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## **CHARACTERS, DISTRIBUTION, AND FOOD PLANTS OF LEAFHOPPER SPECIES IN THAMNOTETTIX GROUP**

**DWIGHT M. DELONG and HENRY H. P. SEVERIN**

## **TRANSMISSION OF CALIFORNIA ASTER-YELLOWS VIRUS BY LEAFHOPPER SPECIES IN THAMNOTETTIX GROUP**

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**CHARACTERS, DISTRIBUTION, AND FOOD PLANTS OF  
LEAFHOPPER SPECIES IN THAMNOTETTIX GROUP**

**DWIGHT M. DELONG and HENRY H. P. SEVERIN**

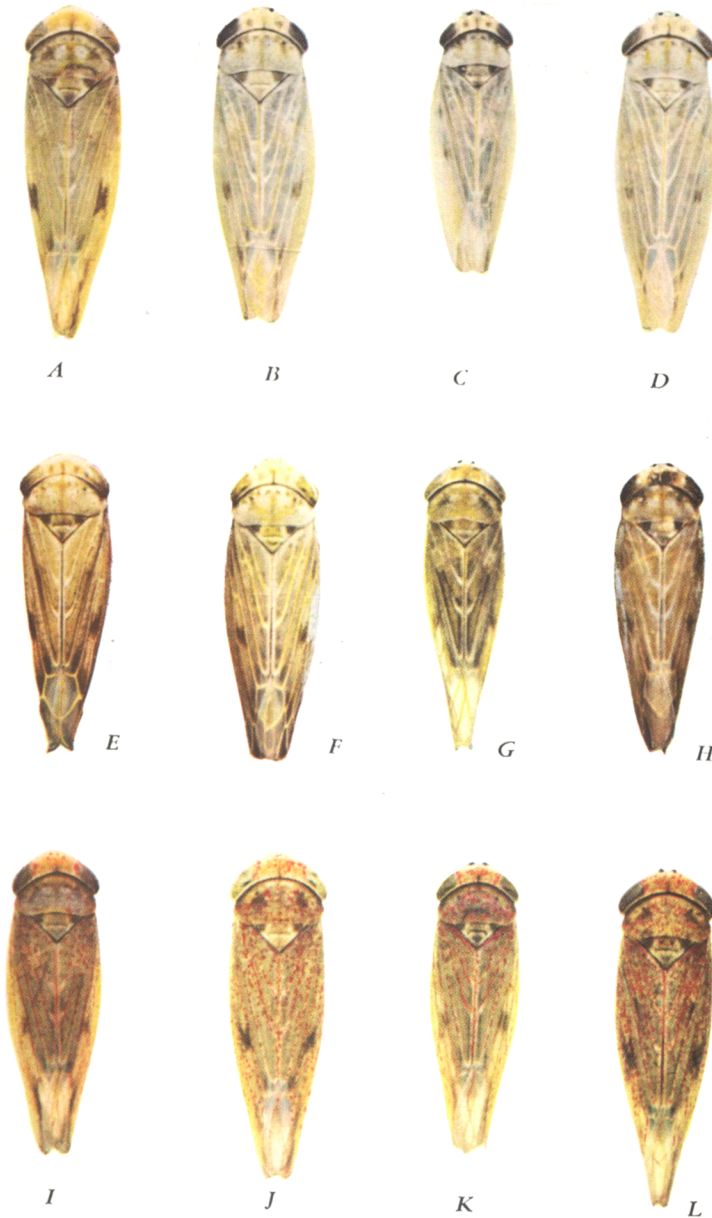


Plate 1.—Color variations of *Idiodonus heidemanni* (Ball), a leafhopper vector of California aster-yellows virus: *A*, *B*, gray females with no spot and one black spot on front of head, respectively; *C*, gray male, and *D*, gray female, with two round black spots between ocelli; *E*, *F*, brown females with no spot and one spot on front of head respectively; *G*, brown male, and *H*, brown female, with two round black spots between ocelli; *I*, male, and *J*, female, with no spots on front of head and blood-red dots on head, thorax, and wings; *K*, male; *L*, female with two round black spots between ocelli and blood-red dots on head, thorax, and wings respectively.

**CHARACTERS, DISTRIBUTION, AND FOOD PLANTS OF  
LEAFHOPPER SPECIES IN THAMNOTETTIX GROUP<sup>1</sup>****DWIGHT M. DELONG<sup>2</sup> and HENRY H. P. SEVERIN<sup>3</sup>****INTRODUCTION**

SOME years ago three species (Severin, 1929, 1934)<sup>4</sup> and a biological race (Severin, 1940) of one of these leafhopper species were reported to transmit the California aster-yellows virus. Recently, DeLong and Severin (1945, 1946, 1947a, 1947b) recorded thirteen additional leafhopper vectors of the virus. The present paper deals with the characters, distribution, and food plants of eight more leafhopper vectors, two of which have been previously mentioned in the literature (Severin, 1934). In a companion paper Severin (1948) discusses the transmission of the virus by these eight leafhopper species.

The genus *Thamnotettix* was erected by Zetterstedt (1840) to include European species, and *Cicada prasina* Fallen was designated as the type. The early American workers placed a large number of American species in this genus as they were described. In recent years several new genera have been described to include certain groups of closely related American species formerly in the genus *Thamnotettix*. The species treated in the present paper have been placed in three genera described by Ball (1936). These are *Idiodonus*, *Colladonus*, and *Friscananus*. There is little doubt that these species in the three genera are closely related; they may belong to a single genus. The color patterns will usually distinguish them, but the genital structures are similar in both the males and the females of the species concerned. The females usually bear a median sunken spatulate process on the last ventral segment which varies in width, length, and the degree of production beyond the posterior margin in different species. The males may be distinguished by the shape of the style and the length and position of the spine on each side of the caudal margin of the pygofer.

**IDIODONUS HEIDEMANNI (BALL)**

*Idiodonus heidemanni* (Ball) is blunt-headed and has a general color of grayish green, sprinkled with minute red spots. It is 4 mm long.

The vertex (fig. 1, A) is broad, bluntly produced, and about twice as wide at the base between the eyes as the median length.

<sup>1</sup> Received for publication May 27, 1947.

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<sup>3</sup> Entomologist in the Experiment Station.

<sup>4</sup> See "Literature Cited" for citations, referred to in the text by author and date.

