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THE DISTRIBUTION OF CICADAS IN THE UNITED STATES WITH DESCRIPTIONS OF NEW SPECIES

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In North America north of Mexico one hundred and forty named forms of cicadas are now known to occur of which about one hundred and twenty-seven may be considered species, though some of the others will likely be so regarded in the future. The best known of the number is the famous *Magicicada septendecim* L., which, with the race *tredecim* Riley, and the smaller form *cassinii* Fisher, occurs from the New England and South Atlantic States westward to the eastern part of Nebraska, Kansas, Oklahoma and Texas.

Of the large cicadas of the genus *Tibicen,* the usual coloring of which is black and green, fifteen species inhabit the eastern half of the United States and no member of the genus has so far been recorded from the states bordering the Pacific. *Tibicen canicularis* Harris, that extends from Nova Scotia to Manitoba and the mountains of Colorado, has thus a wide distribution in the north, while further south and occupying the territory from the New England States to Florida and westward to about the 100th meridian, the most wide-spread species are *linnei* S. & G., *chloromera* Walker, *lyricen* De Geer, and *auletes* Germar, this last being one of our largest cicadas. *Tibicen similaris* S. & G. appears to be confined to the southeastern states from Virginia to Louisiana, and is usually found in the lowland; *figurata* Walker, occurs from Arkansas and Tennessee south to Louisiana and Florida; *resonans* Walker, occurs from North Carolina to Florida, Louisiana and Kansas, though there are several gaps, such as Arkansas and Oklahoma; *davisi* S. & G., occurs in all the coast states from New Jersey to Mississippi and northward to Arkansas. The beautifully marked *latifasciata* Davis, occurs along the coast from New Jersey to North Carolina and probably to the

Gulf of Mexico; *winnemanna* Davis, is more of an inland species and occurs from Pennsylvania to Illinois and south to Alabama and Georgia, while *robinsoniana* Davis, occurs from Virginia westward to Missouri. In the general region of the Mississippi and its tributaries, are found *Tibicen pruinosa* Say, *T. aurifera* Say, and *T. superba* Fitch, the last being a unique species mostly green in color.

A different group of *Tibicen* that average somewhat larger than the fifteen species just mentioned, are the five that have, except in rare variations, the mesonotum decorated with two pipe-shaped marks that have been likened to the Hebrew letter resh inverted. They also pretty regularly have a dorsal row of spots on the abdomen. Of such species are *marginalis* Walker, and *resh* Haldeman, that occur in the central part of the United States and reach the Gulf of Mexico to the south; *dorsata* Say, that is slightly more western in distribution, and occurs southward to Texas; *dealbata* Davis, still more western, occurs from Montana and North Dakota southward to New Mexico and Texas, and lastly *cultriformis*, Davis, a large species, that thus far is known only from eastern Arizona.

The remaining eight species of *Tibicen*, namely *inauditus* Davis, *tigrina* Davis, *townsendi* Uhler, *bifida* Davis, *duryi* Davis, *parallela* Davis, *chiricahua* Davis, and *longiopercula* Davis, are all confined to the southwestern states, and are smaller than the five just considered. The first five of this group are known to reach Texas on the east; *parallela* and *chiricahua* are recorded from New Mexico and Arizona, while *longiopercula* is known only from Arizona. It is among these last mentioned insects, which in most of the species have the sides of the body conspicuously parallel to each other, especially in the males, and which are also generally black with orange or reddish markings, that the greatest resemblance occurs to *plebeja* Scopoli of the old world, the type of the genus *Tibicen*.

The seventeen species of *Diceroprocta*, with the exception of *viridifascia* and *vitripennis*, are confined to the southern states, many of them extending into Mexico. *Diceroprocta viridifascia* Walker, *olympusa* Walker, *marevagans* Davis, and *bicornica* Walker, are found along the Atlantic coast, or that of the Gulf

of Mexico; *cinctifera* Uhler, *vitripennis* Say, *bequaerti* Davis, *texana* Davis, *bibbyi* Davis, *delicata* Osborn, and *azteca* Kirkaldy, occupy the general region of the Mississippi or some part of Texas, with an extension westward along the Rio Grande of *cinctifera; arizona* Davis, *knighti* Davis, *swalei* Distant, *semicincta* Davis, *apache* Davis, and *eugraphica* Davis, occur west of the 100th meridian, except for the slight extension eastward of the last mentioned species.

