

SONORAN CICADAS COLLECTED BY HARRY H.
KNIGHT, DR. JOSEPH BEQUAERT AND OTHERS,
WITH DESCRIPTIONS OF NEW SPECIES.

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Mr. Harry H. Knight and Dr. Joseph Bequaert were members of the Cornell University Biological Expedition, organized by Prof. J. Chester Bradley, that started by automobile from Ithaca, New York, in May, and reached California in August, 1917. Both of these gentlemen collected what cicadas they were able to find as the journey progressed, and have kindly turned them over to me. They form an interesting collection and I have been unable to identify two of them with descriptions of species mentioned in *Biologia Centrali-Americana*, or previously known from the United States. These are here described as new, together with two others from the same general region that I have from other sources. A new *Okanagana* from California is also described.

Of the fourteen species here placed in the genus *Tibicen*, only the first seven, in the opinion of the author, really belong there. In the remaining seven the uncus is wish-bone shaped instead of simple, and the first cross vein of the fore wing does not, as a rule, start as far back or near to the base of the wing from radius 3, as it does in the species having the simple uncus. The last seven species here referred to, and others of like character, will no doubt in due time be assigned to one of the genera already described, but they do not belong to the genus *Cicada*, where they would fall in Distant's arrangement by the shape of the head, for Mr. Van Duzee has pointed out in the Bulletin

of the Buffalo Society of Nat. Sciences, June, 1912, and in the Canadian Entomologist for November, 1914, that the genus as so restricted does not include any of the original Linnean species of *Cicada*.

Tibicen pruinosa Say.

Wharton, Texas, June 24, 1917, male (H. H. K.).

Tibicen marginalis Walker (*marginata* Say).

Wharton, Texas, June 24, 1917, male, and Victoria, Texas, June 25, 1917, male (H. H. K.).

Tibicen superba Fitch.

Wharton, Texas, June 24, 1917, male; Sutherland Springs, Texas, June 26, 1917, male, and New Braunfels, Texas, June 28, 1917, female (H. H. K.).

Tibicen montezuma Distant.

Comstock, Texas, July 3, 1917, male (H. H. K.).

This specimen agrees well with the figure and description in Biol. Centr.-Amer., as does a male from Gatesville, Texas, July 16, 1888, in the collection of the U. S. Nat. Museum.

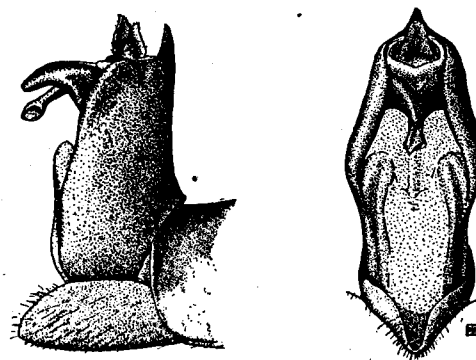
Tibicen inauditus new species.

Type male from west of Vega, Oldham County, Texas, July 15, 1917 (Miss McGill). Davis collection.

A black and light orange or straw-colored species, with rather prominent eyes, and a conspicuous pruinose spot on each side of the abdomen.

Head above black with the following marks light orange-colored: a spot on the rather prominent front, a triangular one just behind this, two small ones (one larger than the other) above each antenna, and an irregular one each side of the ocelli at the back of the head. Pronotum black with the anterior margin faintly touched with light orange; the posterior margin more broadly so, the light band being about one half a millimeter in width. The anterior angles are light orange, and the tops of the raised portions, occupying the central part of the pronotum, are orange-colored and darker than the margins. Mesonotum black with a well defined pruinose stripe on each side near the base of the wings. The hind margin is light orange including the ridges of the elevated X. The central portion is occupied by two light spots at the extremities of the X, and anterior to the depressions there are four others, the two central spots being curved and the outer ones more rounded. Tergum black with two pruinose spots at the base, one large one each side below the tympanum, and the eighth segment also conspicuously pruinose. The posterior edge of each segment is narrowly edged with light orange.