The vertex and face are pale yellow; the face has several fuscous arcs. The pronotum is pale, dull green; the anterior portion is paler. The scutellum is yellow with an orange spot in each basal angle. The elytra are milky white and subhyaline, with a greenish tint. The entire upper surface and the face are closely dotted with minute, reddish, pepperlike spots.

The last ventral segment of the female (fig. 1, *B*) is roundedly produced and bluntly rounded at the apex. The male plates are rather broad at the base,

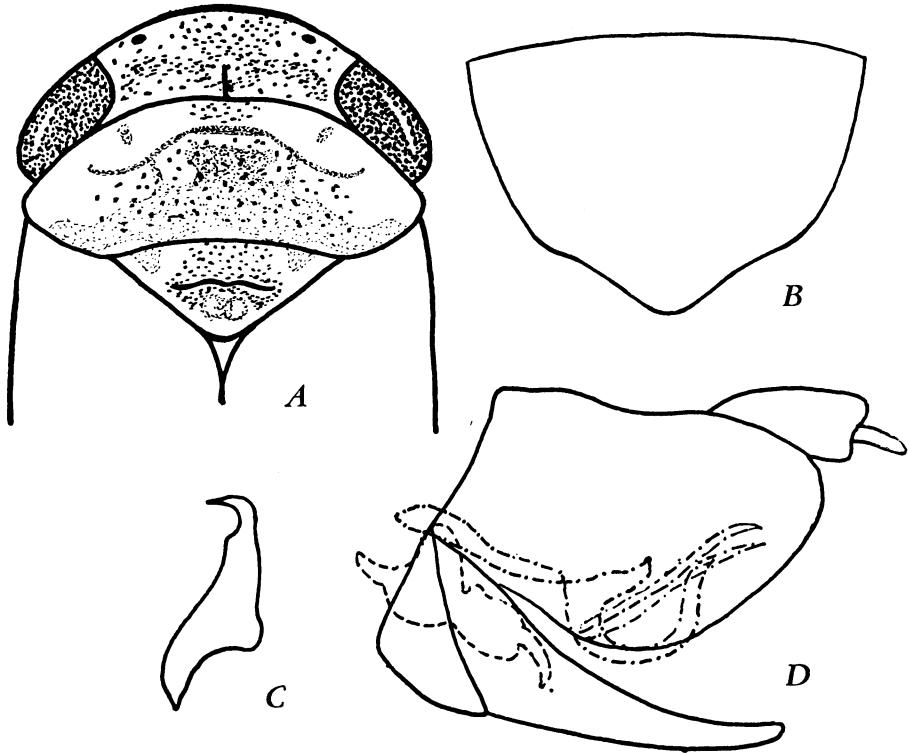


Fig. 1. *Idiodonus heidemanni* (Ball): *A*, dorsal view of head, pronotum, and scutellum; *B*, female last ventral segment; *C*, ventral view of male style; *D*, lateral view of male genitalia.

and roundedly narrowed to form slender, elongated, tapering apices. The male style (fig. 1, *C*) is rather broad at the base and rather short, narrowed to a pointed apex, which is curved outwardly and directed laterally. The aedeagus (fig. 1, *D*) is sicklelike in lateral view, with a pair of long slender processes extending dorsally and caudally from the base of the sickle beyond its apex. The pygofer is rounded without a spine at its apex.

**Breeding Experiments.** Ball (1900) described *Idiodonus heidemanni* (Ball) (= *Thamnotettix heidemanni* Ball) collected from Cerro Summit and Alder, Colorado, both high mountain points. Ball (1911) also described *I. schwartzi* (Ball) (= *T. schwartzi* Ball) from a pair taken at Dewey, Utah, by J. R. Horton, and from one female taken at Ashford, Arizona, by Barber and Schwartz; the latter he received from the United States National Museum.

Ball (1900) described the color of *Idiodonus heidemanni* as grayish green sprinkled with blood-red dots; the detailed color description is as follows:

The vertex and face pale yellow, sutures and about five short arcs on the front fuscous, pronotum pale olive, the anterior margin lighter, scutellum yellow, an orange spot inside each basal angle. Elytra milky subhyaline with a greenish cast, the black tergum showing through. Whole upper surface and face minutely dotted with blood red.

Ball (1911) described *Idiodonus schwartzi* as smoky cinereous, with two round black spots on the front of the head, and two angled ones on the scutellum; his description is as follows:

The vertex pale yellow, slightly washed with orange, the ocelli red, a pair of round black spots between them equidistant from the ocelli and each other. Face pale yellow, the sutures dark, a few short smoky arcs on lower part of front. Pronotum cinereous. Scutellum yellow, a triangular black spot just within each basal angle. Elytra cinereous, the costal margin subhyaline, a narrow smoky stripe at apex. Veins of clavus and claval suture pale, veins on corium and a line along the claval suture smoky, emphasized on a line which follows the outer sector omitting its outer branch, and ends in the margin of the third apical cell.

In breeding experiments by the junior author, pairs of recently molted adults were mated, the males fitting the description of *Idiodonus schwartzi*, the females similar except that some had no spots, some 1 black spot, and some the typical 2 spots between the ocelli. Each pair without exception had some offspring with no spots, some with 1 spot, and some with 2 spots, as shown in plate 1, *A* to *H*. Males and females with blood-red dots on the body (plate 1, *I, J, K, L*), and otherwise fitting the description of *I. heidemanni*, were mated. Some of the offspring of each pair failed to show the red spots. Females with acute and rounded heads were mated, each with males of the same type. The offspring of pairs with acute heads had both acute and rounded heads; and the offspring of those with rounded heads likewise had both acute and rounded heads. During the winter most of the adults are brown in color (plate 1, *E, F, G, H*) and during the summer gray forms (plate 1, *A, B, C, D*) predominate. This is true both under natural conditions and under greenhouse conditions. This breeding evidence indicates that we are dealing with color variations of a single species. The priority name which must be given to this species is *Idiodonus heidemanni*.

**Geographical Range.** The detailed occurrence of *Idiodonus heidemanni* is not known, but it is recorded for California and Colorado (Ball, 1900). It probably occurs in other states of the northwestern United States.

**Distribution and Food Plants in California.** The localities in which *Idiodonus heidemanni* was collected and its food plants are as follows:

Los Angeles County: This leafhopper species was commonly taken during the summer of 1919 on Australian saltbush, *Atriplex semibaccata*, near Compton by H. H. P. Severin.

Santa Barbara County: Near Santa Maria and Lompoc, on July 31, 1942, adults were collected in sugar-beet fields by N. W. Frazier.

