

STUDIES ON THE GENUS CICADULA

(HOMOPTERA, CICADELLIDAE)

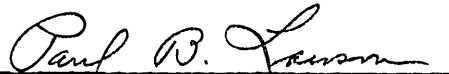
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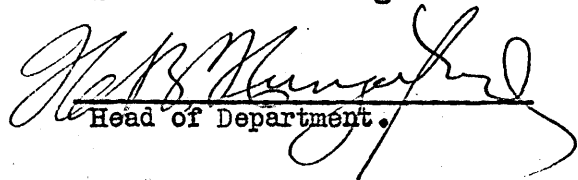
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fillment of the requirements for
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Approved by:


Instructor in charge.


Head of Department.

May 19, 1930.

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THE GENUS CICADULA ZETTERSTEDT.

The writer became interested in the genus *Cicadula* during the summer of 1929, when many specimens were caught in the light trap. A number of these specimens were sent to different Cicadellid authorities and with some species the determinations did not agree. A great deal of variation seemed to occur in the species determined as *Cicadula sex notata*. In face of the economic importance connected to at least one species of the genus it was felt that proper identification should be assured before control measures were considered. It was thought that the internal genitalia of the males might give some clue to the proper identification. With this thought in mind, the writer has attempted to settle the identity of species of *Cicadula* found in North America.

In general, the members of this genus are small and quite elongate. The vertex is longer on the middle than next the eye but not strongly produced. The pronotum short, the anterior margin more or less convex, the posterior margin generally slightly concave. The elytra are long, exceeding the abdomen, overlapping apically, with a distinct appendix and

with the inner sector not forked, there being only two antepical cells, with four apical cells. The hind wings have three closed apical cells. The external male genitalia are characterized by the elongation of the plates in two attenuated finger-like processes. The oedagus usually has two processes apically.

Through the courtesy of Dr. Lawson specimens of C. punctifrons from Europe were loaned the writer. These proved to be quite distinct from the specimens of that species from the Western States. The markings on the vertex of the European species did not agree with specimens found in Kansas and Minnesota, the latter being larger and more robust with no markings on the posterior margin of the vertex to correspond with those on the specimens from Europe. The plates of the European species were covered with many more hairs than were found in the Kansas specimens. The internal male genitalia of the European species is quite different from that of the American species, having the foot of the style extended into a sharp toe and the two finger-like processes of the oedagus arising at the apex of the shaft. In contrast, in the American specimens the foot of the style is not extended into a sharp toe and the finger-like processes of the oedagus arise before the end of the shaft. Then the genitalia of C. punctifrons from New

York state were studied and these were found to agree exactly with the genitalia of the specimens from Europe. This showed conclusively that two species had been confused in the United States and that the western one was new to science while the eastern one has been correctly identified as C. punctifrons. In the writer's experience the color markings of the variety repleta vary so much that a distinct variety cannot be recognized. The black spots in the basal angle of the scutellum and the black marks on the anterior portion of the vertex might ordinarily distinguish the variety from the species, but the spots on the scutellum vary from large black spots to two dark patches showing through the pronotum and the patches on the anterior margin of vertex vary from black or brown to an entire absence of color. Apparently no distinguishing line can be drawn.

Specimens of Cicadula sex notata from Russia were loaned the writer by E. W. Davis of Richfield, Utah. The specimens appeared to be more stoutly built than the American specimens. The spots on the posterior margin of the vertex were larger and more rounded than in the American specimens. A large number were dissected and the internal genitalia of the males were found to be different from those of the American specimens. The oedagi are of about the same size but in the

European specimens a distinct bend occurs at the apex of the shaft where the two finger-like processes arise. The processes of the oedagus of the American specimens are compressed dorso-ventrad. The characteristic curve in the oedagus of the European specimens is a constant character that held true in the large number dissected. C. sex notata was originally described in Europe, consequently the specimens in America which have been found to be different must receive another name.

The American specimens have a great many color variations. The colorings are not clear cut, for all extremes can be found. In many specimens the middle pair of marks on the vertex are absent; in others they are very small. In some the pronotum is yellow, while in others it varies to dusky black. In some the basal angles of the scutellum are yellow; in others they are black or the black only shows through the posterior part of the pronotum. In some the elytra are yellow; in others they are spotted with dusky brown. In some the frons is very lightly marked; in others the markings are heavy and black. Nevertheless, the writer attempted to find some internal male genitalia differences that could be used to separate variously colored specimens. A large number of each form were dissected but no internal variations could be detected. The species seem

to be one with many slight variations in color.