Fore wings with the costal margins straw-colored to the end of the radial cells, beyond darkened; subcostal veins black; first and second cross veins infuscated. The basal cell of each fore wing contains a conspicuous black, longitudinal mark, with the posterior portion of the cell nearly clear. The flaps of both fore and hind wings are grayish in color. Beneath light straw-colored, with what dark margins there are about the head, nearly concealed by pruinose. The transverse rugæ are orange with the sides black and the hollows well filled with white silken hairs. There are also many hairs in the rather shallow median sulcus, and longer ones under the eyes. The legs are straw-colored, inconspicuously touched and lined with black. The opercula, straw-colored with the extremities rounded and the inner margins



Tibicen inauditus.

not overlapping. The last ventral segment slightly truncate at extremity. The valve also straw-colored. The external parts of the genitalia nearly all black.

MEASUREMENTS (IN MILLIMETERS).

	Male Type
Length of body	23
Width of head across eyes	9
Expanse of fore wings	67
Greatest width of operculum	5
Greatest length of operculum	5

In addition to the type, two other males were collected by Miss Mildred McGill during an automobile trip. She writes as follows: "They were collected close to the Ozark Trail, which leads through Glenrio, Tex., to Las Vegas, N. M. As you know it is mostly planes in this part of the country and it was in what is called the Cap Rocks which are pretty high and except for grass are barren on top. But

in the canyons there are large cottonwood and hackberry trees and grape vines. Along the rough, rugged sides of the canyon are cedars and small bushes, that are called here skunk bushes, and soap-weeds, or bear grass. It was on these small bushes and bear grass that I captured the cicadas. It was about 2.30 or 3 P. M. I located them by their singing, which was very shrill."

Tibicen species?

Black Canyon near Bumble Bee, Arizona, July 30, 1917, female (H. H. K.). I have no male with which to compare this specimen, and it is therefore doubtfully placed, but it resembles *Tibicen inauditus*, though larger.

Tibicen duryi new species.

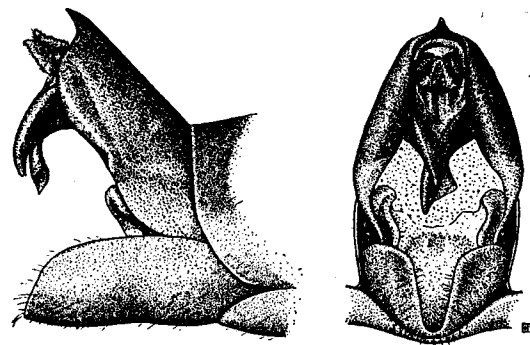
Type male, Jemez Springs, New Mexico, 7,000 ft., June 27, 1917 (John Woodgate). Davis collection.

Allotype female, Box Canyon, Grant County, June, 1912 (Charles Dury). Davis collection.

A black and reddish species much resembling an *Okanagana* in coloring, especially when the wings are closed. The head at the eyes not much broader than the front margin of the pronotum.

Head above black with the following marks deep orange in color: a spot on front, a somewhat triangularly shaped one just behind this, one above each antenna, and one irregular spot each side of the ocelli at the back of the head extending to back of the eyes. Pronotum black margined with orange, and slightly broader so on the posterior margin than on the anterior and sides. The tops of the raised portions occupying the central part of the pronotum are deep orange-colored and darker than the margins. Mesonotum black with a pruinose spot each side near the anterior margin (sometimes nearly obliterated), and a pruinose stripe each side near the base of the wings. The hind margin, the elevated portion of the X, two spots at the extremities of the X, and four spots (two inner curved) beyond the depression, orange. Tergum black with two pruinose spots at the base, one large one each side below the tympanum on the third segment, and also more or less conspicuously pruinose on the eighth segment. The posterior margins of all of the segments, except the first and second, narrowly lined with red, which is conspicuously broadened on the eighth segment of the female. The female from Fort Grant, Arizona, has a blacker dorsum, but the hind margin of the eighth segment is conspicuously red. Fore wing with the costal margin straw-colored to the end of the wing; subcostal vein black; first and second cross veins infuscated. The basal cell of each fore wing with about the outer half conspicuously blackened; more clear at base. The wings are red at base, including the flaps of both the fore and hind pair. There are

also some conspicuous black markings interspersed with the red at the base of the wings. Beneath orange, with what dark markings there are about the head nearly concealed by pruinose and silvery hairs. The transverse rugæ are black; the legs are orange conspicuously streaked with black. The



Tibicen duryi.

opercula orange, with the extremities rounded and the inner margins overlapping. The last ventral segment orange, narrowed and somewhat rounded at the extremity. The valve also orange-colored. The external parts of the genitalia nearly all black.