Napa County: On October 4, 1945, 1 female was captured on an unknown host plant at Larkmead by H. H. P. Severin.

Marin County: Adults were abundant on alkali heath, *Frankenia grandifolia*, October 10, 1946, and July 27, 1947, near San Rafael.

### IDIODONUS KIRKALDYI (BALL)

*Idiodonus kirkaldyi* (Ball) is a pale green to yellowish species with black spots on the vertex, somewhat resembling *Colladonus geminatus* in appearance. It is 3.5 to 4.0 mm long.

The vertex (fig. 2, A) is produced and bluntly rounded at the apex. The length at the middle is about the same as the basal width between the eyes.

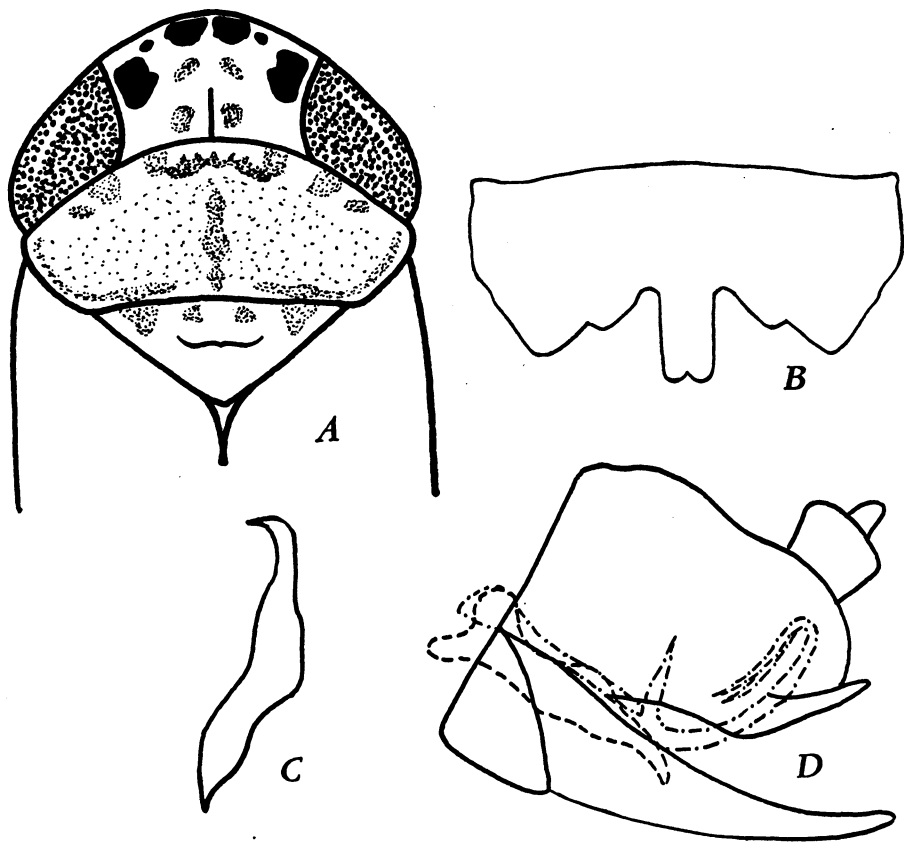


Fig. 2. *Idiodonus kirkaldyi* (Ball): A, dorsal view of head, pronotum, and scutellum; B, female last ventral segment; C, ventral view of male style; D, lateral view of male genitalia.

The color of the vertex is creamy yellow with a pair of large, round, black proximal spots at the apex, and a large, round, black spot just back of each ocellus next the eye. A pair of rather large brownish spots are on the base of the vertex; each spot is about equidistant between the eye and the median line. The pronotum is dull yellow to pale brownish, with irregular dark mottling along the anterior margin and on the disk. The scutellum is creamy yellow, with triangular brown spots in the basal angles and a pair of small, round, black spots between them, just back of the anterior margin. The elytra are pale brownish; the costal portion is subhyaline, and the nervures are pale,

usually margined with brown. The elytra appear striped because of a narrow, dark, smoky stripe on the claval area and a wider stripe just inside the outer sector of the corium; the wide stripe extends across the first and second anteapicals and the second apical cell.

The last ventral segment of the female (fig. 2, *B*) is angularly excavated from the prominent lateral angles to the base of a median spatulate process; this process is almost parallel-margined, slightly notched at the apex, and produced beyond the posterior margin of the segment. The male plates are rather broad at the base, then roundedly narrowed to form long, attenuated, tapering apices. The style (fig. 2, *C*) is elongate, only slightly narrowed on the apical fourth, with the apex bent laterally and sharp-pointed. The aedeagus (fig. 2, *D*) is slender, almost parallel-margined, and curves dorsally almost to the anal tube; there it recurves and is divided into a pair of slender processes which extend ventrally. The pygofer bears a spine, which arises on the ventral apical portion and only slightly exceeds the rounded margin of the pygofer.

**Geographical Range.** *Idiodonus kirkaldyi* apparently occurs only in California.

**Distribution and Food Plants in California.** High populations of *Idiodonus kirkaldyi* were collected during the summer and autumn on California sagebrush, *Artemisia californica*, in San Mateo County.

### GEMINATE LEAFHOPPER, COLLADONUS GEMINATUS (VAN DUZEE)

The geminate leafhopper, *Colladonus geminatus* (Van Duzee) is a small, blunt-headed, greenish species with black markings similar to those of *Idiodonus kirkaldyi*. It is 4.5 mm long.

The vertex (fig. 3, *A*) is bluntly and roundedly produced, and almost twice as wide between the eyes at the base as the median length. The ocelli are about one third the distance from the eyes to the apex.

The vertex is yellow in color, with a pair of large triangular black spots on the margin at the apex. An elongate somewhat quadrate black spot is just back of each ocellus. A small brownish spot is just posterior to the inner margin of each of the latter black spots. The pronotum is yellowish anteriorly with a few brown spots along the anterior margin, and the disk is dull greenish brown. The scutellum is dull yellowish, with a median impressed brown line, a pair of round brown spots just in front of it, and a brownish triangular spot about half way from the basal angle to the median line on each side along the anterior margin. The elytra are brown to greenish subhyaline; the nervures are pale except on the apical portion, where they are brown.

