below the antennal scrobes, spot back of the eye, basal three-fourths of the mandibles, and most of the scape, all of which are cream colored; clypeal border with a broad extension on the medial lobe with a sinuate margin; clypeal elevation depressed with the sides converging to a truncate end, which is emarginate and subequal in width to the length of the epistomal suture; mandibles with two distinct denticles, basad of which is a slight denticle-like elevation; antennae light fulvous below and dark above, normal in form.

Thorax black except for a divided band on the pronotum, a broad band on the scutellum, the metanotum, a large patch on each side of the propodeum, a small patch on the mesopleuron, and the tegulae, all of which are cream colored; tegulae low and smooth; enclosure with a slight but distinct medial groove and the surface entirely covered with fine striae subparallel to the meson; mesosternal tubercle absent; legs yellow except for most of the coxae, the trochanters, and the apical end of the hindfemora, which are black; wings subhyaline, slightly clouded apically.

Abdomen with a divided band on tergum 1, broad but deeply emarginate bands on terga 2 to 5; venter sometimes immaculate or with variable amounts of cream-colored markings on sternites 2 to 5; pygidium wedge shaped with the sides converging to a small rounded apical end.

MALE.—Length 9 mm. Black with cream-colored markings; punctuation and pubescence about average.

Head slightly wider than the thorax, black except for the entire face below the antennal scrobes, small spot back of the eye, basal three-fourths of the mandibles, and most of the scape, all of which are cream colored; clypeal border with three subequal small denticles; clypeal surface slightly convex; hair lobes equal in length to the width of the lateral lobes; mandibles with a low carina-like elevation; antennae light fulvous below, darker above, normal in form.

Thorax black except for two patches on the pronotum, an evanescent band on the scutellum, the metanotum, large patch on each side of the propodeum, small spot on the mesopleuron, and the tegulae, all of which are cream colored; tegulae low and smooth, enclosure smooth except for a slight but distinct medial groove; mesosternal tubercle absent; legs cream colored except for dark



patches on the forecoxae, basal end of the forefemora, apical third of the hindfemora, patch on the apical end of the hindtibiae, and much of the hindtarsi; wings subhyaline but very slightly clouded apically.

Abdomen with a wide but emarginate and divided band on tergum 1, broad but deeply emarginate bands on all terga 2 to 5; venter with more or less divided, cream-colored bands on sternites 2 to 5; pygidium with side slightly convex and ends subequal in width.

The female of *C. calochorti* Rohwer is very similar in structure to the female of *C. varians* Mickel but its color markings are very much lighter. It is slightly smaller than the latter species. With more collecting between the two distributional areas, *C. varians* Mickel may in time be shown to be a subspecies of *C. calochorti* Rohwer.

TYPE.—The type female of *C. calochorti* Rohwer, from Boulder, Colo., June 27, 1905, mariposa lily (*Calochortus gunnisonii*) (W. P. Cockerell), is at the U.S. National Museum, no. 28481.

DISTRIBUTION.—This species has been taken along the eastern slope of the Rocky Mountains, from Alberta south to New Mexico and Texas.

PREY RECORD.—None.

PLANT RECORD.—*Achillea millefolium* (Wyoming), *Cleome serrulata* (Wyoming), *Calochortus gunnisonii* (Colorado), *Kuhnistera (Petalostemum) eliagophylla* (North Dakota), *Sisymbrium altissimum* (North Dakota), *Tetradymia canescens* (New Mexico), *Veratrum* sp. (Idaho).

### 53a. *Cerceris clypeata clypeata* Dahlbom

FIGURES 75, 156a,b,c

*Cerceris clypeata* Dahlbom, 1845, pp. 221, 500.—Smith, F., 1856, p. 465.—Cresson, 1865, p. 114.—Packard, 1866, p. 61.—Cresson, 1872, 229.—Provancher, 1882, p. 75, n. 2; 1883, pp. 644, 645.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 488.—Robertson, 1889, pp. 297–304.—Provancher, 1889, p. 644.—Robertson, 1890, p. 200; 1891, pp. 570, 571, 573, 575; 1893, pp. 267–274; 1894a, pp. 455, 457, 460, 462; 1896a, p. 175; 1896b, p. 72.—Dalla Torre, 1897, p. 456.—Peckham, 1898, p. 109, pl. 1, fig. 8.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Smith, J. B., 1900, p. 519.—Smith, H. S., 1908, p. 368.—Smith, J. B., 1910, p. 678.—Banks, 1912a, p. 18; 1912b, p. 107.—Viereck, 1916, pp. 695, 696.—Mickel, 1917b, p. 488.—Britton, 1920, p. 341.—Rau, 1922, p. 21.—Bischoff, 1927, p. 369.—Johnson, 1927, p. 156.—Proctor, 1938, p. 439.—Scullen, 1942, pp. 189–190.—Proctor, 1946b, p. 500.—Scullen, 1949, p. 70; 1951, p. 1006.—Krombein, 1952a, p. 181; 1952b, p. 95; 1954, pp. 6–7.—Krombein and Evans, 1954, p. 235.—Evans, 1957, p. 86, pl. 12, fig. 31.—Krombein, 1958a, p. 197.—Scullen, 1960, p. 77.

*Cerceris imitator* Cresson, 1865, p. 125.—Provancher, 1889, p. 450.—Ashmead, 1899, p. 295.—Smith, J. B., 1910, p. 678.—Viereck, 1916, pp. 695, 696.

*Cerceris deserta* Packard, 1866, p. 63.

- Cerceris imitatoria* Schletterer, 1887, p. 494.—Smith, H. S., 1908, p. 367.—Banks, 1912a, p. 20; 1912b, p. 107.—Mickel, 1917b, pp. 446, 449.—Britton, 1920, p. 342.—Scullen, 1951, p. 1008.
- Cerceris chryssipe* Banks, 1912, p. 18.—Stevens, 1917, p. 421.—Scullen, 1951, p. 1006.
- Cerceris clymene* Banks, 1912a, p. 20; 1912b, p. 107.—Scullen, 1951, p. 1006.
- Cerceris zobeide* Brimley, 1929, p. 194.—Scullen, 1951, p. 1011; 1960, p. 77.
- Cerceris zosma* Brimley, 1929, p. 195.—Scullen 1951, p. 1011; 1960, p. 77.

**FEMALE.**—Length 12 to 14 mm. Black with yellow markings; punctation and pubescence average.

Head subequal in width to the thorax; black except for large frontal eye patches, the surface of the clypeal process, base of mandibles, patch on the scape, and a small spot back of the compound eyes, all of which are yellow; clypeal border with two broad and low denticles with a depression between them; clypeal process inverted scoop shaped, with the sides subparallel or slightly converging apically; mandibles with three low denticles, the apical one being more isolated and somewhat larger; antennae normal in form.

Thorax black except for two patches on the pronotum, the metanotum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure deeply ridged subparallel to the meson; mesosternal tubercles absent; legs fuscous to black basally to near the middle of the femora, beyond which they are yellow infused with brown; wings subhyaline but clouded.

Abdomen black except for a broad band slightly emarginate on tergum 2 and narrow broken lines on the posterior margins of terga 3, 4, and 5; venter immaculate; pygidium with sides slightly converging to an apical rounded end.

**MALE.**—Length 10 to 12 mm. Black with yellow markings; punctation and pubescence average.

Head slightly wider than the thorax, black except the face, base of mandibles, and the scape, all of which are yellow; clypeal border with three subequal denticles on the medial lobe; surface of the clypeus convex; hair lobes limited to the lateral lobes of the clypeus; mandibles with the inner margin slightly sinuate without distinct denticles; antennae with the terminal segment slightly curved.

Thorax black except for two patches on the pronotum, the metanotum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure deeply ridged parallel to the meson; mesosternal tubercles absent; forelegs dark to the femora, beyond which they are mostly yellow; midlegs largely yellow with darker areas; hindlegs largely yellow to middle of the femora, beyond which they are largely dark; wings subhyaline but slightly clouded.

Abdomen black except for a broad band on tergum 2 and narrow broken lines on terga 3 to 6; venter black to dark fuscous with small

yellow spots appearing laterally on sternites 2, 3, and 4; pygidium with sides slightly convex and with the apical end slightly convex.

*C. clypeata* Dahlbom and its closely related forms have presented a difficult problem to taxonomic workers. Banks was inclined to consider slight variations as characters on which to establish new species. On the other hand, some students were inclined to bring together closely related forms that the present writer prefers to keep distinct. The correct identification of some males is still uncertain. Only exhaustive field studies can clear up this problem.

*C. imitator* Cresson (new name *C. imitatoria* Schletterer), which was described from Illinois, appears to be a male *C. clypeata* Dahlbom, with the band on the second tergite somewhat narrower than on the typical *clypeata* male.

The writer has studied the types of *C. clypeata* Dahlbom at Lund, and he finds the typical forms of this species clearly defined.

TYPES.—The type female and allotype male of *C. clypeata* Dahlbom, labeled "America," are at the Universitets Zoologiska Institution, Lund, Sweden. The type male of *C. imitator* Cresson, from Illinois, is at the Philadelphia Academy of Natural Sciences, no. 1951. The type female and the allotype male of *C. chryssipe* Banks, from Falls Church, Va., are at the Museum of Comparative Zoology, Harvard, no. 13791. The type female and allotype male of *C. clymene* Banks, from Glencarlyn, Va., and Falls Church, Va., are also at the Museum of Comparative Zoology, Harvard, no. 13789. The type male of *C. zobeide* Brimley and the type female of *C. zosma* Brimley, both collected at Raleigh by C. S. Brimley, are at the North Carolina State Department of Agriculture, Raleigh, N.C.

DISTRIBUTION.—Through the Eastern States and southeast Canada. It is common west to eastern Nebraska and Kansas. One female and two males are recorded from Colorado. Limited specimens have been seen from the southeastern Gulf States.

PREY RECORD.—*Balaninus nasicus* Say (Peckham, 1898, Wisconsin), *Chalepus dorsalis* Thunberg (Krombein, 1954, West Virginia), *Lema trilineata* Oliver (Chrysomelidae) (K. W. Cooper, New Jersey; F. Kurczewski, Virginia); *Pissodes strobi* (Peck) (K. W. Cooper, New Jersey); *Tanymecus confusus* (Say) (Bridwell, Washington, D.C.).

PLANT RECORD.—*Acacia* (Texas), *Ambrosia artemisiaefolia* (Kentucky), *Angelica* sp. (Colorado), *Asclepias* sp. (Connecticut, Massachusetts), *Asclepias comuti* (Illinois), *Asclepias incarnata* (Illinois), *Asclepias sulliventii* (Illinois), *Asclepias tuberosa* (Georgia), *Asclepias verticillata* (Illinois, Iowa), *Aster ericoides* (Illinois), *Berteroa incana* (Massachusetts), *Ceanothus* sp. (Virginia), *Ceanothus americanus* (Illinois, New York, Virginia), *Chrysanthemum leucanthemum* (North Carolina), *Cicuta* sp. (Virginia), *Cicuta maculata* (Ohio), cotton

(Alabama), *Daucus carota* (Massachusetts, New York, Ohio), dogbane (= *Apocynum* sp.; New Hampshire), *Erechtites hieracifolia* (New Jersey), *Euphorbia marginata* (Kansas), *Euthamia graminifolia* (New Jersey). *Helianthus divaricatus* (North Carolina) horsemint (Texas), *Hydrangea arborescens* (North Carolina), *Leucanthemum* sp. (North Carolina), *Melilotus alba* (Iowa, Kansas, Massachusetts, Tennessee), *Monarda didyma* (North Carolina), peach (Georgia), *Polygonum cuspidatum* (Massachusetts), *Polygonum pennsylvanicum* (Illinois), *Rhus glabra* (Maryland), *Sambucus canadensis* (Ohio), *Solidago* (Connecticut, Massachusetts, New York, North Carolina, Pennsylvania, Virginia), *Solidago canadensis* (Illinois, New York), *Solidago serotina* (North Dakota), *Symphoricarpos racemosus* (Ohio).

53b. *Cerceris clypeata dakotensis* Banks, new status

FIGURES 76, 157a,b,c

*Cerceris dakotensis* Banks, 1915, p. 402.—Stevens, 1917, p. 422.—Scullen, 1951, p. 1007.

FEMALE.—Length 11 to 12 mm. Black with light yellow markings; punctuation and pubescence average.

Head subequal in width to the thorax; black except for large frontal eye patches, surface of the clypeal process, base of mandibles, round spots back of the eyes, and the scape, all of which are yellow; clypeal border with two broad and low denticles with a depression between them; clypeal process with the sides converging to a near truncate apical end, which is very slightly emarginate; mandibles with three low denticles, the apical one being more isolated and somewhat larger; antennae normal in form.

Thorax black except for two elongate patches on the pronotum, the metanotum, oval patches on the propodeum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure heavily ridged transversally; mesosternal tubercle absent; legs with the coxae and trochanters fuliginous on all legs, the basal half of the femora of the fore- and midlegs also fuliginous and the more apical parts of all legs yellow; wings subhyaline but slightly clouded.

Abdomen with lateral yellow patches on tergum 1, a broad band very slightly emarginate on tergum 2, deeply emarginate bands on terga 3, 4, and 5; venter immaculate except for lateral yellow patches on sternite 3; pygidium with sides slightly convex and converging to a rounded apical end.

MALE.—Indistinguishable from the males of *C. clypeata clypeata* Dahlbom.

The female of *C. clypeata dakotensis* Banks is very close to *C. clypeata clypeata* Dahlbom, from which the former is separated by the form of its clypeal process.



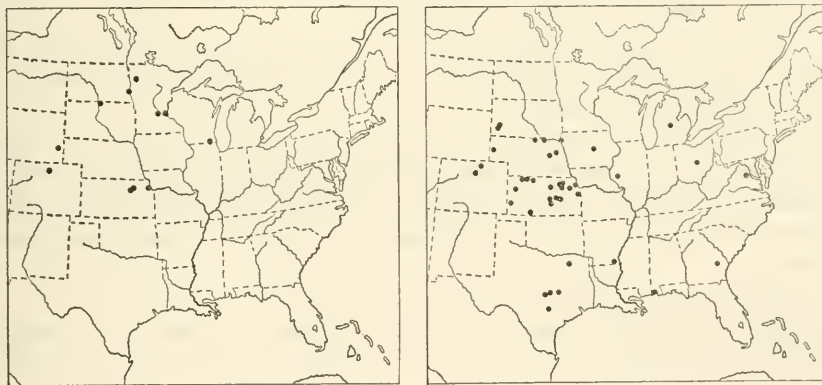
**TYPES.**—The type female and allotype male of *C. dakotensis* Banks, from Fargo, N. Dak., July 7, Sept. 6 (Stevens), are at the Museum of Comparative Zoology, Harvard, no. 13770.

**DISTRIBUTION.**—North Central States. Specimens are as follows:

**COLORADO:** ♀, Fort Collins, July 18, 1938 (M. T. James). **ILLINOIS:** ♀, White Heath, June 14, 1925 (Beardsley). **KANSAS:** ♀, Blackjack Creek, Potta-1954 (H. E. and M. A. Evans); ♀, Leavenworth Co., July 1, 1924 (E. P. Breakey); ♀, Riley Co., Sept. 11 (J. B. Norton). **MINNESOTA:** ♀, Midland Hills Golf Club, Ramsey Co., Aug. 30, 1921 (Arthur Hertig); ♀, Polk Co., Aug. 16, 1924 (Walter Carter); ♀, St. Anthony Park, Ramsey Co., Sept. 14, 1924 (Walter Carter); ♀, Wright Co., Aug. 5, 1936 (S. S. Easter). **MONTANA:** ♀ [no other data]. **NEBRASKA:** ♀, Halsey, Aug. 4, 1948 (R. R. Dreisbach); ♀, Omaha, June 25, 1913, alfalfa (L. T. Williams). **NORTH DAKOTA:** ♀, Fargo, Aug. 25, 1918, *Solidago canadensis* (O. A. Stevens). **SOUTH DAKOTA:** ♀, Mobridge, Aug. 15, 1924. **UTAH:** ♀, Provo, July 6, 1922 (E. P. Van Duzee). **WISCONSIN:** ♀, Genoa, July 7-12, 1911. **WYOMING:** ♀, Wheatland, Sept. 3, 1954 (Don Fronk).

**PREY RECORD.**—None.

**PLANT RECORD.**—*Melilotus alba* (North Dakota), *Solidago canadensis* (North Dakota), *Solidago serotina* (North Dakota).



FIGURES 76, 77.—Localities of: 76, *C. clypeata dakotensis* Banks; 77, *C. clypeata gnarina* Banks.

53c. *Cerceris clypeata gnarina* Banks, new status

FIGURES 77, 158a,b,c

*Cerceris gnarina* Banks, 1913a, p. 237.—Scullen, 1951, 1008.

**FEMALE.**—Length 12 to 14 mm. Black with yellow markings; punctuation and pubescence average.

Head subequal in width to the thorax; black except for large frontal eye patches, large patch on clypeal process, spots back of compound eyes, and base of mandibles, all of which are yellow; clypeal border with two large, blunt denticles, between which is a broad, deep depression continuous with a depression below the clypeal process;

clypeal process large, inverted scoop shaped; mandibles with one prominent denticle and a very low divided denticle more basad; antennae normal in form.

Thorax black except for two elongate patches on the pronotum and the metanotum, which are yellow; tegulae low, smooth, and fulvous; enclosure lightly ridged in the lateral angles and with a light medial groove; mesosternal tubercles absent; legs fulvous; wings subhyaline but clouded.

Abdomen with broad yellow bands on the first two terga; the band on tergum 1 is semidivided medially; the 3rd and rarely the 4th tergum may show remnants of yellow lines on the posterior border at the lateral extremities; venter immaculate; pygidium with the sides converging to a rounded apical end.

MALE.—Indistinguishable.

*C. clypeata gnarina* Banks is very close to *C. clypeata clypeata* Dahlbom. The size of the former is noticeably larger, the clypeal process more rugged and more rounded on its margins. These characters and the heavy yellow band on the first tergite of the former help to distinguish the females.

TYPE.—The type female of *C. gnarina* Banks, from Vinita, Indian Terr. [Okla.], June 7 (Wickham), is at the American Museum of Natural History, no. 15837.

DISTRIBUTION.—Throughout the Western Central States, from Alberta, Canada, south through South Dakota, Nebraska, Iowa, Kansas, Colorado, and into Texas. Limited records are from as far east as Michigan, Ohio, and Illinois. One specimen is recorded from Georgia.

PREY RECORD.—None.

PLANT RECORD.—Parsnip (Texas), *Polytaenia nutallii* (Texas), *Zizia aurea* (Ohio).

### 53d. *Cerceris clypeata prominens* Banks, new status

FIGURES 78, 159a,b,c

*Cerceris prominens* Banks, 1912a, p. 19.—Scullen, 1942, p. 188; 1951, p. 1010.  
*Cerceris alaope* Banks, 1912a, p. 22; 1912b, p. 107.—Scullen, 1942, p. 188.

FEMALE.—Length 13 mm. Black with yellow markings; punctuation and pubescence average.

Head slightly wider than the thorax; black except for two large frontal eye patches, patch on the clypeal process, small spot back of compound eye, base of mandible, and the scape, all of which are yellow; clypeal border with two low, broad denticles, between which is a single, medial broad lamella; clypeal process longer than broad, convex above; mandibles with three denticles, the more apical one

the largest, the others small and fused at the base; antennae normal in form, nearly black beyond the scape.

THORAX black except for two elongate patches on the pronotum, the metanotum, and patch on the propodeum, all of which are yellow; tegulae low, smooth, and amber in color; enclosure ridged longitudinally; mesosternal tubercles absent; legs largely yellow infused with brown, basal segments very dark; wings subhyaline, slightly clouded.

Abdomen black except for a divided band on tergum 1, a wide but deeply emarginate band on tergum 2, narrow bands on terga 3, 4, and 5; venter immaculate; pygidium with sides slightly convex and converging to a rounded apical end.

MALE.—Length 13 mm. Body colors black with yellow markings, legs with considerable amber; punctation somewhat coarse and crowded; pubescence average.

Head about one-seventh wider than the thorax; black except the entire face, basal half of mandibles, and two basal segments of the antennae, all of which are yellow; clypeal border with three distinct dark fuscous denticles on the medial lobe; clypeal surface only slightly convex; hair lobes cover only lateral clypeal lobes; mandibles with two denticles; antennae with the terminal segment curved.

Thorax black except for two widely separated patches on the pronotum, the metanotum, and a small spot on the tegulae, all of which are yellow; tegulae low and smooth; enclosure with a deep medial groove and lateral ridges at a 45° angle to the base; mesosternal tubercles absent; basal three segments of all legs yellow ventrally and dark dorsally, tibiae and tarsi of the first two pair of legs largely yellow; tibiae and tarsi of hindlegs dark; wings subhyaline.

Abdomen black except for lateral patches on tergum 1, broad but emarginate band on tergum 2, narrow bands on terga 3 to 6 and lateral small patches on sternites 2, 3, and 4, all of which are yellow; pygidium with sides subparallel but slightly convex and ends subequal in width.

*C. clypeata prominens* Banks is close to *C. clypeata clypeata* Dahlbom, from which the former is separated by the more deeply emarginate band on its second tergum. Some border line specimens may remain uncertain. The males are more difficult to separate than the females. The females of *C. atramontensis* Banks and *C. clypeata gnarina* Banks are also very close but easily separated by the characters given in the key.

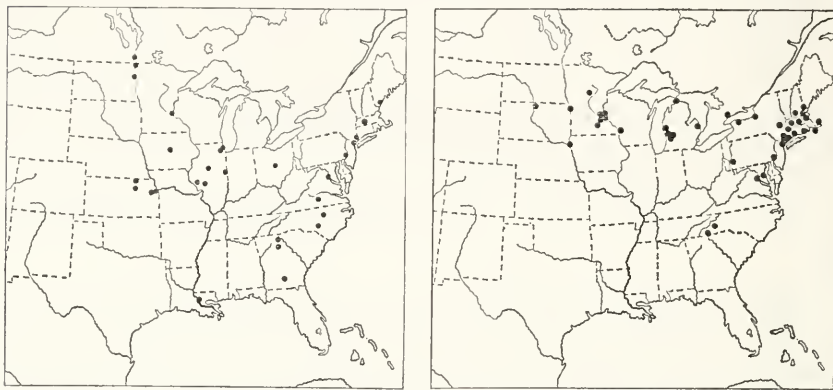
TYPES.—The type female and allotype male of *C. prominens* Banks, from Falls Church, Va., September and October, are at the Museum of Comparative Zoology, Harvard, no. 13790. The type female and allotype male of *C. alaope* Banks, also from Falls Church,

Va., are at the Museum of Comparative Zoology, Harvard, no. 13784.

**DISTRIBUTION.**—Throughout the Eastern States, south to the Gulf of Mexico and west to Minnesota, Iowa, and Kansas.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Asclepias* sp. (Ohio), *Melilotus alba* (Kansas).



FIGURES 78, 79.—Localities of: 78, *C. clypeata prominens* Banks; 79, *C. dentifrons* Cresson.

#### 54. *Cerceris dentifrons* Cresson

FIGURES 79, 160a,b,c

*Cerceris dentifrons* Cresson, 1865, p. 124.—Packard, 1866, p. 63.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 489.—Dalla Torre, 1897, p. 457.—Ashmead, 1899, p. 295.—Smith, J. B., 1900, p. 519; 1910, p. 678.—Banks, 1912a, p. 18.—Viereck, 1916, p. 696.—Stevens, 1917, p. 422.—Mickel, 1917b, p. 448.—Johnson, 1927, p. 156.—Proctor, 1938, p. 439; 1946, p. 500.—Scullen, 1951, p. 1007.

**FEMALE.**—Length 8 mm. Black with light yellow markings; punctuation close and deep; pubescence very short.

Head slightly wider than the thorax; black except for large frontal eye patches and the clypeal process, all of which are yellow; clypeal margin slightly extended with denticle-like extensions at the lateral apices; clypeal process lunate with the points very acute; mandibles with two adjoining medial denticles; dark fuscous except for a yellow area at the base; antennae normal in form, dark fuscous.

Thorax black except for two patches on the pronotum, the metanotum, small patches on the propodeum, and the tegulae, all of which are light yellow; tegulae low and smooth; enclosure deeply ridged longitudinally; mesosternal tubercles absent; legs fuscous to near the apical ends of the femora, beyond which they become ferruginous with darker patches on the midtibiae; wings subhyaline.

Abdomen with a doubly indented band on tergum 1, a deeply emarginate band on tergum 2, and narrow, slightly emarginate bands



on terga 3, 4, and 5; venter immaculate; pygidium with sides converging to a round apical end.

The color markings vary some in the shade of yellow and in their extent. The clypeal process easily distinguishes this small eastern species.

MALE.—Unknown.

TYPE.—The type female of *C. dentifrons* Cresson, from Illinois, is at the Philadelphia Academy of Natural Sciences, no. 1942.1.

DISTRIBUTION.—Scattered records throughout the Northeastern States, from South Dakota to New England, north of the Ohio River and the Washington, D.C., area.

PREY RECORD.—None.

PLANT RECORD.—*Solidago rigida* (North Dakota).

### 55. *Cerceris deserta* Say

FIGURES 80, 161a,b,c,d,e

*Cerceris deserta* Say, 1825, p. 344.—Smith, F., 1856, p. 465.—Cresson, 1865, p. 125.—Packard, 1866, p. 63.—Cresson, 1876, pp. 206–211.—Provancher, 1882, p. 76; 1883, p. 465.—LeConte, 1883, p. 232.—Taylor, 1884, p. 80.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 489.—Provancher, 1889, p. 645.—Ashmead, 1890, p. 32.—Dalla Torre, 1897, p. 457.—Peckham, 1898, p. 115.—Bridwell, 1898, p. 209.—Smith, J. B., 1900, p. 519.—Viereck, 1906, p. 397.—Smith, H. S., 1908, p. 367.—Smith, J. B., 1910, p. 678.—Banks, 1912a, p. 18; 1912b, p. 107.—Viereck, 1916, p. 695.—Mickel, 1917b, p. 449.—Britton, 1920, p. 341.—Bischoff, 1927, p. 369.—Viereck, 1928, p. 196.—Scullen, 1942, p. 187.—Strickland, 1947, pp. 121–130.—Scullen, 1951, p. 1007.

*Cerceris fulvipes* Cresson, 1865, p. 126.—Packard, 1866, p. 63.—Patton, 1879, p. 360.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 492 (*fulvipediculata* nomen nudum).—Robertson, 1894, pp. 453, 455; 1896, p. 175.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Smith, J. B., 1910, p. 678.—Scullen, 1942, p. 187.

*Cerceris fulvipediculata* Schletterer, 1887, p. 492.—Smith, H. S., 1908, p. 369.—Banks, 1912a, p. 24.—Viereck, 1916, p. 695.—Stevens, 1917, p. 422.—Mickel, 1917b, p. 451.—Viereck, 1920, p. 342.

FEMALE.—Length 10 mm. Black with creamy-yellow to white markings; punctation and pubescence average.

Head slightly wider than the thorax; black except for two large frontal eye patches, a bilobed patch on the clypeal elevation, large patch back of the compound eye, and the basal half of the mandibles, all of which are creamy white; clypeal border with five denticles, the medial one with a medial depression above and the two lateral denticles much smaller than the second pair; clypeal elevation reduced to a characteristic bilobed, distended area; mandibles with three small denticles, becoming progressively larger toward the apical one, beyond which there is a carina; antennae fulvous below and fuscous above, normal in form.

Thorax black except for two patches on the pronotum, the metanotum, a large patch on the propodeum, a minute spot on the pleuron, and a patch on the tegulae, all of which are creamy white to creamy yellow; the tegulae low and smooth; enclosure with a medial groove and the surface lightly ridged medially, parallel to the meson, and with heavier ridges near the lateral angles at about 45° to the base; mesosternal tubercles absent; legs fulvous with limited yellow patches, wings subhyaline, slightly clouded at the apical border.

Abdomen black with subequal bands of creamy white on all terga 1 to 5 except that the band on tergum 1 is divided medially; venter with variable patches of creamy white laterally on sternites 2 to 5; pygidium with the sides slightly convex, the apical end rounded and the basal end slightly broader and not rounded.

MALE.—Length 10 mm. Black with yellow and creamy-white markings; punctation and pubescence average.

Head slightly wider than the thorax; black with the exception of the entire face, spot back of the eye, basal half of the mandibles, and the scape, all of which are yellow; clypeal border with three widely separated denticles; clypeal surface with a very characteristic ridge just above the border extending the full width of the medial lobe, above which is a prominent flat area; hair lobes short, extending from the eyes over about two-thirds of the distance to the lateral clypeal denticles; mandibles with a broad sinuate carina; antennae normal in form.