MEASUREMENTS (IN MILLIMETERS).

	Male Type.	Fe	Allotype
Length of body	28.		26.
Width of head across eyes	10.		9.5
Expanse of fore wings	73.		74.
Greatest width of fore wing	11.5		11.5
Greatest width of operculum	6.		
Greatest length of operculum	6.		

In addition to the type and allotype the following specimens have been examined:

Jemez Springs, New Mexico, July 12, 1916, 7,500 ft., female; June 15, 1917, 7,000 ft., female; July 22, 1917, 6,400 ft., male, all collected by John Woodgate. Post Creek Canyon, Fort Grant, Arizona, July 17, 1917, female (Dr. Joseph Bequaert). This last is a large specimen with wings expanding 82 millimeters. All of the above are in the author's collection.

Though this cicada resembles *Tibicen townsendi* and *Tibicen bifida*, the opercula are not as long as in either of those species, the

front is not as prominent as in *townsendi* and the genitalia differ. See illustrations in JOURNAL N. Y. ENTO. Soc., March, 1916.

Mr. Charles Dury, of Cincinnati, Ohio, who has sent me many insects, presented me with my first specimen a number of years ago, and I take pleasure in naming the species in honor of my friend.

Tibicen castanea Davis.

Bonita, Arizona, Pinaleno Mts., July 16, 1917, five males (H. H. K.). Post Creek Canyon, Fort Grant, Arizona, July 17, 1917, female (J. B.).

This species was described from Arizona in the JOURNAL N. Y. ENTOMOLOGICAL SOCIETY for March, 1916, where illustrations will be found.

Tibicen knighti new species.

Type male from Santa Catalina Mts., Tucson, Arizona, July 23, 1917 (Harry H. Knight). Davis collection.

Head above black with a dark yellowish spot each side between the antenna and the eye and an irregular one each side of the ocelli at the back of the head and extending to back of the eye. Pronotum blackish, shining, with the posterior marginal band olive colored, the band extending along the sides to the anterior angles, the posterior angles of the pronotum, however, are fuscous. Mesonotum shining chocolate-colored, the elevated \times olive,



Tibicen knighti.

and the sides of that color also to the base of the fore wings where there is an orange spot seen only when the insect is expanded. The outer sides of the W-mark are faintly outlined in part with olive. Tergum shining, the tympanal areas rather conspicuous and chocolate-colored. The succeeding segments blacker with the posterior margins faintly chocolate-colored. Last segment with a pruinose spot each side, and more conspicuously chocolate-colored than segments three to seven. Fore wing with the costal margin yellowish to the end of the radial cell, darker beyond; subcostal vein black;

first and second cross veins slightly infuscated. The basal cell of each fore wing nearly clear, but blackened along the anterior margin. The flaps of both fore and hind wings are gray in color. Beneath pruinose, black about the eyes, where there are some long, silken, white hairs. The transverse rugæ are yellowish and somewhat blackened where they join the shallow frontal sulcus. The legs are chocolate-colored with lighter spots and dashes, the hind pair being lighter colored than the other two pair. The opercula are pruinose, the lower extremities of the inner margins not quite touching, and the ends rounded. The ventral segments are dark chocolate-colored, central ones being lighter posteriorly. The last segment is rounded at the extremity and the valve is black. The external parts of the genitalia chocolate-colored and black.

MEASUREMENTS (IN MILLIMETERS).