The female last ventral segment (fig. 3, *B*) is rounded to the posterior margin, which is somewhat sinuate and distinctly notched either side of a short, rather broad, median spatulate process. This process is produced beyond the posterior margin of the segment and slightly notched at middle. The male plates are broad at the base, then concavely narrowed to rather long acutely pointed apices. The style (fig. 3, *C*) is elongate and rather narrow, more strongly narrowed on the apical sixth. The apex is blunt with a slight toothlike projection on the outer apical margin. The aedeagus (fig. 3, *D*) is slender, almost parallel-margined, with a pair of terminal processes which extend

ventrally from the recurved dorsal portion. The pygofer bears a prominent spine on each side at about the middle of the apical portion.

**Geographical Range.** The geminate leafhopper is quite common and widely distributed in the northwestern United States and in western Canada. It is known to occur in Alaska, British Columbia, Washington, Oregon, California, Colorado, Utah, Wyoming, Montana, and Idaho.

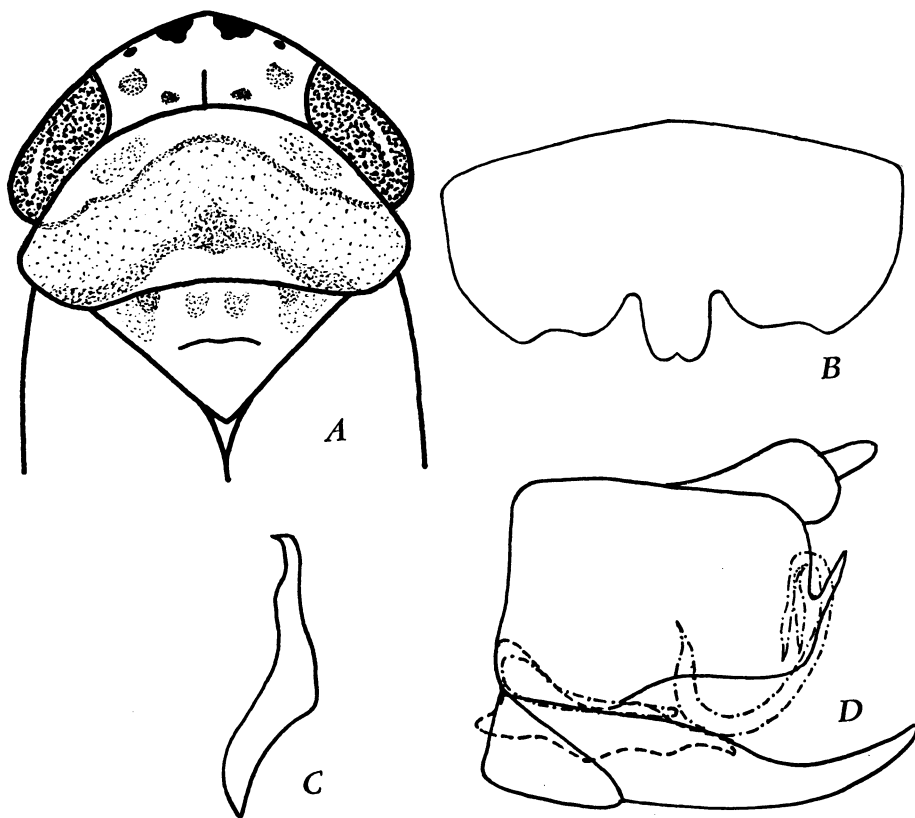


Fig. 3. *Colladonus geminatus* (Van Duzee): *A*, dorsal view of head, pronotum, and scutellum; *B*, female last ventral segment; *C*, ventral view of male style; *D*, lateral view of male genitalia.

**Distribution and Food Plants in California.** The geminate leafhopper is widely distributed in California and has been taken in vegetable fields and on ornamental flowering plants. It has commonly been collected on carrots in the Sacramento and Salinas valleys but rarely on celery, and often on asters in the Salinas Valley (Severin, 1934). Nymphs and adults are abundant on delphiniums and are an efficient vector of the virus to this host plant (Severin, 1942).

#### MOUNTAIN LEAFHOPPER, *COLLADONUS* *MONTANUS* (VAN DUZEE)

The mountain leafhopper, *Colladonus montanus* (Van Duzee) is a blunt-headed species with a tiny yellow saddle on the commissural line of a pair of black elytra. It is 4.5 mm long.

The vertex (fig. 4, *A*) is bluntly angled and almost twice as wide between the eyes at the base as the median length. The color of the vertex is pale yellow to white, with a darker band on the basal portion between the eyes. The pronotum is pale yellowish except for a darker band on the anterior portion