In the genus *Cacama* there are five species sometimes called "Cactus Dodgers" from their habit of hiding behind the broad parts of these spiny plants upon the approach of danger. All of the species inhabit the southwestern states, often extending into Mexico, where there are at least four additional species of the genus. *Cacama valvata* Uhler, *variegata* Davis, and *dissimilis* Distant, reach as far eastward as Texas, while *californica* Davis, and *crepitans* Van Duzee, have thus far not been recorded east of southern California.

Cicada hieroglyphica Say, occurs from Long Island, N. Y., to Florida and westward to Kansas and Oklahoma; *Cicada chisos* Davis, has been reported from Texas and Mexico. *Proarna venosa* Uhler, occurs from Nebraska and Colorado southward into Arizona and Texas; *Pacarina puella* Davis, in Louisiana, Oklahoma, Arizona and Texas southward into Mexico, while *Tettigades mexicana* Distant, extends northward from Mexico into Cochise County, Arizona, from which locality several specimens have been recorded.

The famous *Quesada gigas* Olivier, with its shrill song sometimes likened to a steam whistle, extends from southern Texas southward to Argentina, South America. It is known as the "Soup Bug," because about sun-down, when it is active and noisy, it sometimes flies to light, and lands among the supper dishes.

Up to this point we have in a general way considered the distribution in the United States of about fifty-seven species belonging to nine genera, the males of which can protrude the uncus from, or withdraw it into the abdomen. In the genera *Okanagana, Tibicinoides, Okanagodes, Clidophleps, Platypedia* and *Neoplaytpedia* the uncus cannot be withdrawn to like extent by

the males into the abdomen, and is protected by being dropped into the valve or hypandrium. This character furnishes an easy method of separating the genera of North American Cicadas into two series. The genus *Melampsalta,* in which the uncus can be withdrawn into the abdomen, is generally placed at the end of the series, on account of venational characters, but it probably would be better placed near *Proarna* and *Pacarina.*

Okanagana rimosa Say, has the greatest known east and west distribution of any cicada in North America. It occurs from Nova Scotia to British Columbia and south to New York, Pennsylvania and Nevada. *Okanagana canadensis* Provancher, occurs from New Brunswick to Alberta and southward to New York, Pennsylvania and Colorado. *Okanagana balli* Davis, is a species sometimes common in Iowa and neighboring states, and as far west as Kansas and Montana; *synodica* Say and *hesperia* Uhler, occur from Montana and Kansas westward to the Rocky Mountains and southward to Utah, Arizona and Texas, while *Okanagana viridis* Davis, the only species so far known from the southeastern states, occurs in Mississippi, Arkansas and Tennessee. *Okanagana bella* Davis, has a wide distribution, occurring from Alberta, Kansas, New Mexico and Utah westward to California and British Columbia; *O. occidentalis* Walker, is slightly more northern in its distribution, occurring from Montana and Manitoba to British Columbia and the mountains of California. The remaining thirty-two species are to be found west of the Rocky Mountains, and no less than twenty-two species of the genus are known to be natives of California.

Of *Tibicinoides,* with proportionally shorter marginal areas in the fore wings than in *Okanagana,* there are three species, namely *cupro-sparsus* Uhler, *mercedita* Davis, and *minuta* Davis, all of which are so far known only from California.

The pale colored *Okanagodes gracilis* Davis, is found in California, Arizona and Utah. The uncus in this prominent-eyed species, with a narrow pronotum, is shaped as in *Clidophleps,* though in venational characters it resembles *Okanagana,* except that it usually has five marginal areas in the hind wing instead of six.

As far as at present known *Clidophleps wrighti* Davis, *blaisdelli* Uhler, *distanti* Van Duzee, *pallida* Van Duzee, *vagans* Davis, *tenuis* Davis, are confined to the state of California, while *astigma* Davis, occurs over the line in Lower California.

The next genus is *Platypedia,* and so far all the records are from west of the Mississippi. There are twelve known species and three that are here recorded as geographic races of *putnami,* but which may be species. The forms are as follows: *mohavensis* Davis, from Colorado, New Mexico, Arizona and Utah; *areolata* Uhler, Montana, Idaho, Utah, British Columbia, Washington, Oregon, California; *falcata* Davis, western Texas near the Rio Grande; *latipennis* Davis, Colorado; *putnami* Uhler, Nebraska, Colorado, Utah, New Mexico, Nevada, California; race *occidentalis* Davis, California, race *lutea* Davis, South Dakota, Montana, Utah to Arizona; race *keddiensis* Davis, California, Oregon; *vanduzeei* Davis, California, Nevada; *minor* Uhler, California, Nevada, Colorado; and *rufipes* Davis, *similis* Davis, *aperta* Van Duzee, *laticapitata* Davis and *barbata* Davis, all from California.