	Male Type
Length of body	24.
Width of head across eyes	9.5
Expanse of fore wings	70.
Greatest width of operculum	5.
Greatest length of operculum	4.5

In addition to the type four other males were collected on rocky slopes at the same time and place. Mr. Knight says: "This form has a most unusual song; resembles loud rasping of an Acridid grasshopper; rasps and intervals about equal." This species resembles in form, in color, and in shining appearance the much smaller *Tibicen arizona* from the Santa Rita Mts., Arizona, described and figured in the JOURNAL N. Y. ENTO. Soc., March, 1916. It also resembles somewhat in form, though not in color, the figure of *Cicada psophis* in Biol. Centr.-Amer., but it does not agree with Walker's original description.

I take great pleasure in naming this insect after Mr. Harry H. Knight, who spent much time in collecting cicadas for me, as the records in this paper will attest, and who has also sent to me many other specimens on former occasions.

Tibicen delicata Osborn.

Laguna, Texas, Nueces River, July 2, 1917, on *Bignonia*, the desert willow, 5 males, 1 female, and Sheffield, Texas, Pecos River, July 4, 1917, all collected by Mr. Knight.

This species was figured on plate VI, fig. 2, JOURNAL N. Y. ENTO. Soc., March, 1916, the illustration being made from one of the type

specimens sent to me by Prof. Osborn. The seven individuals here recorded differ from this typical male, and also from the sixteen specimens in the author's collection, in having about the apical fourth of each fore wing more smoky than usual.

Tibicen cinctifera Uhler.

Florence, Arizona, July 29, 1917, fifty-seven males, fourteen females (H. H. K. and J. B.); Black Canyon, Bumble Bee, Arizona, July 31, 1917, male (H. H. K.); Tempe, Arizona, August 1, 1917, four males, two females (J. B.). Grand Canyon, Arizona, Lower Bright Angel trail, August 2, 1917, three males (H. H. K.); Buckeye, Arizona, August 7, 1917, six males, twenty-one females, on poplars along irrigation ditch (H. H. K. and J. B.); Palomas, Arizona, August 8, 1917, three males (H. H. K.). Mr. Knight says of those from Florence: "On mesquite, song continuous, even toned, moderately shrill note."

The above records cover the specimens with the hind margin of the pronotum broadly banded with straw color or greenish, and the costal margin of the fore wing to the end of the radial cell also light colored. There is, however, a variety of a much darker orange color with the hind margin of the pronotum more narrowly banded with orange. For this variety we have the following records:

Del Rio, Texas, Devil's River, July 3, 1917, male; Bonita, Arizona, July 16, 1917, and Tucson, Arizona, Sabin's Canyon, Santa Catalina Mts., July 23, 1917, all collected by Mr. Knight, who states on one of the labels that "this form has a continuous song."

Tibicen viridifascia Walker var. *bequaerti* new variety.

The reasons for believing that Uhler's *Cicada reperta* is a synonym of *Cicada viridifascia* Walker are given on page 58, JOURNAL N. Y. ENTOM. SOC., March, 1916.

On August 10, 1916, the author collected a *Tibicen viridifascia*, and heard many more singing at Ft. Monroe, Va., the most northern locality so far known for the species. Southward from Virginia we have numerous records and specimens from along the Atlantic coast to Big Pine Key, Florida. Some of these specimens have been compared with Uhler's *reperta* in his collection in the U. S. Nat. Museum, and found to be the same.

From the Gulf coast of Florida we have seen a female collected at

Carrabelle, August 9, 1903, in the collection of Prof. Albert P. Morse. In the author's collection are the following: Baldwin Co., Alabama, July 8, 1917, male collected "in a cypress on the beach by the bay" (H. P. Loding); Ship Island, Miss., August 24, 1915, female (Rehn and Hebard); Mandeville, La., June, 1916, female (H. Edw. Hubert); Timbalier Island, Terre Bonne Co., La., August 12, 1917, two males captured among the black mangroves, *Avicennia nitida* (E. C. Wurzelow). In Texas Mr. Knight collected at Richmond, June 23, 1917, five males, and at Wharton, June 24, 1917, four males. These places are about fifty miles from the coast.

