

FURTHER STUDIES OF THE GENUS EMPOASCA
(HOMOPTERA, CICADELLIDAE)

PART III

SEVENTEEN NEW SPECIES OF EMPOASCA FROM THE
UNITED STATES AND CANADA

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In 1931 a revision of the North American species of *Empoasca* was published by the U. S. Department of Agriculture as Technical Bulletin 231. Since that time nine new species were described by the senior author,¹ four new species were described by F. W. Poos² and nine were described by the senior author and J. S. Caldwell.³ The present species are described from material collected by the senior author throughout the western United States in 1930 and from material in the University of Kansas Collection, a small collection from the Kansas Agricultural College, and small numbers of specimens sent to the authors by several workers in entomology.

***Empoasca ponderosa* n. sp.**

Resembling *coccinea* in size and general appearance, but with distinct genitalia. Length, 3.5 mm.

Vertex one-third wider between eyes than length at middle, produced about one-half its length beyond anterior margins of the eyes.

Color.—Smoky green, tinged with yellow. Wings subhyaline, veins green.

Genitalia.—Female last ventral segment rather strongly roundedly produced. Male plates rather long, apices broad but upturned, appearing triangular in ventral view. Of the male genital pieces the oedagus is similar to *coccinea* and has a pair of long processes extending dorsally and caudally from the base of the oedagus proper. These are more slender than in *coccinea*. The dorsal spines are long, notched anteriorly at about half their length producing a long finger process wider at middle and suddenly constricted to a pointed tip. Spine directed anteriorly and ventrally.

Described from two male specimens, one from General Grant Park, California, August 12, 1930, and one from Pacific

¹Ohio Jour. Sci. 32: 393-400, July, 1932.

²Proc. Ent. Soc. Wash. 35: 174-179, Nov., 1933.

³Ann Ent. Soc. Amer. 27: 604-609, Dec., 1934.

Grove, California, August 17, 1930, both collected by the senior author. Male holotype from Pacific Grove, California, in author's collection. Collected from Pine in these localities.

***Empoasca convergens* n. sp.**

Resembling *fabae* in general appearance and coloration, slightly smaller and with distinct genitalia. Length, 3 mm.

Vertex about one-fourth wider between eyes than length at middle.

Color.—Pale green with variable markings, usually with a row of pale spots along anterior margin of pronotum.

Genitalia.—Male plates long and narrow, apices pointed. Of the male genital pieces, the lateral processes of the pygofers are rather long, stout, in ventral view, narrowed and pointed at apices with apical third rather strongly convergent. In lateral view they appear heavy, almost straight, with apex rather abruptly pointed. Dorsal spine consisting of two parts; the basal portion is broad and directed caudally and slightly ventrally. The apical portion is a long rounded, pointed spur which extends at right angles from the ventral apical portion of the basal part.

Described from a male and female specimen from Newaygo, Canada, April 22 and August 20, 1929, and three male and one female specimens from Toronto, Canada, September 1, 1929, and a series of five male and one female specimens collected at Cedar Swamp, Ohio, by J. S. Caldwell, April 17, 1934. Male holotype and female allotype from Cedar Swamp, Ohio.

***Empoasca dentata* n. sp.**

A small green species resembling *erigeron* in general appearance, but with distinct genitalia. Length, 3 mm.

Vertex bluntly produced more than one-half its length before anterior margins of eyes, almost twice as wide between eyes as length at middle.

Color.—Pale green to yellow, three dashes on basal portion of vertex and three spots on anterior margin of pronotum pale.

Genitalia.—Female last ventral segment produced and rounded. Male plates rather narrow, and covered with long hairs. Of the male genital pieces the lateral processes are long and narrow in ventral view with apices turned sharply outwardly and with rounded teeth-like processes on outer margins just before apices. In lateral view with apex slightly indented on upper margin. Dorsal spine broad, strongly curved anteriorly near middle, then narrowed to a pointed apex which is directed anteriorly and ventrally.

Described from a series of three male and two female specimens from Manhattan, Kansas, May 17, 1929, collected by D. A. Wilber, one male specimen from Douglas County, Kansas, at light trap, July 20, 1930, and one male from Cherokee County, Kansas, collected by Dr. R. H. Beamer. Male holotype and female allotype from Manhattan, Kansas.

Empoasca constricta n. sp.

Resembling *E. fabae* in general appearance, pale green with paler dashes and spots on head and pronotum. Length, 3 mm.