Neoplatypedia, in which the costal margins of the fore wings are suddenly bent and the end of the uncus upturned, is represented by two species, *ampliata* Van Duzee, found in Oregon and California, and *constricta* Davis, from Colorado, Utah, Arizona, Idaho and California.

It has already been stated that the genus *Melampsalta* might be placed to advantage near *Proarna* and *Pacarina,* or at least preceding *Okanagana,* instead of being at the end of the series. This large genus of many species is represented in North America, as far as known, by the following: *Melampsalta calliope* Walker, from Virginia to Georgia and westward to Colorado and Texas; variety *floridensis* Davis, in Georgia and Florida; *kansa* Davis, from Kansas, Colorado, Oklahoma and Texas, and *camerona* Davis, from southeastern Texas.

All the cicadas here mentioned have been considered in papers appearing in this JOURNAL since March, 1915. At that time very little could have been written concerning the distribution of the species, a great many of which were unknown. In a few years it is hoped that a satisfactory annotated list of the North American cicadas can be made, that will give in more de-

tail the distribution of the species of which we have here attempted a brief outline.

For the specimens upon which the following notes are based, the writer is chiefly indebted to Dr. Raymond H. Beamer and the University of Kansas. Dr. Beamer sent me for examination nearly nine hundred specimens during 1929. Mr. George P. Engelhardt has collected many during his travels in the western states, while I am also indebted to Dr. John W. Sugden, of Salt Lake City, Prof. Vasco M. Tanner, of Provo, Utah, and to Mr. H. B. Parks, of San Antonio, Texas. Mr. Howard H. Cleaves, of Staten Island, has collected many cicadas for me in the past and secured the Grand Cayman Island specimen while on the "Pinchot South Seas Expedition of 1929." Mr. W. E. China has, as usual, been very kind in making comparisons in the collection of the British Museum.

Tibicen robinsoniana Davis.

Originally described from Virginia in this JOURNAL for March, 1922, this species was recorded from Missouri in the March, 1923, number, page 7, and from Tennessee in the June, 1926, number, page 177. On the fourth of September, 1928, Mr. A. E. Brower collected a male at Forsyth, Missouri, which he has kindly presented to me.

Tibicen resh Haldeman.

In 1853 Prof. S. S. Haldeman described this species from Utah, as noted in this JOURNAL for 1915 and 1918, where some account of it will be found. It received its specific name because the spots on the mesonotum are shaped like the Hebrew letter resh but inverted. Several other species of cicadas, notably *marginales, dorsata dealbata,* and *cultriformis,* also have the inverted resh marks on the mesonotum. Several hundred specimens of *resh* have been examined and almost without exception the resh marks are present.

In 1916 Dr. R. H. Beamer kindly let me examine eleven males and nineteen females that were very dark in color, collected in Elk County, Kansas, in August of that year. One of these, a female, was without any sign of the usual resh marks on the mesonotum. In 1921, Miss M. McGill sent me two males collected at Sulphur, Oklahoma, in July, 1921, that were without the resh marks, and in 1923 Beamer and Lawson collected a number of *resh* in southeastern Kansas in July and August, among them several very dark individuals. A female from Wilson County, Kansas, August 2, 1823, is without the resh marks on the mesonotum.

While Prof. Haldeman thought the cicada he described was collected in Utah by the Stansbury expedition, it probably came from Texas along with some of his other specimens. *Tibicen resh* is known to occur in Alabama, Mississippi, Louisiana, Missouri, Kansas, Oklahoma and Texas, in which last state it is at times very common, but no specimens have been examined from Utah, and Dr. John W. Sugden, of Salt Lake City, has so far been unable to find it, or any of its immediate allies near that city. *Tibicen dorsata* Say, and *Tibicen dealbata* Davis, reach the Rocky Mountains and may ultimately be found in Utah, for they have even a more westerly distribution than *Tibicen resh* is known to have at present.

Mr. Perry A. Glick has kindly sent me a male *resh* taken in the Glick Airplane Insect Trap at Tallulah, La., August 30, 1926, at 7:30 P. M., elevation 200 feet. In 1922, and again in 1923, Miss Louise Knobel collected this species at Hope, Arkansas, chiefly in July and August, at light. Some came to a light trap near woods, one, a male, as late as September 6, 1922.

Tibicen inauditus Davis.

This species was described and figured in this JOURNAL for December, 1917, from northwestern Texas, and further records were given in this JOURNAL for 1926, page 179, and 1927, page 376. A male has been received from the Chisos Mountains, Brewster County, southwestern Texas, collected June 22, 1929. The species is now known from Texas, New Mexico, and Oklahoma.

Tibicen duryi Davis.

