

FURTHER STUDIES OF THE GENUS EMPOASCA.<sup>1</sup>  
(HOMOPTERA, CICADELLIDAE.)

PART IV

ELEVEN NEW SPECIES OF *Empoasca* FROM THE UNITED STATES

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AND

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***Empoasca gelbata* n. sp.**

Resembling *obtusa* in general appearance but with distinct genitalia. Length, 4 mm.

Vertex broadly rounded, slightly produced at middle, almost parallel margined.

Color: Dull yellowish to greenish yellow, tinged with brown.

Genitalia: Female last ventral segment strongly, roundedly, produced, becoming somewhat pointed at apex. Male plates rather short, gradually tapering to blunt apices. Lateral processes of pygofer in ventral view slightly narrowed near apex, the inner margin curving outwardly at apex. In lateral view the processes are notched dorsally near apex, and concavely excavated ventrally beyond this notch. Spine of ninth segment sickle-shaped, the apical half narrower, with apex extending almost ventrally.

Described from a male specimen collected at Fish Lake, Wisconsin, August 15, 1924; and four male and four female specimens collected October 11, 1919, at Ames, Iowa, and one female collected at Madison, Wisconsin, July 29, 1917. The specimens from Ames, Iowa and Madison, Wisconsin, were collected by Dr. E. D. Ball. Male holotype from Fish Lake, Wisconsin, and female paratypes from Ames, Iowa, and Madison, Wisconsin, in DeLong collection. Female allotype and male and female paratypes from Ames, Iowa, in Ball collection.

***Empoasca gleditsia* n. sp.**

In form and general appearance this species resembles *pergandei*, but with distinct genitalia. Length 3.5 mm.

Vertex broadly rounded, scarcely produced, parallel margined, twice as wide between eyes as median length.

Color: Green tinged with yellow. Elytra subhyaline, veins paler, a black spot just anterior to each posterior cross vein.

Genitalia: Female last ventral segment roundedly produced, bearing a rather deep narrow notch at apex which is rounded at base. Male plates long and rather narrow. Lateral processes of the pygofer in lat-

<sup>1</sup>Previous studies of this group are summarized in OHIO JOURNAL OF SCIENCE 35: 29, January, 1936.

eral view enlarged and bent upward just before apical portion which is slender and curved slightly caudally. In lateral view these processes are narrowed and curved inwardly at apex. Spine of ninth segment short and broad with an anterior, ventrally pointed projection.

Described from a series of nine male and female specimens collected at Twin Falls, Idaho, June 23, 1932, from Globe Locust. Male holotype, female allotype and male and female paratypes in DeLong collection.

***Empoasca chelata* n. sp.**

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

Vertex produced and bluntly angled, one-fourth wider between eyes than length at middle.

Color: Bright green tinged with orange.

Genitalia: Female last ventral segment roundedly produced. Male plates long and tapered to blunt apices. Lateral processes of pygofer bifurcate at apex forming a chela. Spines of ninth segment short and broad, broadly concavely rounded on anterior margin forming a ventrally, anteriorly directed spine.

Described from two specimens collected at Okolona, Mississippi, June 14, 1934, from *Crataegus* by Mr. D. W. Grimes. Male holotype, female allotype, in DeLong collection.

***Empoasca setata* n. sp.**

In form and general appearance resembling *Forcipata sicberi*. Closely related to *erigeron* but with distinct genitalia. Length 3.5 mm.

Vertex strongly produced, bluntly angled, one-third wider between eyes than length at middle.

Color: Yellow tinged with orange, anterior margin of pronotum with three pale spots one at middle and one behind either eye.

Genitalia: Male plates long, concavely curving on outer margin, apices broadly curved and slightly enlarged. Lateral processes of pygofer in ventral view tapering to pointed apices, usually crossed before apex. In lateral view they taper to a pointed apex which is slightly deflected. Spine of ninth segment short and broad, deeply notched anteriorly to produce a long narrow apical portion directed anteriorly.

Described from a single male specimen from Santa Fe, Mexico, collected in October, 1898. Male holotype in DeLong collection.

***Empoasca rubrata* n. sp.**

Form and general appearance of *aurcoviridis* but with distinct genitalia. Length 4.5-5 mm.

Vertex broadly rounded, more than twice as broad as length at middle.

Color: Brown, tinged with dull reddish. Elytra smoky, veins brownish. Vertex, pronotum and scutellum sometimes entirely reddish.

Genitalia: Last ventral segment of female strongly roundedly produced, slightly broadly notched at apex. Male plates narrowed to blunt

apices. Lateral processes of pygofers in ventral view curving inwardly on apical half, enlarged by inward bulge just before rapidly narrowed, pointed apex. Slightly indented on outer margin opposite bulge. In lateral view the lateral processes are concavely excavated on ventral portion of apex which is very narrow and sharply pointed. Spine of ninth segment modified sickle-shaped, apical half narrow.