The twenty-five specimens in the author's collection of Uhler's *reperta*, or *viridifascia* Walker, as we think it should be called, from the Atlantic coast, differ in markings from those from the Gulf coast, and still more so from those from Texas. The Atlantic coast specimens are darker with the venation largely orange in color, the disk of the pronotum is black with the elevated portions fulvous as described by Uhler, and the collar, or hind margin of the pronotum, is yellowish, or greenish, in some individuals. The w-mark has the lower extremities of the w quite rounded. The tergum is dark, in most of the twenty-five specimens of a chocolate color. There is the dark area in the basal cell, as described by Uhler.

The specimens from the Gulf coast so far examined are much lighter in color, the disk of the pronotum is not as conspicuously blackened especially along the front margin of the collar; the w-mark has the lower extremities of the w more pointed, and the tergum is more tawny. The nine specimens from Texas are marked like those from along the Gulf coast, the basal cell in the fore wing, however, is clear, slightly touched with black along the fore margin, and the eyes are more prominent than in specimens from the Atlantic coast. The genitalia appear to be alike in all of the specimens. Some of the features mentioned may be seen by a comparison of the figures given on the accompanying plate. We consider that the Gulf coast and especially the Texas examples, constitute a variety for which we propose the name *bequaerti*. As the type of this variety a male from Richmond, Texas, June 23, 1917, has been selected, and is shown on the plate at fig. 6. The male *viridifascia* figured, came from Beaufort, North Carolina.

Tibicen azteca Kirk. (*pallida* Distant, preoccupied).

Sutherland Springs, Texas, June 26, 1917, male (H. H. K.).

In the collection of the U. S. National Museum there are three Texas specimens that have been identified as *pallida*, and from the description of the species and figure in *Biologia Centrali-Americana*, the determination is probably correct. We figure one of the National Museum specimens. In addition to the above we can add the following records:

Wichita Falls, Texas, August 16, 1905, female (Prof. A. P. Morse); Foss, Oklahoma, July, 1916, twelve males (Miss Anna Bennett). Miss Bennett writes as follows concerning those she collected: "Found generally in the wheat and oats stubble, but some were found on trees, weeds and bushes. They sing continually, but are quite hard to locate because of their color. I believe we found most of them in the open away from the creeks and canyons."

Tibicen eugraphica Davis.

Fort Stockton, Texas, July 5, 1917, eleven males, one female (H. H. K. and J. B.); Chancellor Station, Pecos Co., Texas, July 5, 1917 (H. H. K.); Fabens, Texas, July 9, 1917, four males (J. B.), two males, two females on screw bean (H. H. K.); Mesilla Park, New Mexico, July 11, eight males, two females on edge of desert on mesquite (H. H. K.); Mesilla Park, N. Mex., July 12, five males (J. B.); Aden, N. Mex., July 12, 1917, nine males on desert (H. H. K.); Steins, N. Mex., July 14, 1917, male (J. B.); Aqua Caliente, Arizona, August 7, 1917, two males, one female (J. B.).

The following interesting record may be added to the above: Barber Co., Kansas, 1,468 ft., July 19-21, 1916, eighty males and eleven females (R. H. Beamer). Collection University of Kansas. None in this long series show any indication of green coloring. In Barber Co., *eugraphica* and what I have identified as *vitripennis* Say, occur together. Say mentions green coloring in *vitripennis*, which is true of those from Barber Co., Kans., as well as those from further north and south. *Vitripennis* is proportionally a longer-winged species. *Tibicen eugraphica* was described and figured in the JOURNAL N. Y. ENTO. SOCIETY, March, 1916.

Cacama valvata Uhler.

Comstock, Texas, July 3, 1917, male (H. H. K.).

Proarna venosa Uhler.

New Braunfels, Texas, June 27, 1917, three males (H. H. K.); Comstock, Texas, July 3, 1917, eleven males, two females (H. H. K.); Juno, Texas, July 3, 1917, four males (H. H. K.); Pecos River, Sheffield, Texas, July 4, 1917, two males (H. H. K.); Fort Stockton, Texas, July 5, 1917, one male (J. B.). Alamogordo, N. Mex., July 1, 1917, three males (Prof. Wm. M. Wheeler); Aden, N. Mex., July 12, 1917, sixty-six males and seven females "on desert grass" (H. H. K.); Steins, N. Mex., July 14, 1917, one male, one female (H. H. K.).

Pacarina signifera Walker.