This gayly colored and hansome species has been recorded in this JOURNAL for December, 1917, and March, 1921, from Colorado, New Mexico and Arizona. It also occurs in Texas and Utah as appears from the following records: Davis Mountains, Jeff Davis County, 8,000 feet, Texas, five males and one female, June 20, 1928 (O. C. Poling). Chisos Mountains, Brewster County, 7,000 feet, Texas, male and female, June, 1929, and Boquillas, Brewster County, Texas, two females, June 24, 1929 (H. B. Parks). St. George, Utah, 1928 (Dr. John W. Sugden collection); Zion National Park, Utah, August 12, 1929, two males, one female (Dr. Raymond H. Beamer, University of Kansas).

Dr. Beamer also collected *duryi* in Coconino County, Arizona, and in McKinley County, New Mexico, in June and July, 1929, while Mr. George P. Engelhardt collected a male at Estancia, Torrance County, New Mexico, July 8, 1929. An additional Colorado record is a male from Fremont County, 1913 (J. Sinden).

Diceroprocta cinctifera Uhler, variety viridicosta. New var., Pl. VIII, fig. 1.

Type male and female allotype from Hidalgo County, Texas, August 14, 1928 (Dr. Raymond H. Beamer). Collection University of Kansas.

Diceroprocta cinctifera Uhler, was originally described from New Mexico, and it and nearly related forms are described in this JOURNAL for March, 1921; March, 1925, and December, 1928. Tables have been given for their separation, and of *cinctifera* Uhler it was stated that the opercula have the outer edges nearly parallel to each other; 8th segment and middle base of tergum pruinose. It may be added that the dark stripe running lengthwise of the abdomen beneath, is bounded each side in the male by nearly parallel pruinose areas, which do not occur in *apache*. In typical *cinctifera* the costal margin of the fore wings is colored bright orange to the end of the radial cell.

Numerous typical specimens having these characters have been examined from Bernalillo County, New Mexico, also from Dona Ana County, New Mexico, the type locality, and from along the Rio Grande in Texas from El Paso, Presidio, Castolon, Boquillas, Del Rio, and to Eagle Pass in Maverick County, in all a distance of about six hundred and fifty miles. In sending six males and one female collected at Boquillas, 750 feet, Brewster Co., June 24, 1929, Mr. H. B. Parks wrote that the cicadas emerged from the narrow river bank on the north side of the Rio Grande, and that the willows along the river were white with the cast shells of the pupæ.

Below Eagle Pass the altitude is about six hundred feet or less, and all the way to the coast, a distance of about three hundred miles, there is found a variety of *cinctifera* that owing to its great difference in color appears like a distinct species. It is, however, a variety or geographic race, with the collar green or greenish, the costal margin of the front wings green to the end of the radial cell, the subcostal vein almost black and the anal areas of all of the wings in part pale gray or straw-colored. In typical *cinctifera* the collar and front margins of the fore wings are conspicuously bright orange in color, as has been stated. The typical form and the race are alike in having the same areas pruinose.

We propose for this variety, or geographic race, the name of *viridicosta*. Numerous examples of this form were collected by Dr. Raymond H. Beamer and his associates from the University of Kansas, in July and August, 1928, as follows: Hidalgo County, thirty-one males and four females; Starr County, one male, and Cameron County one male. Other specimens have been examined, and we have a *viridicosta* labeled Eagle Pass, and also a *cinctifera* supposed to be from the same locality.

Diceroprocta cleavesi new species. (Pl. VIII, Figs. 2–3.)

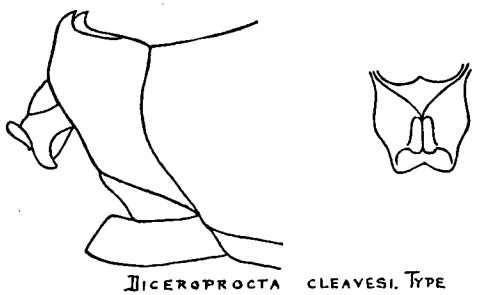
Type male from Grand Cayman Island, British West Indies, April 17, 1929 (Howard H. Cleaves collector). Davis collection.

Resembles *Diceroprocta bonhotei* Distant, from the Bahamas, but differs in having the opercula with the outer sides more nearly parallel to each other, and in the pattern of the pruinose areas. It still more closely resembles *Diceroprocta biconica* Walker, of Cuba, but differs in the pruinose areas, and in having the extreme base of both pairs of wings deep orange instead of greenish as in *bonhotei* and *biconica*.