Thorax black except for two patches on the pronotum, the metanotum, patch on the propodeum, and the tegulae, all of which are light yellow; tegulae low and smooth; enclosure with a medial groove, moderately ridged with the ridges spreading apically; mesosternal tubercle absent; legs largely yellow with the apical end of the hindfemora fuscous and fuscous patches on the fore- and midfemora and the hindtibiae.

Abdomen black with two separated patches on tergum 1 and subequal narrow bands on terga 2 to 6, slightly emarginate, which are creamy white; venter with wedge-shaped, creamy-white patches on sternites 2 to 5; pygidium with sides slightly converging apically to a semitruncate end.

Several earlier workers appear to differ in their identification of the male of *C. deserta* Say, on which the species was established. Also there apparently has been some misidentification of the female of the species. The present writer bases his recognition of the male on the following facts: (1) A specimen labeled "Neotype" in the Museum of Comparative Zoology, Harvard, is the species herein recognized as *deserta* Say; it is assumed this "Neotype" label was placed on the specimen by Banks. (2) The species as

accepted by the present writer runs to *deserta* Say in Bank's key (1912a, p. 13); however, not all of the specimens determined by Banks agree with the above "Neotype." (3) A specimen in the Philadelphia Academy of Natural Sciences determined by Cresson agrees with the one the writer calls *deserta* Say. (4) Unpublished notes by S. A. Rohwer indicate he accepted Cresson's determinations at Philadelphia as correct. (5) A male specimen determined by Viereck indicates he agrees with the present writer in the form accepted as *deserta* Say.

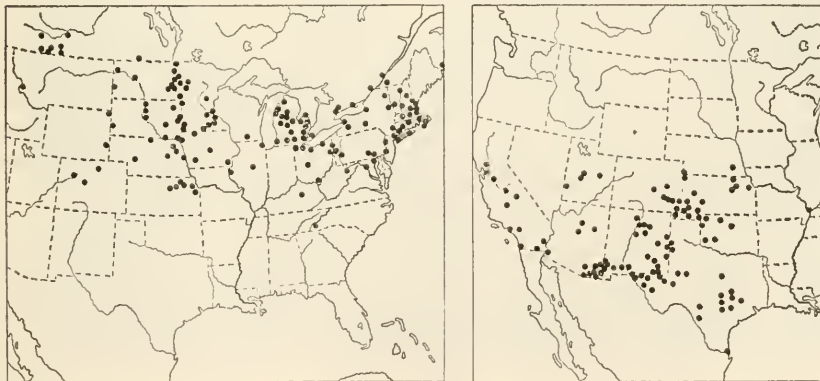
In the writer's paper (1942, p. 187), he called attention to the fact that *C. fulvipes* Cresson is the female of *C. deserta* Say.

**TYPES.**—The writer is accepting the male specimen labeled "Neotype," from South Dakota, Aug. 20 [locality and year illegible], at the Museum of Comparative Zoology, Harvard, no. 31,113, as authentic by Banks. The original type material, which apparently has been lost, is recorded from "N. West Territory, Mo., Pa." The female type of *C. fulvipes* Cresson, from Delaware, is at the Philadelphia Academy of Natural Sciences, no. 1941.

**DISTRIBUTION.**—Throughout the North Central and Northeastern States.

**PREY RECORD.**—The Peckhams (1898) record *C. deserta* Say as taking *Conotrachelus posticatus* Boheman (Curculionidae); however, because some workers have differed in the identification of *C. deserta* Say, this record needs verification. No other prey records have been found by the writer.

**PLANT RECORD.**—*Aster* sp. (Kansas), *Eupatorium* sp. (Kentucky), *Grindelia* sp. (North Dakota), *Melilotus alba* (North Dakota), *Polygonum* sp. (Kansas), *Solidago* sp. (Connecticut, Kansas, Massachu-



FIGURES 80, 81.—Localities of: 80, *C. deserta* Say; 81, *C. frontata frontata* Say.

setts, North Dakota, New Hampshire, New York), *Solidago canadensis* (Minnesota), *Solidago rigida* (Minnesota, North Dakota), yarrow (New York).

56a. *Cerceris frontata frontata* Say

FIGURES 81, 162a,b,c, 183a,b; PLATE 1

- Cerceris frontata* Say, 1823, p. 80.—LeConte, 1883, p. 167.—Cresson, 1865, p. 129.—Packard, 1866, p. 64.—Cresson, 1875, p. 717; 1887, p. 282.—Schletterer, 1887, p. 492.—Dalla Torre, 1897, p. 461.—Ashmead, 1899, p. 295.—Viereck and Cockerell, 1904, p. 130.—Banks, 1912a, p. 16.—Mickel, 1917b, p. 447.—Banks, 1947, p. 9.—Scullen, 1951, p. 1008; 1961, pp. 46–47.
- Cerceris texensis* Saussure, 1867, p. 89.—Schletterer, 1887, p. 504.—Dalla Torre, 1897, p. 478.—Scullen, 1951, p. 1010.
- Cerceris occidentalis* Saussure, 1867, p. 100.—Schletterer, 1887, p. 498.—Dalla Torre, 1897, p. 469.—Scullen, 1951, p. 1009.

FEMALE.—Length 25 mm. Ferruginous with dull yellow markings; punctation and pubescence normal.

Head somewhat wider than the thorax; largely dull yellow with a ferruginous area extending through the ocellar area between the compound eyes, a ferruginous line connecting the vertex of the eyes with a like-colored area on the occiput; clypeal border with two separated, prominent, blunt denticles; laterad of each a much smaller denticle; above each of the larger denticles a cluster of prominent bristles, laterad of which is a row of shorter bristles decreasing in length toward and extending to the mandibles; clypeal process lunar shaped but with considerable variations in the angle of expansion in different specimens; a prominent row of closely packed bristles extends along the concave margin of the process between the two points; mandibles dull yellow at the base, becoming dark fuscous toward the tip with two widely separated small denticles; antennae normal in form with the scape dull yellow and the flagellum becoming dark fuscous apically.

Thorax ferruginous except for a semidivided band on the pronotum, the scutellum, the metanotum, most of the propodeum, divided patch on the enclosure, elevated areas on the pleuron, and the tegulae, all of which are dull yellow infused with ferruginous; tegulae low and smooth; enclosure relatively smooth except for a slight medial groove; mesosternal tubercles absent; legs largely dull yellow infused with ferruginous; wings slightly clouded with ferruginous.

Abdomen largely dull yellow on the terga with more or less ferruginous along the anterior margins of each tergum; venter ferruginous with the elevated areas somewhat lighter; pygidium with the sides slightly convex, the basal end much narrower than the truncate apical end, fringed with a row of bristles.

MALE.—Length 19 mm. Dark fuscous, ferruginous, and yellow; closely punctate; pubescence somewhat longer than average.





*C. frontata frontata* Say (top and bottom): copulating pair on *Baccharis glutinosa*, two miles northeast of Portal, Ariz., July 28, 1961, photographed by Martin A. Mortenson (photo courtesy Southwest Research Station, Portal, Ariz.).



Head slightly wider than the thorax, face yellow below antennal scrobes, dark fuscous on the vertex and occiput, with a ferruginous patch back of the ocelli, genae mostly ferruginous with a small yellow spot in the upper area; clypeal border with three denticles, the medial one somewhat more prominent; clypeal surface slightly convex; mandibles slightly sinuate but without distinct denticles; antennae ferruginous, becoming fuscous apically, terminal segments blunt and slightly curved.

Thorax dark fuscous on the mesonotum, enclosure, and depressed areas on the pleuron and venter; pronotum with a yellow band deeply emarginate with a wedge-shaped ferruginous area; scutellum, metanotum, patches on the propodeum, and the tegulae yellow infused with ferruginous; other parts largely ferruginous; tegulae low and smooth; enclosure relatively smooth except for a medial groove and limited punctation along the lateral margin; mesosternal tubercles absent; legs yellow and ferruginous; first metatarsal segment long and straight on the hindleg; wings subhyaline tinged with ferruginous.

Abdomen has the first tergum ferruginous with lateral yellow patches, terga 2 to 5 with broad yellow bands slightly emarginate with ferruginous, tergum 6 largely yellow; venter largely ferruginous with deeply emarginate or broken bands on sternites 2, 3, and 4; pygidium with sides very slightly convex and the basal end noticeably broader than the truncate apical end.

Superficially, there is considerable similarity between *C. frontata* Say and *C. bicornuta* Guérin; however, they may be separated readily by the clypeal processes of the females and by the first tarsal segments of the hindlegs of the males. There is a marked variation within the species, varying both in size and color in the same locality. The background color of the male, for example, may vary from ferruginous to fuscous. The females may vary nearly as much. Western species in general are lighter than eastern species. In the Bay Area in California the species also become somewhat darker. The males vary in length from 13 to 20 mm., and the females, from 15 to 22 mm. The much darker and somewhat larger forms of the northeastern range are recognized as a subspecies, *C. frontata rawi* Rohwer.

TYPES.—Say's types appear to have been lost. *C. frontata* Say was described from Arkansas. From the description, the type appears to have been a lighter form. A neotype female, from 19 mi. E. of Lordsburg, N. Mex., 4600 ft., Aug. 1, 1946 (H. A. Scullen), designated by the writer, is deposited at the U.S. National Museum. The type female of *C. occidentalis* Saussure and the type female of *C. texensis* Saussure were not found in Vienna or Geneva. A male at the Museum d' Histoire Naturelle, Geneva, determined by Saussure as *C. texensis* Saussure was considered a representative of that species.

A female of *C. occidentalis* Saussure, designated a lectotype by the writer, is at the Museum d' Histoire Naturelle, Geneva. Both of the above were typical lighter forms of *C. frontata* Say and were from Texas. This is our largest species of *Cerceris* in North America.

DISTRIBUTION.—Throughout the South Central States and the Southwest, from southern Illinois, southern Nebraska, Colorado, Utah, and central California, south into Mexico.

PREY RECORDS.—*Lixus mucidus* LeConte (California; Curculionidae), *Eupagoderes* sp., and *Cleonus pulvereus* LeConte (Krombein, 1960b, Portal, Ariz.).

PLANT RECORD.—*Acacia* sp. (Arizona), *A. augustissima* (Arizona), *Ampelopsis arborea* (Texas), *Asclepias* sp. (Arizona, New Mexico, Mexico, and Texas), *A. speciosa* (Utah), *A. subverticillata* (Arizona), *Baccharis* sp. (Arizona, Mexico), *B. glutinosa* (Arizona, Mexico), *Baileya pleniradiata* (Arizona), *Eriogonum* sp. (California), *E. thomasi* (Arizona), *Gutierrezia sarothrae* (Arizona), *Lepidium* sp. (Arizona), *Melilotus alba* (Arizona, Kansas, New Mexico), *Mimosa* sp. (Arizona), parsnip (Texas), *Petalostemum multiflorum* (Texas), *Salsola pestifer* (Utah), *Solidago* sp. (Kansas), *Spindus saponari* (Arizona).

#### 56b. *Cerceris frontata raii* Rohwer

##### FIGURE 82

*Cerceris raii* Rohwer, 1920, p. 230.—Rau, 1922, p. 21; 1928, pp. 325–337.—Scullen, 1951, p. 1010.

*Cerceris frontata raii* Scullen, 1960, p. 80.

FEMALE.—Length 20 mm. Structurally like *C. frontata frontata* Say but considerably darker.

Head dark ferruginous with the antennal and ocellar areas dark fuscous.

Thorax black and dark ferruginous; metanotum and tegulae yellow; yellow may also appear on the propodeum and the scutellum; legs dark ferruginous; wings heavily clouded with ferruginous.

Abdomen largely dark ferruginous; yellow bands on terga 3 to 6 deeply emarginate or broken into two lateral patches; venter rufo-ferruginous.

MALE.—Length 17 mm. Structurally like the male of *C. frontata frontata* Say but with yellow markings much more limited.

Head black except the face yellow and small amber spots back of the eyes.

Thorax black except for two patches on the pronotum, two spots on the scutellum, the metanotum, and the tegulae, all of which are yellow infused with ferruginous; legs ferruginous and yellow; wings lightly clouded with ferruginous.



Abdomen with the first tergum ferruginous, second tergum with a broad yellow band deeply emarginate with ferruginous and anterior border black; terga 3, 4, and 5 with a yellow band deeply emarginate with fuscous; tergum 6 fuscous with a trace of yellow; venter light fuscous with the more elevated areas lighter and with traces of yellow on sternites 2 and 3.

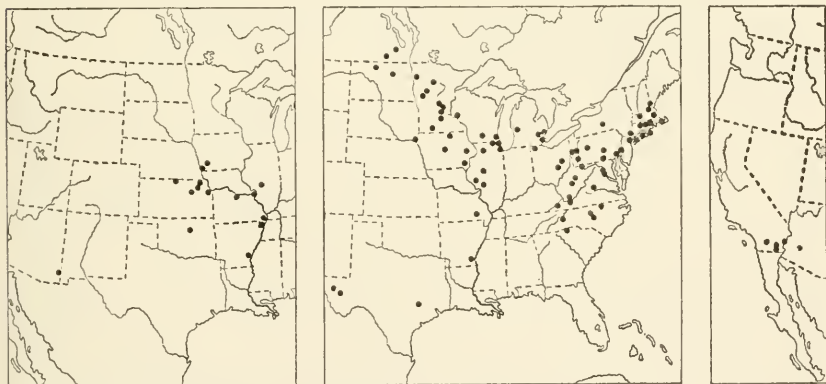
As in *C. frontata frontata* Say, the subspecies *ravi* Rohwer is variable in its color intensity.

**TYPES.**—The type female and allotype male of *C. ravi* Rohwer, from near St. Louis, Mo. (Phil Rau), are in the U.S. National Museum, no. 21610.

**DISTRIBUTION.**—Southern Iowa, southern Illinois, Missouri, eastern Kansas, northeastern Texas, Oklahoma, and Arkansas.

**PREY RECORD.**—The nesting and feeding habits of this subspecies were described by Phil Rau (1922, 1928), who found them using *Lixus concavus* Say (rhubarb curculio) and *Thecesternus humeralis* (Say) near St. Louis.

**PLANT RECORD.**—*Avicennia nitida* (Texas), *Cuscuta* sp. (Kansas), *Euphorbia marginata* (Kansas).



FIGURES 82–84.—Localities of: 82, *C. frontata ravi* Rohwer; 83, *C. halone* Banks; 84, *C. macswaini* Scullen.

### 57. *Cerceris halone* Banks

FIGURES 83, 163a,b,c

*Cerceris halone* Banks, 1912a, p. 24.—Stevens, 1917, p. 422.—Scullen, 1951, p. 1008; 1960, p. 78.—Byers, 1962, pp. 317–321.

*Cerceris architis* Mickel, 1916, p. 409; 1917b, p. 450.—Abbott, 1928, pp. 205, 206.—Scullen, 1951, p. 1005.—Krombein, 1958a, p. 197.

*Cerceris alacris* Mickel, 1917a, pp. 333, 334, 452.—Scullen, 1951, p. 1005 (new synonymy).—Krombein, 1958a, p. 197.

*Cerceris salome* Banks, 1923, p. 21.

*Cerceris shermani* Brimley, 1928, p. 200.

FEMALE.—Length 13 to 15 mm. Black with yellow markings; punctation and pubescence average.

Head slightly wider than the thorax; black except for most of the face below the antennal scrobes, small spots back of the compound eyes, base of mandibles, and patch on the scape, all of which are yellow; clypeal border with two very large angular denticles with a depression between them; clypeal process broader than long with the margin lunar shaped; mandibles with a prominent medial denticle and a more basal smaller one; antennae normal in form and dark amber.

Thorax black except for two separated patches on the pronotum, the metanotum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure heavily ridged, becoming irregular in some specimens; mesosternal tubercle absent; legs dark basally, becoming yellow amber on the more apical parts of the femora and beyond; wings slightly clouded.

Abdomen with tergum 1 showing two lateral patches, tergum 2 with a broad band deeply emarginate anteriorly, terga 3, 4, and 5 with narrow bands, all of which are yellow; venter dark amber; pygidium with sides slightly converging apically to a truncate end.

MALE.—Indistinguishable from closely related forms.

The extent of yellow shows variations in some specimens but no more than is common for most species.

TYPES.—The type female of *C. halone* Banks, from Falls Church, Va., is at the Museum of Comparative Zoology, Harvard, no. 13777. The type female of *C. architis* Mickel, from South Bend, Nebr., July 2, 1915, taken on *Melilotus alba* (E. G. Anderson), and the type female of *C. alacris* Mickel, from Mitchell, Nebr., July 21, 1916 (C. E. Mickel), are both at the University of Nebraska. The type female of *C. salome* Banks, from New York (N. Banks), is at the Museum of Comparative Zoology, Harvard, no. 14705. The type female of *C. shermani* Brimley, from Raleigh, N.C., July 1929, is in the collection of the North Carolina State Department of Agriculture.

DISTRIBUTION.—Through the Eastern States, south to South Carolina and west to North Dakota, Nebraska, Kansas, and Texas.

PREY RECORD.—*Curculio affinis* (?) (Virginia), *C. confusor* Hamilton (Virginia), *C. iowensis* Casey (Minnesota, Virginia), *C. nasicus* Say (Abbot, 1928, Minnesota; Illinois; Byers, from Virginia), *C. rectus* (Say) (Krombein, 1958).

PARASITE RECORD.—*Hedychrum violaceum* Brullé (Chrysididae) (Bridwell).

PLANT RECORD.—*Melilotus alba* (Nebraska), *Rhus glabra* (New Mexico), *Solidago* sp. (North Carolina, Kansas), *S. altissima* (New Jersey), *S. canadensis* (New York).

58. *Cerceris macswaini*, new species

FIGURES 84, 164a,b,c

FEMALE.—Length 10 mm. Black with creamy-white markings; punctation average; pubescence very short.

Head slightly wider than the thorax; black except for large frontal eye patches, the medial lobe of the clypeus, small patches on the lateral clypeal lobes, large spot back of the eye, and the base of the mandibles, all of which are creamy white; clypeal border with two blunt lateral denticles and a divided medial one; clypeal process broader than long and with the apex emarginate; mandibles with two distinct denticles, the apical one slightly the larger; antennae normal in form and largely ferruginous.

Thorax black except for a divided band on the pronotum, the metanotum, a large patch on the propodeum, a spot on the pleuron, and a spot on the tegulae, all of which are creamy white; tegulae low and smooth; enclosure heavily ridged longitudinally with the apical ends of the ridges spreading; mesosternal tubercles very inconspicuous; legs largely dark fuscous except for creamy-white patches near the apical ends of the first two pair of femora; wings subhyaline with the usual clouded area near the apex.

Abdomen with two lateral patches on tergum 1, terga 2 to 5 with deeply emarginate bands, all of which are creamy white; venter immaculate; pygidium with the sides subparallel basally but converging apically to a rounded end.

MALE.—Length 9 mm. Black with creamy-white markings; punctation average; pubescence very short.

Head slightly wider than the thorax; black except the entire face, small spot back of the eye, base of the mandibles, and the scape, all of which are creamy white; clypeal border with three subequal but low denticles; hair lobes extend over about two-thirds of the lateral clypeal lobe; mandibles with little more than a sinuate carina; flagellum ferruginous below, becoming darker above.

Thorax black except for a broken band on the pronotum, the metanotum, a large patch on the propodeum, a small evanescent spot on the pleuron, and the tegulae, all of which are creamy white; tegulae low and smooth; enclosure variably ridged; mesosternal tubercle absent; legs largely creamy white except for dark patches near the basal end of the first two pair of femora, the apical one-third of the third pair of femora, a patch on the apical end of the hind pair of tibiae, and the apical segments of the hind pair of tarsi; wings subhyaline with the usual apical clouded area.

Abdomen black except for two lateral patches on tergum 1, broad but deeply emarginate bands on terga 2 to 6; venter with lateral

triangular patches on sternites 2 to 5; pygidium sides very slightly convex, ends subequal in width, the apical end very slightly convex.

The male of *C. macswaini* Scullen is almost indistinguishable from the male of *C. calochorti* Rohwer. The enclosure of the former usually is ridged considerably while that of the latter is smooth except for the usual medial groove. So far, the known geographical ranges do not overlap.

**TYPES.**—The type female and allotype male of *C. macswaini* Scullen, from Imperial Co., Calif., June 1911 (J. C. Bridwell), are deposited at the U.S. National Museum, no. 67731. Paratypes are as follows:

ARIZONA: ♀ (C. F. Baker). CALIFORNIA: 41 ♀ ♀, 61 ♂ ♂, Imperial Co., May, June 1911 (J. C. Bridwell); 2 ♀ ♀, 2 ♂ ♂, Imperial Co., June 1912 (J. C. Bridwell); 16 ♀ ♀, 6 ♂ ♂, Experiment Farm, Imperial Co., June 1912 (J. C. Bridwell); 3 ♀ ♀, Blythe, Riverside Co., June 14, 1945 (E. G. Linsley); 3 ♀ ♀, Blythe, July 20, 30, 1947 (J. W. Macswain); ♀, Holtville, Imperial Co., Aug. 11, 1917 (J. Bequaert); 3 ♀ ♀, Palm Springs, Riverside Co., June 22, 1945.

**DISTRIBUTION.**—This species is known only from southern California and adjoining Arizona.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Baccharis glutinosa*, *Hyptis emory*, *Tamarix fallica* (all from California).

### 59. *Cerceris melanthe* Banks

FIGURES 85, 165a,b,c

*Cerceris melanthe* Banks, 1947, pp. 21–22.—Scullen, 1951, p. 1009.

**FEMALE.**—Length 6 to 10 mm. Black with yellow markings; punctuation coarse; pubescence average.

Head subequal in width to the thorax; black except for the entire face below the antennal scrobes, a small spot back of the compound eye, and base of the mandibles, all of which are yellow; the clypeal border (here considered the lower of two parallel rows of denticle-like processes) consists of a broad medial tridentate process, to each side of which is an indistinct denticle; clypeal elevations (here considered the upper of the two parallel rows of denticles) consists of three denticles, the medial one small and very acute and the two lateral ones somewhat larger and rounded apically; the two parallel rows of elevations are separated by a depression that is black including the two rows of denticles; mandibles with one large denticle, basad of which is a much smaller denticle; antennae normal in form.

Thorax black except for a divided band on the pronotum, the metanotum, a small patch on the propodeum, and the tegulae, all of



which are yellow; tegulae low and smooth; enclosure with a medial groove and scattered small punctation over much of the surface; mesosternal tubercle minute; legs fuscous except the hindtrochanter and most parts beyond the femora, all of which are yellow; wings subhyaline, becoming cloudy apically.

Abdomen with a narrow semidivided band on tergum 1, a broad band very slightly emarginate on tergum 2, narrower and deeply emarginate bands on terga 3, 4, and 5; venter black except for lateral yellow patches on sternites 3 and 4; pygidium with sides convex, the apical end rounded and the basal end acute.

MALE.—Unknown.

*C. melanthe* Banks closely resembles *C. nitida* Banks, which has been taken in Texas. The two females can be separated by the clypeal denticles and the bicolored hindfemora of the latter species. The former has not been taken east of New Mexico.

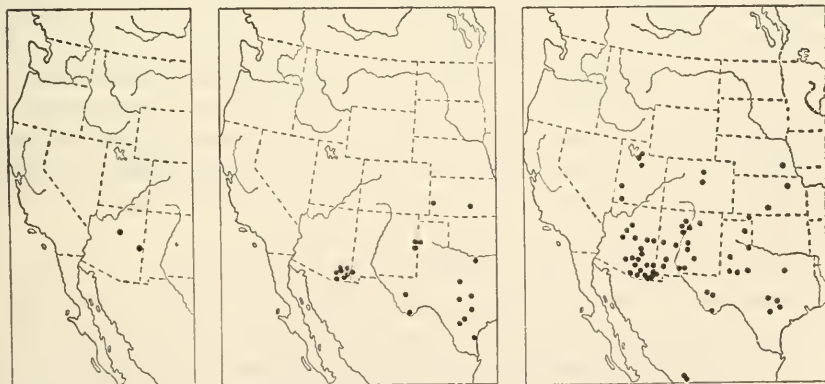
TYPE.—The type of female of *C. melanthe* Banks, from Apache Co., Santa Catalina Mts., Ariz., July 25, 5500 feet (J. Bequaert), is at the Museum of Comparative Zoology, Harvard, no. 23539.

DISTRIBUTION.—Arizona and New Mexico. Specimens are as follows:

ARIZONA: 4 ♀ ♀, S. Arizona, August 1902 (F. H. Snow); 5 ♀ ♀, Oak Creek Canyon, 6000 ft., July, August 1902 (F. H. Snow); ♀, same locality, Aug. 9, 1932 (R. H. Beamer); ♀, same locality, Aug. 27, 1947 (L. D. Beamer). NEW MEXICO: ♀, Willow Creek, Sept. 4, 1933 (G. E. Bohart).

PREY RECORD.—None.

PLANT RECORD.—None.



FIGURES 85-87.—Localities of: 85, *C. melanthe* Banks; 86, *C. mimica* Cresson; 87, *C. morata* Cresson.

60. *Cerceris mimica* Cresson

FIGURES 86, 166a,b,c,d

- Cerceris mimica* Cresson, 1872, p. 288; 1887, p. 282.—Schletterer, 1887, p. 497.—Dalla Torre, 1897, p. 467.—Ashmead, 1899, p. 295.—Banks, 1912a, pp. 13, 14.—Scullen, 1951, p. 1009; 1961, p. 47.
- Cerceris esau* Schletterer, 1887, p. 458.—Dalla Torre, 1887, p. 459.—Ashmead, 1899, p. 296.
- Cerceris minima* [sic] Schletterer, 1887, p. 497.
- Cerceris englehardti* Banks, 1947, pp. 12, 13.

FEMALE.—Length 18 mm. Black, ferruginous, and yellow; punctuation average; pubescence much longer and darker than average.

Head subequal in width to the thorax; ferruginous except for a large black patch covering the antennal and ocellar areas, and the following parts, which are yellow: large eye patches, patch between the antennae, small patches on the lateral clypeal wings, most of the clypeus, basal part of the mandibles; basal segments of the antennae amber; apical parts of the mandibles and antennae very dark; clypeal margin with two divided extensions, below which is a medial rounded extension; these margin extensions are heavily screened from above by amber bristles; clypeal surface process shorter than broad with two lateral denticle-like points connected by a low carina; prominent short bristles cover the area below the carina; mandibles with two distinct but low denticles; antennae normal in form.

Thorax black, except for semidivided band on the pronotum, the scutellum, and the metanotum, all of which are ferruginous; tegulae low and smooth; enclosure with a medial groove and deeply pitted except the central third at the base; mesosternal tubercles absent; legs ferruginous except the basal segments, which are black; wings uniformly clouded with amber.

Abdomen with tergum 1 ferruginous; terga 2, 3, and 4 with a yellow band divided by a ferruginous wedge, broad at the anterior margin and narrowing to a line at the posterior margin of the tergum; tergum 5 yellow with a similar ferruginous patch but much smaller; venter ferruginous; pygidium with sides convex, basal end narrow and rounded, the apical end broader and semitruncate.

MALE.—Length 17 mm. Black with yellow markings; punctuation average; heavily clothed with unusually long silvery hairs on all parts.

Head subequal in width to the thorax, black except for the face, which is yellow; clypeal border with a medial extension ending with three subequal distinct denticles; an unusually prominent carina between the antennae; mandibles with one small denticle-like elevation near the center; antennae dark with basal segments black and shiny.

Thorax black except for two widely separated patches on the

pronotum, tegulae low, smooth, and with a trace of amber; enclosure with a medial groove and pitted except for the central third at the base; mesosternal tubercles absent; legs black to dark amber with traces of yellow basally to or near the apical ends of the femora; tibiae yellow with dark areas; tarsi largely yellow; wings subhyaline.

Abdomen with tergum 1 black, terga 2 to 5 with wedge-shaped lateral yellow patches narrowing to the medial line but not quite meeting, tergum 6 with widely separated patches; venter black with variable traces of yellow laterally; prominent and heavy clusters of brownish bristles laterally on each sternite; pygidium with sides almost straight but converging slightly apically, with the apical end truncate, clothed with short, scattered bristles.

The male of *C. mimica* Cresson closely resembles the male of *C. bicornuta* Guérin. The bristles on the venter of the former and the S-shaped first hindtarsal segment of the latter species easily separates them. The male of *C. mimica* Cresson also closely resembles the male of *C. verticalis* F. Smith, from which the former can be separated by the form of the pygidium and the lack of bristles on the venter of the latter.

**TYPES.**—The type female of *C. mimica* Cresson, from Texas, is at the Philadelphia Academy of Natural Sciences, no. 1943. The lectotype female of *C. esau* Schletterer, from Mexico, is at the Naturhistorisches Museum, Vienna. The type male of *C. englehardti* Banks, from St. John, Ariz., July 27, 1931 (G. P. Englehardt), is at the Museum of Comparative Zoology, Harvard, no. 27638.