Vertex bluntly angularly produced, about one-fourth wider between eyes than length at middle.

Color.—Pale green washed with yellow, vertex with a median stripe and two oblique yellowish basal stripes. Pronotum with three pale spots on anterior margin. Wings greenish yellow, subhyaline.

Genitalia.—Female last ventral segment long, almost truncate. Male plates long and narrow. Of the male genital pieces the lateral processes are almost straight in lateral view with the upper margin concavely indented at apex, forming a finger process curved upwardly. In ventral view appearing constricted about one-fourth the distance from apex and with a pointed tip. Dorsal spine broad at base, rapidly narrowed then produced and strongly curved ventrally and anteriorly.

Described from a series of four male and four female specimens from Riley County, Kansas, collected in August and October; three male and two female specimens from Branford, Florida, July 31, 1930, and one male from Huachuca Mountains, Arizona, August 2, 1927, all collected by R. H. Beamer; also two male and two female specimens from Columbus, Ohio, September 15, 1898, and April 4, 1899, and one specimen from Gainesville, Florida, July 7, 1918 (C. J. Drake), all in Herbert Osborn collection.

Male holotype and female allotype from Columbus, Ohio; male and female paratypes from the above specified localities.

Empoasca diverta n. sp.

In general appearance and coloration resembling *pallidula* but with distinct genitalia. Length, 3 mm.

Vertex bluntly rounded, about one-fourth wider between eyes than length at middle.

Color.—Vertex brownish with pale markings. Pronotum and scutellum with a median pale area. Wings pale, veins white margined, with areas on corium broadly white.

Genitalia.—Last ventral segment with posterior margin roundly produced. Male plates broad at base, long with sharp points. Of the male genital pieces the lateral processes of the pygofers in ventral view are rather broad and directed inwardly and meet near the apices which are sharply curved outwardly and pointed. In lateral view the processes are slightly narrowed apically. Dorsal spine rather long, strongly curved anteriorly near its middle, narrowed and directed downwardly and ventrally.

Described from a series of four male and nine female specimens collected at S. Catalina Mountains, Arizona, April 25, 1926, by A. A. Nichol. The male is designated as the holotype.

***Empoasca arta* n. sp.**

A small green species of the *fabae* type, but with more pointed head and distinct genitalia. Length, 3-3.5 mm.

Vertex bluntly pointed, one-fourth wider between eyes than length at middle. Pronotum almost twice as broad as median length.

Color.—Green washed with yellow, three basal pale lines on vertex; pronotum with three pale spots on anterior margin.

Genitalia.—Male long and slender. Of the male genital pieces the lateral processes of the pygofers are broad in ventral view, abruptly narrowed on outer margin near apex to form slender tips on inner margin. In lateral view with tips concavely excavated forming a finger process which is curved upwardly. Dorsal spine long and rather narrow, basal portion broad, strongly curved ventrally and anteriorly.

Described from one male specimen from Knight's Landing, California, collected August 22, 1930, by the senior author; one male specimen from Carson City, Nevada, August 9, 1929, and one male from Giant Forest, California, July 28, 1929, both collected by R. H. Beamer. The specimen from Knight's Landing is designated as the male holotype.

***Empoasca occidentalis* n. sp.**

A banded species with angled head and with distinct genitalia. Length, 3-3.5 mm.

Vertex strongly angled, produced about one-half its length before anterior margins of eyes, about one-third wider between eyes than length at middle.

Color.—Pale green with bright green and smoky markings on vertex, pronotum and wings. Vertex usually with a pair of bright green markings on disc. Pronotum and scutellum smoky. A smoky green band across center of clavus and apex of wings. Anterior portion of clavus and area in front of anteapical cells pale, giving a banded appearance.

Genitalia.—Female last ventral segment with posterior margin produced, central fourth with a shallow square-shaped notch at center. Male plates short, appearing triangular. Of the male genital pieces the lateral processes in ventral view are strongly curved inwardly near tips. In lateral view these processes are almost straight. The dorsal spine is short and broad, slightly indented on inner margin, forming a sharp pointed process on inner ventral angle.