Head with the front produced and eyes prominent, as in *bonhotei* and *biconica*, the black or almost black areas on the head, pronotum and mesonotum also following the same pattern, the collar pale brownish-green. The front margin of the fore wings greenish orange to end of radial cell; deep orange where the wings join the body; inner anal areas smoky gray; marginal areas slightly clouded. Abdomen with the base, sides, and extremity pruinose, leaving centrally an ovoid, brown colored area. Beneath mostly pruinose, with the opercula pale greenish and having the outer sides almost parallel to each other, the extremities not as rounded as in *bonhotei*. The inner basal portions of the opercula just meet whereas in *biconica* and *bonhotei* they usually overlap slightly. Centrally the abdomen is pale brown; pruinose at sides.

MEASUREMENTS IN MILLIMETERS

	Male Type
Length of body	32
Width of head across eyes	13
Expanse of fore wings	95
Greatest width of fore wing	14
Width of opercula at base	8
Greatest length of opercula	9



DICEROPROCTA CLEAVESI. TYPE

A photograph of the specimen here described from Grand Cayman Island, was sent to the British Museum, and comparisons were kindly made by Mr. W. E. China. He wrote that:

"The distribution of the white pruinosity which is well preserved in our specimens is exactly the same as in yours. The dorsal spine at the tip of the abdomen in the female is bent slightly upwards as in *bonhotei*." He found also that the last ventral segment in the female of *cleavesi* had the central notch more deeply cut than in *biconica*. From the drawing kindly furnished by Mr. China, this would also appear to be the case in comparison with *bonhotei*.

In this JOURNAL for December, 1928, there is an account of many of the cicadas belonging to the genus *Diceroprocta* with a table for their determination, and under *Diceroprocta biconica* Walker, is the statement that it is rather poorly figured in "Genera Insectorum," Plate 4, Fig. 24, 1912. This figure we now find represents the pattern of pruinosity found in the Cayman Island species, or sub-species, as will be noted by comparison with the figure of the type here presented, and also as gathered from the notes furnished by Mr. China. In the numerous *bonhotei* examined the pruinose areas have been conspicuous only at the base of the tergum between the tympana, and on the last two segments. In fresh examples of *biconica* from Cuba, the pruinosity is more extended and often includes the terminal half of the tergum, leaving the brown, central area, small, and of irregular shape. In the original description of *biconica* in 1850, Walker states: "Body ferruginous above, tawny and powdered with white beneath, partly covered with pale yellow shining down." This is an accurate enough description for many of the specimens, especially old examples. However, even in rubbed individuals the one-time pruinose areas are usually discernible.

Diceroprocta marevagans Davis. (Pl. VIII, Fig. 4.)

Shortly after the description of this species appeared in this JOURNAL for December, 1928, Dr. Raymond H. Beamer sent me twenty-eight males and sixteen females for examination, collected by himself and associates in southeastern Texas near the coast, in Aransas, Victoria, and Brazoria Counties, from August 6 to 9, 1928. The female from Aransas County here figured

has a shallow notch at the extremity of the last ventral segment, and on each side of the notch the margin of the segment is slightly produced.

Dr. Beamer has also sent two males and one female collected at Tampico, Mexico, by W. F. Lynn, June and July, 1928. This extends the range about four hundred miles to the south.

All of these specimens closely resemble the type; the maculations on the fore wings are also the same.

Diceroprocta bibbyi Davis.

This species was described from seventeen specimens collected near Langtry, Valverde County, Texas, in July, 1928, and was figured in this JOURNAL, December, 1928.

Mr. H. B. Parks has sent me a male collected about one hundred miles further up the Rio Grande in the Chisos Mountains, Brewster County, Texas, June 22, 1929.

Diceroprocta bibbyi may at first sight be confused with *Diceroprocta knighti,* but it has a very differently shaped uncus figured as cited above; the first and second crossveins of the fore wings are unclouded, and in addition its general color is much darker, being almost black instead of chocolate brown.

Cicada chisos Davis.

Since this species was described and figured in this JOURNAL for March, 1916, from Texas specimens taken in June, 1908, and in collection U. S. National Museum, Mr. George P. Engelhardt has collected two males at Alpine, Brewster County, Texas, June 7, 1927, and I have received through Mr. H. B. Parks, twelve males and four females collected in the Chisos Mountains, Texas, June 22, 1929. It also occurs in Mexico.

Okanagana schaefferi sub-species **tanneri,** new sub-species. (Pl. VIII, Fig. 5.)

Type male from Woodside, Utah (James Kartchner), Davis collection, and paratypes in the collection, Brigham Young University, Provo, Utah.

This showy black and pale straw-colored insect resembles *Okanagana schaefferi,* but the color pattern is quite different.

