

FOUR NEW SPECIES OF EMPOASCA (HOMOPTERA :
CICADELLIDAE).

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This paper contains descriptions of four new species of *Empoasca* from the southeastern part of the United States. Although color and other external characters of these species are described, the writer is of the opinion that the internal male genitalia furnish the only reliably constant characters for specific identification of nearly all of the species belonging to this genus. In many cases the size and shape of the sternal apodemes for muscular attachments at the base of the abdomen are distinct aids in separating species which are otherwise somewhat similar in appearance. The value of these characters was recognized before the writer was aware of their use by Paoli (4, 5)¹ in his descriptions of new species of *Empoasca*. It seems doubtful whether these characters are sufficiently distinctive to make possible the identification of all of the species of this genus by them alone. It is not within the scope of this paper, however, to enter into an extended discussion of the relative value of characters used for specific identification of the species of this genus. For descriptions of other North American species of the genus *Empoasca*, based on characters found in the male genital chamber, the reader is referred to DeLong (1, 2, 3).

***Empoasca sativae*, new species.**

In general appearance resembling *fabae*. Length of male 3 mm.

Vertex produced about one half its length beyond anterior margins of eyes, a little longer on middle than next eye and about one third wider between eyes than length at middle; pronotum two fifths longer than vertex and with humeral angles prominent.

Color.—Greenish yellow, markings variable; vertex frequently with one pale or dark green spot near anterior margin on each side of median line; pronotum usually with four to six pale spots along anterior margin; scutellum with white line each side of median line to apical half, which has three white spots forming an irregular transverse band just back of middle; elytra greenish yellow, subhyaline.

Male genitalia.—Valve slightly indented on posterior margin (Fig. 1); plates parallel margined for about half their length, then slightly tapered to rounded upturned tips; styles, in ventral view, curved and enlarged between basal third and middle, the apical half narrowed to pointed apices which are somewhat divergent; lateral processes of pygofer in ventral view parallel margined to apical third, where they are somewhat broadened, then concavely rounded to narrow tips, which curve inward and ventrally; spines of tenth segment, in

¹Reference is made by number (italics) to Literature Cited, p. 178.

ventral view, rather short and inconspicuous, broad at base, extending ventrally to a rather blunt point.

Sternal apodemes for muscular attachments on venter at base of abdomen about three times as long as wide, somewhat narrower than those of *abrupta*, slightly rounded at posterior end.

These characters will distinguish this species from *Empoasca fabae* (Harris) and *Empoasca abrupta* DeLong, the two species which it resembles most closely.

Described from a large series of male specimens collected by the author on alfalfa at Leavenworth, Kans., during August, 1930. Specimens of this species were received from Norman Allen, collected during January, 1932, on alfalfa at Baton Rouge, La. It has also been taken in traplights at Knoxville, Tenn., by W. W. Stanley during 1931 and 1932, and at Arlington Experiment Farm (P. O. Rosslyn, Va.) by the author during 1932. It was also taken by sweeping in an apple orchard at Arlington Experiment Farm by the author in September 1931. Of the collection on alfalfa at Leavenworth, Kans., 82 males were identified and 23, or 28 percent, were *sativae*. Of the collection at Baton Rouge, La., 45 males were identified and 36, or 80 percent, were *sativae*. Of 1,938 specimens identified from collections made in traplights at Knoxville, Tenn., during 1931, 7.3 percent were *sativae*.

Holotype male and paratypes deposited in U. S. National Museum (Cat. No. 49933). Paratypes in the author's collection.

Empoasca delongi, new species.

A pale green, slender species without distinct markings on vertex or pronotum. Length 3 to 3.5 mm.

Vertex produced about one half its length beyond anterior margins of eyes, about one third longer on middle than next the eyes, about one third wider between eyes than length at middle; pronotum twice as long as vertex; elytra long and narrow.

Color.—Pale green marked with white; face tinged with yellow; vertex with a darker green area around each ocellus; pronotum with a rather wide white area bordering anterior margin; scutellum with a pale longitudinal median band to apical third, which is pale green; elytra pale green, subhyaline.

Female genitalia (Figs. 2 and 3).—Last ventral segment more than twice as long as preceding segment and with posterior margin strongly roundedly produced.

Male genitalia.—Valve broad, concavely rounded; plates tapered to rather acute tips and about three times as long as basal width; lateral processes of pygofers, in ventral view, almost straight except near apex, where they curve outwardly to a bluntly pointed apex; styles, in ventral view, curved outward at about half their length and narrowed, with the apices diverging; chitinous spines of tenth segment, in lateral view, rather long and thick, extending to a point which is slightly curved anteriorly.

Sternal apodemes for muscular attachments on venter at base of abdomen not conspicuous but slightly longer than those of *fabae*, slightly longer than width of each at base, somewhat separated from each other, posterior ends distinctly rounded.

Described from a large series of specimens collected as nymphs near Occoquan, Va., during August and September, 1931 and 1932, by the author from horse nettle, *Solanum carolinense* L. Nymphs of this species were also collected by the author, on the same host, at Arlington Experiment Farm on July 12, 1933. This species has also been reared on potato in confinement. The first three specimens of this species were collected near Occoquan, Va., in 1930 by J. G. Conklin. It has never been found abundantly. In one collection of over 40 nymphs, made on August 27, 1932, about 25 percent were attacked by mite larvae determined by Dr. H. E. Ewing of the Division of Taxonomy of Insects, U. S. Bureau of Entomology, as belonging to the family Erythraeidae. The species is named for Dr. D. M. DeLong, who examined three specimens in October, 1930, and recognized that they belonged to an undescribed species.