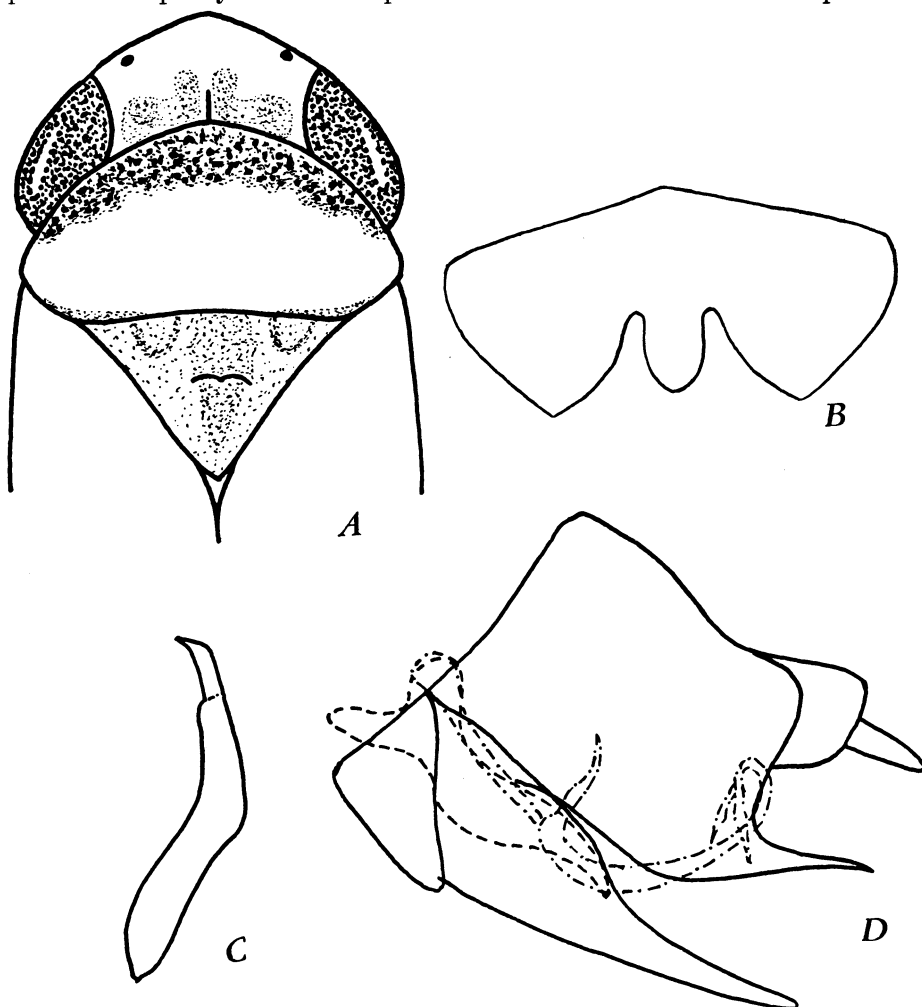


Fig. 4. *Colladonus montanus* (Van Duzee): *A*, dorsal view of head, pronotum, and scutellum; *B*, female last ventral segment; *C*, ventral view of male style; *D*, lateral view of male genitalia.

between the eyes. The scutellum is dark brown to black. The elytra are dark brown or black; the costal half of the corium as far as the apical cell is hyaline with a tiny yellow spot on the corium of the clavus. The face is pale with darker arcs.

The posterior margin of the last ventral segment of the female (fig. 4, *B*) bears a spatulate process at the middle which is produced to the length of the posterior margin and is separated from the broad produced lobes on either

side by a deep U-shaped excavation. The male plates are elongate triangular, with long tapering apices. The male style (fig. 4, *C*) is elongate, only slightly narrowed at the apex. The outer apical margin is pointed. The aedeagus (fig. 4, *D*) extends dorsally, then curves ventrally, forming a pair of slender processes. The pygofer bears a long sharp apical spine on each side, which is directed caudally from the lower portion of the pygofer. This is formed by a deep concave excavation on the dorsal apical portion of the pygofer just beneath the anal tube.

**Geographical Range.** The mountain leafhopper is widely distributed in the Pacific Northwest: it is known to occur in California, Oregon, Washington, Montana, Wyoming, Idaho, Colorado, and Utah in the United States, and in British Columbia in Canada.

**Distribution and Food Plants in California.** The mountain leafhopper is generally distributed in California and has been taken on many different vegetables. During the summer and autumn of 1931 this leafhopper was very abundant in celery fields near Sacramento. Celery was so generally infected with the California aster yellows that it was plowed under (Severin, 1934). Adults captured in the celery and in delphinium fields transmitted the virus to healthy celery; it was thus demonstrated that the insect is a vector of the virus under natural conditions (Severin, 1934, 1942). This leafhopper is one of the most important vectors of the virus to delphinium and breeds on this host plant under natural conditions. A list of economic plants and weeds which serve as food plants of this leafhopper has been published in a previous paper (Severin, 1934).

### COLLADONUS COMMISSUS (VAN DUZEE)

*Colladonus commissus* (Van Duzee) is yellow tinted with orange; it has a bluntly produced head and is 5 to 6 mm long.

The vertex (fig. 5, *A*) is bluntly angled, more than one third longer at the middle than the basal width between the eyes.

The color is straw yellow, tinted with orange, and there are no distinct markings. The pronotum is yellowish, often with a broad triangular spot on the posterior half. The scutellum is yellowish with darker basal angles. The elytra are pale brownish subhyaline, with paler veins except those on the apical portion. The face is pale with faint arcs.

The female last ventral segment (fig. 5, *B*) is strongly produced to form lateral angles, between which the posterior margin is deeply and angularly notched either side of a median rather broad spatulate process, which is not produced to the posterior margin of the segment. The male plates are elongate and triangular. The style (fig. 5, *C*) is elongate and rather narrow, the apical fourth is more narrowed, and the apex bears on the outer margin a rather long-pointed tooth, which extends laterally. The aedeagus (fig. 5, *D*) is rather narrow and curves dorsally, extending almost to the anal tube, where it re-curve and divides into two slender terminal processes, which extend ventrally. The pygofer spine, which is on the middle of the caudal portion, is conspicuous.

**Geographical Range.** The known records indicate that *Colladonus commissus* has been taken only in California.

**Distribution and Food Plants in California.** The locality in which *Colladonus commissus* was collected, the food plants on which it was found, and the numbers collected are as follows:

San Mateo County: At Montara, on September 28, 1941, 2 females were collected on California blackberry, *Rubus vitifolius*. On July 31, 1942, 3 males and 9 females were taken on bush lupine, *Lupinus arboreus*, growing in a

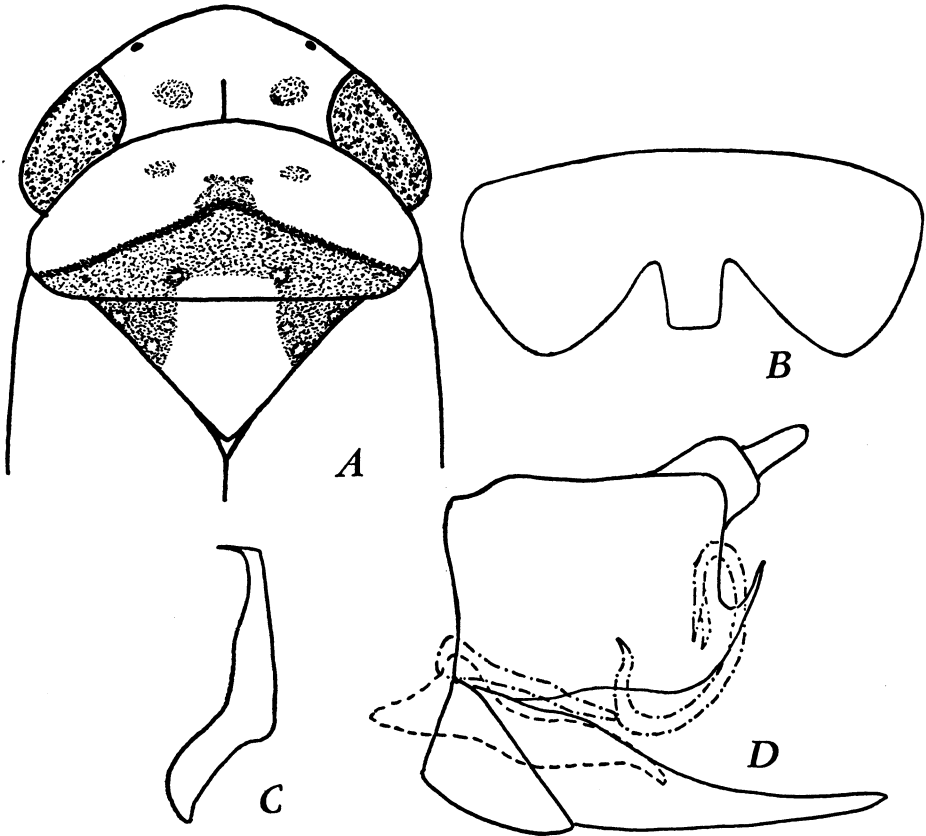


Fig. 5. *Colladonus commissus* (Van Duzee): A, dorsal view of head, pronotum, and scutellum; B, female last ventral segment; C, ventral view of male style; D, lateral view of male genitalia.