**DISTRIBUTION.**—*C. mimica* Cresson has been taken through the Southern States from Arizona to Florida. It is recorded as far north as Kansas and is also common in Mexico.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Asclepias* sp. (New Mexico, Arizona), *Asclepias subverticillata* (Arizona, New Mexico), *Baccharis* sp. (Texas), *B. glutinosa* (Arizona), *Condalia obtusifolia* (Texas), *Eriogonum* sp. (Arizona), parsnip (Texas), *Solidago* sp. (Kansas).

#### 61. *Cerceris morata* Cresson

FIGURES 87, 167a,b,c

*Cerceris morata* Cresson, 1872, p. 230; 1887, p. 282.—Schletterer, 1887, p. 497.—Dalla Torre, 1897, p. 468.—Ashmead, 1899, p. 295.—Banks, 1912a, p. 19.—Scullen, 1942, p. 188; 1951, p. 1009.

*Cerceris nasica* Viereck and Cockerell, 1904, p. 132.—Viereck, 1906b, pp. 233, 239.—Banks, 1947, p. 20.—Scullen, 1942, p. 188.

**FEMALE.**—Length 14 mm. Black, yellow, and ferruginous; punctation and pubescence average.

Head slightly wider than the thorax; most of the face below antennal scrobes, base of mandibles, spots back of compound eyes, and the scape, all yellow; vertex, genae, occiput, medial clypeal lobe below the process, apical part of the process, medial segments of the antennae, all ferruginous; frons black to fuscous; clypeal border with two large, blunt denticles, between which is a deep depression; clypeal process prominent, convex with sides subparallel, the apical margin concave, and the lateral apical points acute; mandibles with three denticles, the more apical one very large and the more basic pair small and close together; antennae normal in form.

Thorax black except for a broad band on the pronotum, the scutellum, and the tegulae, all of which are ferruginous; and the metanotum and patches on the propodeum, which are yellow, the latter bordered with ferruginous; tegulae low and smooth; enclosure moderately ridged longitudinally; mesosternal tubercles absent; legs ferruginous; wings subhyaline, lightly shaded with ferruginous.

Abdomen with the terga largely yellow but with areas of ferruginous appearing medially on some terga and darker emarginations on the anterior borders of most terga; venter largely ferruginous with yellow patches laterally on sternites 2 to 5; pygidium with the sides slightly convex and converging to a rounded apical end.

MALE.—Length 11 to 12 mm. Black with yellow and ferruginous markings; punctuation average; pubescence somewhat longer than average.

Head slightly wider than the thorax; face yellow except for the free margin of the clypeus, which is amber; remainder of the head black except for a yellow spot back of the eye and a mottled ferruginous area extending from one gena through the occiput to the other gena and embodying the yellow spots back of the eyes; clypeal margin with three subequal denticles on the medial lobe; hair lobes subequal in length to the lateral lobes; mandibles with one small but distinct medial denticle, basad of which there is a low sinuate carina; antennae normal in form except for the apical segment, which is blunt and curved; scape yellow and the remaining segments ferruginous, becoming darker apically.

Thorax black except for a divided band on the pronotum, the scutellum, the metanotum, a large patch on the propodeum, and the tegulae, all of which are yellow and, in the case of the pronotum band and the scutellum, bordered with ferruginous; tegulae low and smooth; enclosure with a medial groove and variably ridged with the ridges spreading posteriorly; mesosternal tubercles absent; legs yellow except the dorsal surfaces of the first two pair of femora and the apical parts of the hindlegs beyond the middle of the femora, all of which are



ferruginous; a darker area may appear on the dorsal surface of the third femora; wings subhyaline with a clouded area on the apex.

Abdomen with the darker parts more or less ferruginous and the markings yellow; tergum 1 with lateral yellow patches; tergum 2 with a broad yellow band and a slight emargination of ferruginous; terga 3, 4, and 5 yellow with broad and deep emarginations of ferruginous, tergum 6 largely yellow; venter largely dark ferruginous with emarginate bands of yellow on sternites 2 to 5, and traces of yellow on 6; pygidium with sides slightly diverging apically and the apical end broadly rounded.

The principal variation is the extent of the colors. This is especially true with the terga, where the yellow may cover the terga completely or be deeply emarginate.

*C. morata* Cresson is close to *C. vicina* Cresson. The females may be separated by the form of the clypeal process. The males are indistinguishable where their ranges overlap.

*C. morata* Cresson also is related closely to *C. clypeata* Dahlbom, which it replaces in the South Central States. It possibly should be considered a subspecies of *C. clypeata* Dahlbom.

**TYPES.**—The type female of *C. morata* Cresson, from Texas (Belfrage), is at the Philadelphia Academy of Natural Sciences, no. 1944. The type female of *C. nasica* Viereck and Cockerell, from New Mexico (F. H. Snow), is at the Philadelphia Academy of Natural Sciences, no. 10382.

**DISTRIBUTION.**—*C. morata* Cresson has been taken mostly in Texas, New Mexico, and Arizona. It is recorded as far north as Utah and Kansas and south into Mexico.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Asclepias latifolia* (Texas), cotton (Arizona), *Lepidium* sp. (Arizona), *Melilotus alba* (Kansas), *Wislizenia* sp. (Arizona), *Zizyphus lycioides* (Arizona).

## 62. *Cerceris nebrascensis* H.S. Smith

FIGURES 88, 168a,b,c

*Cerceris nebrascensis* H. S. Smith, 1908, p. 368.—Mickel, 1917b, p. 451.—Scullen, 1951, p. 1009.

**FEMALE.**—Length 10 to 12 mm. Black with creamy-yellow and fulvous markings; punctuation average; pubescence very short.

Head subequal in width to thorax; black except for large frontal eye patches, large patch on the clypeal process, and base of mandibles, all of which are creamy yellow; clypeal border with four denticles, the medial pair being indistinct; clypeal process slightly longer than broad with the free apical margin slightly emarginate; mandibles

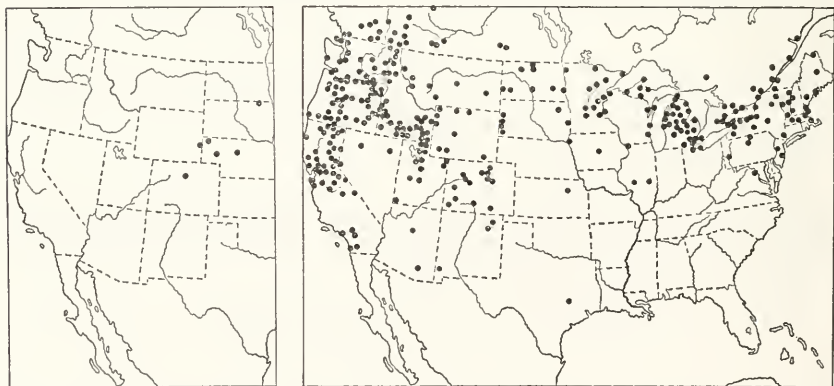
with three closely appressed denticles, the apical one much the larger and the basal one very inconspicuous; antenna normal in form and largely fulvous.

Thorax black except for two widely separated patches on the pronotum and the metanotum, which are creamy yellow; tegulae low, smooth, and fulvous in color; enclosure heavily ridged longitudinally; mesosternal tubercles absent; legs fulvous; wings subhyaline but clouded with fulvous.

Abdomen with the first segment largely fulvous with a semidivided creamy-yellow band on the tergum, terga 2 to 5 with subequal creamy-yellow bands broadly emarginate; venter immaculate; pygidium with sides slightly convex and converging to a narrower rounded apical end.

MALE.—Positive identification still uncertain.

Specimens of females examined show considerable variation in the form of the clypeal process. *C. nebrascensis* is related closely to *C. nigrescens* F. Smith, but the fulvous color readily distinguishes the former from the latter species. *C. nebrascensis* is very close to *C. wyomingensis* Scullen in size, general color pattern, and distribution, but the form of the clypeal process easily separates them; however, in both species the clypeal process shows considerable variation in form.



FIGURES 88, 89.—Localities of: 88, *C. nebrascensis* H. S. Smith; 89, *C. nigrescens nigrescens* F. Smith.

TYPE.—The type female and one paratype male, both from Glen, Sioux Co., Nebr., 4000 ft., Aug. 15, 1906, are at the University of Nebraska.

DISTRIBUTION.—This rare species has been taken only in the North Central States as indicated by the following records. Specimens are as follows:

COLORADO: ♀, Boulder Co., Sept. 10, 1926 (C. P. Custer). NEBRASKA: ♀, Halsey, Aug. 12, 1925 (L. C. Worley); ♀, Sand Hills, Sept. ; ♀, Glen, Sioux Co., 4000 ft., Aug. 12, 1906 (P. R. Jones). SOUTH DAKOTA: ♀, Hecla, July 26, 1928 (H. C. Severin). WYOMING: ♀, Torrington, Sept. 20, 1939 (J. Standich).

PREY RECORD.—None.

PLANT RECORD.—*Solidago serotina* (Nebraska).

### 63a. *Cerceris nigrescens nigrescens* F. Smith

FIGURES 89, 169a,b,c,d

*Cerceris nigrescens* F. Smith, 1856, p. 466.—Cresson, 1865, p. 123.—Packard, 1866, p. 62; 1872, p. 230.—Provancher, 1882, p. 75; 1883, pp. 643, 644.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 497.—Provancher, 1889, p. 643.—Dalla Torre, 1897, p. 468.—Peckham, 1898, p. 116, pl. 8, fig. 6.—Ashmead, 1899, p. 295.—Viereck and Cockerell, 1904, p. 138.—Banks, 1912a, p. 20.—Stevens, 1917, p. 422.—Mickel, 1917b, p. 450.—Carter, 1925, p. 133.—Bischoff, 1927, p. 208.—Krombein, 1936, pp. 94, 95; 1938, pp. 1-3.—Banks, 1947, p. 18.—Scullen, 1951, p. 1009.—Evans, 1957, p. 85, pl. 41, figs. 27-29.—Scullen, 1960, p. 79.

FEMALE.—Length 12 mm. Black with cream-colored markings; punctuation somewhat less than average; pubescence short.

Head slightly wider than the thorax; black except large frontal eye patches, dorsal surface of the clypeal process, patch between the antennal scrobes, spots back of the compound eyes, base of mandibles, and small spot on the scape, all of which are cream colored; clypeal border extended on the medial lobe and forming lateral denticles, between which is a broad projection consisting of lateral carina connected by a thinner lamella; clypeal process convex above, slightly broader than long, emarginate with the lateral points rounded; mandibles with three small denticles, the apical one the most acute and larger, the basal one low and broad, all fused at the base; antennae normal in form, dark above, light below with a small yellow spot on the scape.

Thorax black except for two widely separated patches on the pronotum, the metanotum, and patches on the tegulae, all of which are cream colored; tegulae low and smooth; enclosure deeply ridged longitudinally, but the ridges tending to spread apically; mesosternal tubercle absent; legs dark to about the apical end of all femora, tibiae dark above and cream below, tarsi cream with darkened areas; wings subhyaline clouded with amber, darker toward the apex.

Abdomen black except for two separated patches on tergum 1, narrow bands on terga 2 to 5, all of which are cream colored; venter immaculate; pygidium with the sides strongly converging apically to a narrow rounded point.

MALE.—Length 10 mm. Black with cream-colored to creamy-yellow markings; punctuation and pubescence average.

Head slightly wider than the thorax; black except entire face, small spot back of compound eye, base of mandible, and patch on the scape, all of which are cream colored; clypeal margin with three low denticles, the medial one sometimes slightly divided, all usually low and often indistinct; clypeal surface slightly convex; mandibles with a rounded extension medially on the lower margin; antennae with the apical segment slightly curved.

Thorax black except for two elongate, widely separated patches on the pronotum, the metanotum, and the tegulae, all of which are cream colored; tegulae low and smooth; enclosure lightly ridged longitudinally but somewhat irregular; mesosternal tubercles absent; legs with the first two pair largely yellow except dark patches on the dorsal sides of the femora; the hindlegs yellow except the apical half of the femora, a patch on the apical end of the tibiae, and small patches on the tarsi, all of which are dark amber; wings subhyaline with the stigma light.

Abdomen black except for two separated patches on tergum 1, narrow bands on terga 3 to 6, divided bands on sternites 2, 3, and 4, all of which are cream colored; pygidium with the sides subparallel and the apical end truncate.

*C. nigrescens nigrescens* F. Smith is close to the following species in general appearance: *astarte* Banks and *dentifrons* Cresson in the Eastern States. In the West it is near *C. aequalis* Provancher. The form of the clypeal process and the pygidium usually will separate them. The cream-colored markings of the nominate subspecies also will aid in its recognition. In the Pacific Coast States the cream-colored markings gradually are replaced with yellow. Mating pairs may be found in southern Oregon, where one sex has yellow markings and one, cream-colored markings. Some individuals show varying amounts of cream and yellow. In California *C. nigrescens munda* Mickel, the yellow form, predominates.

TYPE.—The type female of *C. nigrescens* F. Smith, from Nova Scotia, is in the British Museum, no. 21.1,431.

DISTRIBUTION.—This is the most widely distributed species of *Cerceris* in North America. It ranges from New England west through the Northern States to the Pacific Coast and south to Nevada, Utah, Colorado, Nebraska, Iowa, Illinois, Ohio, and North Carolina. It is recorded also from Alaska. As indicated above, the subspecies *munda* Mickel largely takes over in California.

PREY RECORD.—*Hyperodes solutus* (Boheman) (New York), *H. delumbis* Gyllenhal (Krombein, 1936, 1938, New York), *Sitona hispidulus* (Fabricius) (Krombein, 1936, 1938, New York), *Gymnetron antirrhini* Paykull (Krombein, 1938, New York).

PLANT RECORD.—*Achillea* sp. (California, Idaho, New York, Oregon), *A. millefolium* (Wyoming), alfalfa (Alberta, Idaho, Oregon),



*Angelica* (Minnesota), *Anthemis cotula* (Idaho), *Apocynum androsaemifolium* (Quebec, Canada), *Aralia hispida* (Vermont), *Asclepias* sp. (California, Idaho), *A. mexicana* (California), asparagus (Idaho), beans (Idaho), *Berteroa incana* (Massachusetts), blackeyes (Colorado), *Brassica nigra* (Utah), Canada thistle (Oregon), carrots (California, Idaho, New York, Oregon), *Ceanothus americanus* (Massachusetts, Quebec, Canada), *C. canadensis* (Massachusetts), *C. fendleri* (Arizona), *Chrysothamnus* sp. (California, Idaho, Oregon, Washington), *C. leucanthemum* (New York, North Carolina), *C. viscidiflorus* ssp. *typicus* (California), *Cicuta maculata* (Ohio), *Cirsium* sp. (Idaho), *Cirsium lanceolatum* (British Columbia, Canada), *Cleome* sp. (Idaho), *C. lutea* (Oregon), *C. serrulata* (Oregon), clover (Idaho, Oregon), *Conium maculatum* (Oregon, Utah), corn (Idaho), *Croton californicus* (California), daisy (New York), *Daucus carota* (New York, Oregon), *Epilobium angustifolium* (Idaho, Alaska), *Eriogonum* sp. (Oregon), *E. fasciculatum* (California), *E. fasciculatum* v. *polifolium* (California), *E. nudum* (California), *E. ovalifolium* (Utah), evening primrose (minute) (California), *Grindelia squarrosa* (Utah), *Holodiscus discolor* (Oregon), honeysuckle (Saskatchewan, Canada), *Ilex verticillata* (Quebec, Canada), *Lotus americanus* (California), matta beets (Idaho), *Melilotus* sp. (sweet clover) (Idaho, Oregon, South Dakota, Washington), *Melilotus alba* (Iowa, California), parsnips (Idaho), *Philadelphus coronarius* (New York), *Polygonum* sp. (Colorado), *Polygonum auberti* (California), potatoes (Idaho, Oregon), *Potentilla* (California), rose (Illinois), rudbeckia (Idaho), *Salix* sp. (Colorado), *Salix exigua* (California), *Senecio cymbalarioides* (Colorado), *S. platylobus* (Utah), wild snapdragon (Idaho), *Solidago* sp. (British Columbia, Canada, Colorado, Idaho, Massachusetts, New York, North Dakota, Oregon, Utah, Washington), *Solidago canadensis* (New Mexico), *S. elongata* (Oregon), *Sonchus arvensis* (Idaho), *Sophia pestifer* (Idaho), *S. sophia* (Idaho), spearmint (British Columbia, Utah), sumac (Wisconsin), *Symphoricarpos occidentalis* (North Dakota), *S. racemosus* (British Columbia, Canada), *Tanacetum vulgare* (Michigan), tansy (British Columbia, Canada), Umbelliferae (Utah), *Veratrum* (Idaho), vetch (Utah), water hemlock (Idaho, Oregon), yarrow (New York, Oregon, Utah).

63b. *Cerceris nigrescens arelate* Banks, new status

FIGURES 90, 170a,b,c

*Cerceris arelate* Banks, 1912a, p. 18.—Proctor, 1938, part VI, p. 439; 1946, part VII, p. 500.—Viereck, 1916, p. 696.—Scullen, 1951, p. 1005.

*Cerceris nigrifolius* Banks, 1915, p. 402.—Scullen, 1951, p. 1009 (new synonymy).

*Cerceris crawfordi* Brimley, 1928, p. 199.—Scullen, 1951, p. 1007 (new synonymy).

FEMALE.—Length 10 mm. Black with yellow markings; punctation and pubescence average.

Head subequal in width to the thorax; black except frontal eye patches, clypeal process, base of mandibles, small spot above the process, and small spot back of the eyes, all of which are yellow; clypeal border extended from the medial lobe, showing broad, blunt denticles at the lateral angles of the extension and a much smaller medial denticle; clypeal process of the inverted scoop type but subequal in width and length, deeply emarginate with the lateral points very acute; mandibles with three denticles, the most apical one larger and separated from the two basal denticles, which are joined at their bases and subequal in size; antennae dark, normal in form.

Thorax black except for two widely separated spots on the pronotum, the metanotum, and small patch on the tegulae, all of which are yellow; tegulae low and smooth; enclosure rugose, with the ridges extending longitudinally; mesosternal tubercle absent; legs dark to or near the apical end of the femora of all legs, beyond which they are mostly yellow; wings subhyaline but clouded in the apical area; stigma medium dark; pygidium with the sides converging to a rounded apical end.

Abdomen with subequal bands on all terga 1 to 5 except that on tergum 1 it is divided at the meson; venter immaculate; pygidium with sides slightly converging to a rounded apical end.

MALE.—The subspecies *C. nigrescens arelate* Banks is structurally close to *C. nigrescens nigrescens* F. Smith except for the lighter markings, which are yellow, the lateral clypeal denticles, which are more prominent, and the usual absence of light markings on the tergum and the venter of the former.

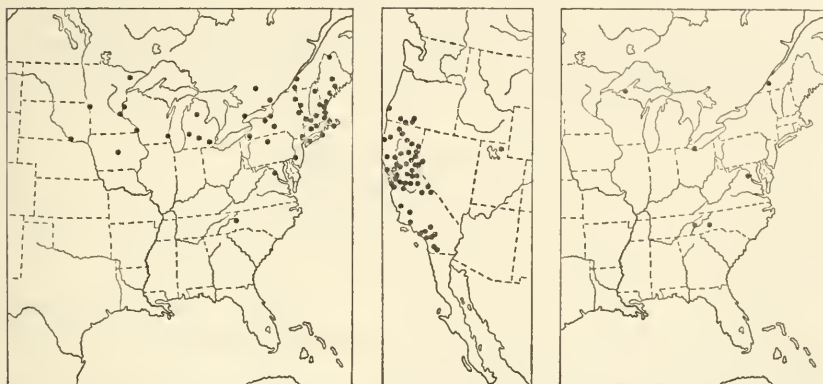
The female of *C. nigrescens arelate* Banks is very near in form and color to the female of *C. nigrescens nigrescens* F. Smith, from which the former is separated by the form of its clypeal process and the very acute lateral points of its process. The latter is inclined to have the markings somewhat creamy yellow in the typical form found in the northeast, while *C. nigrescens arelate* Banks has bright yellow markings.

TYPES.—The type female of *C. arelate* Banks, from Great Falls, Va., June 20, is at the Museum of Comparative Zoology, Harvard, no. 13779. The type male of *C. nigrifulus* Banks, from Colden, N.Y., July 3 (M. C. Van Duzee), is at the Museum of Comparative Zoology, Harvard, no. 13782. The type male of *C. crawfordi* Brimley, from Raleigh, N.C., July 1928, is in the collection of the North Carolina State Department of Agriculture, Raleigh, N.C.

DISTRIBUTION.—Through the Northeastern States and southeastern Canada, west to Minnesota and south to Virginia.

PREY RECORD.—None.

PLANT RECORD.—None.



FIGURES 90-92.—Localities of: 90, *C. nigrescens arelate* Banks; 91, *C. nigrescens munda* Mickel; 92, *C. nitida* Banks.

### 63c. *Cerceris nigrescens munda* Mickel

FIGURES 91, 171a,b,c

*Cerceris munda* Mickel, 1917a, p. 337.—Banks, 1947, p. 18.—SculLEN, 1951, p. 1009; 1960, p. 79.

*Cerceris abbreviata* Banks, 1919, p. 84; 1947, p. 17.

FEMALE.—Structurally close to *C. nigrescens nigrescens* F. Smith. Markings yellow and often more extended than in the typical subspecies, especially noticeable in the amount of yellow on the venter and the hindfemora. As indicated, the yellow forms take over in southern Oregon and become the dominating form in California; however, the yellow form has been taken in Washington, where the type of *C. abbreviata* Banks was taken.

MALE.—As in the female, the male of the subspecies *munda* differs from the typical form only in the more yellow markings.

The subspecies *C. nigrescens munda* Mickel is very close to *C. aequalis aequalis* Provancher, which is also confined largely to California. The principal difference is in the form of the clypeal process of the female, which is very distinctive. So far, the males of *C. aequalis aequalis* Provancher have not been distinguished. It is probable they are being confused with the males of *C. nigrescens munda* Mickel.

TYPES.—The type female and allotype male of *C. munda* Mickel, both collected at Sacramento, Calif., by L. Bruner, on Oct. 6, 1916, and Oct. 3, 1916, respectively, are at the University of Nebraska.

The type of *C. abbreviata* Banks, taken at "Yakima City, W. T., July 2, 3, 4, '82," is at the Museum of Comparative Zoology, Harvard, no. 13794.

PREY RECORD.—None.

PLANT RECORD.—CALIFORNIA: *Adenostoma* sp., *Chrysothamnus viscidiflorus typicus*, *Eriogonum fasciculatum*, *E. nudum*, *Helianthus* sp., ladino clover, *Lotus americanus*, *Melilotus alba*, *Phacelia* sp., *Polygonum auberti*, *Salix* sp., *Solidago* sp., *S. californica*, *Trifolium* sp.  
NEVADA: *Chrysothamnus* sp.

#### 64. *Cerceris nitida* Banks

FIGURES 92, 172a,b,c

*Cerceris nitida* Banks, 1913b, p. 424, fig. 9.—Mickel, 1917b, p. 454.—Scullen, 1951, p. 1009.

FEMALE.—Length 9 mm. Black with light yellow markings; punctations more limited than average; pubescence very short; slightly more shiny than the average.

Head slightly wider than the thorax; black except the large frontal eye patches, most of the clypeus, evanescent small spot back of the eye, and the base of the mandibles, all of which are very light yellow; clypeal border with five distinct denticles subequally spaced on the medial lobe; clypeal elevation low, acute, depressed, and fuscous; entire clypeal margin and area below the clypeal elevation fuscous; mandibles with three low denticles, the basal one very small; antennae normal in form, fuscous over the scape, peduncle, and the upper surface of the flagellum, the latter light below.

Thorax black except for a divided band on the pronotum, evanescent spots on the scutellum, the metanotum, and a patch on the tegulae, all of which are light yellow; tegulae low and smooth; enclosure with a medial groove, the surface relatively smooth and with pits along the lateral margins; mesosternal tubercle very small; legs black to near the apical ends of the femora, except the hindtrochanter, which is light yellow; apical end of the fore- and midfemora are yellow; apical ends of the hindfemora are ferruginous and the more apical segments of all legs are largely yellow with darker patches; wings subhyaline with the apical region clouded.

Abdomen with a semidivided small patch on tergum 1 and with subequal emarginate bands on terga 2 to 5; venter with light yellow lateral patches on sternite 3 and small evanescent spots on sternite 4; pygidium elongate oval with the apical end rounded and the basal end narrow.

MALE.—Length 8 mm. Black with light yellow markings; punctation very limited; pubescence very short; body shiny.

Head slightly wider than the thorax, black except the entire face,



base of the mandibles, and patch on the scape, all of which are light yellow; clypeal margin with a tridentate medial extension; mandibles without denticles; clypeal surface convex; hair lobes less "waxed" than average and extending over about one-half of the lateral lobe border, blending in with a band of long bristles extending over the lower border of the entire clypeus; antennae normal in form.

Thorax black except for a divided band on the pronotum, the metanotum, and the tegulae, all of which are light yellow; tegulae low and smooth; enclosure smooth except for a light medial groove; mesosternal tubercle absent; legs with the forecoxae black, the other coxae mostly light yellow, all trochanters light yellow, femora black except the apical ends, which are light yellow on the fore- and midlegs and ferruginous on the hindlegs; the tibiae and tarsi largely yellow with some dark patches on those of the hindlegs; wings subhyaline but clouded on the apical area.

Abdomen with narrow light yellow bands on terga 2 to 6, that on tergum 2 somewhat wider than the others, all emarginate; venter with an emarginate band on sternite 3 and small evanescent lateral yellow spots on sternite 4; pygidium with sides subparallel, the ends subequal in width and the apical end rounded.

The female of *C. nitida* Banks is very close to the female of *C. melanthe* Banks. They may be separated by the form and arrangement of the clypeal denticles and by the color of the hindfemora, which are uniformly fuliginous to the apical end on *C. melanthe* Banks but ferruginous on the apical end of *C. nitida* Banks.

**TYPES.**—The type female of *C. nitida* Banks, from North Carolina, is at the American Museum of Natural History, no. 21185. A male labeled "Type" is at the Museum of Comparative Zoology, Harvard. As this was probably labeled by Banks, it may be considered the allotype.

**DISTRIBUTION.**—This rare species has been taken in very limited numbers over a wide area from Quebec south to North Carolina, west to Illinois, and southwest to Texas. Specimens are as follows:

**ILLINOIS:** ♀, Makanda, June 4, 1919. **MICHIGAN:** ♀, Otonagon Co., June 28, 1955 (R. R. Dreisbach). **NEW YORK:** ♀, Beaver Creek, McLean "Res." [sic], Sept. 1, 1925. **NORTH CAROLINA:** ♀, Black Mountains, July 9, 1912 (Beutenmuller); ♀, Valley of Black Mts., June 1906 (W. Beutenmuller). **OHIO:** 7 ♀ ♀, Put-in-Bay, July 1, 1910 (C. H. Kennedy); 2 ♂ ♂, Put-in-Bay, July 10 (C. H. Kennedy); ♂, Put-in-Bay (C. H. Kennedy). **QUEBEC, CANADA:** ♀, St. Hilaire, Aug. 28, 1927 (J. W. Buckle). **TENNESSEE:** ♀, Chimneys C. Gr. [sic], Great Smoky Mountains National Park, 2800 ft., June 12, 1954 (H. E. and M. A. Evans). **TEXAS:** ♀, Stonewalle, April 16, 1953 (L. D. Beamer); 3 ♀ ♀ [no data].

**PREY RECORD.**—None.

**PLANT RECORD.**—None.

65. *Cerceris occipitamaculata* Packard

FIGURES 93, 173a,b,c

- Cerceris occipitamaculata* Packard, 1866, p. 62.—Cresson, 1872, p. 229; 1887, p. 282.—Schletterer, 1887, p. 498.—Dalla Torre, 1897, p. 469.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Smith, H. S., 1908, p. 368.—Stevens, 1917, p. 422.—Mickel, 1917b, p. 449.—Carter, 1925, p. 133.—Scullen, 1951, p. 1009.
- Cerceris fasciola* Cresson, 1872, p. 230; 1887, p. 282.—Schletterer, 1887, p. 491.—Ashmead, 1899, p. 295.—Viereck, 1906b, p. 234.—Banks, 1912a, p. 23.—Viereck, 1916, pp. 695-696.—Washburn, 1918, p. 226, fig. 115.—Britton, 1920, p. 342.—Scullen, 1951, p. 1007 (new synonymy).
- Cerceris novomexicana* Viereck and Cockerell, 1904, p. 137.—Scullen, 1951, p. 1009 (new synonymy).

FEMALE.—Length 11 mm. Black with creamy-yellow markings; punctation somewhat smaller and more scattered than average; pubescence average.