In 1877 Uhler described a form of Cicadula sex notata and called it C. divisa. No types can be found at the present time. According to the description it was nothing more than a form of C. sex notata at that time. After examining the internal male genitalia of specimens conforming to the description of C. divisa, it seems clear that this was a name given to what we have been calling C. sex notata and since the latter name can be applied now only to European specimens, Cicadula divisa becomes the name for what has hitherto in the United States been called C. sex notata.

Cicadula snowi sp. n.

Figs. 1 - 1d.

A yellow species with two spots on vertex, allied to C. punctifrons. Length 4 to 5 mm.

Form:

Vertex bluntly angulate, one-fourth to one-fifth longer on front than next the eye, about three times wider than long. Pronotum more than twice as wide as long, anterior margin broadly convex, lateral margins distinctly shorter than humeral margin, posterior margins broadly emarginate. Scutellum equal to width of vertex. Elytra exceeding abdomen; appendix distinct.

Color:

Yellow or yellowish green. Vertex with two large black spots near anterior border. Pronotum yellow. Scutellum yellow. Elytra whitish hyaline, smoky at apex; nervures light. Face yellow.

External genitalia:

Male valve large, rectangular in shape, apex obtusely rounded; plates projecting beyond valve length of valve, then produced to two attenuated finger-like processes which exceed

length of pygofer, bristles on plate extending over margin of pygofer.

Internal male genitalia:

Style with finger-like anterior processes; widest at point of attachment to connective, then slightly constricted either side of middle, suddenly narrowed to apical foot which bears a number of short stout spines on inner margin, the inner angle of apex being obtuse and the outer acute. Oedagus equal to length of style, shaft moderately long, terminating in two short finger-like processes, compressed dorso-ventrally and ending in sharp points.

Described from one male specimen collected at Hamilton County, Kansas, elevation 3350 feet, by F. H. Snow. Type deposited in Snow Entomological collection.

Cicadula obsoleta sp. n.

Figs. 2 - 2f

A yellow species with two black spots on vertex, allied to C. pallida. Length 5 mm.

Form:

Vertex one-half wider than long; one-fourth longer on middle than next to eye; broadly rounding with front. Pronotum short, more than twice as wide as long, anterior margin broadly convex, lateral margins distinctly shorter than humeral margin, posterior margin about straight. Scutellum equal to vertex in width. Elytra exceeding abdomen by one-fifth their length; appendix distinct.

Color:

Yellow. Vertex yellow with two small brown spots near anterior margin; brown spots between ocelli and eye. Pronotum yellow. Scutellum yellow with transverse line black; ards brown; antennal sockets brown; brown spots on inner margin of eye.

External genitalia:

Female last ventral segment equal to preceding segment, slightly emarginate on posterior margin on middle; pygofer slightly shorter than black ovipositor, white spines on apical

third. Male valve large, triangular; plates extending beyond valve apically in two finger-like processes, outer margin of plates with white spines.

Internal male genitalia:

Style with finger-like anterior process, widest at point of attachment to connective, then slightly constricted on either side of middle, suddenly narrowed to apical foot which bears a number of short stout spines on inner margin, the inner angle of apex being obtuse, the outer acute. Oedagus equal to style in length, shaft moderately elongate, terminating in two short finger-like processes with branch on inner margin of each process.

Holotype, male, Aransas County, Texas, June 6, 1928,

by A. M. James.

Allotype, female, Aransas County, Texas, June 6, 1928,

by A. M. James.

Paratypes, 7 females, Aransas County, Texas, June 6, 1928,

by P. H. Beamer and A. M. James.

Orange County, Texas, September 14, 1928,

by P. H. Beamer.

Douglas County, Kansas, 1927, by P. B. Lawson.

Type deposited in Snow Entomological collection..

Cicadula major sp. n.

Figs. 3 - 3f.

A large robust greenish-yellow species with two black spots on vertex, allied to C. snowi. Length of female 5.5 mm. to 7 mm.; length of males 4.5 mm. to 5.5 mm.

Form:

Vertex nearly parallel margined, very slightly longer on middle than next to eye, broadly rounding with front. Pronotum twice as wide as long, anterior margin broadly convex, posterior margin shallowly emarginate, lateral margins distinctly longer than humeral margin. Scutellum slightly greater than width of vertex. Elytra exceeding abdomen by more than one-third their length; appendix distinct.

Color:

Dirty yellow. Vertex with two large black spots, sometimes two black or brown patches on or near anterior margin, sometimes small brown marks on apex. Pronotum dirty yellow. Scutellum yellow except for black transverse line, basal angles sometimes black. Elytra dirty yellow, sometimes with gray stripes; nervures light. Frons yellow, sometimes with light markings.