canyon near Montara. This leafhopper was commonly collected on monkey-flower, *Diplacus aurantiacus*, during the spring, summer, and autumn each year from 1943 to 1945. It was rarely taken on bracken, *Pteridium aquilinum* var. *lanuginosum*, near Montara. On July 25, 1945, 1 female was captured on Aleppo pine, *Pinus halepensis*, growing in Sharp Park.

Alameda County: At Berkeley, on August 28, 1942, 1 female was swept from Japanese or Boston ivy, *Parthenocissus tricuspidata*.

Sonoma County: On June 4, 1943, a few adults were collected on an unknown host plant by N. W. Frazier.

### COLLADONUS FLAVOCAPITATUS (VAN DUZEE)

*Colladonus flavocapitatus* (Van Duzee) has a sharply pointed head, which is yellow without markings; the elytra are brown. It is 5.0 to 5.5 mm long.

The vertex (fig. 6, *A*) is produced and angled. The apex is pointed. The median length is more than one half the basal width between the eyes.

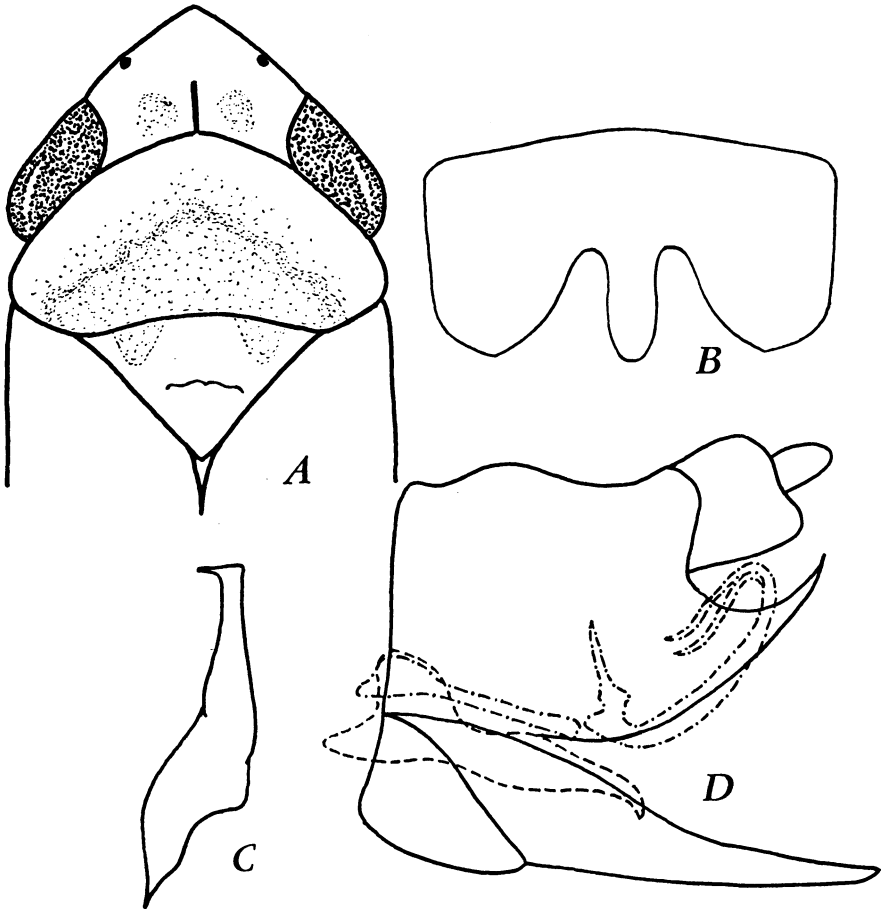


Fig. 6. *Colladonus flavocapitatus* (Van Duzee): *A*, dorsal view of head, pronotum, and scutellum; *B*, female last ventral segment; *C*, ventral view of male style; *D*, lateral view of male genitalia.

The vertex of the male is yellowish, tinted with brown. In the female it is often darker. The pronotum is olive brown, the anterior margin is paler. The scutellum is reddish brown. The elytra are some shade of brown or greenish brown. The face is pale yellow.

The female last ventral segment (fig. 6, *B*) is produced and rather broadly rounded on the outer margins. The posterior margin is deeply excavated either side of a median spatulate process; this process is rounded at the apex and pro-

duced to the length of the posterior margin of the segment. The male plates are elongated triangular, rather broad at the base and rounded, tapering to acute apices. The style (fig. 6, *C*) is elongate, gradually tapered to the apex; the apex is blunt and bears on the outer margin a long toothlike projection, which is directed laterally. The aedeagus (fig. 6, *D*) is directed dorsally and recurved, with a pair of slender processes which extend ventrally. The pygofer bears a long curved apical spine on each side, which is formed by a deep excavation just below the anal tube.

**Geographical Range.** *Colladonus flavocapitatus* is widely distributed in the western portion of the North American continent: it occurs from Alaska through British Columbia and Alberta to Washington, Oregon, California, Idaho, and Colorado.

**Distribution and Food Plants in California.** As determined by N. W. Frazier and J. H. Freitag, the localities and food plants of populations collected are as follows:

Tulare County: Adults were commonly swept from wild gooseberry, *Ribes* sp., growing in General Grant Park, on September 3, 1940; September 3, 1942; September 11, 1943; and September 15, 1944; by N. W. Frazier and J. H. Freitag. Adults were taken on *Ribes cereum* and on *R. roezlii* on August 14, 1947, by H. H. P. Severin.

Sonoma County: On September 11, 1943, 1 male was collected, but the host plant is unknown.