Head slightly wider than the thorax; black except for large frontal eye patches, the clypeal process, the lateral wings of the clypeus, patch above the clypeal process, patch back of the compound eyes, the base of the mandibles, and the scape, all of which are creamy yellow; clypeal border with a prominent extension on the medial lobe with denticle-like processes at the lateral angles; clypeal process subequal in width to the length, relatively flat above, and with the free margin slightly emarginate; mandibles with three denticles closely fused at the base, the medial one much the larger; antennae normal in form, scape creamy yellow, peduncle and flagellum fulvous.

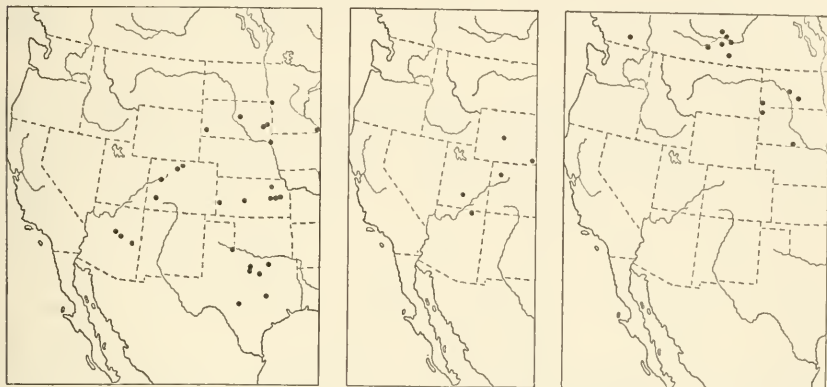
Thorax black except for two patches on the pronotum, the metanotum, large patches on the propodeum, and the tegulae, all of which are creamy yellow; tegulae smooth; enclosure smooth except for a medial groove and very limited punctation in the lateral angles; mesosternal tubercles absent; first two pairs of legs are dark on the basal segments to one-third of the femora, largely yellow beyond to the apical segments of the tarsi, which are fulvous; the hindlegs are dark at the base to and including the basal end of the femora, beyond which they are largely yellow except the apical ends of the femora, which are dark; wings are subhyaline but slightly darker at the apex.

Abdomen with creamy-yellow subequal bands on terga 1 to 5, that on tergum 1 divided; venter immaculate; pygidium with sides converging to an apical rounded point.

MALE.—Length 10 mm. Black with creamy-yellow markings; punctation and pubescence as in female.

Head subequal in width to the thorax; black except for the entire face, small spots back of the compound eyes, base of the mandibles, and the scape, all of which are creamy yellow; clypeal margin slightly extended from the medial lobe, showing two lateral, low, rounded denticles, the usual medial one not evident; the surface of the medial

lobe of the clypeus with a prominent convexity; mandibles with two more or less fused denticles, the more basic one with a divided point and tapering off as a low ridge toward the base of the mandible; antennae with the terminal segment slightly curved; scape yellow and the remaining segments fulvous.



FIGURES 93-95.—Localities of: 93, *C. occipitamaculata* Packard; 94, *C. sexta* Say; 95, *C. stigmatialis* Banks.

Thorax black except for two separated patches on the pronotum, the metanotum, and the tegulae, all of which are creamy yellow; tegulae low and smooth; enclosure faintly ridged about  $30^\circ$  from meson and with a faint medial groove; mesosternal tubercles absent; legs with all coxae black, forelegs black to near the center of the femora, beyond which they are largely yellow, the midlegs yellow except for a dark patch on the femora, the hindlegs yellow on the trochanter and beyond except the apical half of the femora, a patch on the apical end of the tibiae, and the four apical tarsal segments, which are dark; wings subhyaline but slightly darker at the apex.

Abdomen with subequal bands on terga 1 to 6, somewhat emarginate and that on tergum 1 divided; venter dark except for lateral patches on sternites 2, 3, and 4; pygidium with sides subparallel but with the apical end slightly wider than the basal end.

*C. occipitamaculata* Packard is close to *C. nigrescens* F. Smith. The females can be separated by the form of the clypeal processes. The prominent convex surface of the medial lobe of the clypeus on *C. occipitamaculata* Packard will distinguish the male of that species.

Types.—The type female of *C. occipitamaculata* Packard, from Kansas (Norton), has not been located. Recognition of this species is based on specimens so labeled by E. T. Cresson and other earlier workers. A neotype, from Hunt Co., Texas, is being designated by the present writer and is to be deposited at the U.S. National Museum.

The type male of *C. fasciola* Cresson, taken in Comal Co., Texas, is at the Philadelphia Academy of Natural Sciences, no. 1950. The type female of *C. novomexicana* Viereck and Cockerell, from Jackson Park, N. Mex., at skunk cabbage, July 7, 1903 (Anna Gohrman), is at the Philadelphia Academy of Natural Sciences, no. 10383.

DISTRIBUTION.—Central and South Central States, from South Dakota and Iowa south to Arizona, New Mexico, and Texas. Specimens are as follows:

ARIZONA: ♀, Coconino Co., 7200–7500 ft., Aug. 29, 1935 (T. H. and G. G. Hubbell); ♀, Flagstaff, June 10, 1909 (F. C. Pratt); ♂, Flagstaff, Feb. 20, 1932 (Painter); ♀, Flagstaff, 7000 ft., Sept. 5, 1955 (H. A. Scullen). COLORADO: ♀, Berkeley, June 10, 1897 (E. J. Oslar); ♀, Boulder, June 20, 1922; ♂, Boulder, June 20, 1922 (L. O. Jackson); ♀, Fort Collins; 3 ♂♂, Fort Collins, June 22, 1899; ♀, Regnier, 4500 ft., June 6, 9, 1919; ♀, Rifle, 5400 ft., July 19–21, 1919; ♀, Ridgway, 7000 ft., July 10, 1919. IOWA: ♀, Sioux City, June 10, 1949 (Slater and Laffoon). KANSAS: ♀, Baldwin (Bridwell); ♂, Great Bend, June 3, 1952 (Cheng Liang); ♀, Hamilton Co., 3350 ft. (F. H. Snow); ♀, Lyons Co., June 15, 1923 (C. O. Bare); ♀, Osage Co., June 16, 1923; 3 ♀♀, Riley Co. (Marlatt, Popenoe). MINNESOTA: ♀, Traverse Co. (O. W. Oestland). NEBRASKA: ♀, April 24, 1896; 2 ♀♀, ♂ (T. Pergande). NEW MEXICO: 2 ♀♀, Highrolls, May 29–30, 1902. SOUTH DAKOTA: 2 ♂♂, Brookings, June 18, 1921 (H. C. Severin); ♂, Brookings, June 14, 1933 (H. C. Severin); ♂, Hingle, June 15, 1924 (H. C. Severin); ♀, Onida, June 18, 1933 (H. C. Severin); 3 ♂♂, Volga; ♀, Wasts, Pennington Co., June 3, 1941 (G. R. and A. M. Ferguson). TEXAS: 2 ♀♀, Austin, April 22, 1900; 2 ♀♀, Austin, May 9, 1900; ♀, Austin, April 9, 1909 (R. A. Cushman); ♀, Childress, June 8, 1906 (J. D. Mitchell); 3 ♀♀, Dallas, May 9, 1906 (F. C. Bishopp); ♀, Dallas, May 9, 1906 (W. D. Pierce); ♀, Dallas, April 24, 1908; ♀, Denton, May 19 (F. C. Bishopp); ♀, Fedor, April 25, 1896; 2 ♂♂, Fedor, April 2 and 6, 1898 (Birkmann); ♂, Fedor, April 21, 1904 (Birkmann); 2 ♀♀, Fedor, May 11–12, 1905; ♀, Hunt Co., May 17, 1934; 5 ♀♀, 3 ♂♂, Fedor, April 25, 1938 (RWS); ♀, 3 ♂♂, Fedor, May 2, 1939; ♂, Fedor, May 4, 1939; ♀, ♂, Fedor, May 5, 1939; ♂, Fedor, May 9, 1939; ♀, Fedor, May 20, 1939; ♀, Fedor, June 2, 1939; ♀, Fedor, May 6, 1940; ♀, ♂, Fedor, May 11, 1940; ♀, Fedor, May 14, 1940; 2 ♀♀, Roanoke, Denton Co., May 31, 1951 (H. E. Evans); ♀, Wolf Canyon, May 20, 1907 (F. C. Bishopp).

PREY RECORD.—None.

PLANT RECORD.—*Amorpha fruticosa* (Texas), *Eriogonum umbellatum* (Colorado), *Helianthus petiolaris* (Kansas), *Heracleum lanatum* (Colorado), iris (Arizona), *Pastinaca sativa* (Texas), *Polytaenia nuttallii* (Texas).

#### 66. *Cerceris posticata* Banks

*Cerceris posticata* Banks, 1916, p. 64; 1947, p. 20.—Scullen, 1951, p. 1010.

FEMALE.—Unknown.

MALE.—Length 15 mm. Black with yellow and light fulvous markings; close to male of *C. sexta* Say in structural details and color pattern except as indicated below.



Head without yellow spot back of the eye; surface of medial clypeal lobe more convex on *posticata*.

Thorax very close to that of *sexta* Say except that patch on the propodeum is smaller than on the latter species.

Abdomen with band on tergum 2 very slightly wider and bands on terga 3 to 6 narrower than on *sexta* Say; bands on sternites more limited than on *sexta* Say.

*C. posticata* Banks is known only from the unique type male. It is very close to the male of *C. sexta* Say and may prove to be that species. For the present, the writer will retain it as a valid species.

TYPE.—The holotype male, from Jemez Mountains, N. Mex., July 11 (Woodgate), is at the Museum of Comparative Zoology, Harvard, no. 13771.

PREY RECORD.—None.

PLANT RECORD.—None.

#### 67. *Cerceris rhois* Rohwer

*Cerceris rhois* Rohwer, 1908, p. 325.—Scullen, 1951, p. 1010.

FEMALE.—Unknown.

MALE.—Length 12 mm. Black with yellow and light fulvous markings; close to male of *C. sexta* Say in structural details and color pattern except as indicated below.

Head with the medial clypeal denticle somewhat smaller than the two lateral denticles.

Thorax lacks the yellow patches on the propodeum of *C. sexta* Say.

Abdomen with band on tergum 1 not emarginate and other abdominal bands narrower than on *sexta*.

*C. rhois* Rohwer is known only from the unique type male. It, like *C. posticata* Banks, is very close to the male of *C. sexta* Say and may prove to be the same species. This also the writer prefers to retain as a valid species until better characters are found for separating closely related males.

TYPE.—The holotype male, from Rio Ruidoso, White Mts., New Mexico, about 6500 ft., July 21, on flowers of *Rhus glabra* (C. T. H. Townsend), is at the U.S. National Museum, no. 28482.

PREY RECORD.—None.

PLANT RECORD.—None.

#### 68. *Cerceris serripes* (Fabricius)

*Vespa serripes* Fabricius, 1781, p. 464.

*Cerceris serripes*, Bequaert (not Fabricius) 1928, p. 62 (misassociation for *C. bicornuta* Guérin).—Scullen, 1942, pp. 188, 189.—Strandtmann, 1945, p. 311.—Van der Vecht, 1961, p. 67.

FEMALE.—Length 13 to 15 mm. Black with yellow markings; punctuation coarse, but not as close as on *C. halone* Banks, which it most nearly resembles.<sup>14</sup>

Head lost from the type.

Thorax with two patches on the pronotum, line on the scutellum, and large patches on the propodeum, all of which are yellow; enclosure deeply ridged; propodeum very coarsely sculptured.

Abdomen with two lateral patches on tergum 1 separated by a wedge-shaped emargination; tergum 2 with a broad but deeply emarginate band, emargination deep and rounded; terga 3 and 4 with narrower bands, emarginate; tergum 5 with a broad band, slightly emarginate, emargination acute; apical sternite very deeply incised; pygidium with sides converging slightly to a truncate apical end.

The headless, unique type of *Vespa serripes* Fabricius in the British Museum has resulted in considerable confusion since Bequaert published his note on it in 1928. This type has proven to be a misassociation based on a statement by R. E. Turner. On the basis of Bequaert's published note, the writer published his 1942 paper and, from 1942 to 1946, used the name *Cerceris serripes* (Fabricius) when determining specimens of what formerly was and now is known as *C. bicornuta* Guérin. In 1946, specimens of *C. bicornuta* Guérin were sent to Dr. Benson of the British Museum to be compared with the type of *Vespa serripes* Fabricius. On June 20, 1946, Dr. Benson reported that the type of *V. serripes* Fabricius is a female and not a male as reported by Bequaert and, furthermore, that *C. bicornuta* Guérin was "not even closely related to *V. serripes*." Since that date the writer has reverted to using the name *C. bicornuta* Guérin. More recently, several specimens representing species known to be near *C. serripes* (Fabricius) have been compared carefully with that type by Dr. Yarrow. As yet, none have been found that fully agree. *C. halone* Banks appears to be the nearest. For the present, it seems necessary to let *C. serripes* (Fabricius) remain a valid species until there is an opportunity for some specialist to make a more exhaustive study of the problem.

MALE.—Unknown.

TYPE.—The holotype female of *Vespa serripes* Fabricius is in the Banks collection at the British Museum. It bears the label "N.

---

<sup>14</sup> This fragmental description is based on private correspondence with Drs. Robert B. Benson and I. H. H. Yarrow of the British Museum and Dr. J. Van der Vecht of Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands (via Dr. Krombein). Sketches furnished by Dr. Benson and Dr. Van der Vecht have been of material help.

Amer" and "63/45," the latter of which Benson indicated is an abbreviation for the British Museum Register No. 1963-45.

PREY RECORD.—None.

PLANT RECORD.—None.

### 69. *Cerceris sexta* Say

FIGURES 94, 174a,b,c

*Cerceris sexta* Say, 1837, p. 382.—Smith, F. 1855, p. 465.—LeConte, 1883, p. 763.—Cresson, 1865, p. 119.—Packard, 1866, p. 61.—Patton, 1879, p. 361.—Cresson, 1875, p. 382; 1887, p. 282.—Schletterer, 1887, p. 502.—Ashmead, 1890, p. 32.—Dalla Torre, 1897, p. 476.—Bridwell, 1898, p. 209.—Ashmead, 1899, p. 295.—Viereck, 1906b, p. 234.—Smith, H. S., 1908, p. 365.—Banks, 1913b, p. 424.—Mickel, 1917b, p. 450.—Banks, 1947, p. 10.—Scullen, 1951, p. 1010; 1960, p. 79; 1961, p. 47.

*Cerceris biungulata* Cresson, 1865, p. 118.—Packard, 1866, p. 61.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 487.—Ashmead, 1890, p. 32.—Dalla Torre, 1897, p. 454.—Ashmead, 1899, p. 295.—Viereck, 1906b, p. 234.—Scullen, 1951, p. 1005; 1960, p. 79.

*Cerceris orphne* Banks, 1947, pp. 15-16.—Scullen, 1951, p. 1009 (new synonymy).

FEMALE.—Length 15 mm. Black with yellow markings lightly bordered with amber; punctation and pubescence average.

Head subequal in width to the thorax; face largely yellow, large yellow areas on genae, dark amber band on the vertex back of ocelli, clypeal border with a broad medial extension bordered laterally by a corina ending in a denticle, and between these two denticles a placoid-like membrane; clypeal process lunar shaped with the horns very long, curved, and acute; mandibles with three small denticles medially located, the more apical one widely separated from the medial one; antennae normal in form; scape yellow and the flagellum ferruginous, becoming slightly darker apically.

Thorax black except for a deep emarginate band on the pronotum, the scutellum, the metanotum, large areas on the propodeum, patch on the pleuron, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure black, heavily ridged longitudinally; meso-sternal tubercles absent; legs amber; wings subhyaline.

Abdomen with tergum 1 largely yellow; terga 2 to 5 with broad yellow bands deeply emarginate with fuscous, the band becoming somewhat broader on tergum 2; venter dark amber to fuscous, becoming lighter on sternite 2; pygidium with sides converging slightly to a truncate apical end.

MALE.—Length 15 mm. Black with yellow markings; punctation and pubescence average.

Head subequal to thorax in width; face yellow; small yellow spots back of eye bordered with fuscous; clypeal border extension showing two lateral low denticles with a barely evident elevation mesad of

the above denticles; a slight medial depression extending from the clypeal margin about two-thirds of the way to the epistomal suture; mandibles somewhat sinuate but without distinct denticles; antennal scape slightly inflated with a yellow patch in front, flagellum dark fuscous with the terminal segment strongly bent.

Thorax black except for two patches on the pronotum, the metanotum, two small patches on the propodeum, and the tegulae, all of which are yellow; enclosure ridged parallel to the meson; mesosternal tubercles absent; legs light ferruginous with large yellow areas on most segments beyond the trochanter; wings subhyaline.

Abdomen black and yellow; tergum 1 with large lateral yellow patches; terga 2 to 6 with subequal broad yellow bands emarginate with black anteriorly; venter dark fuscous with lateral yellow patches on sternites 2, 3, and 4. Both sexes may show more or less dark ferruginous or fuscous areas on the vertex, the genae of the head, and the scutellum of the thorax.

TYPES.—Say's original male type has been lost. A neotype male, from Colorado, designated by the present writer, is deposited at the Philadelphia Academy of Natural Sciences, no. 5041. The type female of *C. biungulata* Cresson, from the Rocky Mts., Colorado (Riding), is at the Philadelphia Academy of Natural Sciences, no. 1956. The type male of *C. orphne* Banks, from Jemez Springs, N. Mex., July 2 (Englehardt), is at the Museum of Comparative Zoology, Harvard, no. 23536.

DISTRIBUTION.—Through the South Central States, from Nebraska and Colorado south to Arizona. Specimens are as follows:

ARIZONA: ♀, at base of Humphrey's Peak, 9500 ft., August (Snow); ♀, Navajo Mts., Navajo Co., July 13, 1933 (Stanley Bee); ♀, Rainbow Lodge, Navajo Mts., Coconino Co., 6500 ft., July 15, 1933 (Stanley Bee); ♀, Oak Creek Canyon, 6000 ft., (F. H. Snow); 2 ♀ ♀, Rainbow Lodge. COLORADO: ♀, Berkley, June 3; ♀, "Colorado" (C. F. Baker); ♀, Meeker, 6200 ft., July 20–21, 1919; ♀, Pleasant Valley, Aug. 19, 1906. KANSAS: 2 ♂ ♂, Greeley Co. NEW MEXICO: ♀, Koehler (W. R. Walton). UTAH: ♀, Boulder, Sept. 11, 1949 (C. J. Stewart). WYOMING: ♀, Cheyenne, Aug. 23, 1931; ♀, Lander, July 22, 1953 (R. R. Dreisbach).

PREY RECORDS.—None.

PLANT RECORD.—None.

#### 70. *Cerceris stigmosalis* Banks

FIGURES 95, 175a,b,c

*Cerceris stigmosalis* Banks, 1916, p. 64.—Stevens, 1917, p. 422.—Scullen, 1951, p. 1010; 1960, p. 79.

*Cerceris fugatrix* Mickel, 1917a, pp. 335, 336; 1917b, p. 452.—Scullen, 1951, p. 1008.

*Cerceris sayi* Banks, 1923, p. 21.—Scullen, 1951, p. 1008.

*Cerceris stevensi* Banks, 1923, p. 22.—Scullen, 1951, p. 1008.



**FEMALE.**—Length 15 to 18 mm. Black with pale yellow to creamy-white markings; punctation average; pubescence slightly longer than average.

Head subequal in width to the thorax; black except for large eye patches on the face, surface of the clypeal process, base of mandibles, and large round spots back of the compound eyes, all of which are pale yellow; clypeal border with a medial extension bordered laterally by an irregular heavy carina; clypeal process broader than long with the points somewhat angular; mandibles black except at the base with two adjoining small subequal denticles; antennae normal in form, basal half light amber, and apical half somewhat darker.

Thorax black except two elongate patches on the pronotum, the scutellum, and large patches on the propodeum, all of which are pale yellow; tegulae amber, low, and smooth; enclosure ridged longitudinally but spreading out somewhat posteriorly; mesosternal tubercles absent; legs reddish amber with the basal segments darker; wings subhyaline tinged with amber.

Abdomen black with pale yellow to creamy-white markings; tergum 1 with two large light yellow patches; terga 2 to 5 with broad but deeply emarginate light yellow bands; tergum 6 black; venter black; pygidium with sides converging apically to a truncate end.

**MALE.**—Length 14 to 15 mm. The type, which is a small specimen, is 12 mm. Black with pale yellow or creamy-white markings; punctation average; pubescence slightly longer than average.

Head black except entire face, small round spot back of eyes, base of mandibles, and scape, all of which are pale yellow; clypeal border with medial lobe extended and with three small denticles on the margin of the extension; hair lobes on the lateral wings only; mandibles with a broad lobe medially on the lower margin; antennae dark amber with the basal segments lighter and the scape yellow, terminal segment curved.

Thorax black with two large patches on the pronotum, the scutellum, patch on the propodeum, and the tegulae, all of which are pale yellow; tegulae low and smooth; enclosure with a medial groove, smooth except for lateral ridges approximately  $45^\circ$  to the base; mesosternal tubercles absent; fore- and midlegs dark fuscous to near the center of the femora, beyond which they are yellow; the hindlegs are mostly yellow basally to beyond the center of the femora, which are light amber on the apical third; apical segments of the hindlegs are yellow infused with amber; wings subhyaline tinged with amber.

Abdomen black with two pale yellow patches on tergum 1; terga 2 to 6 with broad pale yellow bands deeply emarginate; tergum 7 black; venter black except for lateral pale yellow patches on sternites 2 to 5; pygidium with sides subparallel and apical corners rounded.

The principal variations are found in the clypeal process of the female, which may have the points considerably extended and the yellow markings on the surface greatly reduced or completely absent. *Cerceris stigmatosa* Banks most closely resembles *Cerceris sexta* Say, from which the females of the former may be separated by the form of their processes and the much lighter shade of their markings. Possibly *stigmatosa* should be considered a subspecies of the latter.

TYPES.—The type male of *C. stigmatosa* Banks, from Fargo, N. Dak., September, on *Solidago* sp. (Stevens), is at the Museum of Comparative Zoology, Harvard, no. 13778. The type male of *C. fugatrix* Mickel, from Mitchell, Nebr., Aug. 4, 1916 (C. E. Mickel), is at the University of Nebraska. The type female and allotype male of *C. sayi* Banks, from Steele, N. Dak., July 13 (Stevens), are at the Museum of Comparative Zoology, Harvard, no. 14706. The type female of *C. stewarti* Banks, from Steele, N. Dak., (Stevens), is at the Museum of Comparative Zoology, Harvard, no. 14707.

DISTRIBUTION.—In the United States and Canada *stigmatosa* is found in the North Central States, from Alberta south to Nebraska. The same species has been taken on the plateaus of central Mexico by the writer and other workers. Specimens are as follows:

ALBERTA: ♂, Bow Island, July 14, 1937 (C. L. Neilson); ♂, Cypress, July 24, 1923 (E. H. Strickland); 2 ♂♂, Lethbridge, July 29, 1916 (Sladen); 3 ♀♀, 2 ♂♂, Lethbridge, July 28, Aug. 8, 14, 1914, Aug. 14, 1922, Aug. 15, 1939 (E. H. Strickland); 3 ♀♀, 5 ♂♂, Lethbridge, July 24, 1922, Aug. 8, 1923, July 2, 5, 6, 8, 1923 (H. E. Gray); ♂, Lethbridge, Aug. 7, 1923 (Walter Carter); ♀, 2 ♂♂, Lethbridge, Aug. 9, 1926 (E. R. Tinkham); 2 ♀♀, 5 ♂♂, Lethbridge, Aug. 20, 1921, July 27, 29, 1922 (H. L. Seamans); ♀, Lethbridge, July 1, 1940 (R. W. Salt); 4 ♀♀, 8 ♂♂, Manyberries, Aug. 11, 1939 (E. H. Strickland); ♂, Manyberries, July 14, 1949 (Gordon A. Hobbs); 10 ♀♀, 4 ♂♂, Medicine Hat, Aug. 7, 1938, July 29, 1939, Aug. 9, 1939, Aug. 11, 1941 (E. H. Strickland); 3 ♀♀, Medicine Hat, Aug. 1, 1917, July 23, Aug. 23, 1919 (Sladen); ♀, Medicine Hat (J. R. Mallock); ♀, Medicine Hat, Aug. 16, 1939 (J. L. Carr); ♂, Pple. Spgs. [sic], July 1922 (H. L. Seamans); 3 ♂♂, Suffield, July 29, 1949 (Gordon A. Hobbs); 5 ♀♀, 7 ♂♂, Tilley, Aug. 23, 1939, July 12, Aug. 11, 15, 1940, July 9, 20, 1941 (J. L. Carr). BRITISH COLUMBIA: ♀, Summerland, Aug. 10, 1916 (Sladen). MONTANA: ♂, Elkhorn Mts. (W. M. Mann); ♀, Laurel, July 12, 1914 (M. A. C.); NORTH DAKOTA: ♂, Marmantle, July 30, 1934 (A. C. Fox); 10 ♀♀, 8 ♂♂, Steele, July 13, 1919, Aug. 18, 1922, Aug. 4, 1923 (O. A. Stevens); ♀, Washburn, July 23, 1926 (O. A. Stevens). SOUTH DAKOTA: ♂, Buffalo, Sept. 9, 1927 (H. C. Severin); ♀, Wewela, Sept. 16, 1930 (H. C. Severin). MEXICO: 3 ♀♀, 64 mi. NE. Durango, Durango, 6500 ft., Oct. 19, 1957 (H. A. Scullen); 6 ♀♀, 3 ♂♂, San Luis Potosí, S. L. P., 7300 ft., Oct. 1-2, 1957 (H. A. Scullen).

PREY RECORD.—None.

PLANT RECORD.—*Cleome serrulata* (Alberta), *Kuhnistera oligophylla* (North Dakota), *Solidago* sp. (North Dakota).

71. *Cerceris tepaneca* Saussure

FIGURES 96, 176a,b,c

*Cerceris tepaneca* Saussure, 1867, p. 90.—Schletterer, 1887, p. 504.—Cameron, 1890, p. 125.—Dalla Torre, 1897, p. 478.—Ashmead, 1899, p. 296.—Scullen, 1961, p. 48.

*Cerceris sextoides* Banks, 1947, p. 10.—Scullen, 1951, p. 1010.

*Cerceris eurymele* Banks, 1947, pp. 11–12.

**FEMALE.**—Length 15 mm. Black with yellow markings; punctuation and pubescence average.

Head slightly wider than the thorax; face, base of mandibles, scape, and large patch back of the eyes, all yellow; clypeal border black with five denticles, the two lateral ones and the medial one smaller than the other two; clypeal process with spreading blunt points deeply concave between them, dark at the tips, mandibles with three separated denticles, the more apical one much the largest; antennae normal in form, scape yellow, flagellum ferruginous basally, becoming dark apically.

Thorax black except for two emarginate patches on the pronotum, the metanotum, large patches on the propodeum, and the tegulae, all of which are yellow; tegulae low and smooth; enclosure deeply ridged longitudinally; mesosternal tubercle absent; legs black on basal parts, including the basal end of the femora, beyond which they are yellow infused with amber and becoming more ferruginous on the apical parts; wings subhyaline tinged with amber.

Abdomen black and yellow; first tergum with two separated yellow patches; terga 2 to 5 largely yellow with variable amounts of black in the center of each; tergum 6 with yellow to the sides of the pygidium; venter with broad emarginate bands of yellow on sternites 2, 3, 4, and 5; pygidium with sides slightly converging to a smaller apical end.

**MALE.**—Length 13 mm. Black with yellow markings; punctuation and pubescence average.

Head subequal in width to the thorax; black except the entire face, base of mandibles, the scape, and a small spot back of the eye, all of which are yellow; clypeal border extended with three low denticles on the margin; hair lobes extending about half way to the meson; clypeal surface convex; mandibles with three very low denticle-like elevations; antennae with the terminal segment slightly curved.

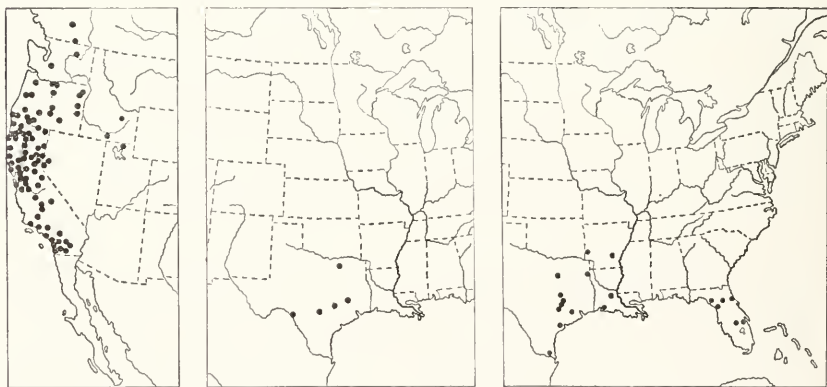
Thorax black except for two elongate patches on the pronotum, the metanotum, and the tegulae, all of which are yellow; tegulae low and smooth; mesosternal tubercle absent; enclosure deeply ridged longitudinally but spreading posteriorly; legs yellow except the forelegs, which are fuscous basally to the center of the femora; midlegs with a fuscous patch near the basal end of the femora; hindlegs with the apical ends of the femora fuscous and a fuscous patch on the apical end of the tibiae; wings subhyaline lightly tinged with amber.