External genitalia:

Female last ventral segment about as long as preceding, posterior margin slightly produced. Pygofer large, widest at middle; equal to or slightly exceeding the ovipositor; apices of pygofer clothed with white spines. Male valve large, rounded posteriorly, about three-fourths as long as last ventral segment; plates broad basally, about twice as long as valve, margin bare narrowing to somewhat divergent apices; pygofer broad, exceeding the length of plates.

Internal male genitalia:

Styles narrowed slightly below attachment of connective, with distinct conical caudo-lateral protuberance which bears a number of fine hairs; foot rather elongate and scaly, with obtuse inner angle and acute outer angle. Oedagus shorter than style, shaft large with dorsal midway process, two curved sword-like processes near apex of shaft, apex of shaft blunt.

Holotype, male, Ramsey County, Minnesota, February 1922.

Allotype, female, Douglas County, Kansas, June 18, 1929.

Paratypes, 3 males and 26 females --

Douglas County, Kansas, June 6, 1929, by P.B. Lawson.

Hamilton County, Kansas, by F. H. Snow.

Ramsey County, Minnesota, July 1922.

Ducheane, Utah, July 1926 by Vaseo M. Tanner.

Type deposited in Snow Entomological collection.

Cicadula borealis sp. n.

Figs. 4 - 4c.

A dirty yellow species with black vertex and yellow median line, allied to C. slossoni. Length 3.5 mm. to 4.5 mm. to 4.5 mm.

Form:

Vertex one-half wider than long, one-fourth longer on middle than next the eye, broadly rounding with front. Pronotum more than twice as wide as long, anterior margin broadly convex, lateral margin slightly shorter than humeral margin, posterior margin about straight. Scutellum about equal to vertex in width. Elytra exceeding abdomen by one-fifth their length; appendix distinct.

Color:

Dirty yellow. Vertex black with wide yellow median line continuing from margin of vertex across pronotum and scutellum; pale ocelli very conspicuous. Dark markings on anterior margin of pronotum extending toward posterior border on each side of yellow band. Scutellum with basal angles black, sometimes other markings. Elytra smoky with light spot on claval suture in male; nervures dark. Frons with black arcs somewhat convergent; sutural lines black; black spot under each eye.

External genitalia:

Female last ventral segment equal to preceding segment, slightly emarginate on middle; pygofer slightly shorter than black ovipositor, very much narrowed on apical fifth, clothed with white spines. Male valve large, triangular; plates extending beyond valve ending in two finger-like processes; outer margin of plates with white spines; spiny pygofer extending beyond plates.

Described from one male (holotype) and female (allotype) collected at Everett, Washington, September 1, 1909 by J. A. Hyslop.

Holotype, deposited in Dr. Osborn's collection.

Allotype, deposited in Snow Entomological collection.

Cicadula osborni sp. n.

Figs. 5 - 5a.

A black species with vertex black except for yellow ocelli and yellow median line, allied to C. pоторia. Length 4 mm.

Form:

Vertex more than twice as wide as long, one-sixth longer on middle than next the eye, broadly rounding with front. Pronotum short; twice as wide as long; anterior margin broadly convex, lateral margin distinctly shorter than humeral margin, posterior margin almost straight. Scutellum equal to vertex in width. Elytra exceeding abdomen by one-fifth their length; appendix distinct.

Color:

Black. Vertex practically solid black; sometimes with fine yellow median lines; ocelli yellow and conspicuous; posterior margin sometimes with slight yellow border. Pronotum solid black with small median yellow line on anterior third; sometimes two yellow spots on anterior margin widely divided. Scutellum black or with black basal angles and broad black transverse line. Elytra black, somewhat lighter toward tip, sometimes with light spot on claval suture; nervures dark. Frons with black

convergent arcs; sutural lines black; black spot below eye;
antennal sockets black.

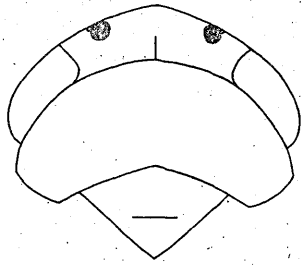
External genitalia:

Male valve extra large, shape of isosceles triangle;
plates large extending beyond valve about length of latter,
terminating apically in two finger-like processes that extend
beyond spiny pygofer; plates apparently bare of spines.

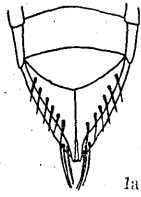
Holotype, male, Savonaski, Naknek Lake, Alaska, July
31, 1919.

Paratype, male, Savonaski, Naknek Lake, Alaska,
July 31, 1919.