#### FRISCANANUS INTRICATUS (BALL)

*Friscananus intricatus* (Ball) has a pointed head and the vertex is without distinct markings. The length is 5 mm.

The vertex (fig. 7, *A*) is pointed at the apex, slightly longer at the middle than the basal width between the eyes. The anterior margin is rounded to the front except at the apex. The elytra contain several irregular reticulate veinlets on the clavus and in the anteapical cells.

The color of the vertex is pale, washed with brown. There is usually a pale band before the eyes. The face is pale with fuscous arcs. The pronotum is usually dark brown with an anterior bow-shaped pale line. The elytra are dark brown with paler nervures, and the irregular reticulations are usually milky white. There is usually an oblique, subhyaline, light area beyond the middle of the costa.

The female last ventral segment (fig. 7, *B*) is concave on the posterior margin, with an angular emargination either side of a median spatulate process, which is rather broad and considerably exceeds the posterior margin in length. The male plates are long and taper to attenuated apices. The style (fig. 7, *C*) is elongate and rather narrow. It is more narrowed on the apical fourth. The apex is bent sharply so as to form a long sharp toothlike projection on the outer margin. The aedeagus (fig. 7, *D*) is narrow and curved dorsally, then recurved ventrally at the anal tube; there it divides into a pair of long slender processes, which are directed ventrally. The pygofer bears a very short pointed spine at about the middle of the caudal margin.

**Geographical Range.** The records of *Friscananus intricatus* indicate that it occurs only in California.

**Distribution and Food Plants in California.** Adult *Friscananus intricatus* were taken in small numbers during the spring, summer, and autumn of 1941 to 1945 on monkey-flower, *Diplacus aurantiacus*, in San Mateo County. At Montara, July 25, 1945, it was occasionally collected on bracken, *Pteridium aquilinum* var. *lanuginosum*.

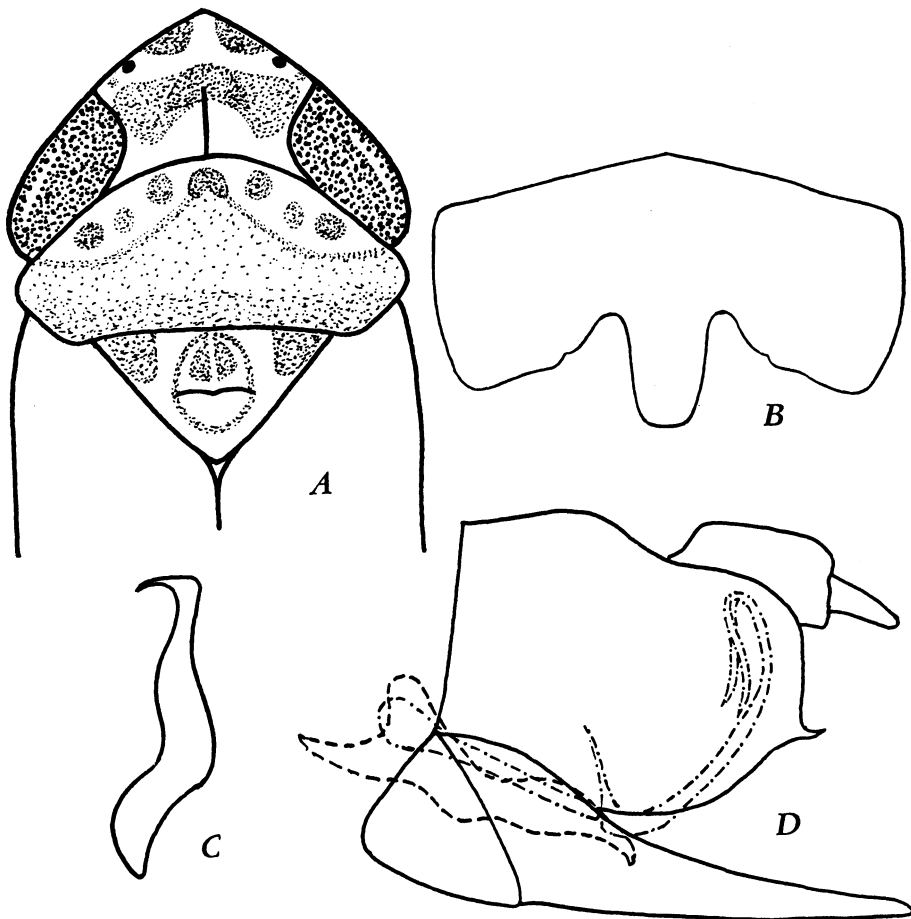


Fig. 7. *Friscananus intricatus* (Ball): A, dorsal view of head, pronotum, and scutellum; B, female last ventral segment; C, ventral view of male style; D, lateral view of male genitalia.

#### FRISCANANUS RUPINATUS (BALL)

*Friscananus rupinatus* (Ball) resembles *F. intricatus* in having a produced, pointed vertex. In addition it has a bisected black spot at the apex. It is 5 mm long.

The vertex (fig. 8, A) is obtusely angled, the apex is rounded, and it is as wide between the eyes at the base as the median length. The elytra do not contain extra reticulate veinlets.

The vertex is orange yellow with a large semicircular black spot on the apex, bisected by the narrow, pale, median line. The pronotum is greenish to reddish brown; the anterior margin is pale. The scutellum is pale yellow; the basal angles are greenish brown. The elytra are greenish subhyaline, washed with brown. The venation is usually inconspicuous. The apices of the claval veins are white, and the veinlets surrounding the apical cells are rusty brown.