OKANAGANA TANNERI. TYPE

Head narrower than the front margin of the pronotum; front considerably produced and prominent. Median sulcus of the front well defined. Pronotum with the humeral angles rounded, the anterior angles prominent and the sides wavy or uneven and considerably amplified. Last ventral segment with the sides converging toward the extremity, which is more fully rounded out than in *gibbera,* where it is often shallowly notched, and than in most specimens of *schaefferi,* where it is somewhat truncate. Uncus black with a pale dorsal line. When viewed from behind, with a shallow notch at the extremity. The valve extends slightly beyond the uncus, and is pale straw colored. Fore wings moderately broad, and about as in *schaefferi,* with the costal margin pale straw colored almost to the end of the wings, where it is slightly darkened. Basal cell opaque with the surrounding veins pale, causing the central dark portion to be, by contrast, even more conspicuous. The venation is pale yellowish or straw-colored nearly to the marginal cells, where it is pale brown. Both pairs of wings at base, as well as the anal membranes, are pale straw-colored. The fore wings have the usual dark marks at the extreme base, while in the hind wings the pale straw-colored area at base is outwardly margined in places with fuscous.

Head pale with a broad interrupted black band, in which the ocelli are included, connecting the eyes; also black behind the eyes. Pronotum black, with the collar, side margins, two large irregular spots, one each side of the central line, pale. This pattern differs very greatly from either *schaefferi* or *gibbera,* in which the pronotum, except the margins, is generally all black. Mesonotum black, the posterior margin, the elevated X and connecting spots together with the posterior extremities of the obconical marks pale; also pale straw-colored each side at the base of the wings. Metanotum margined posteriorly with pale straw-color. Tergum black with the segments margined posteriorly with pale straw-color, segments 8 and 9 about one half pale. Beneath pale; five segments narrowly black at the

base. Legs pale variegated with black with about the basal half of the fore femora black, the remainder straw-colored. In *schaefferi* the fore femora are black except at the extremities.

MEASUREMENTS IN MILLIMETERS

	Male Type
Length of body	28
Width of head across eyes	7
Expanse of fore wings	68
Greatest width of fore wing	12
Length of valve	4.5

In addition to the type, three male paratypes collected at the same place and probably at the same time, have also been examined. They are in the collection of Brigham Young University, Provo, Utah, and one was collected by Prof. Vasco M. Tanner, who has also sent me other cicadas.

Okanagana rimosa Say.

There seems every reason to believe that this species, known to occur in the Highlands of the Hudson, is to be found living on the coast as far south as Long Island, New York, though up to date the only specimens collected have been those found in the wash-up on the beach of the south shore. The record now stands: Rockaway Beach, June 26, 1909, female (George P. Engelhardt); Rockaway Beach, June 14, 1914, female (Ernest Shoemaker), and Long Beach, June 27, 1926, female (Alfred J. Kistler).

Mr. Kistler wrote of this last specimen that it "was found to the best of my recollection with some faint signs of life. . . . The exact locality should be Lido Beach, a mile or so further out from Long Beach proper."

This species has a wide range in the north extending from Nova Scotia and New Brunswick to Michigan, Wisconsin, Illinois, Iowa, Minnesota, North and South Dakota, and Manitoba. We also have records, supposedly of this species, from Fraser Mills, British Columbia, and from Idaho, Nevada and the mountains of California, but further specimens should be examined from the extreme western part of the range beyond the Rocky Mountains.

Okanagana canadensis Provancher.

Like *Okanagana rimosa,* mentioned above, this species has a wide range in the northern part of North America. We have records from New Brunswick, New Hampshire, Pennsylvania, Ontario, Michigan, South Dakota, Colorado, Manitoba and Alberta.

The Alberta records are two males collected at Edmonton, June 16, 1916 (Prof. F. S. Carr), and three males and one female, also from Edmonton, June 5 to 14, 1925 (Owen Bryant). The Royal Ontario Museum of Zoology, Toronto, contains a number of specimens from Lake Nipigon, Macdiarmid, and various other parts of that province, many of them collected by Norman K. Bigelow. In the Annual Report of the Entomological Society of Ontario for 1922, page 38, Prof. Lawson Caesar records a brood of this species on Manitoulin Island, Lake Huron, June 16, 1922. He states that seventy-five of the cast pupa skins were counted on or close to a single poplar tree (*Populus tremuloides*), and that the greatest volume of sound appeared to come from the part of the woods where poplars were most abundant.