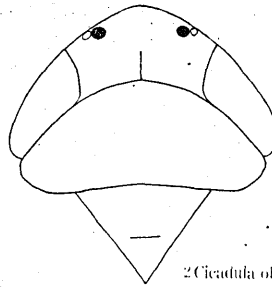
Type deposited in Dr. Osborn's collection.



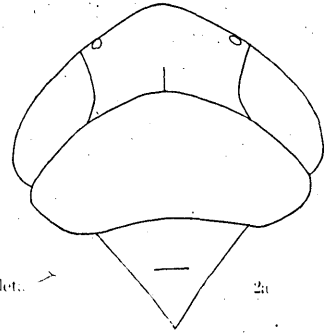
1 *Cicadula snowi*



1a



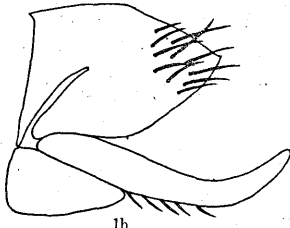
2 *Cicadula obsoletus*



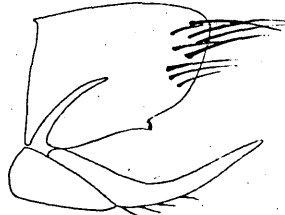
2a



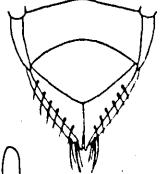
1c



1b



2b



2c



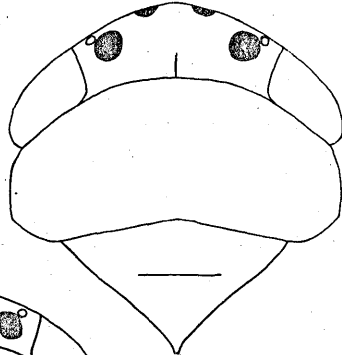
2d



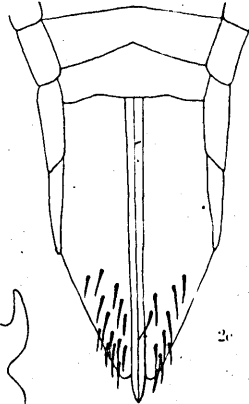
2e



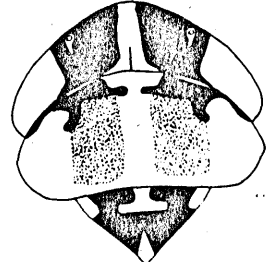
1d



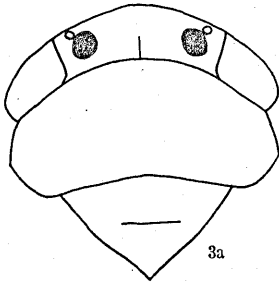
3 *Cicadula major*



3b



4 *Cicadula borealis*



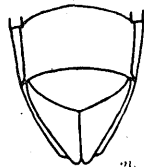
3a



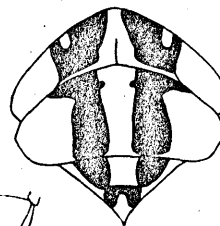
3c



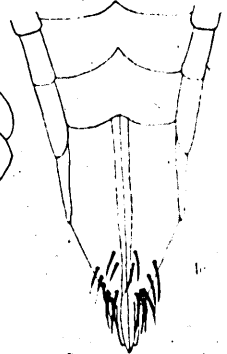
3d



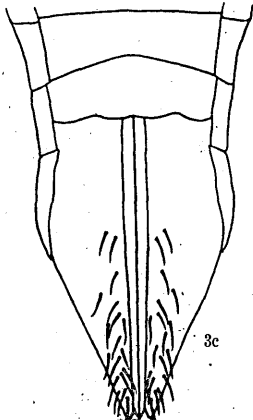
3e



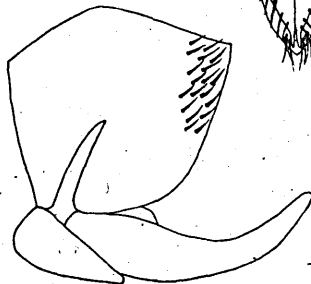
4a



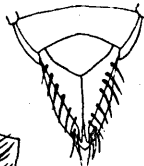
4b



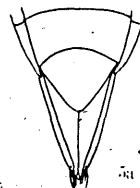
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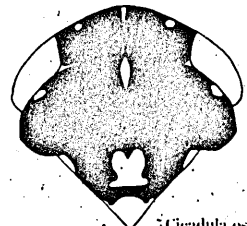
3c



4c



4d



5 *Cicadula osborni*