Described from a series of 48 specimens collected from Juniper at Twin Falls, Idaho, along the Snake River, in June, 1930; and one specimen from Donner Lake, California, August 6, 1930; two male and two female specimens from General Grant Park, August 12, 1930, all collected by the senior author. One male from Fish Lake, Utah, September 2, 1930; two male and three female specimens from Pingree Park, Colorado,

August 22, 1929, were collected by D. A. Wilber. Two male and two female specimens from Colfax County, New Mexico, August 21, 1927, collected by P. A. Radio and L. D. Anderson, and one male and three female specimens from Socorro County, New Mexico, August 18, 1927, collected by L. D. Anderson. Holotype male and allotype female from General Grant National Park, California.

Empoasca decora n. sp.

Resembling *aspersa* in size, coloration and general appearance. Length, 2.5–3 mm.

Vertex bluntly produced, about twice as wide between eyes as length at middle.

Color as in *aspersa*. Vertex, pronotum, and scutellum, pale green with irregular markings. Wings pale green to white, rather uniformly mottled with smoky areas. Veins pale to white.

Genitalia.—Female last ventral segment with posterior margin broadly roundedly produced. Male plates rather long, appearing pointed, set with heavy spines. Of the male genital pieces the styles are short, curved strongly inwardly and with tips divergent. Lateral process of pygofer rather heavy in ventral view. In lateral view appearing strongly curved dorsally on apical third and slightly narrowed. Dorsal spine rather short, broad tipped, and curved slightly anteriorly.

Described from a series of five male and five female specimens from Alpine, California, collected July 9, 1929; three male and three female specimens from Cedar City, Utah, collected August 19, 1926; one male specimen collected at Carson City, Nevada, August 9, 1929; and two male specimens from Alpine, California, collected July 9, 1929. All of the above specimens were collected by R. H. Beamer. A series of three male and four female specimens from Otero County, New Mexico, collected June 19, 1929, by Dr. R. H. Painter.

Holotype male and allotype female from New Mexico. Paratypes from localities mentioned above.

Empoasca venusta n. sp.

A pale yellow or green species without definite markings, resembling *fabae* in size and general appearance. Length, 3–3.5 mm.

Vertex about one-half wider between eyes than length at middle, bluntly rounded on anterior margin, not produced half its length before anterior margins of eyes.

Color.—Pale to bright green washed with yellow.

Genitalia.—Female last ventral segment produced on posterior margin. Male plates rather short and narrow at apex. Of the male genital pieces the styles are rather short and divergent at apex. Lateral processes of pygofer long in ventral view, with an abrupt bending outwardly, then inwardly, near apex with apices thin, slightly divergent

and curved outwardly. In lateral view appearing straight with pointed apices. The dorsal spines are short and broad with small pointed spur on the ventral anterior portion, entire spine slightly curved anteriorly.

Described from two male and two female specimens from Hocking County, Ohio, collected in September and October, 1933, by Dorothy M. Johnson. Male holotype and female allotype from Hocking County, Ohio.

***Empoasca falca* n. sp.**

A blunt-headed species with slight banding. Length, 3.5 mm.

Vertex bluntly pointed, about one-third wider between eyes than length at middle, produced about one-half its length before anterior margins of eyes.

Color.—Vertex and pronotum brownish to yellow, wings greenish subhyaline with a faint smoky band across middle of clavus and another across apex of wings.

Genitalia.—Female last ventral segment with margin broadly produced. Male plates broad and rather short, appearing pointed at tips. Of the male genital pieces the oedagus is inflated on the apical half, the lateral processes of the pygofer rather short, in lateral view with apex narrowed and produced in a setaceous process. In ventral view the inner margins are concavely curved at the apex, forming finger processes on outer margin. Dorsal spines rather long, directed ventrally and anteriorly and gradually narrowed to a sharp point.

Described from two male and two female specimens, collected at Yosemite Park, California, August 10, 1930, by the senior author. Male holotype and female allotype in author's collection.

***Empoasca plebeia* n. sp.**

Resembling *bifurcata* in general appearance, but with distinct genital characters. Length, 3 mm.

Vertex angularly produced, one-third wider between eyes than length at middle.

Color.—Green without definite markings. Wings greenish subhyaline.

Genitalia.—Male plates long and narrow with upturned tips. Of the male genital pieces the lateral processes are long and slender. In ventral view they form slender curved finger processes on outer margins curving inwardly. In lateral view these are constricted near apex and produced as slender tips. Oedagus long, extending more caudally than dorsally, and with a long finger process arising ventrally about half its length and curving caudally and dorsally. Dorsal spine broad and short, directed ventrally and slightly caudally, with a blunt apex.