Abdomen black except the first tergum, which has two large lateral yellow patches; terga 2 to 5 are mostly yellow with black emarginations basally; tergum 6 mostly yellow; venter with more or less emarginate yellow bands on sternites 2, 3, 4, and 5 and small lateral yellow spots on sternite 6; pygidium with sides subparallel.

The extension of the yellow markings varies. This is especially true of the terga. *C. eurymele* Banks represents the extreme yellow form. The shape of the clypeal process on the female is quite variable. A series of specimens collected by F. X. Williams on the sand hills of San Francisco show noticeably longer pubescence. In recent years, colonies on these sand hills have been eliminated by expanding residential districts.

**TYPES.**—A male specimen of Saussure's original type series of *C. tepaneca* at Vienna, described from Orizaba, Mexico, has been designated a lectotype by the present writer. The type female of *C. sextoides* Banks, from Lone Tree, Yakima River, Wash., June 30, 1882 (S. Henshaw), and the type female of *C. eurymele* Banks, from Davis, Calif., June 30 (Bohart), are at the Museum of Comparative Zoology, Harvard, nos. 23547 and 23546, respectively.

**DISTRIBUTION.**—Throughout the Pacific Slope States, from British Columbia south and into Mexico.



FIGURES 96-98.—Localities of: 96, *C. tepaneca* Saussure; 97, *C. texana* Scullen; 98, *C. tolteca* Saussure.

**PREY RECORD.**—*Sitona californicus* Fabricius (Antioch, Calif.). *Trigonoscuta pilosa* Mots (San Francisco sand dunes, Calif.).

**PLANT RECORD.**—*Baccharis Emoryi* (California), *Chrysothamnus nauseosus consimilis* (California), *C. viscidiflorus* (California), *Croton californicus* (California), *Daucus carota* (Oregon), *Eremocarpus sati-*



*gerus* (California), *Eriogonum* sp. (California), *E. fasciculatum* (California), *Foeniculum vulgare* (California), *Gutierrezia sarothrae* (California), *Melilotus alba* (California, Oregon), *Polygonum auberti* (California), privet (California), *Rosa* sp. (California), *Solidago* sp. (California), *S. occidentalis* (California).

## 72. *Cerceris texana*, new species

FIGURES 97, 177a,b,c

FEMALE.—Length 11 mm. Black with lemon-yellow markings; punctation small; pubescence average.

Head subequal in width to the thorax; black except for large frontal eye patches, dorsal surface of the process, spot back of the eye, base of the mandibles, and a small patch on the scape, all of which are yellow; clypeal border with a broad extension on the medial lobe; clypeal process slightly broader than long, with a denticle-like extension on the lateral angles of the free terminal border; mandibles with one large denticle, basad of which is a small one; antennae normal in form.

Thorax black except for two widely separated patches on the pronotum, the metanotum, and a patch on the tegulae, all of which are yellow; tegulae low and smooth; enclosure finely ridged at a slight angle to the medial groove; mesosternal tubercle absent; legs fulvous with the two basal segments darker; wings subhyaline, clouded at the apical margin.

Abdomen with subequal medium-width bands emarginate on all terga 1 to 5, the first one being divided; venter immaculate; pygidium wedge shaped, with the apical end small and rounded.

MALE.—Unknown.

The female of *C. texana* Scullen is very close to the female of *C. clypeata clypeata* Dahlbom but the former may be distinguished from the latter species by the form of the clypeal process. The female also resembles the female of *C. aequalis aequalis* Provancher in general form and color but the clypeal processes are quite different.

TYPES.—The type female of *C. texana* Scullen, from Del Rio, Tex., Apr. 13, 1949 (Michener-Beamer), is at the University of Kansas, no. 6068. Paratypes are as follows:

TEXAS: ♀, Brazos Co., June 3, 1939 (J. E. Gillasp); 3 ♀♀, Fedor, 1897 (Birkmann); ♀, Fedor, June, 1898 (Birkmann); 3 ♀♀, Fedor; ♀, Ft. Sam Houston, Bexar Co., Mar. 22, 1953 (M. Wasbauer); ♀, Omas Park, Bexar Co., Mar. 23, 1953 (M. Wasbauer); ♀ [no data].

DISTRIBUTION.—Known only from Texas.

PREY RECORD.—None.

PLANT RECORD.—None.

73. *Cerceris tolteca* Saussure

FIGURES 98, 178a,b,c

*Cerceris tolteca* Saussure, 1867, p. 94.—Schletterer, 1887, p. 504.—Cameron, 1890, p. 109.—Dalla Torre, 1897, p. 478.—Ashmead, 1899, p. 296.—Scullen, 1961, p. 48.

*Cerceris cosmiocephala* Cameron, 1904, p. 67.

FEMALE.—Length 11 mm. Black to dark amber with yellow and light amber markings; punctation light and not crowded; pubescence average.

Head subequal in width to the thorax; black except most of face below antennal scrobes, line between the antennae, two elongate patches on the vertex, patch back of the eye, basal half of mandibles, and scape, all of which are yellow; clypeal margin with two prominent and irregular elevations opposite the lateral angles of the clypeal process; between these two elevations a deep recess continuous with the depression of the clypeal process; a prominent row of bristles between the above marginal elevations, and the lateral angles of the clypeal process extending to the bases of the mandibles; the clypeal process closely resembling that of *C. bicornuta* Guérin in miniature form but the dorsal surface of the process not lunar in *C. tolteca* Saussure as in *C. bicornuta* Guérin; mandibles with a thin corina extending from near the base of the mandibles to an abrupt denticle-like ending near the center of the mandible; apical end and denticle-like process of the mandible dark amber; antennae normal in form.

Thorax black except band on prothorax, semidivided band on the scutellum and the metanotum, small elongate patches on the propodeum and the tegulae, all of which are yellow somewhat tinged with amber; tegulae low and smooth; enclosure smooth and shiny except for a faint medial groove and pits along the lateral margins; mesosternal tubercles absent; legs dark amber to black on the coxae and trochanters, light amber becoming yellow on the femora and yellow amber beyond; wings subhyaline with amber shading.

Abdomen with a broad yellow band posteriorly on tergum 1; tergum 2 largely black to dark amber with lateral yellow patches and traces of yellow posteriorly; tergum 3 yellow; terga 4 and 5 with broad yellow bands slightly emarginate with black; tergum 6 mostly yellow, becoming somewhat amber on the pygidium; venter dark amber with small patches of yellow laterally on sternites 3, 4, and 5; pygidium with sides convex and ends subequal in width.

MALE.—Length 9 mm. Black or dark amber with yellow markings; punctation and pubescence average.

Head black except most of face, two elongate patches on the vertex, patches back of the compound eyes, base of the mandibles, and the scape, all of which are yellow; clypeal border with three denticles;

hair lobes very broad extending from the lateral denticles to the eyes, noticeably amber in color; clypeal surface slightly convex; mandibles without denticles; antennae normal in form.

Thorax black except for band on the pronotum, the scutellum, the metanotum, patches on the propodeum, spots on the pleuron, and the tegulae, all of which are yellow; tegulae smooth and very slightly elevated; enclosure smooth and shiny except for a faint medial groove and pits along the lateral margins; mesosternal tubercles absent; legs black basally, becoming yellow in part on the femora and mostly yellow beyond; wings subhyaline clouded with amber.

Abdomen with a yellow band on tergum 1; tergum 2 black or with a narrow yellow band anteriorly; tergum 3 yellow; terga 4, 5, and 6 with yellow bands infused with amber and black; venter black to dark amber with yellow spots appearing on sternites 3 and 4; pygidium semioval with the apical end truncate.

Both sexes show considerable variation in the extent of the yellow markings and the darker background color may be medium amber. The female of *C. tolteca* Saussure is very distinct even when compared with others, which run close to it in the keys. The clypeal process is very different from that of any other species near its size. The general color pattern of the male, the broad amber hair lobes, and the more oval pygidium easily distinguish that sex.

**TYPES.**—The lectotype female of *tolteca* Saussure, designated by the writer and from near Cuernavaca, Mexico, is at the Museum d'Histoire Naturelle, Vienna. The original type, also from Cuernavaca, Mexico, has not been found.

The holotype male of *C. cosmiocephala* Cameron, from San Marcos, Nicaragua (C. F. Baker), is at the British Museum, no. 21.1.737.

**DISTRIBUTION.**—Through the Southern States, from Arizona to Florida, north to Oklahoma and Arkansas, and south into Central America. Specimens are as follows:

**ARIZONA:** ♀, Amado, July 23, 1957 (G. D. Butler); 3 ♀ ♀, 2 ♂ ♂, Canelo, July 3, 1956 (G. D. Butler); ♂, Nogales, Aug. 3, 1927 (J. C. Bradley); ♂, Patagonia, Santa Cruz Co., Aug. 25, 1955 (F. G. Werner, G. D. Butler); ♂, Portal, Aug. 10, 1959 (H. E. Evans); ♀, Sonoita, Santa Cruz Co., Sept. 6, 1957 (T. R. Haig). **ARKANSAS:** ♂, Jefferson Co., July 8, 1954 (L. D. Warren); ♀, Lincoln Co., July 2, 1953; ♂, Polk Co., Aug. 21, 1928 (L. D. Beamer). **FLORIDA:** ♀, Cocoa, July 1 (G. E. Bohart); ♂, Gainesville, July 8, 1955 (R. A. Morse); 2 ♂ ♂, Haines City, Sept. 17, 1954 (H. V. Weems, Jr.); ♂, Levy Co., July 19, 1958 (H. V. Weems, Jr.). **LOUISIANA:** ♀, ♂, Cameron, June 6–14, 1905; ♂, Keatchie, June 14, 1905; 2 ♂ ♂, Opelousas (G. P. Pilate); 2 ♂ ♂, Orange, Aug. 23, 1907 (F. C. Bishopp); ♂, Winnfield, July 21. **OKLAHOMA:** ♂, Great Salt Plains, Alfalfa Co., July 24, 1953 (Evans and others). **TEXAS:** ♂, Brownsville, June 25, 1930 (J. O. Martin); ♂, Brazos Co., June 20, 1937 (J. E. Gillaspay); ♀, 2 ♂ ♂, Calvert, June 22, 1904 (F. C. Bishopp); 4 ♂ ♂, Fedor, Lee Co., June 17–29, 1909; 2 ♂ ♂, Lee Co. (Birkmann); ♂, McDade, Bastrop Co., June 27, 1934 (J. E.

Gillaspy); 3 ♀, 9 ♂♂, Richmond, Fort Bend Co., June 22, 1917 (Bequaert); ♂, Tarrant Co., June 13, 1948 (Barr); ♂, Victoria, June 29, 1903 (A. W. Morrill); ♂, Waskom, Harrison Co., June 18, 1958 (R. L. Fischer); ♀, Wellbom, June 29, 1937 (Strandtmann).

PREY RECORD.—None.

PLANT RECORD.—Alfalfa (Arizona), *Bidens pipennata* (Florida), *Donellsmithia hintonii* (Mexico), *Richardia scabra* (Florida).

#### 74. *Cerceris varians* Mickel

FIGURES 99, 179a,b,c

*Cerceris varians* Mickel, 1917a, p. 336.—Banks, 1947, p. 18.—Scullen, 1951, p. 1010.

FEMALE.—Length 11 mm. Black with yellow markings; punctuation and pubescence average.

Head slightly wider than the thorax; black except for the two large frontal eye patches, upper surface of the clypeal process, lateral wings of the clypeus, mesal patch dorsad of the clypeus, spot back of the eye, base of the mandibles, and patch on the scape, all of which are yellow; clypeal border with an extension from the medial lobe, which has a sinuate margin and a smooth depressed area above the margin; clypeal process with the sides converging apically to an emarginate end subequal in width to the epistomal suture; mandibles with two distinct denticles, the more apical one the larger, and basad of the smaller one a slight elevation where a third denticle would be; antennae normal in form.

Thorax black except for two widely separated small patches on the pronotum, a divided band on the metanotum, large patch on the propodeum, and a patch on the tegulae, all of which are yellow; tegulae low and smooth; enclosure finely ridged with the ridges running at an angle to the base; mesosternal tubercles absent; legs largely yellow except the two basal segments, base of the femora, and the apical ends of the hindfemora, which are black; wings subhyaline.

Abdomen with a broad divided band on tergum 1, broad but deeply emarginate bands on terga 2 to 5; sternum immaculate or with lateral yellow patches on sternites 2, 3, and 4; pygidium with the sides converging to a rounded apical end.

MALE.—Unrecognizable. In the *aequalis* complex.

The female of *C. varians* Mickel closely resembles the female of *C. aequalis aequalis* Provancher in size, structure, and color pattern, from which species the former is separated by the form of its clypeal process. The males are inseparable at present.

TYPES.—The type female and allotype male of *C. varians* Mickel, from Donner Lake, Placer Co., Calif., taken Aug. 24, 1916 (L. Bruner),

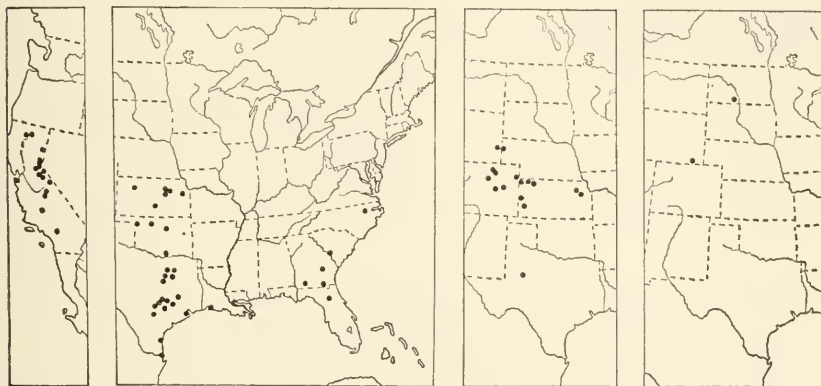


and Aug. 21, 1916 (L. Bruner), respectively, are at the University of Nebraska.

DISTRIBUTION.—*C. varians* Mickel is confined to California with the exception of two specimens labeled "Nev." and one from near Zitácuaro, Michoacán, Mexico.

PREY RECORD.—None.

PLANT RECORD.—*Chrysothamnus* sp., *Solidago* sp. (both records from California).



FIGURES 99–102.—Localities of: 99, *C. varians* Mickel; 100, *C. verticalis* F. Smith; 101, *C. vicina* Cresson; 102, *C. wyomingensis* Scullen.

### 75. *Cerceris verticalis* F. Smith

FIGURES 100, 180a,b,c

*Cerceris verticalis* F. Smith, 1856, p. 466.—Cresson, 1865, p. 130.—Packard, 1866, p. 64.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 505.—Dalla Torre, 1897, p. 481.—Ashmead, 1899, p. 296.—Scullen, 1951, p. 1010; 1961, p. 48.

*Cerceris gnara* Cresson, 1872, p. 229; 1887, p. 282.—Schletterer, 1887, p. 483.—Dalla Torre, 1897, p. 462.—Ashmead, 1899, p. 295.—Banks, 1912a, p. 22.—Mickel, 1917b, p. 449.—Scullen, 1951, p. 1008; 1960, p. 78.

*Cerceris firma* Cresson, 1872, p. 229; 1887, p. 282.—Schletterer, 1887, p. 491.—Dalla Torre, 1897, p. 460.—Ashmead, 1899, p. 295.—Banks, 1912a, p. 20.—Scullen, 1951, p. 1007; 1960, p. 78.

FEMALE.—Length 16 mm. Black with ferruginous and yellow markings; punctuation average; pubescence conspicuous and somewhat longer than average.

Head largely ferruginous except for the large frontal eye patches, patch on the clypeal process, and the base of the mandibles, all of which are yellow, and an area about the antennal scrobes and the clypeal denticles, which are dark; clypeal border with two prominent denticles separated by a deep depression, these denticles each

flanked laterally by a smaller denticle; clypeal process with the free margin converging to an acute point; to each side of the process an indistinct denticle; prominent bristles covering much of the clypeal border; mandibles with two denticles, the more basal one much the larger; antennae normal in form.

Thorax black except for two separated fulvous patches on the pronotum, the metanotum, which is yellow, and large patches on the propodeum, which are ferruginous; tegulae low, smooth, and fuliginous; enclosure with a medial groove and deep pits along the lateral margins; mesosternal tubercles absent; legs ferruginous; wings sybhyaline, somewhat clouded apically.

Abdomen with the first tergum ferruginous marked with a more or less broken band of yellow, the second tergum largely yellow with a wedge-shaped emargination of ferruginous, which may completely divide the yellow markings medially; terga 3 and 4 with narrow apical yellow bands, tergum 5 with a narrow yellow band, which may be reduced to a medial patch; all abdominal bands show a break along the medial line; venter with the first two sternites largely ferruginous and the remainder dark and immaculate; pygidium with the sides convex, the basal end small, and the apical end flaring slightly.

MALE.—Length 13 mm. Black and fulvous with lemon-yellow markings; punctation somewhat coarse; pubescence somewhat longer than average.

Head slightly wider than the thorax, black except for the entire face below the antennal scrobes, basal two-thirds of the mandibles, and patch on the scape, all of which are lemon yellow; clypeal border with three denticles on the medial lobe, the medial one being much the longest; clypeal surface slightly convex; hair lobes extending over the lateral clypeal lobes; mandibles with one denticle; antennae with the terminal segment slightly curved and blunt.

Thorax black except for two separated patches on the pronotum, the metanotum, small spots on the propodeum, and spots on the tegulae, all of which are yellow; tegulae low and smooth; enclosure with a medial groove and one or two deep pits in the lateral angles; mesosternal tubercles absent; legs with the coxae very dark, the foretrochanters and forefemora fulvous except for yellow patches on the latter, the mid- and hindtrochanters yellow, the midfemora fulvous except for a yellow patch, the hindfemora yellow on the basal half and fulvous on the apical half, the remaining parts fulvous to fuliginous; wings subhyaline.

Abdomen with the first tergum fuscous with two large lateral patches and two small medial spots of yellow; tergum 2 with a broad band deeply emarginate and divided medially; terga 3 to 6 with narrow posterior bands all divided medially; venter immaculate; pygidium

almost as broad at its base as it is long, sides converging to a slightly narrower apical end.

Both sexes of *C. verticalis* F. Smith superficially resemble those of *C. mimica* Cresson. The females of these species can easily be separated by the quite different clypeal processes. The males are separated by the form of the pygidium, which is much narrower on *C. mimica* Cresson. The latter also has a very distinctive series of lateral clusters of bristles on each sternite.

**TYPES.**—The type female of *C. verticalis* F. Smith, from Georgia, is at the British Museum, no. 21.1,431. The type male of *C. gnara* Cresson and the type female of *C. firma* Cresson, both from Texas, are deposited at the Philadelphia Academy of Natural Sciences, nos. 1938 and 1945, respectively.

**DISTRIBUTION.**—Through the South Central and South Eastern States, from Kansas south to Texas and east to North Carolina and Florida, south into Mexico.

**PREY RECORD.**—None.

**PLANT RECORD.**—*Ampelopsis arborea* (Florida), cactus (Kansas), *Cirsium* sp. (Texas), *Daucus carota* (Florida), *Melilotus alba* (Florida), *Petalostemon multiflorum* (Texas), *Ptilimnium capillaceum* (Florida), *Polytaenia nuttallii* (Texas).

#### 76. *Cerceris vicina* Cresson

FIGURES 101, 181a,b,c

*Cerceris vicina* Cresson, 1865, p. 120.—Packard, 1866, p. 61.—Cresson, 1887, p. 282.—Schletterer, 1887, p. 505.—Ashmead, 1890, p. 32.—Dalla Torre, 1897, p. 481.—Ashmead, 1899, p. 296.—Smith, H. S., 1908, p. 367.—Mickel, 1917b, p. 450.—Banks, 1947, p. 20.—Scullen, 1951, 1011.

*Cerceris platyrhina* Viereck and Cockerell, 1904, p. 133.—Viereck, 1906b, pp. 234, 239.—Scullen, 1942, p. 188 (erroneously synonymized with *morata* Cresson) (new synonymy).

**FEMALE.**—Length 14 mm. Black with yellow and ferruginous markings; punctuation and pubescence average.

Head subequal in width to the thorax; most of face below antennal scrobes yellow bordered with ferruginous, otherwise black except for spots back of compound eyes, base of mandibles, and scape, all of which are yellow bordered by ferruginous; clypeal border with two very broad and rounded extensions on the medial lobe, between which is a deep depression; clypeal process with the sides converging to a narrow truncate apical end, which is slightly emarginate; mandibles with three distinct denticles, the most apical one much the largest; antennae normal in form.

Thorax black except for a yellow band on the pronotum, divided by an area of ferruginous, and the yellow metanotum; tegulae low, smooth, and yellow bordered with ferruginous; enclosure heavily ridged longitudinally; mesosternal tubercles absent; legs ferruginous shading into yellow on some more apical segments; wings subhyaline clouded with ferruginous.

Abdomen with the first tergum largely ferruginous, a broad yellow band on tergum 2 bordered with ferruginous, terga 3 and 4 with narrow bands becoming broad laterally and tergum 5 with a broad but emarginate band; venter dark with somewhat lighter posterior margins; pygidium with sides slightly convex and converging to a round apical end.

MALE.—Indistinguishable.

Three male specimens taken at Scott City, Kans., July 1929 (V. F. Calkins) (the same place, time, and collector as for the three females), agree very well with specimens of males of *C. morata* Cresson. One of the above three males is dark and has all but lost its ferruginous coloring and, as a result, very closely agrees with the males of *C. clypeata* Dahlbom. The southern range of *C. vicina* Cresson so overlaps the northern range of *C. morata* Cresson, that, for the present, the writer is unable to distinguish between the males of these two species within the overlapping area.

*C. vicina* Cresson shows the usual variation in the extent of the colored markings. It is related most closely to *C. morata* Cresson, from which the females of the former may be separated by the form of their clypeal processes. The latter species is taken largely in Texas, New Mexico, and adjoining states.

TYPES.—The type female of *C. vicina* Cresson, from the Rocky Mts., Colorado Territory (Riding), is at the Philadelphia Academy of Natural Sciences, no. 1939. The type female of *C. platyrhina* Viereck and Cockerell, from Filmore Canyon, Organ Mts., N. Mex., Aug. 29 (Cockerell), is at the Philadelphia Academy of Natural Sciences, no. 10384.

DISTRIBUTION.—On the east slope of the Rocky Mts. in Nebraska, Kansas, and Colorado. Specimens are as follows:

COLORADO: ♀, Boulder, Oct. 14, 1930 (C. A. Smith); 3 ♀♀, "Colo." (C. F. Baker); ♀, Colorado City, Bear Creek Canyon, July (E. S. Tucker); ♀, Colorado Springs, El Paso Co., Aug. 13, 1945 (I. J. Central); 2 ♀♀, Fort Collins, July 11, 1937, July 11, 1938 (M. T. James); ♀, Greeley, Sept. 19, 1931, *Solidago* sp. (R. Sumner); ♀, Limon, Aug. 16, 1949 (R. R. Dreisbach); 2 ♀♀, Wray, 3700 ft., Aug. 17-19, 1919. KANSAS: ♀, Blackjack Creek, Pottawatomie Co., July 3, 1953 (Evans and party); ♀, Cheyenne Co., 3300 ft. (F. X. Williams); ♀, Douglas Co., 900 ft. (F. X. Williams); ♀, Ellis Co., 2000 ft., July 19, 1912 (F. X. Williams); ♀, Rowles Co., 2850 ft.; ♀, Rooks Co., 1775 ft., Aug. 9, 1912; 3 ♀♀, 3 ♂♂, Scott City, July 1929 (V. F. Calkins); ♀, Scott Co.,



Aug. 21, 1952 (H. E. Evans); ♀, Wichita Co., 3300 ft. (F. X. Williams). NEBRASKA: ♀, Mitchell, July 17, 1916 (C. E. Mickel). TEXAS: ♀, Conlen, Aug. 8, 1952 (R. R. Dreisbach). WYOMING: ♀, Tarrington, Aug. 1, 1943 (D. G. Denning).

PREY RECORD.—None.

PLANT RECORD.—*Melilotus alba* (Nebraska), *Solidago* sp. (Colorado).

77. *Cerceris wyomingensis*, new species

FIGURES 102, 182a,b,c

FEMALE.—Length 11 to 12 mm. Black with light yellow and ferruginous markings; punctation average; pubescence short.

Head subequal in width to the thorax; black except for large frontal eye patches, most of the clypeus, small spot back of the eye, and basal part of mandibles, all of which are light yellow; clypeal border fuliginous in color, with two broad blunt denticles between which there is a carina-like extension, medially depressed; clypeal process sides converging to a narrow, rounded apical end; mandibles that are light fuscous in color apically have two denticles, the more apical one the larger; antennae ferruginous basally becoming darker apically, normal in form.

Thorax black except for two widely separated patches on the pronotum, and the entire metanotum, both of which are yellow, and the tegulae, which are ferruginous; tegulae low and smooth; enclosure deeply ridged with the lateral ridges diverging posteriorly and a group of transverse ridges on the posterior part; mesosternal tubercles absent; legs ferruginous except for the basal end of the coxae, which are black; wings subhyaline.

Abdomen black except for tergum 1, anterior part of tergum 2, medium-broad but emarginate bands on terga 3 and 4, and broad band on posterior part of tergum 5, all of which are light yellow; venter black except the first two sterna, which are ferruginous; pygidium with sides converging to a rounded apical end.

MALE.—Unknown.

*C. wyomingensis* Scullen is very close to *C. nebrascensis* H. S. Smith in size, general color, and distribution, but the form of the clypeal process will separate them; however, this process shows considerable variation in form on each species. More collecting and field studies may show a closer affiliation.

TYPES.—The type female of *C. wyomingensis* Scullen, from 28 miles east of Laramie, Wyo., 7700 ft., Aug. 6, 1934, at *Cleome serrulata* (H. A. Scullen), is deposited at the U.S. National Museum, no. 66172. Paratypes are as follows:

NORTH DAKOTA: ♀, Breien, Aug. 21, 1922, at *Eriogonum annuum* (O. A. Stevens). WYOMING: ♀, 28 mi. E. Laramie, 7700 ft., Aug. 6, 1934, at *Cleome serrulata* (H. A. Scullen).

DISTRIBUTION.—Southern North Dakota and eastern Wyoming.

PREY RECORD.—None.

PLANT RECORD.—*Cleome serrulata* (Wyoming), *Eriogonum annuum* (North Dakota).

### Unrecognized Species

Owing to the inadequate description and lack of types, the following species is unrecognizable at present.

#### 78. *Cerceris townsendi* Viereck and Cockerell

*Cerceris townsendi* Viereck and Cockerell, 1904, p. 140.—Scullen, 1951, p. 1010.

FEMALE.—Length 7 mm. Black with yellow markings. The inadequate description does not include mention of the clypeal structures nor several other characters found useful by the present writer. From its size, it would appear to belong to Group I; however, the "testaceous" stigma makes its position uncertain.

TYPE.—The type female, from Las Cruces, N. Mex. (Townsend), should be at the Philadelphia Academy of Natural Sciences, but it is not included in the list of types published by E. T. Cresson, Jr. (1928), and the writer has been unable to find it at the above institution. The species is known only from the published description.

PREY RECORD.—None.

PLANT RECORD.—None.

### Species of *Cerceris*

Valid names appear without parentheses: synonyms, with; names of species changed in status from the original by this or previous publications are in brackets. Page numbers of principal references are in italics.