Victoria, Texas, June 25, 1917, three males, two females (H. H. K.); Gillette, Texas, June 26, 1917, twenty males and two females on *Prosopis glandulosa* (H. H. K.); Sutherland Springs, Texas, June 26, 1917, four males, two females (H. H. K.); Sabine, Texas, July 1, 1917, at light (J. B.).

The specimens here recorded have been usually identified in the U. S. Nat. Museum and elsewhere, as *Pacarina signifera* Walker, but we are by no means sure that this is correct.

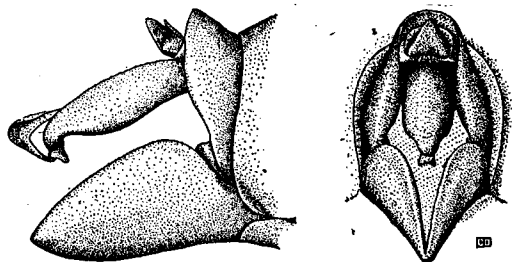
To the foregoing descriptions it may be well to add one of a new species of *Okanagana* from California.

Okanagana pallidula new species.

Type male, Athlone, Merced County, California, August 3, 1917 (Alonzo C. Davis). Wm. T. Davis collection.

A yellowish insect, almost unicolorous, with the membrane or flaps at the base of the wings orange. There are two dark spots, one on either side, on the metanotum, and there are faint indications of darker markings in some of the paratypes, but nothing constant. Some of the specimens are greenish yellow (the type is yellowish), and one shows two minute dark dots centrally near the hind margin of the pronotum; also two dark spots are included in the outlined W-mark on the mesonotum. The costal margin of the fore wings, beyond the radial cell, is also generally darkened. Beneath there is a central dark spot at the base of the abdomen, and some dark dots about the base of the legs. In structure the conspicuous feature as seen from above is the cone-like projection of the front, which is more prominent than in either *Okanagana californicus* or *Okanagana vanduzeei* which are

also more hairy beneath. The front of the head is shaped about as in *O. striatipes* from Utah, except that it is even more produced. The basal cell in the fore wing is about as long but narrower than in that species, and the eyes are less prominent. The uncus when viewed in profile is hooked at the extremity as shown in the illustration.