Described from a series of fifty male and female specimens collected at Belle Glade, Florida, summer of 1929, by Hugh Clifton; a series of twenty-two specimens from Sanford, Florida,

taken at trap light, August 9, 1929, by C. O. Bare; a male specimen from Everglade, Florida, August 11, 1930, collected by Paul Oman; and a male specimen from Maricopa County, Arizona, August 7, 1927, collected by R. H. Beamer, and a series of male and female specimens in Ball collection from Port-au-Prince, Haiti.

Holotype male and allotype female are from Belle Glade, Florida.

Empoasca torqua n. sp.

Resembling *fabae* in general appearance, but with distinct genitalia. Length, 3 mm.

Vertex roundedly produced as in *fabae*, one-third wider between eyes than length at middle.

Color.—Green washed with yellow, vertex with white markings, three large spots on anterior margin of pronotum with central portion of scutellum white. Wings greenish, hyaline, unmarked.

Genitalia.—Male plate rather long and pointed, triangular. Of the male genital pieces the lateral processes of the pygofer are rather short, slender, and with short pointed apices. Styles short, curving outwardly. Dorsal spines broad at base, rapidly narrowed to rather long curved apical portion which is directed inwardly and curved upon itself.

Described from a series of four male specimens collected at Meridian, Mississippi, July 17, 1930, by R. H. Beamer; a series of six males collected in Champaign County, Ohio, in April, 1934, by J. S. Caldwell, and one male specimen collected at Vienna, Illinois, June 14, 1934, by H. H. Ross and the senior author. Male holotype and paratypes in author's collection. Paratype males in Kansas University Collection and Illinois Natural History Survey Collection.

Empoasca unca n. sp.

Size and general appearance of *fabae*, but with head more produced and genitalia distinct. Length 3–3.5 mm.

Vertex almost one-third wider between eyes than length at middle, bluntly angled, produced about one-third its length before anterior margin of eyes. Wings long and narrow.

Color.—Pale green, vertex, pronotum, and scutellum tinged with orange, a median basal spot on vertex, three spots on anterior margin of pronotum, and a pale median stripe on scutellum. Wing subhyaline, veins green.

Genitalia.—Male plates rather short, appearing triangular but with tips turned upward and curved. Of the male genital pieces the lateral processes of the pygofer are short and rather broad, in ventral view appearing notched on inner margin at apex, forming a sharply curved finger process pointing inwardly. In lateral view appearing slightly indented on upper margin at apex. Dorsal spine broad and short,

caudal margin strongly convexly rounded, ventral anterior corner produced into a short sharp spur-like process.

Described from one male specimen collected at Emery, Utah, August 16, 1929, and two males from Grand Canyon, Arizona, August 11, 1927, all collected by R. H. Beamer. Holotype male from Grand Canyon, Arizona. Male paratypes from Grand Canyon and Emery, Utah.

***Empoasca ratio* n. sp.**

Resembling *birdii* in color and general appearance but with distinct genital characters. Length, 3.5 mm.

Vertex about one-fifth wider between eyes than length at middle. Wings long, considerably produced beyond abdomen.

Color quite variable. Some specimens are green with few or faint markings. In well marked specimens the ground color is pale green or yellowish, marked with dark brown on pronotum and scutellum, and basal half and apical third of wings. Usually three elongated pale spots on posterior half of vertex and three on anterior margin of pronotum.

Genitalia.—Female last ventral segment with posterior margin roundedly produced. Male plates triangular, appearing to have pointed tips. Of the male genital pieces the lateral processes of the pygofers are stout in ventral view, gradually tapering to pointed slightly divergent apices. In lateral view gradually curved upwardly and with pointed apex. Dorsal spine broad and rather short, directed ventrally and notched anteriorly near apex and somewhat ventrally, forming a ventral anterior process which is directed anteriorly and curved ventrally.

Described from a series of three male and four female specimens collected at Republic, Washington, August 6, 1931, by R. H. Beamer. Male holotype and female allotype in Kansas University Collection.

***Empoasca dilitara* n. sp.**

A pale green species with orange yellow vertex and without definite color markings. Length, 2.5–3 mm.

Vertex one-fourth wider between eyes than length at middle, rounded in front, produced about one-third its length before anterior margins of eyes.

Color.—Vertex orange yellow, pronotum green, scutellum pale yellow, wings greenish yellow, subhyaline.