- (*abbreviata* Banks), 497, 498  
*acanthophila* Cockerell, 346, 352, 355-357, 364, 365, 373, 390  
*aequalis aequalis* Provancher, 344, 350, 452-453, 454, 494, 497, 511, 514  
*aequalis bolingeri* Scullen, 344, 452, 453-454  
*aequalis idahoensis* Scullen, 344, 454-455  
(*alacris* Mickel), 483, 484  
(*alaope* Banks), 474, 475  
*alceste* Mickel, 343, 454, 455-456  
(*ampla* Banks), 438, 439  
(*arbuscula* Mickel), 458, 459  
(*architis* Mickel), 336, 483, 484  
[*arelate* Banks], 495, 496  
*argia* Mickel, 346, 351, 357-359, 394  
(*argyrotricha* Rohwer), 404, 405  
*arizonella* Banks, 352, 357, 359  
[*arno* Banks], 404, 405

- astarte* Banks, 344, 350, 389, 454, 456-458, 467, 494  
*[athene]* Banks, 337, 437, 438  
*atramontensis* Banks, 397, 344, 350, 427, 458-459, 475  
*(austrina)* Fox, 423, 424, 426, 428  
*azleca* Saussure, 345, 349, 459-461  
*banksi* Scullen, 343, 459, 461-462  
*(belfragei)* Banks, 418, 420  
*(bicornis [sic])* Ashmead, 463  
*bicornuta bicornuta* Guérin, 335, 336, 345, 349, 462-465, 466, 481, 489, 503, 504  
*bicornuta fidelis* Viereck and Cockerell, 337, 345, 349, 464, 465-466  
*(biungulata)* Cresson, 505, 506  
*blakei* Cresson, 338, 346, 351, 359-361, 385  
*boharti* Scullen, 345, 466-467  
*bridwelli* Scullen, 346, 351, 361-363, 375  
*butleri* Scullen, 346, 361, 363-364  
*californica arno* Banks, 347, 353, 402, 404-405, 414  
*californica californica* Cresson, 337, 339, 347, 353, 401-404, 406, 412  
*calochorti* Rohwer, 344, 351, 467, 468-469, 486  
*(calodera)* Banks, 401, 403  
*carrizonensis* Banks, 352, 365, 366  
*(catawaba)* Banks, 440, 442  
*chilopsidis* Viereck and Cockerell, 346, 365-366  
*(chryssipe)* Banks, 470, 471  
*(cincta)* Dahlbom, 411, 412  
*cleomae* Rohwer, 352, 366-367  
*clypeata clypeata* Dahlbom, 335, 344, 350, 427, 459, 467, 469-472, 473, 474, 475, 491, 511, 518  
*clypeata dakotensis* Banks, 344, 350, 470, 472-473  
*clypeata gnarina* Banks, 344, 350, 470, 473-474, 475  
*clypeata prominens* Banks, 344, 350, 474-476  
*(clymene)* Banks, 470, 471  
*cockerelli* Viereck, 352, 366, 367  
*cochisi* Scullen, 347, 353, 416-418  
*(cognata)* Mickel, 401, 403  
*compacta compacta* Cresson, 348, 353, 416, 417, 418-420, 432  
*compar compar* Cresson, 348, 354, 439, 440-442, 445, 450, 451  
*compar geniculata* Cameron, 348, 354, 402-404  
*compar orestes* Banks, 348, 354, 443, 444-445, 446  
*(complanata)* Mickel, 398, 399  
*completa* Banks, 347, 353, 402, 404, 405-407  
*conifrons* Mickel, 346, 351, 367-369, 375, 399  
*(contracta)* Taschenberg, 407, 408  
*convergens* Viereck and Cockerell, 334, 346, 352, 364, 366, 369-372, 385, 386, 387, 397  
*(cosmiocephala)* Cameron, 512, 513  
*crandalli* Scullen, 346, 352, 372-374  
*(crawfordi)* Brimley, 495, 496  
*crotonella* Viereck and Cockerell, 346, 351, 363, 374-376  
*(curvicornis)* Cameron, 463, 464  
*[dakotensis]* Banks, 472, 473  
*(denticularis)* Banks, 401, 403  
*dentifrons* Cresson, 343, 350, 476-477, 494  
*deserta* Say, 333, 335, 343, 350, 462, 469, 477-480

- dilatata chisosensis* Scullen, 347, 353, 409-410  
*dilatata dilatata* Spinola, 347, 353, 407-409, 410, 412, 461  
*(dufourii* Guérin), 463, 464  
*echo atrata* Scullen, 346, 377-378  
*echo echo* Mickel, 346, 351, 367, 374, 376-377, 394, 467  
*(elegans* F. Smith), 359  
*(elegantissima* Schletterer), 359  
*(englehardti* Banks), 488, 489  
*(eriogoni* Viereck and Cockerell), 384, 386  
*(esau* Schletterer), 488, 489  
*(eurymele* Banks), 509, 510  
*(fasciola* Cresson), 500, 502  
*femurrubrum athene* Banks, 337, 348, 435, 436, 437-438  
*femurrubrum femurrubrum* Viereck and Cockerell, 334, 348, 354, 435-437  
*(feralis* Cameron), 402, 444  
*(ferruginior* Viereck and Cockerell), 401, 402  
*[fidelis* Viereck and Cockerell], 465, 466  
*finitima citrina* Scullen, 347, 352, 380-382  
*finitima finitima* Cresson, 335, 336, 347, 352, 356, 359, 360, 378-380, 381, 382, 385  
*(finitima nigroris* Banks), 378, 379  
*finitima vierecki* Banks, 347, 352, 381, 382-383  
*(firma* Cresson), 515, 517  
*flavofasciata flavofasciata* H. S. Smith, 397, 348, 354, 416, 420-422, 424  
*flavofasciata floridensis* Banks, 348, 353, 422, 423-425, 430, 431  
*frontata frontata* Say, 333, 337, 345, 350, 479, 480-482, 483  
*frontata rauli* Rohwer, 335, 345, 350, 481, 482-483  
*(fugatrix* Mickel), 465, 506, 508  
*(fulvipediculata* Schletterer), 477  
*(fulvipes* Cresson), 477, 479  
*fumipennis* Say, 333, 334, 335, 336, 347, 349, 401, 410-414, 421  
*(garciana* Viereck and Cockerell), 401, 403  
*[geniculata* Cameron], 442, 444  
*(gnara* Banks), 515, 517  
*[gnarina* Banks], 473, 474  
*grandis grandis* Banks, 347, 353, 402, 405, 412, 414-415  
*grandis perena* Scullen, 347, 412, 414-416  
*halone* Banks, 336, 338, 343, 350, 483-484, 504  
*(hesperina* Banks), 370, 371  
*(huachuca* Banks), 355, 356  
*(illota* Banks), 401, 403  
*(imitator* Cresson), 469, 471  
*(imitatoria* Schletterer), 470, 471  
*insolita albida* Scullen, 349, 354, 447-448  
*insolita atrafemori* Scullen, 349, 354, 448-449  
*insolita insolita* Cresson, 349, 354, 434, 445-447, 448  
*(interjecta* Banks), 401, 403  
*(intractibilis* Mickel), 445, 447  
*irene* Banks, 346, 351, 381, 383-384  
*(isolde* Banks), 401, 403  
*(jacunda* [sic] Hendrickson), 440  
*(jacunda* Cresson), 440, 442  
*(jacunda carolina* Banks), 440, 442  
*kennicottii beali* Scullen, 346, 352, 385, 386-388



- kennicottii kennicottii* Cresson, 346, 352, 360, 384-386, 387, 397  
*krombeini* Scullen, 346, 352, 388-389, 467  
*macrosticta* Viereck and Cockerell, 334, 337, 348, 354, 438-440  
*macswaini* Scullen, 344, 351, 485-486  
*mandibularis* Patton, 336, 347, 354, 422, 425-426  
*(maximiliani* Saussure), 407, 408  
*melanthe* Banks, 345, 486-487, 499  
*mexicana* Saussure, 338  
*mimica* Cresson, 345, 349, 488-489, 517  
*(minima* [sic] Schletterer), 488  
*(minax* Mickel), 355, 356  
*morata* Cresson, 344, 350, 487, 489-491, 517, 518  
*[munda* Mickel], 497  
*(nasica* Viereck and Cockerell), 489, 491  
*(natalenus* Brimley), 420, 421  
*nebrascensis* H. S. Smith, 344, 491-493, 519  
*nehminax* Scullen, 346, 364, 389, 390-391  
*nigrescens arelate* Banks, 343, 350, 457, 495-497  
*nigrescens munda* Mickel, 343, 350, 494, 497-498  
*nigrescens nigrescens* F. Smith, 334, 335, 336, 343, 351, 492, 493-495, 496, 501  
*(nigritulus* Banks), 495, 496  
*nitida* Banks, 345, 350, 487, 497, 498-499  
*(novomexicana* Viereck and Cockerell), 500, 502  
*(occidentalis* Saussure), 480, 481, 482  
*occipitamaculata* Packard, 343, 350, 500-502  
*(olympionis* Strand), 407, 408  
*[orestes* Banks], 444, 445  
*(orphne* Banks), 505, 506  
*(platyrhina* Viereck and Cockerell), 517, 518  
*(pleuralis* H. S. Smith), 426, 428  
*poculum* Scullen, 346, 389, 391  
*(populorum* Viereck and Cockerell), 401, 403  
*posticata* Banks, 350, 502-503  
*[prominens* Banks], 474, 475  
*(psamathe* Banks), 452, 453  
*(pudorosa* Mickel), 370, 371  
*[raui* Rohwer], 335, 482, 483  
*rhoads* Rohwer, 350, 503  
*(rinconis* Viereck and Cockerell), 370, 371  
*robertsonii bifidus* Scullen, 348, 354, 428-429  
*robertsonii emmitosus* Scullen, 348, 353, 428 429, 431  
*robertsonii mitosus* Scullen, 348 353, 429-430, 431  
*robertsonii robertsonii* Fox, 336, 337, 348, 354, 416, 424, 426-428, 434  
*rufa* Scullen, 348, 354, 448, 449-450  
*rufinoda crucis* Viereck and Cockerell, 346, 376, 393, 395-396  
*rufinoda rufinoda* Cresson, 346, 351, 358, 367, 377, 383, 392-395  
*rufopicta* F. Smith, 353, 424, 430-431  
*rybyemsis* (Linnaeus), 354  
*(salome* Banks), 483, 484  
*sandiegensis* Scullen, 348, 353, 430, 432-433  
*(sayi* Banks), 506, 508  
*(semiatra* Banks), 407, 408  
*(seminigra* Banks), 459, 461

- serripes* Fabricius, 336, 463, 503-505  
*sexta* Say, 333, 343, 350, 501, 503, 505-506, 508  
*(sextoides* Banks), 509, 510  
*(shermani* Brimley), 483, 484  
*(snowi* Banks), 370, 371  
*(solidaginis* Rohwer), 418, 420  
*squamulifera* Mickel, 348, 430, 433-434  
*(stevensi* Banks), 506, 508  
*stigmosalis* Banks, 343, 351, 456, 501, 506-508  
*tepaneca* Saussure, 343, 350, 509-511  
*texana* Scullen, 343, 510, 511  
*(texensis* Saussure), 480, 481  
*(thione* Banks), 435, 436  
*tolteca* Saussure, 345, 349, 446, 510, 512-514  
*townsendi* Viereck and Cockerell, 520  
*truncata* Cameron, 334, 337, 345, 351, 396-398  
*(unicincta* Taschenberg), 411, 412  
*vanduzeei eburnea* Scullen, 345, 397, 399-400  
*vanduzeei vanduzeei* Banks, 345, 397, 398-399, 400  
*varians* Miel el, 344, 350, 453, 469, 514-515  
*(venator* Cresson), 463, 464  
*verticalis* F. Smith, 344, 349, 489, 515-517  
*vicina* Cresson, 344, 350, 491, 515, 517-519  
*(vicinoides* Viereck and Cockerell), 452, 453  
*[vierecki* Banks], 382  
*wyomingensis* Scullen, 343, 492, 515, 519-520  
*zelica* Banks, 348, 354, 442, 450-452  
*(zobeide* Brimley), 470, 471  
*(zosma* Brimley), 470, 471

### Prey of *Cerceris*

#### BUPRESTIDÆ

- Acmaeodera acuta* LeConte, 403  
*adenostomae* Cazier, 403  
*angelica* Fall, 403  
*coquilletti* Fall, 403  
*dohrni* Horn, 403  
*dolorosa* Fall, 403  
*fenyesi* Fall, 403  
*gemina* Horn, 403  
*hepburni* LeConte, 403  
*holsteni* White, 403  
*jocosa* Fall, 403  
*nexa* Fall, 403  
*perlanosa* Timberlake, 403  
*plagiaticauda* Horn, 403  
*prorsa* Fall, 403  
*pulchella* (Herbst), 413  
*quadriseriata* Fall, 403  
*sinuata* Van Dyke, 403  
*Actenodes acornis* (Say), 413  
*Agrilus abjectus* Horn, 335, 413  
*angelicus* Horn, 403

## BUPRESTIDÆ—Continued

- arcuatus* (Say), 413  
*blandus* Horn, 403  
*bilineatus* (Weber), 413  
*politus* (Say), 403  
*ruficollis* (Fabricius), 413  
*Anthaxia aeneogaster* Castelnau, 403  
*Buprestis consularis* Gory, 413  
*fasciata* Fabricius, 413  
*lineata* Fabricius, 335, 413  
*maculipennis* Gory, 413  
*rufipes* (Oliver), 413  
*striata* Fabricius, 413  
*Chrysobothris azurea* LeConte, 413  
*blanchardi* Horn, 413  
*dentipes* (Germar), 413  
*deleta* LeConte, 403  
*femorata* (Oliver), 397, 403, 413  
*floricola* Gory, 335, 413  
*lucana* Horn, 403  
*lesueuri* Castelnau, 413  
*purpureovittata* Horn, 413  
*quadriimpressa* Castelnau, 335, 413  
*sexsignata* (Say), 413  
*verdigrispennis* Frost, 413  
*Cinyra gracilipes* (Melsheimer), 413  
*Dicerca americana* (Herbst), 413  
*caudata* LeConte, 413  
*divaricata* (Say), 413  
*lurida* (Fabricius), 397, 413  
*nuttalli* var. *consularis* Gory, 413  
*obscura* Fabricius, 413  
*Dicerca punctulata* (Schonherr), 335, 413  
*spreta* (Gory), 413  
*tuberculata* (Castelnau), 413

## BRUCHIDÆ

- Bruchus* sp., 371  
*Algarobius prosopis* (LeConte), 338, 398  
*Mimosestes amicus* (Horn), 338, 398  
*Mimosestes protrectus* (Horn), 338, 398  
*Neltumius arizonensis* (Schaeffer), 338, 398

## CHRYSOMELIDÆ

- Bassareus sellatus* Suffrian, 397, 422  
*clathratus* (Melsheimer), 397, 422  
*Blapstinus interruptus* (Say), 338, 361  
*Chaelocnema pulicaria* Melsheimer, 336, 379  
*Chlamisus* sp., 335, 337, 422  
*plicata* (Fabricius), 337, 422  
*Chalepus* (= *Dyscinctus*) *dorsalis* Thunberg, 472  
*Colaspis brunnea* (Fabricius), 420  
*Cryptocephalus guttulatus* Oliver, 397, 422  
*mutabilis* Melsheimer, 397, 422  
*notatus* Fabricius, 336, 422

## CHRYSOMELIDAE—Continued

- notatus fulvipennis* Hald, 422  
*quadrifasciatus* Say, 397, 422  
*Graphops floridana* Blake, 338, 361  
*Lema trilineata* (Oliver), 335, 472  
*Pachybrachys dilatatus* Suffrian, 336  
*Rhabdopterus picipes* (Oliver), 336

## CURCULIONIDAE

- Anthonomus sergettatus* Dietz, 338, 361  
*Balaninus nasicus* Say, 335, 472  
*Cleonus pluvireus* (LeConte), 337, 482  
*Conotrachelus* sp., 413  
*naso* LeConte, 397, 459  
*neocrataege*, 335  
*nenuphar* (Herbst), 459  
*posticatus* Boheman, 335, 397, 459, 479  
*Curculio affinis*(?), 484  
*confusor* Hamilton, 484  
*iowensis* Casy, 484  
*nasicus* Say, 336, 338, 484  
*rectus* Say, 484  
*Derelomus basalis* LeConte, 338, 361  
*Eupagoderes* sp., 337, 466, 482  
*Gymnetron antirrhini* Paykull, 336, 494  
*Hyperodes delumbis* (Gyllenhal), 336, 361, 494  
*solutus* (Boheman), 494  
*Limnobaris confusa* Boheman, 338, 361  
*Lixus concavus* Say, 335, 483  
*mucidus* LeConte, 482  
*Pissodes strobi* (Peck), 472  
*Sitona hispidula* (Fabricius), 336, 494  
*Sitona californicus* Fabricius, 510  
*Smicronyx squalidus* Csiki, 394  
*Sphenophorus* (= *Calendra*) *aequalis* Gyllenhal, 336, 465  
*cariosus* (Oliver), 336, 465  
*cultellatus* Horn, 465  
*maidis* Chittenden, 336, 465  
*marinus* Chittenden, 465  
*parvulus* Gyllenhal, 336, 465  
*pertinax* (Oliver), 465  
*placidus* (Say), 335-6, 465  
*setiger* Chittenden, 465  
*venata venata* (Chittenden), 336  
*venatus* (Say), 465  
*zeae* Walsh, 336, 465  
*Tanymecus confusus* (Say), 472  
*Thecesternus humeralis* (Say), 335, 483  
*Trigonoscuta pilosa* Motschulsky, 510  
*Tychius picirostris* (Fabricius), 336, 394

## TENEBRIONIDAE

- Eurymetopon rufipes* Eschscholtz, 337, 438  
*Mctopoloba pruinosa* (Horn), 440



Parasites and Predators on *Cerceris*

## CHRYSIDIDAE

*Hedychrum violaceum* Brulle, 336, 338, 484

## SARCOPHAGIDAE

*Amobia floridensis* (Townsend), 337

*Mctopia leucocephala* (Rossi), 336, 337

*Senotainia trilineata* (Van der Wulp), 336, 337

## MUTILLIDAE

*Dasymutilla coccinohirta* (Blake), 337

*nigripes* (Fabricius), 337

## Literature Cited

## ABBOTT, CYRIL E.

1928. Some observations on the behavior of *Cerceris architis* Mickel (Hym.: Philanthidae). Ent. News, vol. 39, pp. 205-206.

## ASHMEAD, W. H.

1890. On the Hymenoptera of Colorado. Colorado Biol. Assoc. Bull., no. 1, pp. 1-47.

1894. Habits of the Aculeate Hymenoptera, III. Psyche, vol. 7, pp. 59-66.

1899. Classification of the Entomophilous wasps, or the superfamily Sphegoidea. Canadian Ent., vol. 31, pp. 145-155, 161-174, 212-225, 238-251, 291-300, 345-357.

## BANKS, NATHAN

1912a. Notes on the eastern species of *Cerceris*. Ann. Ent. Soc. Amer., vol. 5, pp. 11-30, pls. 1, 2.

1912b. At the *Ceanothus* in Virginia. Ent. News, vol. 23, pp. 102-110.

1913a. Two new fossorial Hymenoptera. Bull. Amer. Mus. Nat. Hist., vol. 32, pp. 237-238.

1913b. New American Philanthidae. Bull. Amer. Mus. Nat. Hist., vol. 32, pp. 421-425, pl. 1 (fig. 17).

1915. New fossorial Hymenoptera. Canadian Ent., vol. 47, pp. 400-406.

1916. Two new species of *Cerceris* (Hymenoptera: Philanthidae). Ent. News, vol. 27, pp. 64-65.

1917. New fossorial Hymenoptera. Bull. Mus. Comp. Zool., vol. 61, pp. 97-115.

1919. New Psammocharidae and Philanthidae. Canadian Ent., vol. 51, pp. 81-85.

1923. Notes and descriptions of some fossorial Hymenoptera. Canadian Ent., vol. 55, pp. 21-22.

1947. Synopsis of west coast *Cerceris* (Hymenoptera: Cerceridae). Psyche, vol. 54, pp. 1-35.

## BEQUAERT, J.

1928. The diplopterous wasps of Fabricius, in the Banksian collection at the British Museum. Bull. Brooklyn Ent. Soc., vol. 23, pp. 53-63.

## BISCHOFF, H.

1927. Biologie der Hymenopteren: Eine Naturgeschichte der Hautflügler. Berlin, Verlag von Julius Springer.

## BRIDWELL, J. C.

1898. A list of Kansas Hymenoptera. Trans. Kansas Acad. Sci., vol. 16, pp. 203-211.

———. Unpublished notes.

## BRIMLEY, C. S.

1927. Notes on some North Carolina Hymenoptera. *Ent. News*, vol. 38, pp. 236-239.
1928. Some new wasps (Hymenoptera) and two new Diptera from North Carolina. *Journ. Elisha Mitchell Sci. Soc.*, vol. 43, pp. 199-206.
1929. Two new wasps from North Carolina (Hymenoptera: Cerceridae). *Ent. News*, vol. 40, pp. 194-195.

## BRITTON, W. E.

1920. Check-list of the insects of Connecticut. *Connecticut State Geol. Nat. Hist. Surv. Bull.*, no. 31.

## BYERS, GEORGE W.

1962. Observations at nests of *Cerceris halone* Banks (Hymenoptera: Sphecidae). *Journ. Kansas Ent. Soc.*, vol. 35, pp. 317-321.

## CAMERON, PETER

- 1888-1900. Hymenoptera, vol. 2. Vol. 34 in Godman and Salvin, *Biologia Centralia-Americana*.
1904. New Hymenoptera mostly from Nicaragua. In C. F. Baker, ed., *Invertebrata Pacifica*, vol. 1, pp. 46-691.

## CARTER, WALTER

1925. Records of Alberta Sphecoidea with descriptions of new species of Crabronidae. *Canadian Ent.*, vol. 57, pp. 131-136.

## CARTWRIGHT, O. L.

1929. The maize billbug in South Carolina (*Calendra maidis* Chittn.). *South Carolina Agric. Exp. Sta Bull.*, vol. 257, p. 31.
1931. Digger Wasps and Buprestidae (Hymenoptera: Cerceridae; Coleoptera: Buprestidae). *Ent. News*, vol. 42, pp. 269-270.

## COCKERELL, T. D.A.

1897. New Hymenoptera from New Mexico, U.S.A. *Entomologist*, vol. 30, pp. 135-138.
1901. Flower and insect records from New Mexico. *Ent. News*, vol. 12, pp. 38-43.

## CRESSON, EZRA T.

- 1862-3. Catalogue of the described species of Hymenoptera inhabiting North America. *Proc. Ent. Soc. Philadelphia*, vol. 1, pp. 202-211, 227-238, 316-344.
1865. Monograph of the Philanthidae of North America. *Proc. Ent. Soc. Philadelphia*, vol. 5, pp. 84-132.
1872. Hymenoptera texana. *Trans. Amer. Ent. Soc.*, vol. 4, pp. 153-292.
1875. Report upon the collections of Hymenoptera made in portions of Nevada, Utah, Colorado, New Mexico and Arizona during the years 1872 and 1874. Chap. 7 in vol. 5 (Zoology) of *Geographical and geological explorations and surveys west of the one hundredth meridian*, pp. 707-728, pls. 33-34.
1876. List of Hymenoptera collected by J. Duncan Putnam of Davenport, Iowa, with description of two new species. *Proc. Davenport Acad. Sci.*, vol. 1, pp. 206-211, pl. 35.
1887. Synopsis of the families and genera of Hymenoptera of America, north of Mexico, together with a catalogue of the described species, and bibliography. *Trans. Amer. Ent. Soc.*, suppl. vol., pp. 1-351.
1916. The Cresson types of Hymenoptera. *Mem. Amer. Ent. Soc.*, no. 1, pp. 1-141.

- CRESSON, E. T., JR.  
1928. The types of Hymenoptera in the Academy of Natural Sciences of Philadelphia other than those of Ezra T. Cresson. Mem. Amer. Ent. Soc., no. 5, pp. 1-90.
- DAHLBOM, ANDREA GUSTAVO  
1845. Hymenoptera Europaea praeecipue Borealia . . . , tomus 1, Berolini.
- DALLA TORRE, K. W. VON  
1890. Hymenopterologische Notizen. Wiener Ent. Zeit., vol. 9, pp. 199-204.  
1897. Fossores (Sphegidae). Vol. 8 of *Catalogus hymenopterorum hucusque descriptorum systematicus et synonymicus*.
- EVANS, HOWARD E.  
1957. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae), part III: Philanthinae, Trypoxyloninae, and Crabroninae. Trans. Amer. Ent. Soc., vol. 83, pp. 79-117, pls. 9-20.  
1959. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae), part V. Trans. Amer. Ent. Soc., vol. 85, pp. 137-191, pls. 18-24.
- FABRICIUS, J. C.  
1781. *Species insectorum*, vol. 1.
- FOX, WILLIAM J.  
1893. Descriptions of new aculeate Hymenoptera. *Psyché*, vol. 6, pp. 553-556.  
1894a. New North American aculeate Hymenoptera. *Journ. New York Ent. Soc.*, vol. 1, pp. 53-56.  
1894b. A proposed classification of the fossorial Hymenoptera of North America. *Proc. Acad. Nat. Sci. Philadelphia*, pp. 292-307.
- GAHAN, A. B., and ROHWER, S. A.  
1917. Lectotypes of the species of Hymenoptera (except Apoidea) described by Abbe Provancher. *Canadian Ent.*, vol. 49, pp. 298-308, 331-336, 391-400.
- GROSSBECK, JOHN A.  
1912a. Habits of *Cerceris fumipennis* Say. *Journ. New York Ent. Soc.*, vol. 20, p. 135.  
1912b. List of insects in Lower California. *Bull. Amer. Mus. Nat. Hist.*, vol. 31, pp. 323-326.
- GUÉRIN-MÉNEVILLE, F.  
1845. *Insects*. Vol. 7 of *Iconographie du règne animal de G. Cuvier*.
- GUIGLIA, D.  
1948. *Annali Del Museo Civico di Storia Naturale Giacomo Doria Pubblicati per Cura di C. Alzona E. F. Capra*, vol. 63, pp. 175-179.
- HARTMAN, CARL  
1905. Observations on the habits of some solitary wasps of Texas. *Bull. Univ. Texas*, no. 65, *Sci. Series*, no. 6.
- HENDRICKSON, GEORGE O.  
1930. Studies in the insect fauna of Iowa prairies. *Iowa State Journ. Sci.*, vol. 4, pp. 49-175, pls. 1, 2.
- JOHNSON, CHARLES W.  
1927. Biological survey of the Mount Desert region, part I: The insect fauna, pp. 1-247. (Publication of Wistar Institute of Anatomy and Biology, Philadelphia).

JOHNSON, CHARLOTT, and LEDIG, RUTH

1918. Early specimens of Hymenoptera from the Claremont-Laguna region. *Journ. Ent. Zool.*, vol. 10, pp. 23-26.

KROMBEIN, KARL V.

1936. Biological notes on some solitary wasps (Hymenoptera: Sphecidae). *Ent. News*, vol. 47, pp. 93-99.
1938. Further observations on the nesting habits of *Cerceris nigrescens* Smith (Hymenoptera: Sphecidae). *Ent. News*, vol. 49, pp. 1-3.
1949. An annotated list of wasps from Nags Head and Kill Devil Hills (Hymenoptera: Aculeata). *Journ. Elisha Mitchell Sci. Soc.*, vol. 65, pp. 262-272.
1950. Collection of wasps during the summer season at Kill Devil Hills, North Carolina: (1) To make better known the actual composition of the coastal fauna of that state and (2) to make observations on the nesting habits and prey preferences of solitary wasps. *Year Book Amer. Phil. Soc.*, 1950, pp. 147-149.
- 1952a. Preliminary annotated list of the wasps of Lost River State Park, West Virginia, with descriptions of new species and biological notes (Hymenoptera: Aculeata). *Proc. Ent. Soc. Washington*, vol. 54, pp. 175-184.
- 1952b. Preliminary annotated list of the wasps of Westmoreland State Park, Virginia, with notes on the genus *Thaumatodryinus* (Hymenoptera: Aculeata). *Trans. Amer. Ent. Soc.*, vol. 78, pp. 89-100.
- 1952c. Biological and taxonomic observations on the wasps in a coastal area of North Carolina (Hymenoptera: Aculeata). *Wasmann Journ. Biology*, vol. 10, pp. 257-341.
1953. Kill Devil Hills Wasps, 1952 (Hymenoptera: Aculeata). *Proc. Ent. Soc. Washington*, vol. 55, pp. 113-135.
- 1954a. Wasps collected at Lost River State Park, West Virginia in 1953 (Hymenoptera: Aculeata). *Bull. Brooklyn Ent. Soc.*, vol. 49, pp. 1-7.
- 1954b. A list of wasps collected in Florida, March 29 to April 5, 1953, with biological annotations (Hymenoptera: Aculeata). *Proc. Ent. Soc. Washington*, vol. 56, pp. 225-236.
1955. An annotated list of wasps collected in Florida, March 20 to April 3, 1954 (Hymenoptera: Aculeata). *Proc. Ent. Soc. Washington*, vol. 57, pp. 223-235.
1956. Miscellaneous prey records of solitary wasps, II (Hymenoptera: Aculeata). *Bull. Brooklyn Ent. Soc.*, vol. 51, pp. 42-44.
- 1958a. Hymenoptera of America north of Mexico. *U.S. Dept. Agric. Monogr.*, no. 2, suppl. 1, 305 pp.
- 1958b. Biological notes on some wasps from Kill Devil Hills, North Carolina, and additions to the faunal list (Hymenoptera: Aculeata). *Proc. Ent. Soc. Washington*, vol. 60, pp. 97-110.
1959. Biological notes on some ground-nesting wasps at Kill Devil Hills, North Carolina, 1958, and additions to the faunal list. *Proc. Ent. Soc. Washington*, vol. 61, pp. 193-199.
- 1960a. Biological notes on several southwestern ground-nesting wasps (Hymenoptera: Sphecidae). *Bull. Brooklyn Ent. Soc.*, vol. 55, pp. 75-79.