Holotype male and allotype female in United States National Museum collection (Cat. No. 49934). Male and female paratypes in collections of the author and the U. S. National Museum.

The male genital pieces of this species most resemble those of *Empoasca birdii* Goding as described by DeLong (1, p. 41-42) in his revision of this genus, but the genital characters are different and on this basis the two species are easily separated.

***Empoasca batatae*, new species.**

A yellowish green species with a produced vertex which is without distinct markings. Fresh specimens pea green with distinctly yellowish elytra. Length 3.5 mm.

Vertex about one third wider at posterior margin between the eyes than length at middle, produced before anterior margins of eyes about one half its length at middle; pronotum about one half longer than vertex.

Color.—Vertex yellowish with one prominent green spot near apex on each side of median line; pronotum green tinged with yellow; scutellum whitish with posterior tip bluish green; elytra greenish subhyaline tinged with yellow.

Female genitalia (Figs. 4 and 5).—Last ventral segment with posterior margin roundedly produced and entire.

Male genitalia.—Valve concaved on posterior margin between lateral angles; plates more than three times as long as basal width, tapered toward the tip to rounded apices, which are slightly upturned; styles, in ventral view, curved and enlarged at basal third, the apical two thirds more narrowed, almost straight the apices slightly divergent; lateral processes of pygofer parallel margined, rather short and straight, except slightly curved inward at apex, in ventral

view; in lateral view apical third curved dorsally to fairly sharp tip; spines of tenth segment, in lateral view, broad and heavy at base, curving anteriorly, then ventrally, and again anteriorly to a sharply pointed apex.

Sternal apodemes for muscular attachments on venter at base of abdomen more than twice as long as wide, rectangular in shape except for slightly rounded corners at posterior end.

Described from a large series of specimens reared on sweet potato in a greenhouse at Arlington Experiment Farm, Rosslyn, Va., and from specimens collected from the same host plant at Fort Myers, Fla., during December, 1931 and 1932, by the author. Specimens were also received from E. J. Hambleton, collected on Leguminosae, June, 1933, at Viçosa, Minas-Gerais, Brazil. The species is named "*batatae*" for the Latin specific name of the sweet potato. It injures this host plant by feeding on the leaves and producing a distinct and prominent stippling.

Holotype male, allotype female, and paratypes male and female in United States National Museum collection (Cat. No. 49935). Paratypes in author's collection.

***Empoasca curvata*, new species.**

Externally this species is apparently rather closely related to *Empoasca birdii* Goding as described by DeLong. Length 3.5 mm.

Vertex produced about one half its length beyond anterior margins of eyes, about one half longer on middle than next eyes, slightly less than half as wide between eyes (at anterior margin) than length at middle; pronotum less than twice as long as vertex. Elytra rather long and narrow.

Color.—Greenish yellow marked with white and pale brown. Vertex with a pale area anterior to each ocellus and a median longitudinal line; pronotum with three pale spots on anterior margin, a median spot and one behind each eye; scutellum orange with a wide pale longitudinal median band terminating at the apex in a circular spot which is slightly greater in diameter than the width of the median band. Elytra subhyaline with extensive irregular areas brown or smoky.

Male genitalia (Fig. 6).—Posterior margin of valve only slightly concave; plates broad at base and about three times as long as broad, with bluntly pointed apices; styles, in ventral view, curved and slightly enlarged at about the middle, the apical halves gradually narrowed to the apices, which are somewhat divergent; lateral processes of the pygofer long and slender, almost parallel margined, when seen in ventral view extending inward, and crossing near the middle and again near the tips, which are rounded; spines of tenth segment, in lateral view, broad at base, directed ventrally and with apical portion curved rather sharply and tapering almost anteriorly to a pointed apex.

Sternal apodemes for muscular attachments on venter at base of abdomen more than twice as long as width of each at middle; posterior ends rounded and somewhat separated from each other.

The species is named "*curvata*" because of its long curved lateral processes of the pygofer.

Described from one male specimen collected on honeysuckle at Arlington Experiment Farm, Rosslyn, Va., by J. W. Scrivener, March 25, 1932, and from one male specimen taken in traplight October 6, 1931, at Knoxville, Tenn., by W. W. Stanley.

Holotype male, collected March 25, 1932, in the United States National Museum collection (Cat. No. 49936). Paratype male (genitalia only) collected at traplight Oct. 6, 1931, in the author's collection. This specimen was not sufficiently isolated from other material when the abdomen was prepared for study and therefore only the genitalia are available.

LITERATURE CITED.

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EXPLANATION OF FIGURES.

Internal male genitalia of Empoasca.

Figure 1. *E. sativae*, abdomen, ventral view.

Figure 2. *E. delongi*, ventral view.

Figure 3. *E. delongi*, lateral view.

Figure 4. *E. batatae*, abdomen, ventral view.

Figure 5. *E. batatae*, lateral view.

Figure 6. *E. curvata*, abdomen, ventral view.

l. p......lateral process of pygofer.

pg......pygofer.

pl......plate.

s......style.

sp......dorsal spine of tenth segment.

st. a......sternal apodeme for muscular attachment.