On June 21, 1927, Mr. E. J. Oslar collected a female of this species at Strontia Springs, Douglas County, Colorado. This, with *Okanagana gibbera,* described in this JOURNAL for 1927, page 379, adds two additional species to the twenty-three mentioned in the annotated list of the Cicadas of Colorado published in March, 1921. Also from Colorado is *Okanagana bella* var. *rubrocaudata,* described in this JOURNAL, March, 1925.

Okanagana striatipes Haldeman.

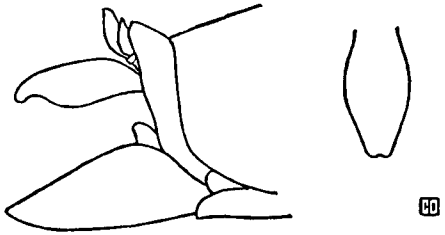
In Stansbury's Exploration and Survey of the Valley of the Great Salt Lake of Utah, 1853, p. 369, S. S. Haldeman described *Cicada striatipes.* He states that the wings expand nearly two inches (23 lines); that it is "black above varied with a little yellow; beneath yellow"; hypostoma prominent; "tergum black with the apex and margins of the segments yellow, elytra and wings with the nervures yellowish-white; those of the exterior cells blackish; the basal portion, which is doubled beneath in repose is orange." In the writer's collection there are 37 speci-

mens from Utah, collected at Salt Lake City by Dr. J. W. Sugden, at Stockton and Eureka by Mr. Tom Spalding, and in Iron County by Mr. Engelhardt, that agree with the description.

On July 1, 1929, Dr. Raymond H. Beamer and his associates on a collecting trip for the University of Kansas, found fifty-nine specimens of a dark form in Coconino County, Arizona, that is evidently closely related to *striatipes*, but at first sight looks something like *vanduzeei* from California in color and size. The head is much smaller and the front is more prominent, also the ventral surface is without the long hairs found not only in *vanduzeei*, but also in the related *consobrina* and *californica*. In color and vestiture it more closely resembles *Okanagana utahensis* Davis, but is very much smaller; the front of the head is not as prominently wedge-shaped, and the abdominal segments are margined posteriorly with orange. As there are connecting specimens, the form from Coconino County is here considered a dark colored variety of *striatipes*.

Okanagana striatipes variety **beameri**. New variety. (Pl. VIII, Fig. 6).

Type male and allotype female from Coconino County, Arizona, July 1, 1929 (Dr. Raymond H. Beamer). Collection University of Kansas.



OKANAGANA STRIATIPES VARIETY BEAMERI. TYPE

Head slightly narrower than the front margin of the pronotum; front moderately produced and about as prominent as is usual in *striatipes*. Median sulcus of the front well defined for most of its length. Pronotum as in *striatipes*, with the humeral angles rounded and the anterior angles prominent. Last ventral segment constricted at the sides, then broadened out to the extremity, which has the outer angles rounded, and a shallow sinus centrally. Uncus when viewed in profile, hooked at the end; when viewed from behind the hook is seen to be notched. The last ventral segment in the female allotype is broadly and doubly notched. In *striatipes* the inner notch is not as prominent, and in *uthensis* there is usually no inner notch. Venation of the fore wings fuscous; in several of the paratypes the veins surrounding the ulmar cells are straw-colored. Costal margin of fore wing yellow to end of radial cell, darker beyond; subcostal vein black, or nearly so. Basal cell clouded, blackened on the hind margin. A few of the paratypes have the subcostal vein pale and the basal cell clouded. Both pair of wings variegated with fuscous at base with the membranes orange red. In *striatipes* the hind wings are not as dark at base.

Head black with the grooves and supra-antennal plates testaceous; beneath with the median sulcus orange; rostrum black orange at base. Pronotum black; the grooves testaceous; bordered all round with orange but more narrowly on the anterior margin. Mesonotum black with the hind margin orange; the elevated X orange with a black spot on each of the fore limbs and four orange spots arranged in a semi-circle in front of the X, as in *striatipes* and *utahensis*. Metanotum black with the posterior margin orange. Tergum black with the segments margined posteriorly with orange. Uncus pale orange, blackened on sides. Beneath, the legs pale striped with black, and abdominal segments fuscous, each one edged with pale posteriorly. Valve pale.

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	19	19
Width of head across eyes	6	6
Expanse of fore wings	49	49
Greatest width of fore wing	8	8
Length of valve	2	

In individuals having the same expanse of wings, the fore wings, as a rule, are slightly narrower in *beameri* than in *striatipes*.

In addition to the type and allotype there are fifty-seven specimens in the lot, all collected in Coconino County, Arizona, on the first of July, 1929, by Dr. Beamer, Paul W. Oman, W. F. Lynn and L. D. Anderson. In the writer's collection there are two males from Flagstaff, Arizona, June 29, 1892, and two males from Bellevue, Washington Co., Utah, June, 1917, and July 7, 1917, collected by Mr. George P. Engelhardt.