Genitalia.—Female last ventral segment roundly produced. Male plates long and slender. Of the male genital pieces the styles are long and slender with tips divergent. The lateral processes of the pygofers are long and in ventral view straight on the inner margin. The outer margin curved outwardly to near tip where it rapidly narrows to a pointed apex. In lateral view the apex is constricted ventrally, forming a dorsal finger process. Oedagus in lateral view with posterior process extending dorsally at about the middle. Dorsal spine triangular, not curved, extending ventrally and with tip bending inward.

Described from a male and two female specimens collected in Eddy County, New Mexico, June 17, 1929, by Dr. R. H. Painter. The male is designated as the holotype and the female as the allotype.

Empoasca simplex n. sp.

Resembling *pergandei* in size and general appearance but with distinct genitalia. Length, 3.5 mm.

Vertex broadly rounded, scarcely produced before anterior margins of the eyes, about twice as wide between eyes as length at middle.

Color.—Vertex yellowish, pronotum, scutellum, and wings green tinged with yellow.

Genitalia.—Female last ventral segment with posterior margins produced, slightly emarginate at middle with indications of about three small teeth. Male plates long and narrow. Of the male genital pieces the lateral processes in ventral view are long, rather heavy, with tips slightly narrowed and convergent. In lateral view the processes are curved upward near the apices and are sharp pointed. The dorsal spine is rather heavy, somewhat strongly curved on anterior margin forming a rather short thick terminal process which is directed ventrally and slightly anteriorly.

Described from two male specimens from Shoshone Basin, Idaho, collected July 27, 1930, and one male from Blackfoot, Idaho, collected June 26, 1930, by the senior author; one male from Burns, Oregon, collected August 3, 1927, by R. H. Beamer and two specimens from Harper County, Kansas, June 22, 1929, collected by D. A. Wilber. Male holotype from Shoshone Basin, Idaho, in author's collection.

Empoasca similis n. sp.

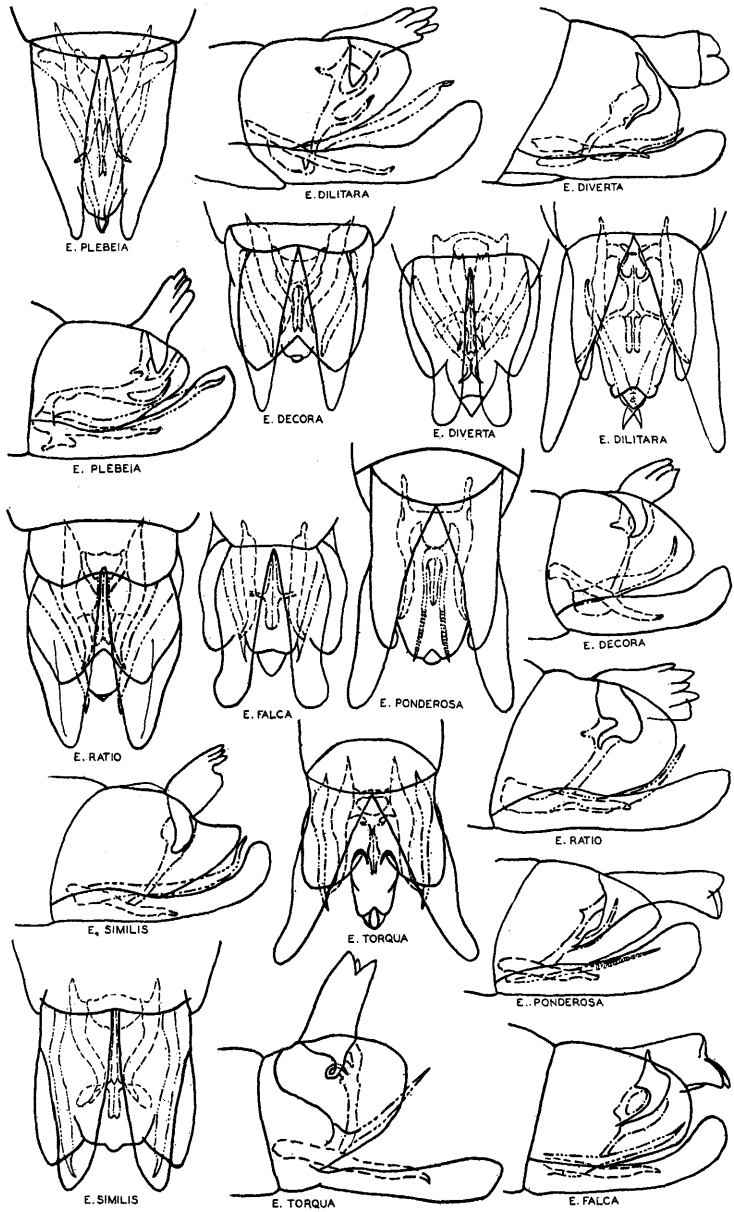
A small pale species with markings as in *aspersa*. Length, 2.5–3 mm.