Described from a series of one male and four female specimens collected at Fish Lake, Utah, September 2, 1930, by the senior author; a male and two female specimens from the same locality collected August 16, 1929, by Dr. R. H. Beamer, and a male from Toas County, New Mexico, collected August 20, 1927, by Dr. R. H. Beamer; two male specimens collected at an altitude of 8,000 feet in Rincon Mountains, Arizona, July 5, 1916, by A. A. Nichol; one male from Newaygo, Canada, collected July 30, 1929; and one male from Phillips, Wisconsin, collected July 18, 1932. All except the specimens from Fish Lake collected by the senior author are in the University of Kansas collection. The following specimens are in the collection of Dr. E. D. Ball: One male from Little Beaver, Colorado, July 19, 1898, and one male and two females from Ames, Iowa, collected July 12, 1898. The Herbert Osborn collection has a series of males and females from Cranberry Lake, New York, collected in August, 1920.

Male holotype, female allotype, and male and female paratypes from Fish Lake, Utah, deposited in the DeLong collection. Male and female paratypes in Herbert Osborn collection; Snow collection, University of Kansas; and Ball collection.

#### ***Empoasca jacinta* n. sp.**

In form resembling *obtusa* but with distinct genitalia. Length 4 mm. Vertex broadly rounded, scarcely produced, more than twice as wide as long.

Color: Green tinged with yellow.

Genitalia: Female last ventral segment strongly roundedly produced. Male plates long, rather uniform in width, rounded at apex. Lateral processes of pygofers in lateral view with apex narrowed and tapering to pointed tip. In ventral view they are very slender, enlarged near apex and curving outwardly, the inner margin concavely rounding, the apex pointed and directed inwardly. Spine of ninth segment sickle-shaped.

Described from a series of twelve male and female specimens collected at San Jacinto Mountains, California, July 15, 1930, by Mr. D. G. Hall. Male holotype, female allotype and male and female paratypes in Snow Entomological Collection, University of Kansas. Male and female paratype in the DeLong collection.

#### ***Empoasca ziona* n. sp.**

Resembling *obtusa* in general appearance but with distinct genitalia. Length 3.5 mm.

Vertex broadly rounded, scarcely produced, twice as wide as long.

Color: Dull green tinged with brown. Anterior margin of pronotum with white spots.

Genitalia: Female last ventral segment slightly, roundly produced. Male plates long, tapered to blunt apices. Lateral processes of pygofer in ventral view long, tapering rather abruptly, constricted and curved inwardly just before apex. Spine of ninth segment long, strongly sickle-shaped, gradually tapered to sharp pointed apex.

Described from a pair of specimens collected at Zion National Park, Utah, August 12, 1929, by Paul W. Oman; and a series of twenty-eight male and female specimens from San Jacinto Mountains, California, collected in October, 1929, by D. G. Hall. Male holotype, female allotype, and male and female paratypes in Snow Entomological Collection, University of Kansas. Male and female paratypes in the DeLong collection.

***Empoasca apata* n. sp.**

Resembling *atrolabes* in general appearance but with distinct genitalia. Length 3.7 mm.

Head narrower than pronotum, almost parallel margined.

Color: Dull green tinged with yellow. Elytra with claval suture pale, a large black spot anterior to last cross vein. Face black.

Genitalia: Male plates rather long and narrow. Lateral processes of pygofer long with rather slender apices concave on inner margin. The outer margin is produced and curved inwardly forming pointed tips. In lateral view the apex is concavely narrowed on ventral margin to sharp pointed tip. Spine on ninth segment rather short, apical half narrower, curved caudally and pointed at apex.

Described from two male specimens, one collected at Logan Canyon, Utah, July 24, 1930, by the senior author and one at Dixie, Oregon, July 8, 1931, by Dr. R. H. Beamer. Male holotype (Utah) in DeLong collection. Paratype male in Snow collection, University of Kansas.

***Empoasca grosata* n. sp.**

Resembling *aureoviridis* in form and general appearance but with distinct genitalia. Length 5 mm.

Vertex broadly rounded, parallel margined, three times as wide as length at middle.

Color: Golden yellow tinged with brown.

Genitalia: Male plates long, tapering to blunt apices. Lateral processes of the pygofer in lateral view appearing distinctly notched both dorsally and ventrally so as to form a curving apex which is narrowed and sharply pointed. In ventral view they are enlarged near apex by a bulge on outer margin, then tapered to pointed apices. Spine of ninth segment sickle-shaped, the pointed apex extending farther anteriorly than base.

Described from a male specimen collected at Redfish Lake, Idaho, August 3, 1930, by the senior author; one male from Cedar City, Utah, collected August 13, 1929, by Dr. R. H. Beamer, and one male from Manitou, Colorado, collected by E. S. Tucker at an altitude of 6,629 feet.