Dr. Beamer writes concerning the fifty-nine specimens collected on July 1, that they were found eight miles north of Williams,

Arizona, on a sage brush flat; that the song was of fair duration, neither long nor short, and that they were also found east of Ashfork in sage brush along the roadside.

Okanagana hesperia Uhler.

A great many specimens of this species have been examined from Kansas, Oklahoma, Texas, Montana, Colorado, New Mexico, and Arizona which were alike in having the basal half or more of all of the wings infuscated, the first two or three segments of the abdomen dark, and with a median, dorsal row of dark spots on the remaining segments. The entire dorsum of the body may, however, in some specimens be so darkly colored as to appear almost black. In the writer's collection there are a number of this dark variety from Turkey Creek Canyon, Colorado, 7,500 feet, July, found in sage brush; one from near Hereford, Deaf Smith County, Texas, June 7, 1925, and a male and female collected at Jemez Springs, New Mexico, July 3, 1929, by Mr. George P. Engelhardt.

Okanagana pallidula Davis.

This species was described and figured in this JOURNAL for December, 1917, page 213, from the male type and nine paratypic males collected at Athlone, Merced County, California, in July and August, 1917, by Alonzo C. Davis. In the original description it was stated that it was a yellowish or greenish-yellow insect, almost unicolorous, with the membranes at the base of the wings orange, and that at first glance, owing to its pale color, it had the appearance of being immature.

Nothing further was learned of the insect until a very much damaged female taken at Bakersfield, California, July 4, 1928, was received from Mr. R. F. Sternitzky. In the summer of 1929, Dr. Raymond H. Beamer of the University of Kansas and his assistant, Mr. Paul W. Oman, captured sixty-four specimens in California. On July 24 they took 32 males of the greenish variety, and 22 males and 2 females of the yellowish variety at Bakersfield. On August 6, Dr. Beamer took 2 males and one female of the greenish variety, and 4 males of the yellowish

variety at Merced, California, and on the same day a male at Winters, California. There has been no difficulty in separating the 64 specimens into the straw-colored and greenish forms or varieties.

One of the females has a median row of small and dark colored spots on the dorsum of the abdomen, except on segment nine, where there are two spots, one each side of the central line. The notch in the last ventral segment of the abdomen is simple in all of the females, being without the inner notch found in many species of *Okanagana*. These are the first females to be described of this very pale species, separated from *uncinata* Van Duzee, which it resembles, by its lighter color, larger size, and in having the third marginal area in the fore wings the length of the median area immediately adjoining it.

Okanagana uncinata Van Duzee.

Mr. Van Duzee in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY, March, 1915, stated that this species was described from two males taken by him on grass along the road five miles north of San Juan Capistrano, Orange County, California, June 25, 1914. But few specimens of *uncinata* have been examined by the writer. The following are the records:

Mokelumne Hill, Calaveras County, Calif., June, 2 males, Los Angeles Museum.

Lindsay, Tulare County, Calif., June 6, 1925, female (Stanley W. Bromley).

The female taken by Mr. Brumley has the notch in the last ventral segment simple, as it is in *Tibicinoides mercedita* Davis, which it resembles. The two species may be told apart by the marginal areas being much shorter in *mercedita;* the third one in the fore wings is about one half as long as the second ulnar area adjoining and immediately behind it. In *uncinata* the third cell is more nearly as long as the adjoining ulnar area.

Clidophleps vagans Davis.

This species was described and figured in this JOURNAL for March, 1925, from a single male found in an automobile, but

probably from the Owen's Valley region, California. In the December, 1927, JOURNAL, another male from Yosemite is recorded and figured. In 1928 Mr. F. H. Wymore of the Branch of the College of Agriculture, Davis, California, sent the following specimens found at Victorville, San Bernardino County, California: nine males and four females collected, June 29, 1927, and one male collected, July 27, 1927. The notch in the last ventral segment of the female is broad with a smaller central notch, and is of the form usual in *Clidophleps*.

PLATE VIII

Figure 1. *Diceroprocta cinctifera* variety *viridicosta*. Type.
Figure 2. *Diceroprocta cleavesi*. Type.
Figure 3. *Diceroprocta cleavesi*. Under side of Type.
Figure 4. *Diceroprocta marevagans* Davis.
Figure 5. *Okanagana schaefferi* sub-species *tanneri*. Type.
Figure 6. *Okanagana striatipes* variety *beameri*. Type.