## KROMBEIN, KARL V.—Continued

1960b. Life history and behavioral studies of solitary wood- and ground-nesting wasps and bees in southeastern Arizona. Year Book Amer. Philos. Soc., 1960, pp. 299-300.

1963. Biological notes on *Cerceris blakei* Cresson (Hymenoptera: Sphecidae). Brooklyn Ent. Soc. Bull., vol. 58, pp. 72-79.

## KROMBEIN, KARL V., and EVANS, HOWARD E.

1954. A list of wasps collected in Florida, March 29 to April 5, 1953, with biological annotation. Proc. Ent. Soc. Washington, vol. 56, pp. 225-236.

## LECONTE, JOHN L., ed.

1883. The complete writings of Thomas Say on the entomology of North America, 2 vols.

## LATREILLE, P. A.

1802. Histoire naturelle, générale et particulière, des Crustacés et des Insectes, vol. 3.

## LINSLEY, E. G., and MACSWAIN, J. W.

1956. Some observations on the nesting habits and prey of *Cerceris californica* Cresson (Hymenoptera: Sphecidae). Ann. Ent. Soc. Amer., vol. 49, pp. 71-84.

## MARLATT, C. L.

1890. [Notes.] Proc. Ent. Soc. Washington, vol. 2, p. 147.

## MICKEL, C. E.

1916. New species of Hymenoptera of the superfamily Sphecoidea. Trans. Amer. Ent. Soc., vol. 42, pp. 399-434.

1917a. New species of Sphecoidea from the central and western states. Nebraska Univ. Studies, vol. 17, pp. 319-341.

1917b. A synopsis of the Sphecoidea of Nebraska (Hymenoptera). Nebraska Univ. Studies, vol. 17, pp. 342-456.

## PACKARD, A. S.

1866-1867. Revision of the fossorial Hymenoptera of North America, I: Crabronidae and Nyssonidae. Proc. Amer. Ent. Soc., vol. 6, pp. 37-115, 353-444.

## PATTON, W. H.

1879. List of a collection of aculeate Hymenoptera made by S. W. Williston in northwestern Kansas. Bull. U.S. Geol. Geogr. Surv. Terr., vol. 5, no. 3, pp. 349-370.

1880. Note on the Philanthinae. Proc. Boston Soc. Nat. Hist., vol. 20, pp. 397-405.

## PECKHAM, GEORGE W. and ELIZABETH G.

1898. On the instincts and habits of solitary wasps. Wisconsin Geol. Nat. Hist. Surv. Bull., no. 2, Sci. Ser., no. 1.

1900. Additional observations on the instincts and habits of the solitary wasps. Bull. Wisconsin Nat. Hist. Soc., vol. 1, pp. 85-93.

## PROCTOR, WILLIAM

1938. Biological survey of the Mount Desert region, part VI: The insect fauna.

1946. Biological survey of the Mount Desert region, part VII: The insect fauna.

## PROVANCHER, L'ABBE L.

1882. Faune Canadienne: Les insectes hyménoptères. Vol. 13 of Le Naturaliste Canadien.

## PROVANCHER, L'ABBE L.—Continued

1883. *Petite Faune Entomologique du Canada* . . . , vol. 2, illustr.  
 1888. *Additions et corrections au faune entomologique de Canada: Hyménoptères.*  
 1889. *Additions et corrections au vol. II, faune entomologique de Canada: Traitant des hyménoptères.*

## RAU, PHIL

1922. *Ecological and behavior notes on Missouri insects.* *Trans. Acad. Sci. St. Louis*, vol. 24, pp. 1-71, pls. 5-7.  
 1928. *Field studies in the behavior of the non-social wasps.* *Trans. Acad. Sci. St. Louis*, vol. 25, pp. 319-489.  
 1933. *The jungle bees and wasps of Barro Colorado Island.*

## RAU, PHIL, and RAU, NELLIE

1918. *Wasp studies afield.*

## ROBERTSON, CHARLES

1887. *Insect relations of certain Asclepiads, I.* *Bot. Gaz.*, vol. 12, pp. 207-216, 244-250, pl. 12.  
 1889a. *Flowers and insects, I.* *Bot. Gaz.*, vol. 14, pp. 120-126.  
 1889b. *Flowers and insects, III.* *Bot. Gaz.*, vol. 14, pp. 297-304.  
 1890. *Flowers and insects, V.* *Bot. Gaz.*, vol. 15, pp. 199-204.  
 1891. *Flowers and insects, Asclepiadaceae to Scrophulariaceae.* *Trans. St. Louis Acad. Sci.*, vol. 5, pp. 569-598.  
 1892a. *Flowers and insects: Umbelliferae.* *Trans. St. Louis Acad. Sci.*, vol. 5, pp. 449-460.  
 1892b. *Flowers and insects: Labiatae.* *Trans. Acad. Sci., St. Louis*, vol. 6, pp. 101-131.  
 1892c. *Flowers and insects.* *Bot. Gaz.*, vol. 17, no. 7, pp. 56-71; no. 8, 173-179; no. 9, 269-276.  
 1893. *Flowers and insects, XI.* *Bot. Gaz.*, vol. 18, pp. 267-274.  
 1894a. *Flowers and insects: Rosaceae and Compositae.* *Trans. St. Louis Acad. Sci.*, vol. 6, pp. 435-480.  
 1894b. *Flowers and insects, XII.* *Bot. Gaz.*, vol. 19, pp. 103-112.  
 1896a. *Flowers and insects.* *Trans. St. Louis Acad. Sci.*, vol. 7, pp. 151-179.  
 1896b. *Flowers and insects, XV.* *Bot. Gaz.*, vol. 21, pp. 72-81.  
 1896c. *Flowers and insects, XVII.* *Bot. Gaz.*, vol. 22, pp. 154-165.

## ROHWER, S. W.

1908. *New Philanthid wasps.* *Canadian Ent.*, vol. 40, pp. 322-327.  
 1912. *In* Grossbeck, *List of insects in Lower California.* *Bull. Amer. Mus. Nat. Hist.*, vol. 31, pp. 323-326.  
 1917. *A report on a collection of Hymenoptera (mostly from California) made by W. M. Giffard.* *Proc. U.S. Nat. Mus.*, vol. 53, pp. 233-249.  
 1919. *Descriptions of new species (descriptions of Philippine wasps). Part 1 of Philippine wasp studies.* *Hawaiian Sugar Planters Assoc. Bull.* 14, pp. 5-18.  
 1920. *Descriptions of twenty-six new species of North American Hymenoptera.* *Proc. U.S. Nat. Mus.*, vol. 57, pp. 209-231.

## SAUSSURE, HENRI L. F. DE

1867. *Hymenoptera: Familien der Vespiden, Sphegiden, Pompiliden, Crabroniden und Heterogynen.* Vol. 2 of *Bd. II of Zoologischer Theil in Reise der . . . Fregatte Novara*, pp. 87-102.

## SAY, THOMAS

1823. A description of some new species of Hymenopterous insects. *Western Quarterly Reporter*, vol. 2, no. 1, pp. 71-82
1825. *In* Keating (compil.), Narrative of an expedition to the source of St. Peter's river . . . under the command of S. H. Long, vol. 2, pp. 268-378.
- 1836-1837. Descriptions of new North American Hymenoptera, and observations on some already described. *Boston Journ. Nat. Hist.*, vol. 1, no. 3, pp. 210-305; no. 4, pp. 361-416.

## SCHLETTNER, AUGUST

1887. Die Hymenopteren—Gattung *Cerceris* Latr. mit vorzugsweiser Berücksichtigung der paläarktischen Arten. *Zool. Jahrb., Zeitschr. System*, vol. 2, pp. 249-510.

## SCULLEN, HERMAN A.

1942. Notes on the synonymy in the genus *Cerceris*, I. *Pan-Pacific Ent.*, vol. 8, pp. 187-190.
1949. Identification of *Cerceris clypeata* Dahlbom. *Pan-Pacific Ent.*, vol. 25, p. 71.
1951. Tribe Cercerini. *In* Muesebeck, Krombein and Townes, Hymenoptera of America north of Mexico, U.S. Dept. Agr., Agr. Monogr. 2, pp. 1004-1013.
1960. Synonymical notes on the genus *Cerceris*, II (Hymenoptera: Sphecidae). *Pan-Pacific Ent.*, vol. 36, pp. 75-80.
1961. Synonymical notes on the genus *Cerceris*, III (Hymenoptera: Sphecidae). *Pan-Pacific Ent.*, vol. 37, pp. 45-49.
1962. Synonymical notes on the genus *Cerceris*, IV (Hymenoptera: Sphecidae). *Pan-Pacific Ent.*, vol. 38, pp. 57-59.
1964. A new subspecies of *Cerceris robertsonii* Fox from the Southeast (Hymenoptera: Sphecidae). *Ent. News*, vol. 75, no. 6, p. 144.

## SMITH, FREDERICK

1856. Catalogue of Hymenopterous insects in the collection of the British Museum, part IV.

## SMITH, HARRY S.

1908. The Sphegoidea of Nebraska. *Nebraska Univ. Studies*, vol. 8, pp. 323-410.

## SMITH, JOHN B.

1900. Insects of New Jersey. *New Jersey State Board Agric. 27th Annual Report*, 1899, suppl.
1910. A report of the insects of New Jersey. *New Jersey State Mus. Ann. Rep.*, 1909.

## SNOW, F. H.

1880. Preliminary list of Hymenoptera of Kansas. *Trans. Kansas Acad. Sci.*, vol. 7, pp. 97-101.

## SPINOLA, M. MAXIMILIEN

1841. Hyménoptères, recueillis à Cayenne en 1839 per M. Leprieur, pharmacien de la Marine Royale. *Annal. Soc. Entom. France*, vol. 10, pp. 85-149.

## STEVENS, O. A.

1917. Preliminary list of North Dakota wasps exclusive of Eumenidae. *Ent. News*, vol. 28, pp. 419-423.

## STRAND, EMBRIK

1910. Beiträge zur Kenntnis der Hymenopteren fauna von Paraguay auf Grund der Sammlungen und Beobachtungen von Prof. J. D. Anistis, I-VI: Unter Mitwirkung mehrerer Spezialisten. Zool. Jahrb., vol. 29, pp. 125-242.

## STRANDTMANN, RUSSELL W.

1945. Observations on the nesting habits of some digger wasps. Ann. Ent. Soc. Amer., vol. 38, pp. 305-313.

## STRICKLAND, E. H.

1947. An annotated list of the wasps of Alberta. Canadian Ent., vol. 79, pp. 121-130.

## TASCHENBERG, E.

1875. Nyssonidae und Crabronidae des zoologischen Museums der hiesigen Universität. Zeitschr. Naturw., Bd. 45, pp. 388-409.

## TAYLOR, GEORGE W.

1884. The entomology of Vancouver Island. Canadian Ent., vol. 16, pp. 77-80.

## VAN DER VECHT, J.

1961. Hymenoptera Sphecoidea Fabriciana. Zool. verh. Rijksmuseum Nat. Hist. Leiden, no. 48, pp. 1-85.

## VIERECK, HENRY L.

1902. Hymenoptera from southern California and New Mexico, with descriptions of new species. Proc. Acad. Nat. Sci. Philadelphia, vol. 54, pp. 728-743.
1903. Maryland Hymenoptera (Aculeata). Ent. News, vol. 14, pp. 119-123.
- 1906a. *Cerceris deserta* Say [note]. Ent. News, vol. 17, p. 397.
- 1906b. Notes and descriptions of Hymenoptera from the western United States. Trans. Amer. Ent. Soc., vol. 32, pp. 173-247.
1916. The Hymenoptera, or wasp-like insects of Connecticut. State Geol. Nat. Hist. Surv. Bull. 22 (State of Connecticut Publ. Doc., no. 47).
1928. A report of the Hymenoptera in the New York State Museum. Bull. New York State Mus., vol. 274, pp. 177-197.

## VIERECK, H. L., AND COCKERELL, T. D. A.

1904. The Philanthidae of New Mexico, II. Journ. New York Ent. Soc., vol. 12, pp. 129-146.

## WASBAUER, M. S.

1957. A new prey record for the genus *Cerceris*. Pan-Pacific Ent., vol. 33, p. 131.

## WASHBURN, F. L.

1918. Hymenoptera of Minnesota. State Entomol. Minnesota, 17th Rep. (April 20, 1919), vol. 17, pp. 145-237.

## WEISS, HARRY B., AND DICKERSON, EDGAR L.

1921. Notes on milkweed insects in New Jersey. Journ. New York Ent. Soc., vol. 29, pp. 123-145.

## WERNER, FLOYD G.

1960. A note on the prey and nesting site of *Cerceris truncata* Cameron (Hymenoptera: Sphecidae). Psyche, vol. 67, pp. 43-44.

## WILLIAMS, F. X.

1919. Descriptions of new species and life history studies. Part 2 of Philippine wasp studies. Hawaiian Sugar Planters Assoc., Bull. 14, pp. 19-186.

## WOODWORTH, C. W.

1913. Guide to California insects, The Law Press, Berkeley, Calif.



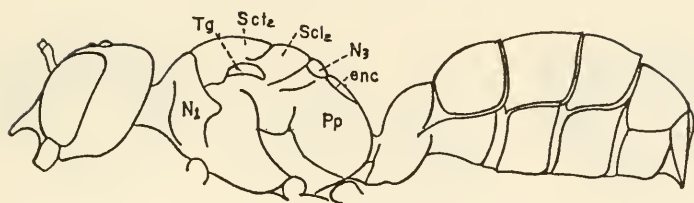


Fig.103

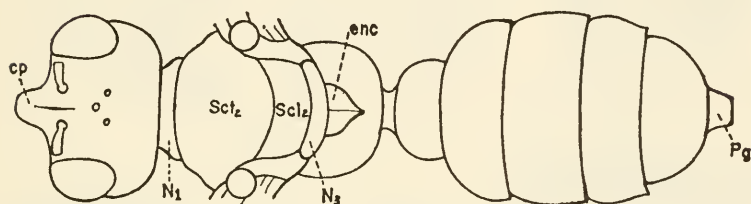


Fig.104

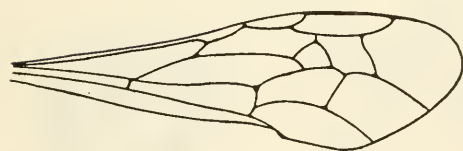


Fig.105

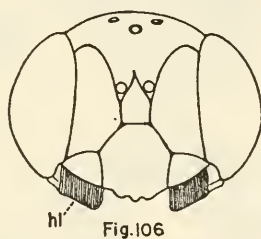


Fig.106

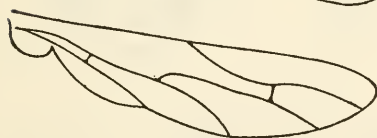
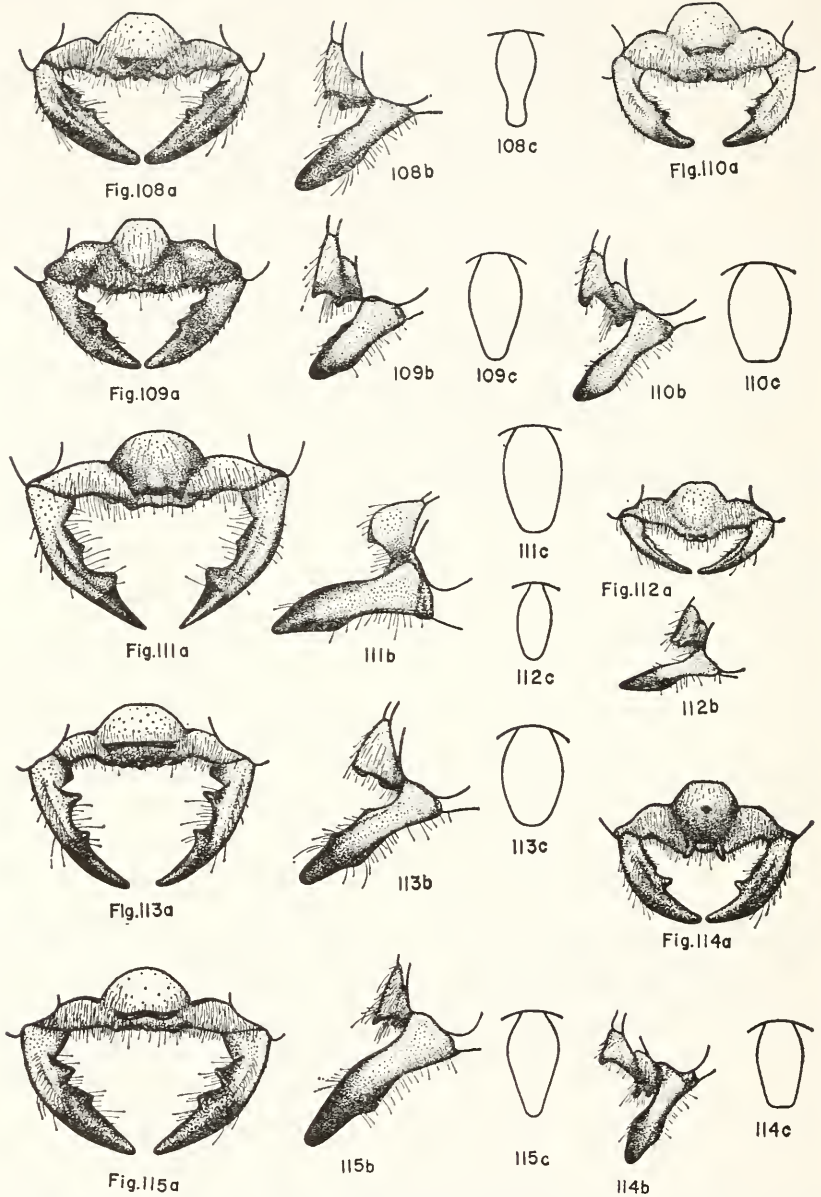
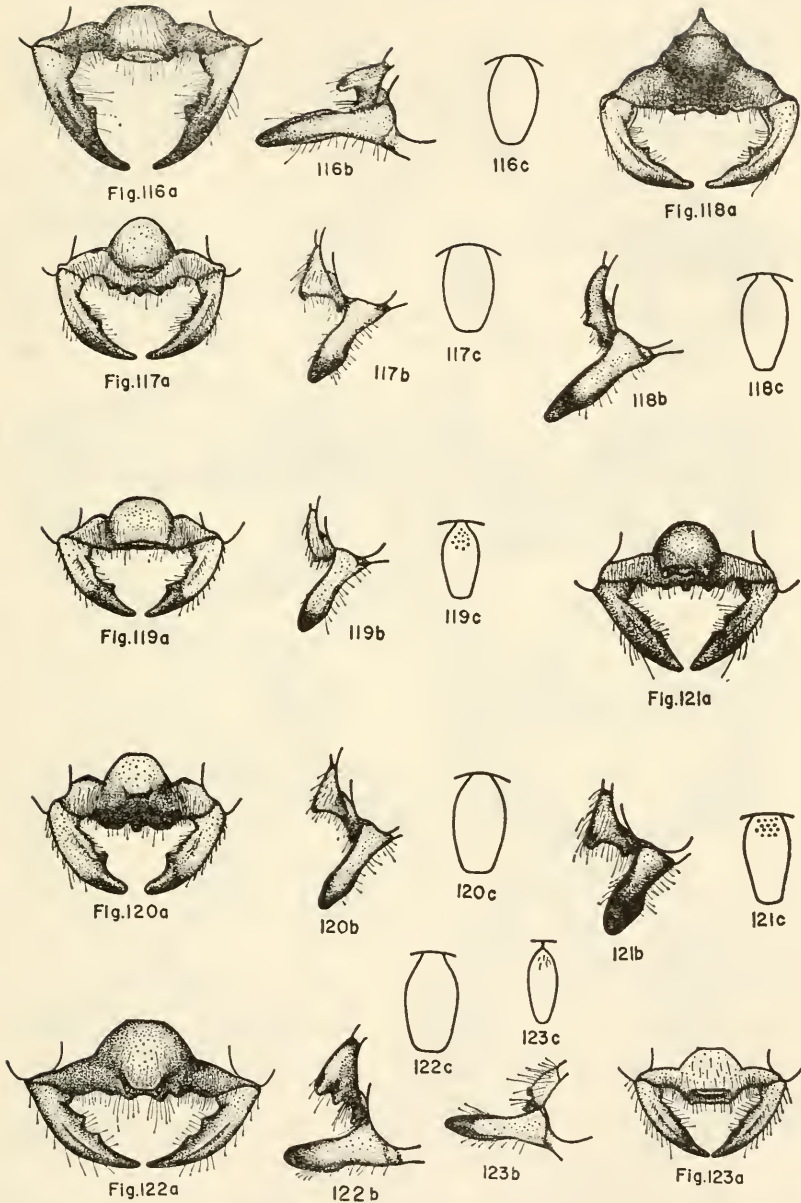


Fig.107

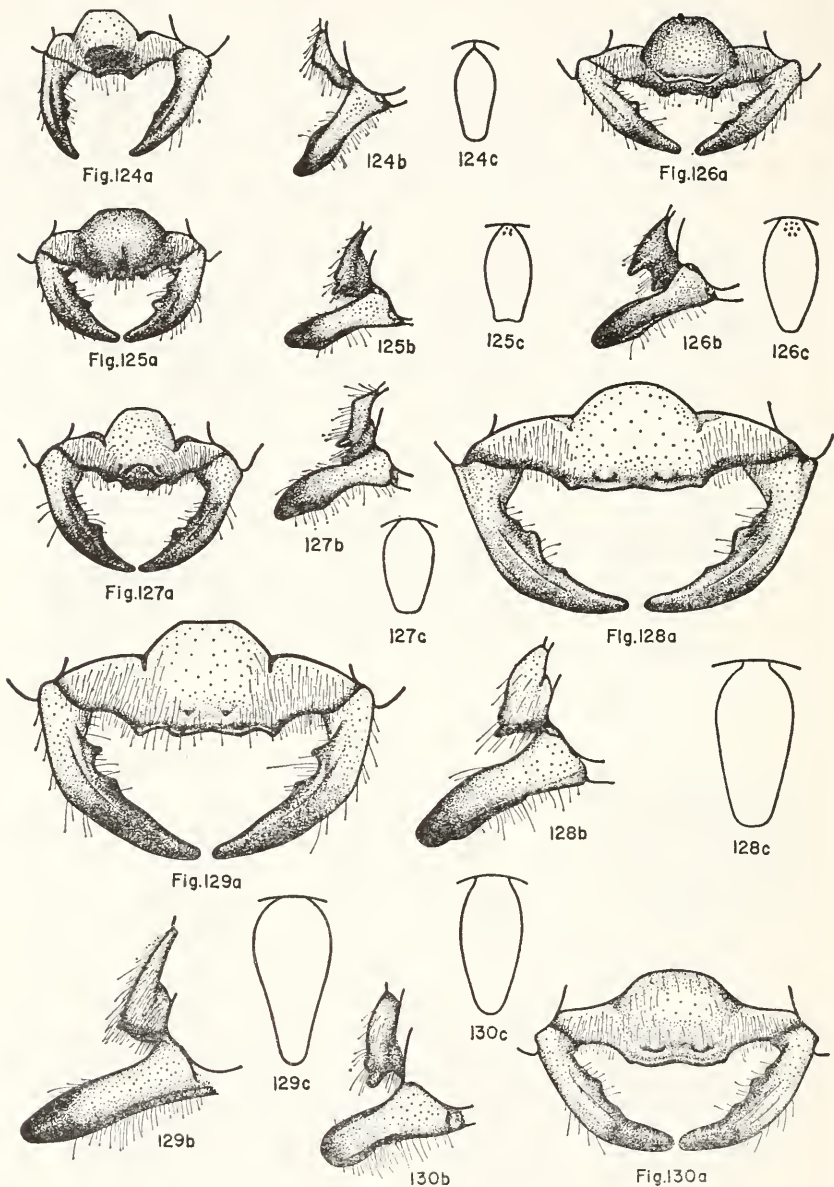
FIGURES 103-107.—103, Lateral aspect of female; 104, dorsal aspect of female; 105, wings of female; 106, face of male; 107, face of female. (Abbreviations: atp=anterior tentorial pits, cp=clypeal process, enc=enclosure, hl=hair lobes, N<sub>1</sub>=pronotum, N<sub>3</sub>=metanotum, Pg=pygidium, Pp=propodeum, Scl<sub>2</sub>=scutellum, Sct<sub>2</sub>=scutum, tg=tegula.)



FIGURES 108-115.—108, *C. acanthophila* Cockerell; 109, *C. argia* Mickel; 110, *C. blakei* Cresson; 111, *C. bridwelli* Scullen; 112, *C. butleri* Scullen; 113, *C. chilopsidis* Viereck and Cockerell; 114, *C. conifrons* Mickel; 115, *C. convergens* Viereck and Cockerell. (a=lower face of female, b=profile of female, c=pygidium of female.)

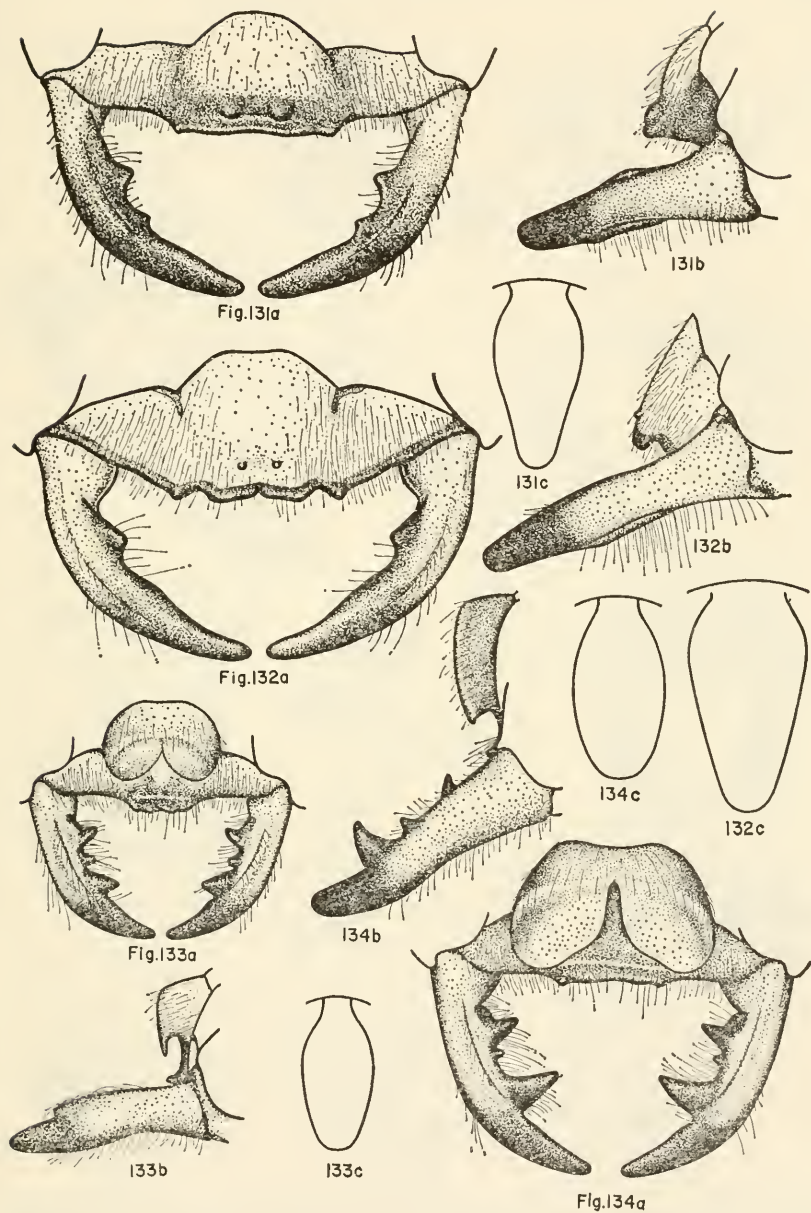


FIGURES 116-123.—116, *C. crandalli* Scullen; 117, *C. crotonella* Viereck and Cockerell; 118, *C. echo echo* Mickel; 119, *C. finitima finitima* Cresson; 120, *C. irene* Banks; 121, *C. kennicottii kennicottii* Cresson; 122, *C. krombeini* Scullen; 123, *C. neahminax* Scullen. (a=lower face of female, b=profile of female, c=pygidium of female.)