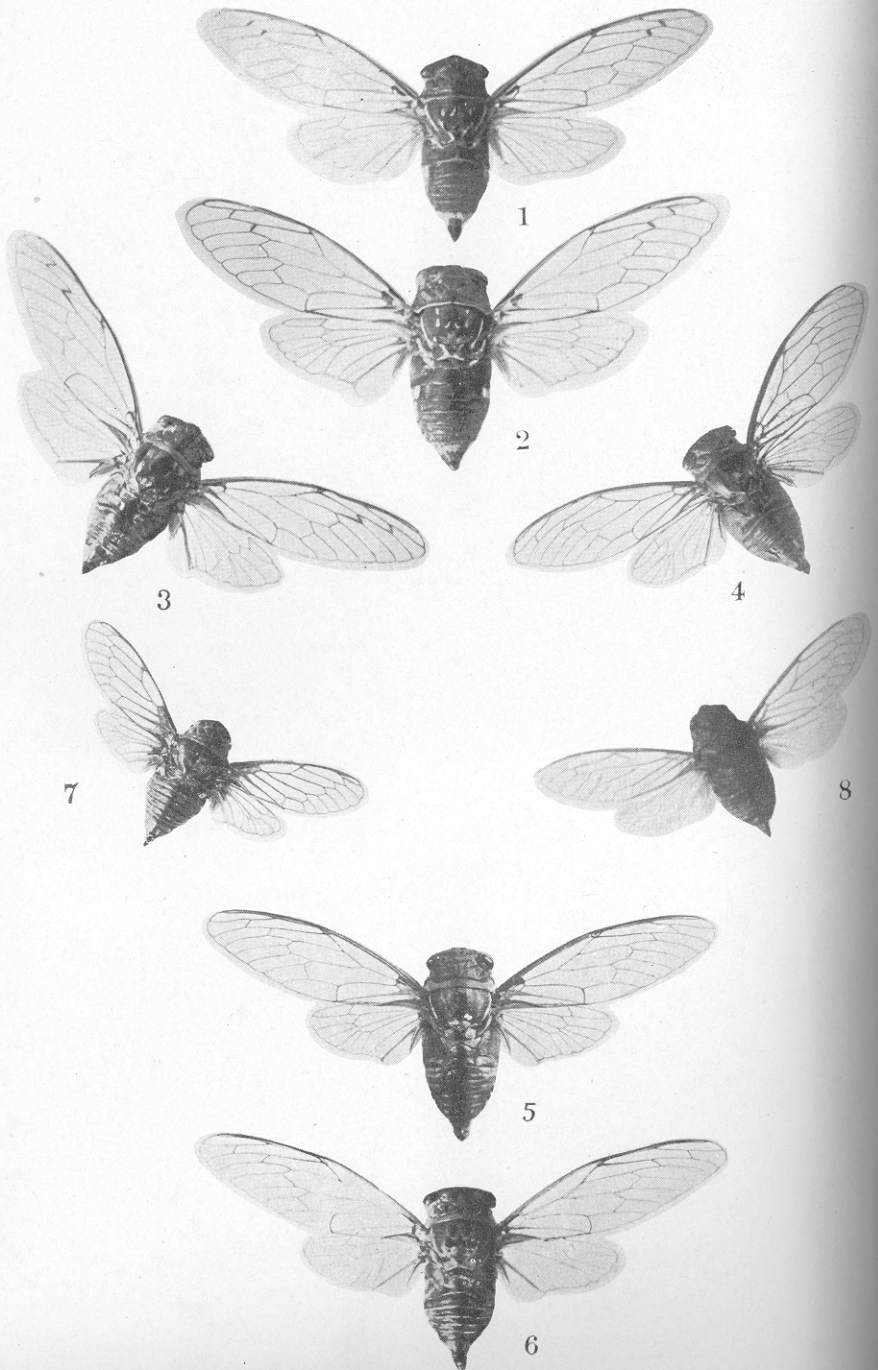
Okanagana pallidula

MEASUREMENTS (IN MILLIMETERS).

	Male Type
Length of body	19
Width of head across eyes	6
Expanse of fore wings	52
Greatest width of fore wing	8
Greatest width of operculum	3
Length of valve	3

In addition to the type the following specimens have been examined, all males and collected at Athlone, Merced County, California, in 1917 by Alonzo C. Davis, who says that they "make a zeeee" noise: July 18, one; July 19, one; July 22, two; July 23, three, one greenish individual "singing with his head out of a hole" in the ground; August 12, two.

At first sight the individuals of this species appear to be immature, but as they were captured while singing that supposition is disposed of, and further structural characters separate *pallidula* from its most closely related congeners. While *Okanagana mercedita* Davis, and the nearly related *Okanagana uncinata* Van D., have the front of about the same shape and the uncus hooked, they are much smaller and the venation is also quite different. In those species the radial cell has the front and hind margin more parallel, and the median cell is differently shaped, as may be seen by comparing the figures of



Cicadidæ.

Okanagana uncinata and *Okanagana pallidula* on the accompanying plate. *O. mercedita* was figured, JOURNAL N. Y. ENTO. SOC., Vol. XXIII, pl. 3, and through the kindness of Mr. Edw. P. Van Duzee I am now able to figure the type of his *uncinata*.

EXPLANATION OF PLATE XIII.¹

- Fig. 1. *Tibicen inauditus* Davis. Type.
- Fig. 2. *Tibicen duryi* Davis. Type.
- Fig. 3. *Tibicen knighti* Davis. Type.
- Fig. 4. *Tibicen pallida* Distant.
- Fig. 5. *Tibicen viridifascia* Walker (*reperta* Uhler).
- Fig. 6. *Tibicen viridifascia* Walker var. *bequaerti* Davis.
- Fig. 7. *Okanagana uncinata* Van Duzee. Type.
- Fig. 8. *Okanagana pallidula* Davis. Type.

¹ The drawings for this paper were made by Mr. Chris E. Olsen, and the photographs, from which the plate was made, by Mr. H. H. Cleaves and the author.