Vertex bluntly rounded, almost twice as wide between eyes as length at middle.

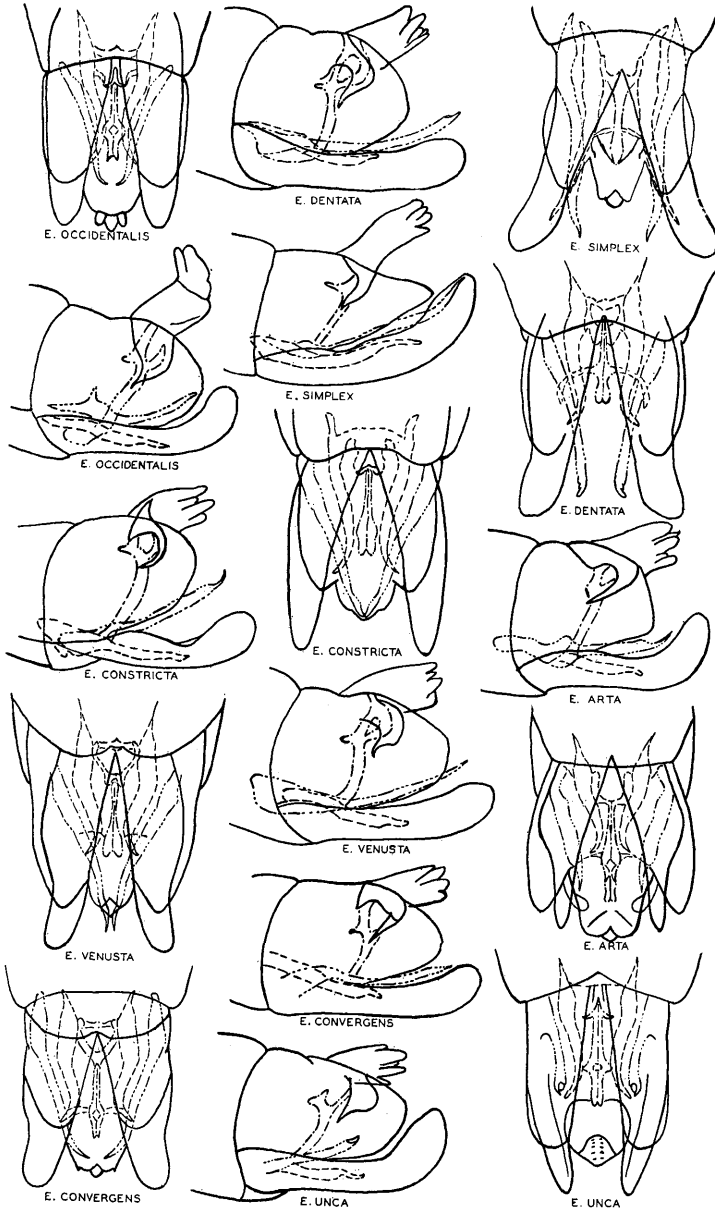
Color.—Milky white to pale green. Vertex, pronotum, and scutellum sparsely stippled with small dark dots. Wings mottled with dark pigment as in *aspersa*.

Genitalia.—Female last ventral segment broadly, roundedly produced. Male plates long, gradually tapered to sharp pointed apices and heavily set with long spines. Of the male genital pieces, the lateral processes of the pygofer in ventral view appear broad near apex where they are narrowed on inner margin and form slender finger processes which curve inwardly. In lateral view they curve abruptly dorsally near apex with apical tip curved slightly caudally. Dorsal spine short and broad, directed ventrally and curved slightly anteriorly.

Described from five male specimens from Carson City, Nevada, collected August 9, 1929, by R. H. Beamer. Male holotype in Kansas University collection.



Ventral and lateral views of male genitalia showing styles, lateral processes, dorsal spine and oedagus in normal position in the genital chambers.



Ventral and lateral views of male genitalia showing styles, lateral processes, dorsal spine and oedagus in normal position in the genital chambers.