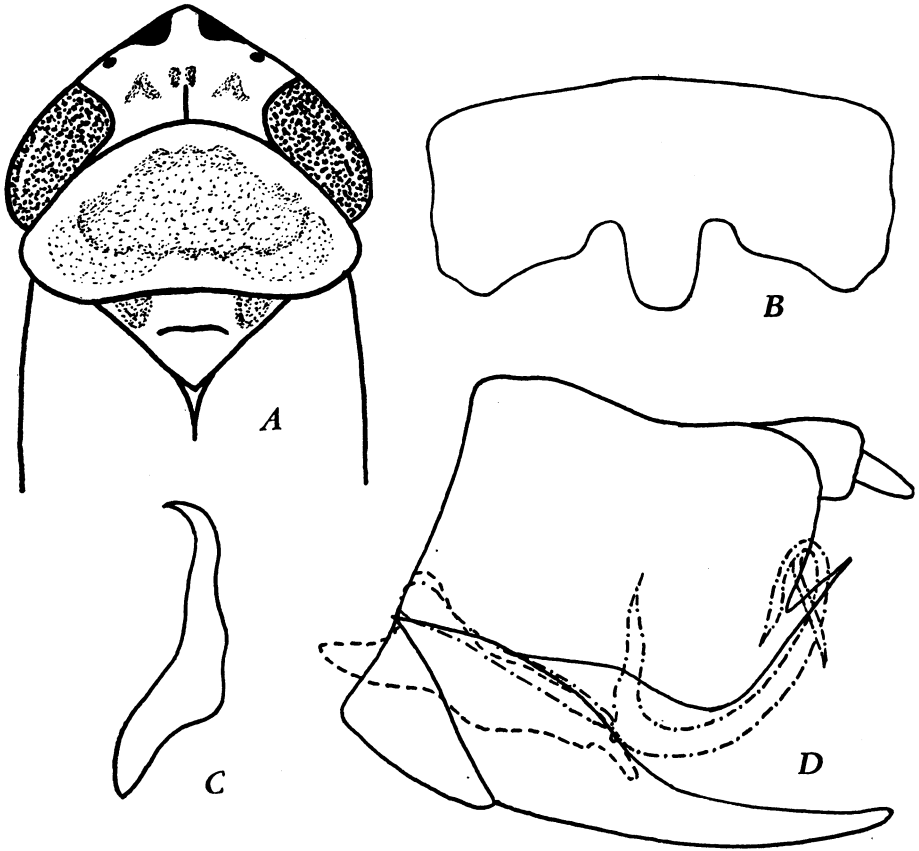


Fig. 8. *Friscananus rupinatus* (Ball): A, dorsal view of head, pronotum, and scutellum; B, female last ventral segment; C, ventral view of male style; D, lateral view of male genitalia.

The female last ventral segment (fig. 8, B) is concavely rounded on the posterior margin and slightly excavated either side of a rather short, broad median tooth, which extends beyond the posterior margin of the segment. The male plates are long, triangular, and tapered to attenuated apices. The style (fig. 8, C) is elongate, somewhat broadened basally, and gradually tapered to a sharply pointed apex, which curves outward. The aedeagus (fig. 8, D) is somewhat narrowed on the apical fourth and recurved at the most dorsal point; there it divides into a pair of slender processes, which are directed ventrally. The pygofer bears a conspicuous spine on the posterior margin at about its middle.

**Geographical Range.** According to known records, *Friscananus rupinatus* occurs only in California.

**Distribution and Food Plants in California.** Large populations of *Friscananus rupinatus* were taken during the summer of 1945 on bracken, *Pteridium aquilinum* var. *lanuginosum* near Montara, San Mateo County; but during the autumn, when bracken became dry, few adults were taken. The adults also were captured in small numbers during the spring, summer, and autumn each year from 1941 to 1945 on monkey-flower, *Diplacus aurantiacus*.

#### FRISCANANUS RUPINATUS VAR. BRUNNEUS N. VAR.

*Friscananus rupinatus* var. *brunneus* n. var. resembles *F. rupinatus* in form and general appearance but lacks the black spots at the apex of the vertex. It is 4.5–5.0 mm long.

The vertex is bluntly and angularly produced, about one and one third times as wide between the eyes at the middle as the median length in the female, and a little broader proportionately in the male.

The color is pale with reddish-brown markings. The male has two small brown spots at the apex of the vertex, a pale brownish area on basal half between the eyes. Its pronotum is pale, marked with dark brown, with a median pale spot on the anterior margin and a median portion on the posterior margin. Its scutellum is pale with dark-brown spots in the basal angles. Its elytra are subhyaline with brownish markings on clavus and disk. The apical veins and the anterior cross veins of the apical cells are dark brown. Its face is pale with pale fuscous arcs on each side.

The female has a large brownish spot on either side of the apex of the vertex and a rather broad brownish band between the eyes on the basal portion of the vertex. Its pronotum is brown with a median pale light spot on anterior margin. Its scutellum is pale brown except a median pale spot and dark-brown spots in the basal angles. Its elytra are reddish brown, subhyaline; the apical veins are dark brown, the claval and anterior veins are pale; the anterior two thirds have dark-brown areas between the pale veins. Its face is pale with darker arcs than in the male.

**Genitalia:** The female last ventral segment has a narrow, median, sunken spatulate process as in *Friscananus rupinatus*. The male genitalia are as in *F. rupinatus*.

Holotype female, allotype male, and female paratypes were collected on bracken near Montara, California, by H. H. P. Severin.

**Distribution and Food Plants in California.** Mixed populations of *Friscananus rupinatus* var. *brunneus* and *F. rupinatus* were collected on bracken, *Pteridium aquilinum* var. *lanuginosum*, growing on the Montara Mountains along the Pacific Coast.

## LITERATURE CITED

BALL, E. D.

1900. Additions to the western Jassid fauna. *Canad. Ent.* 32:337-47.  
1936. Some new genera of leafhoppers related to *Thamnotettix*. *Brooklyn Ent. Soc. Bul.* 31:57-60.

DELONG, D. M., and H. H. P. SEVERIN.

1945. Characters, distribution, and food plants of phlepsid leafhopper vectors of California aster-yellows virus. *Hilgardia* 17(1):1-20.  
1946. Taxonomy, distribution, and food plants of *Gyponana hasta*, a leafhopper vector of California aster-yellows virus. *Hilgardia* 17(3):155-63.  
1947a. Characters, distribution, and food plants of newly discovered leafhopper vectors of California aster-yellows virus. *Hilgardia* 17(16):525-38.  
1947b. Taxonomy, distribution, and food plants of *Acinopterus angulatus*. *Hilgardia* 17(5):211-15.

SEVERIN, H. H. P.

1929. Yellows disease of celery, lettuce, and other plants transmitted by *Cicadula sex-notata* (Fall). *Hilgardia* 3(18):543-83.  
1934. Transmission of California aster and celery-yellows virus by three species of leafhoppers. *Hilgardia* 8(10):339-61.  
1940. Potato naturally infected with California aster-yellows virus. *Phytopathology* 30(12):1049-51.  
1942. Infection of perennial delphiniums by California-aster-yellows virus. *Hilgardia* 14(8):411-40.  
1948. Transmission of California aster-yellows virus by leafhopper species in *Thamnotettix* group. *Hilgardia* 18(4):201-16.

ZETTERSTEDT, J. W.

1840. *Insecta Japonica descripta*. p. 135, col. 292.



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