Male holotype in DeLong collection. Male paratypes in Snow collection, University of Kansas.

**Empoasca confusa** n. sp.

In form resembling *alboneura* but apparently more closely related to *obtusa* group. Length 3 mm.

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

Color: Dull green, mottled with white. The vertex has three longitudinal whitish areas, the pronotum a median longitudinal whitish area, and behind each eye is a large blotch of white. Scutellum with a large, median, longitudinal white area. Elytra smoky, veins paler.

Genitalia: Male plates long, almost uniform in width, apices bluntly rounded. Lateral processes of pygofers in ventral view somewhat vermiculate, apices converging, rapidly narrowed on outer margin to pointed tips. In lateral view they are enlarged just before a rather slender apical portion. Spine of ninth segment short, broad, concave on anterior margin, forming a short thick tooth directed anteriorly.

Described from a single male specimen collected at Burns, Oregon, August 3, 1927. Holotype male in DeLong collection.

**Empoasca carsona** n. sp.

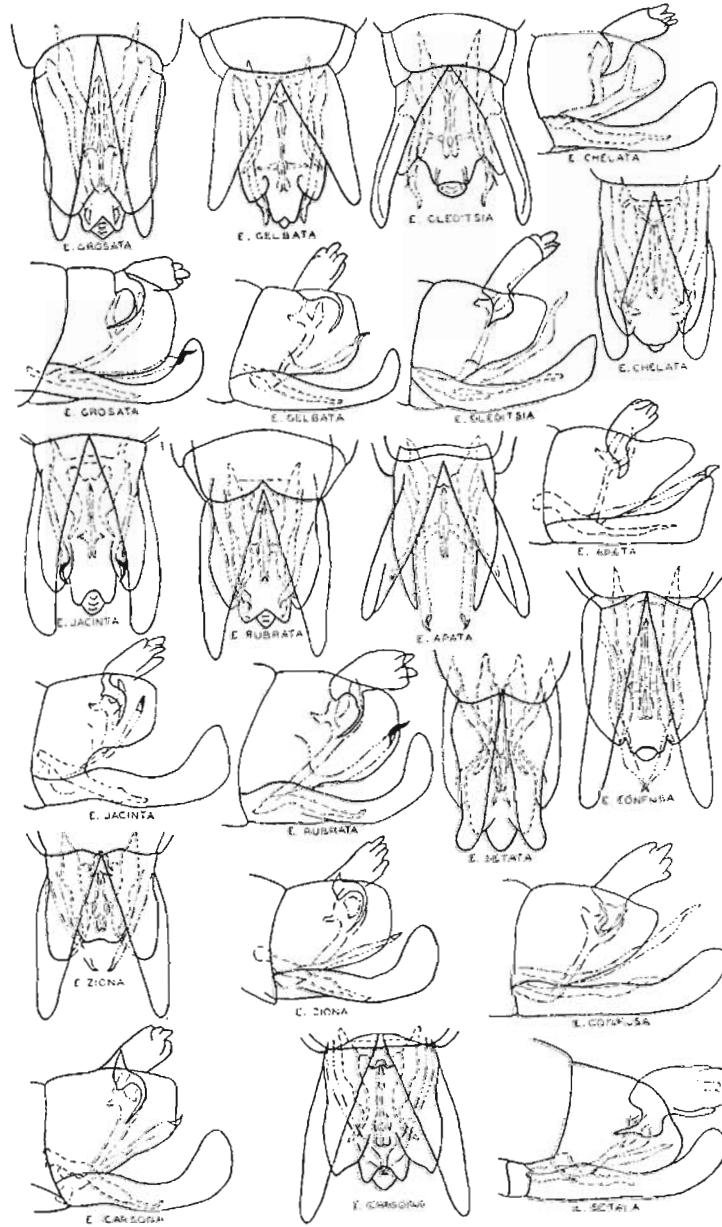
Resembling *obtusa* in form and general appearance but with distinct genitalia. Length 4-5 mm.

Vertex broadly rounded, slightly produced, twice as wide between eyes as length at middle.

Color: Green, tinged with yellow, three conspicuous white spots on vertex and three on pronotum. Elytra greenish subhyaline.

Genitalia: Female last ventral segment strongly produced and roundedly angled. Male plates rather long and narrow, tapered to blunt apices. Lateral processes of pygofers enlarged just before short and very narrow apices. In lateral view the dorsal margin of apical portion is concave. Spine of ninth segment sickle-shaped with narrowed apex directed downwardly.

Described from a series of 5 male and 28 female specimens. Four males and 21 females collected at Carson City, Nevada, August 9, 1929, by Paul W. Oman, and a male and seven female specimens collected at Maricopa County, Arizona, August 7, 1927, by Dr. R. H. Beamer. Male holotype and female allotype from Carson City, Nevada, and male and female paratypes in Snow collection, University of Kansas. Male and female paratypes in DeLong collection.



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