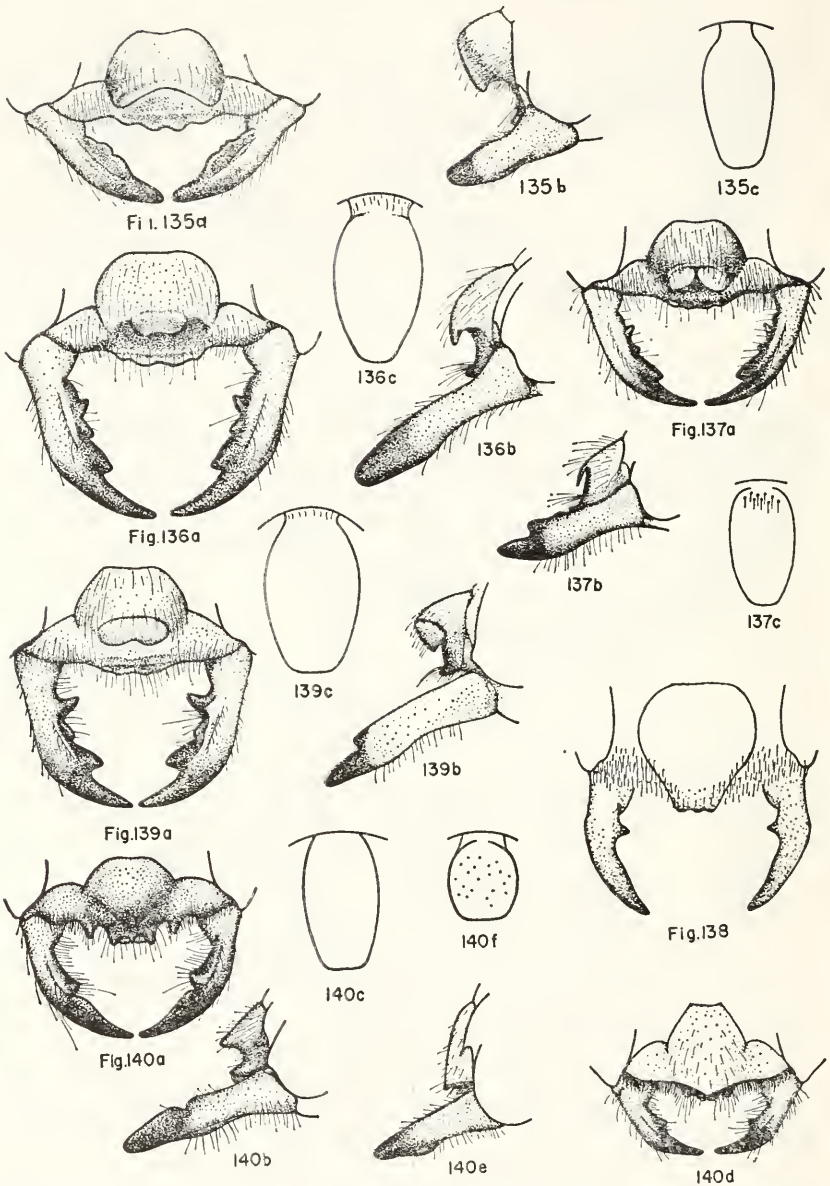


FIGURES 124-130.—124, *C. poculum* Scullen; 125, *C. rufinoda rufinoda* Cresson; 126, *C. truncata* Cameron; 127, *C. vanduzeei vanduzeei* Banks; 128, *C. californica californica* Cresson; 129, *C. completa* Banks; 130, *C. dilatata dilatata* Spinola. (a=lower face of female, b=profile of female, c=pygidium of female.)

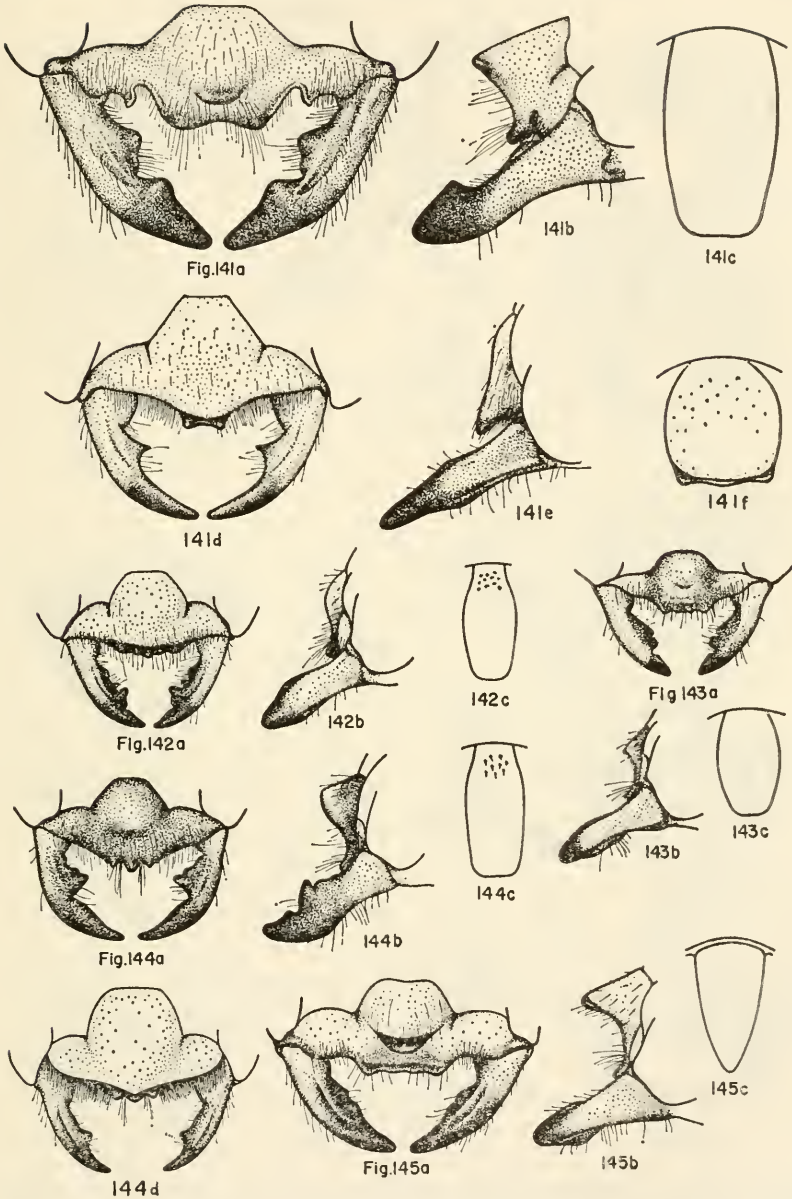




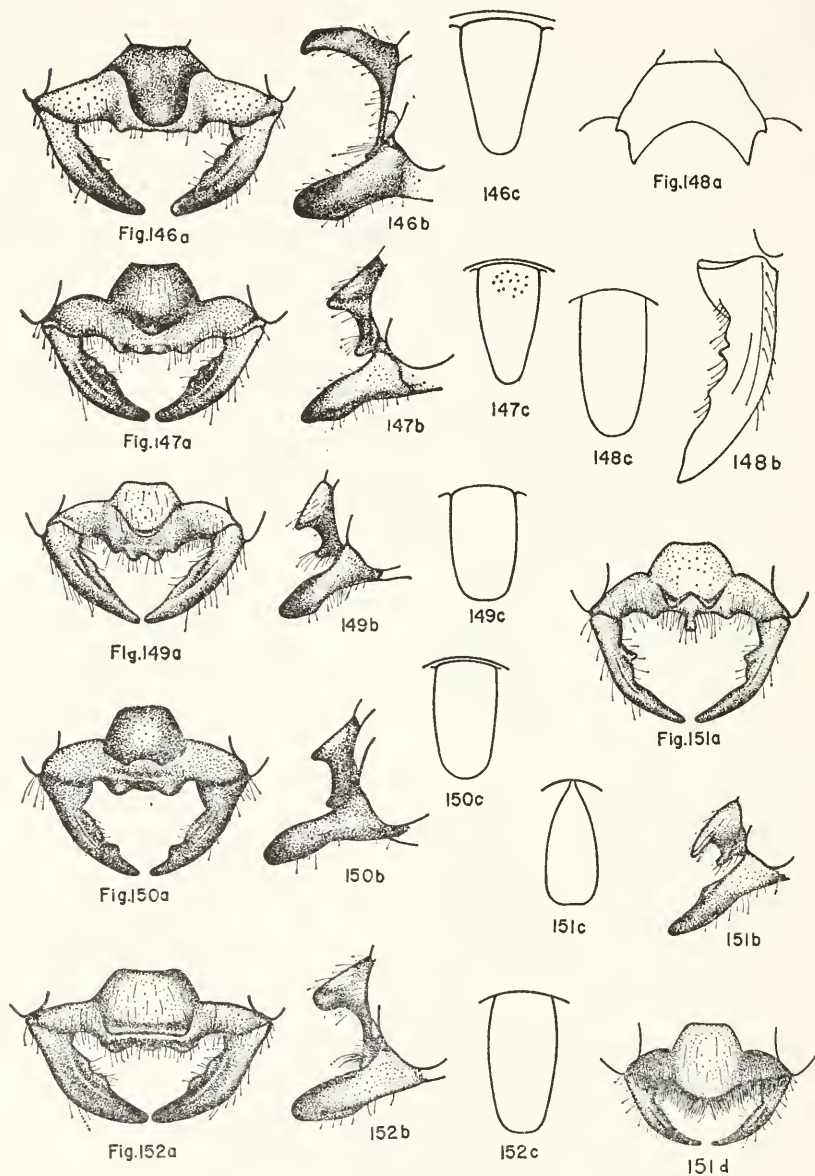
FIGURES 131-134.—131, *C. fumipennis* Say; 132, *C. grandis grandis* Banks; 133, *C. compacta compacta* Cresson; 134, *C. flavofasciata flavofasciata* H. S. Smith. (a=lower face of female, b=profile of female, c=pygidium of female.)



FIGURES 135-140.—135, *C. mandibularis* Patton; 136, *C. robertsonii robertsonii* Fox; 137, *C. robertsonii bifidus* Scullen; 138, *C. rufopicta* F. Smith, lower face of male; 139, *C. squamulifera* Mickel; 140, *C. femurrubrum* Viereck and Cockerell. (a=lower face of female, b=profile of female, c=pygidium of female, d=lower face of male, e=profile of male, f=pygidium of male.)

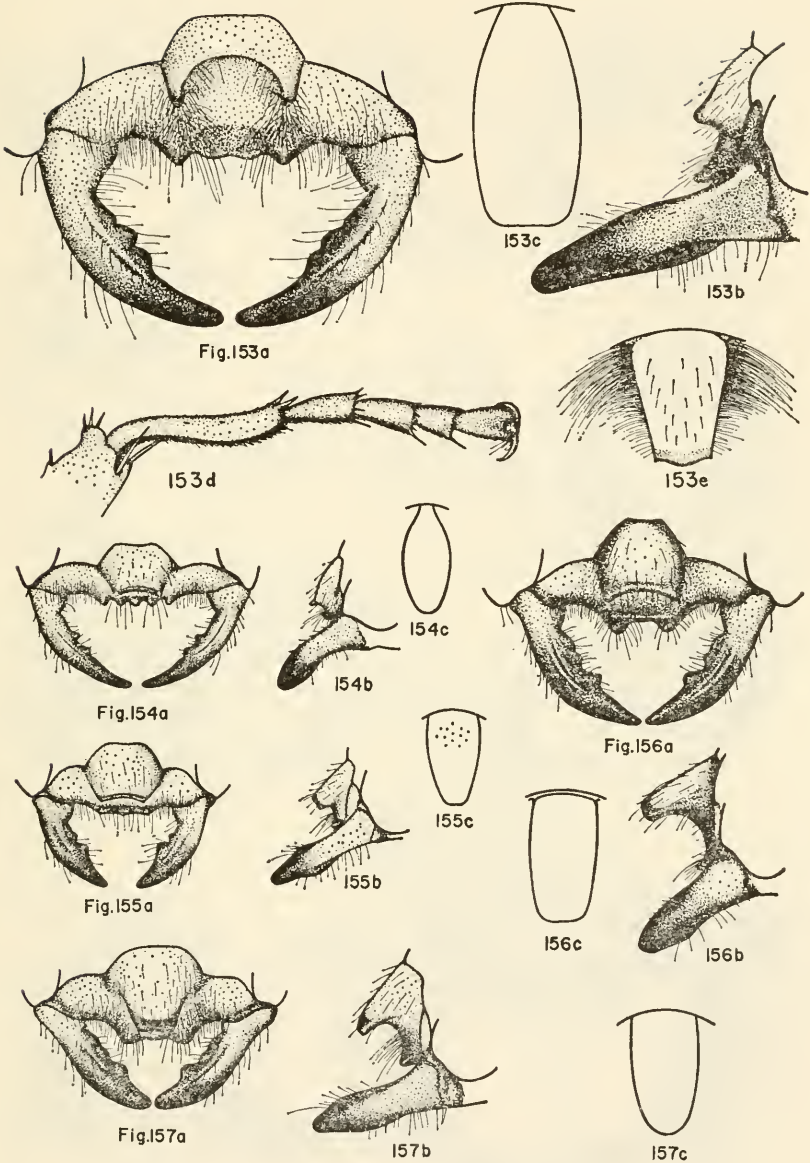


FIGURES 141-145.—141, *C. macrosticta* Viereck and Cockerell; 142, *C. compar compar* Cresson; 143, *C. insolita atrafemori* Scullen; 144, *C. zelica* Banks; 145, *C. aequalis aequalis* Provancher. (a=lower face of female, b=profile of female, c=pygidium of female, d=lower face of male, e=profile of male, f=pygidium of male.)

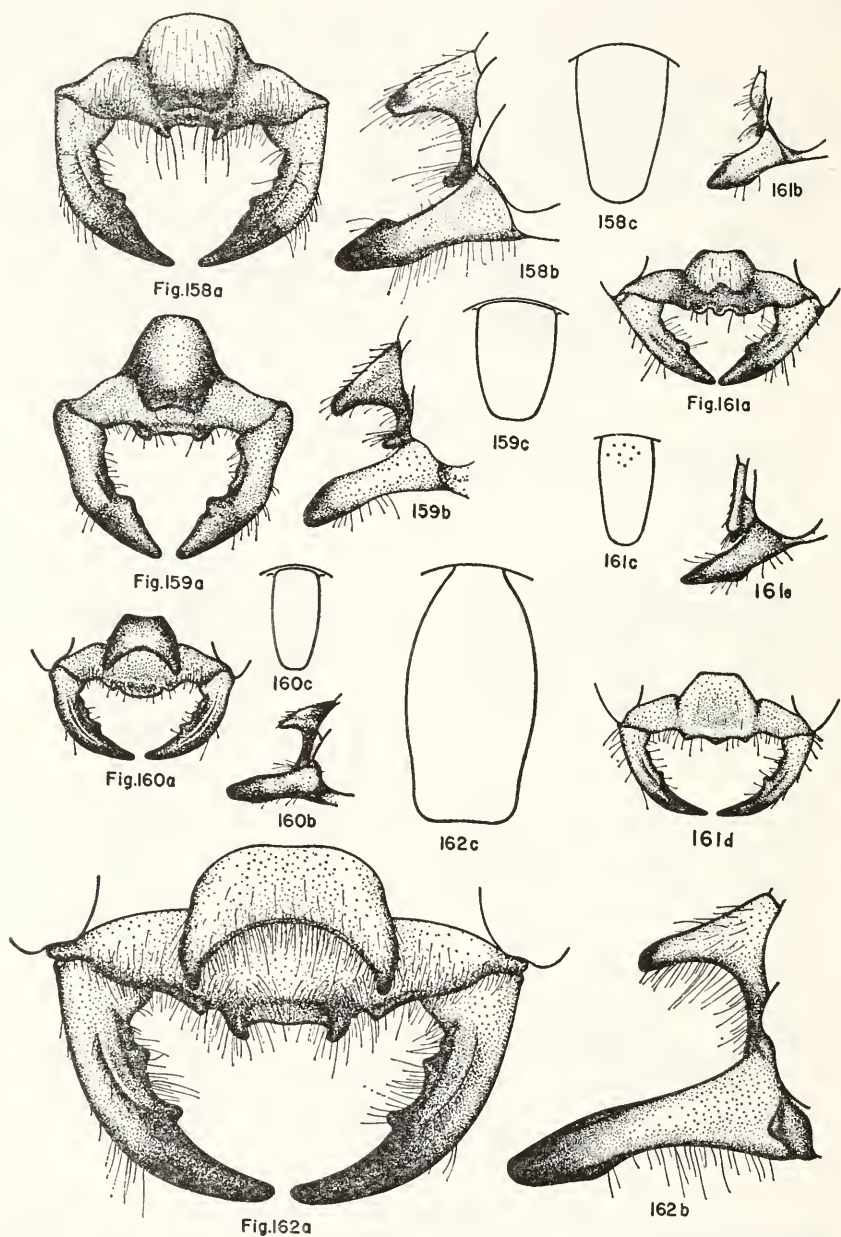


FIGURES 146-152.—146, *C. aequalis bolingeri* Scullen; 147, *C. aequalis idahoensis* Scullen; 148, *C. alceste* Mickel, a=clypeal process of female, b=mandible of female; 149, *C. astarte* Banks; 150, *C. astramontensis* Banks; 151, *C. azteca* Saussure; 152, *C. banksi* Scullen. (a=lower face of female, b=profile of female, c=pygidium of female, d=lower face of male.)

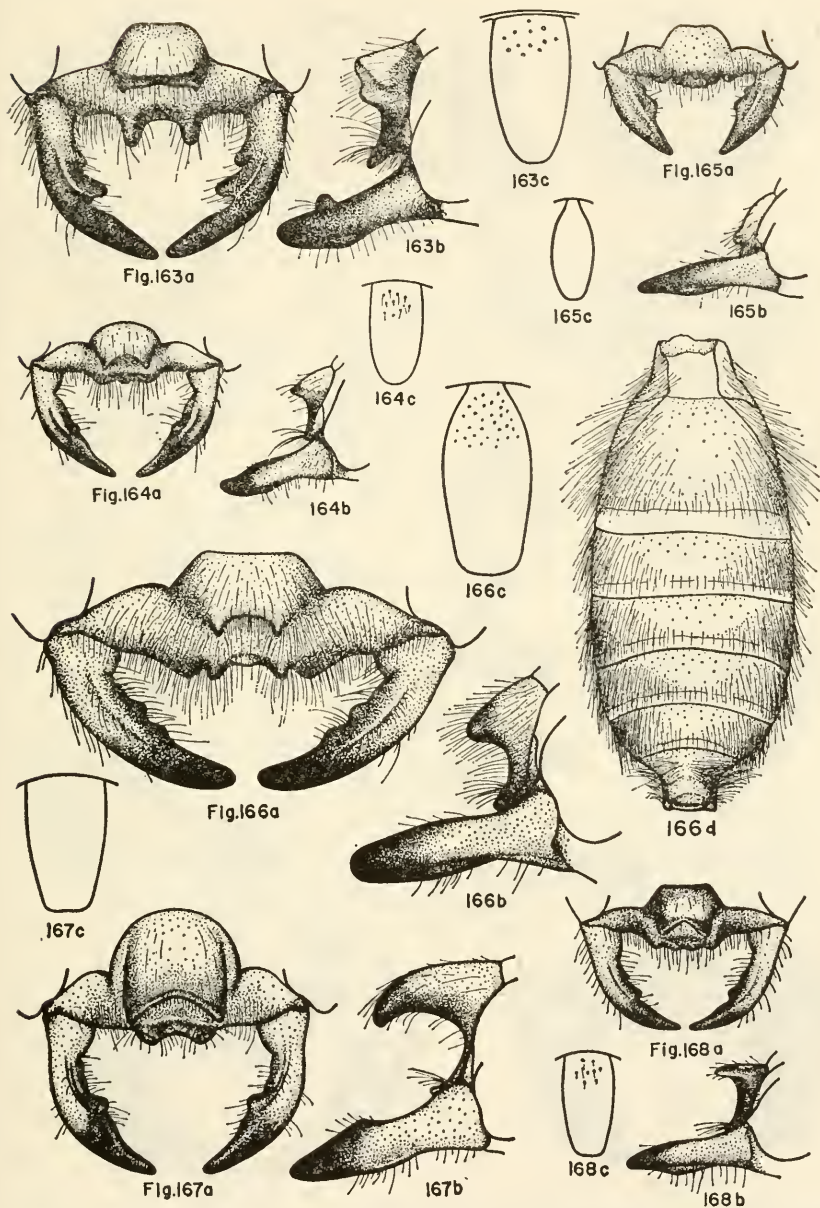




FIGURES 153-157.—153, *C. bicornuta bicornuta* Guerin; 154, *C. boharti* Scullen; 155, *C. calochortii* Rohwer; 156, *C. clypeata clypeata* Dahlbom; 157, *C. clypeata dakotensis* Banks. (a=lower face of female, b=profile of female, c=pygidium of female, d=hindtibia of male, e=pygidium of male.)

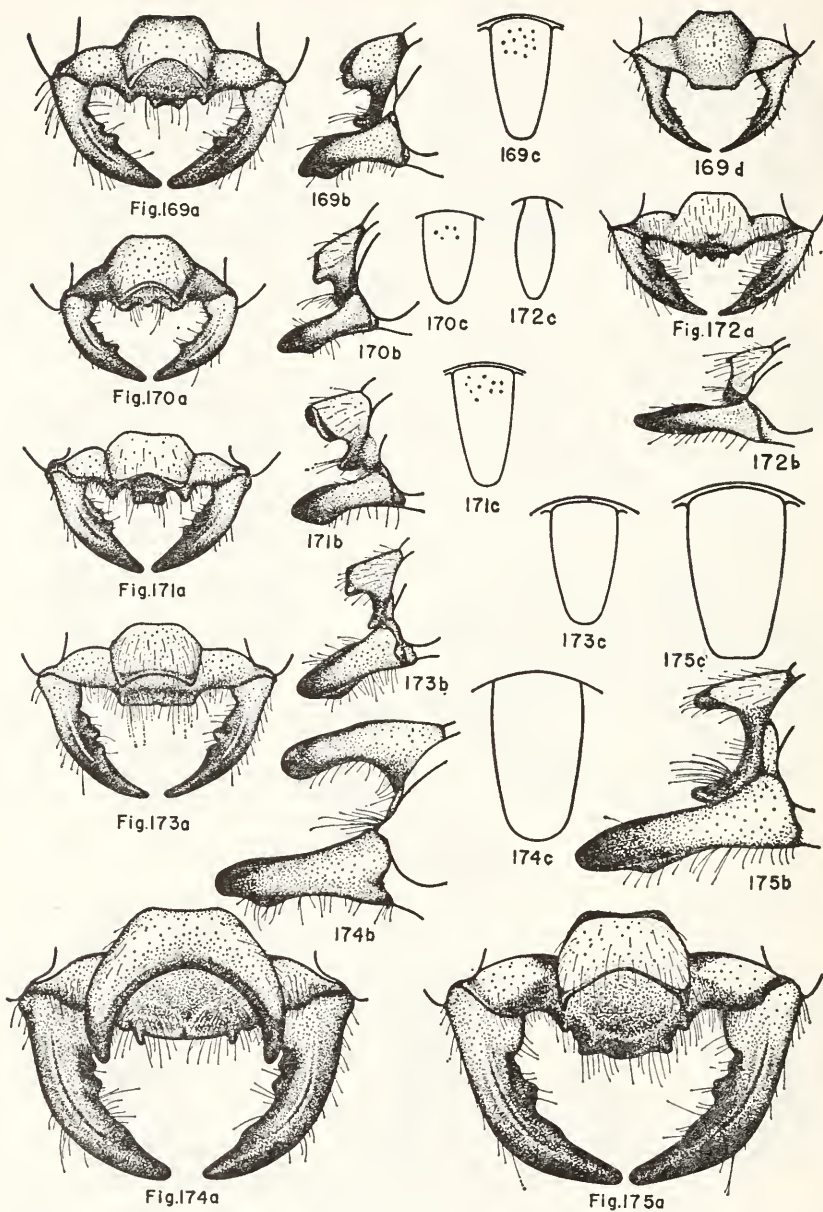


FIGURES 158-162.—158, *C. clypeata gnarina* Banks; 159, *C. clypeata prominens* Banks; 160, *C. dentifrons* Cresson; 161, *C. deserta* Say; 162, *C. frontata frontata* Say. (a=lower face of female, b=profile of female, c=pygidium of female, d=lower face of male; e=profile of male.)



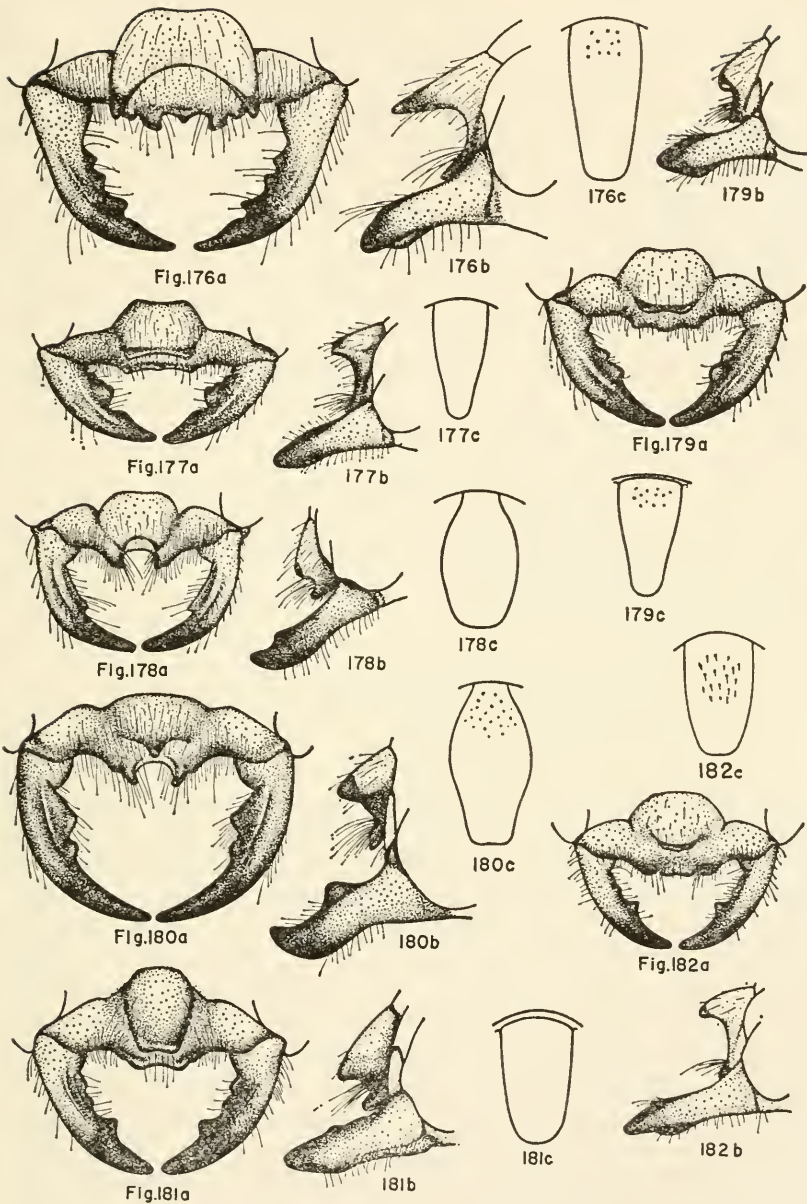
FIGURES 163-168.—163, *C. halone* Banks; 164, *C. macswaini* Scullen; 165, *C. melanihe* Banks; 166, *C. mimica* Cresson; 167, *C. morata* Cresson; 168, *C. nebrascensis* H. S. Smith. (a=lower face of female, b=profile of female, c=pygidium of female, d=venter of male.)





FIGURES 169-175.—169, *C. nigrescens nigrescens* F. Smith; 170, *C. nigrescens arelate* Banks; 171, *C. nigrescens munda* Mickel; 172, *C. nitida* Banks; 173, *C. occipitamaculata* Packard; 174, *C. sexta* Say; 175, *C. stigosalis* Banks. (a=lower face of female, b=profile of female, c=pygidium of female, d=lower face of male.)





FIGURES 176-182.—176, *C. tepaneca* Saussure; 177, *C. texana* Scullen; 178, *C. tolteca* Saussure; 179, *C. varians* Mickel; 180, *C. verticalis* F. Smith; 181, *C. vicina* Cresson; 182, *C. wyomingensis* Scullen. (a=lower face of female, b=profile of female, c=pygidium.)

