

APHIDS ASSOCIATED WITH CHRYSANTHEMUMS IN THE
UNITED STATES

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ABSTRACT

A key to 15 aphid species known to colonize cultivated and native chrysanthemums in the United States is provided; each species is described and characteristic structures are illustrated. A brief summary of taxonomic characters, cultivated and wild hosts, and distribution within the United States and throughout the world are also given for each species.

Key Words: aphididae, aphids, chrysanthemum, taxonomic keys

RESUMEN

Se ofrece una clave para identificar quince especies de áfidos que se sabe colonizan crisantemos, cultivados y indígenas, en los Estados Unidos; se describen e ilustran las estructuras características de cada especie. Se incluye para cada especie un resumen breve de las características taxonómicas, los hospedantes cultivados y indígenas, y la distribución en los Estados Unidos y por todo el mundo.

Chrysanthemums are a long-time favorite of both professional growers and hobbyists. The genus *Chrysanthemum* (Asteraceae = Compositae) includes such well-known flowers as shasta-daisies, pyrethrums, marguerites or Paris-daisies, and annual chrysanthemums (Everett 1981). The great diversity of the plant's form, growing habits, and color has contributed to the popularity of the cultivated varieties of this flower, namely *Chrysanthemum morifolium* Ram. Although the share of the chrysanthemum market has declined since 1981 (Voigt 1989), potted chrysanthemums were the second leading potted flowering plant produced in the United States in 1987 (Anonymous 1991). The wholesale value of potted and florist chrysanthemums for 1993 was more than \$95 million and nearly \$9 million for standard chrysanthemums for 36 reporting states (Anonymous 1994).

Several species of aphids can become established on greenhouse and outdoor plantings. Large colonies of aphids can greatly reduce plant vigor and kill the plant through mechanical injury. However, even a few feeding aphids can damage plants because they produce a sticky substance called honeydew. As the aphids feed, honeydew is excreted and accumulates on the leaves and flowers. In the higher humidity of a greenhouse, honeydew provides an excellent substrate for the growth of black sooty mold. Large areas of mold covering the leaves can reduce photosynthesis and also result in an unattractive plant with a much lower market value. Additionally, aphids can transmit several viral diseases that injure chrysanthemums.

A diverse aphid fauna—at least 15 species—is known to colonize cultivated and wild chrysanthemums in the United States. A brief summary of taxonomic characters, hosts, worldwide distribution, and U.S. distribution is given for each of the 15 species. Aphids treated here are: *Aphis fabae* Scopoli, *Aphis gossypii* Glover, *Aulacorthum cir-*

cumflexum (Buckton), *Aulacorthum solani* (Kaltenbach), *Brachycaudus cardui* (L.), *Brachycaudus helichrysi* (Kaltenbach), *Coloradoa rufomaculata* (Wilson), *Macrosiphoniella sanborni* (Gillette), *Macrosiphoniella subterranea* (Koch), *Macrosiphoniella tanacetaria* (Kaltenbach), *Macrosiphum euphorbiae* (Thomas), *Myzus ascalonicus* Doncaster, *Myzus ornatus* Laing, *Myzus persicae* (Sulzer), and *Pleotrichophorus chrysanthemi* (Theobald). Descriptions, figures, and keys are included as an aid for those responsible for detection, identification, and control of aphids associated with chrysanthemums in the United States.

MATERIALS AND METHODS

In the synonymy section, one asterisk (*) represents the name used by Palmer (1952) and two asterisks (**) represent the name appearing in Blackman & Eastop (1984). Common names are those approved by the Entomological Society of America (Stoetzel 1989).

Information on distribution and hosts is taken from labels on slides in the National Collection of Insects, Beltsville, Maryland, and from records in Palmer (1952), Smith & Parron (1978), and Blackman & Eastop (1984).

Identifications can be made of live aphids, alcohol preserved specimens, or cleared and slide mounted specimens. In the illustrated keys, the species are grouped by morphological differences in antennae, antennal tubercles, cornicles, and caudal setae. Characters used in the keys are apparent with a dissecting microscope with a power of at least 16X. Relative body size of aphid species is after Blackman & Eastop (1984): body length < 2.0 mm are "small," 2.0 - 3.0 mm are "medium," and > 3.0 mm = "large." Body length is measured dorsally from the center of the frons to the end of the abdomen, excluding the cauda (see generalized aphid, Fig. 1). Length of the antennal "terminal process" is measured as the distance from the large primary sensorium to the tip. Length of the "base" of the antenna is measured from the basal portion of the last antennal segment to the apex of the primary sensorium. The keys are not intended for identification of single, errant aphids but should be used for individuals fully colonizing chrysanthemums.

APHIDS ON CHRYSANTHEMUMS IN THE UNITED STATES

Aphis fabae Scopoli 1763

Figs. 1, 2, 3

Synonymy:

* & ** *Aphis fabae* Scopoli

ESA approved common name: bean aphid

Other common name: black bean aphid

Taxonomic characters: Wingless adult female.—In life, body dull black. Small to medium sized, body length 1.8-2.6 mm, rounded. Antenna 6 segmented; tubercles not developed; terminal process approximately $2\frac{2}{3}$ -3 times length of base of antennal segment VI; no secondary sensoria on antennal segment III; setae on antennal segment III longer than diameter of segment. Cornicle dark, cylindrical, 3-3½ times as long as wide. Cauda dark, elongate with 8-12 lateral setae and 2-5 dorsolateral setae.

Winged adult female.—In life, body dull black, usually with dark lateral areas and bands on dorsum of abdomen; immatures often covered with wax; alate nymphs with tessellated abdomen. Small to medium sized, body length 1.9-2.4 mm, rounded. Antenna 6 segmented; tubercles not developed; terminal process approximately $2\frac{1}{2}$ -

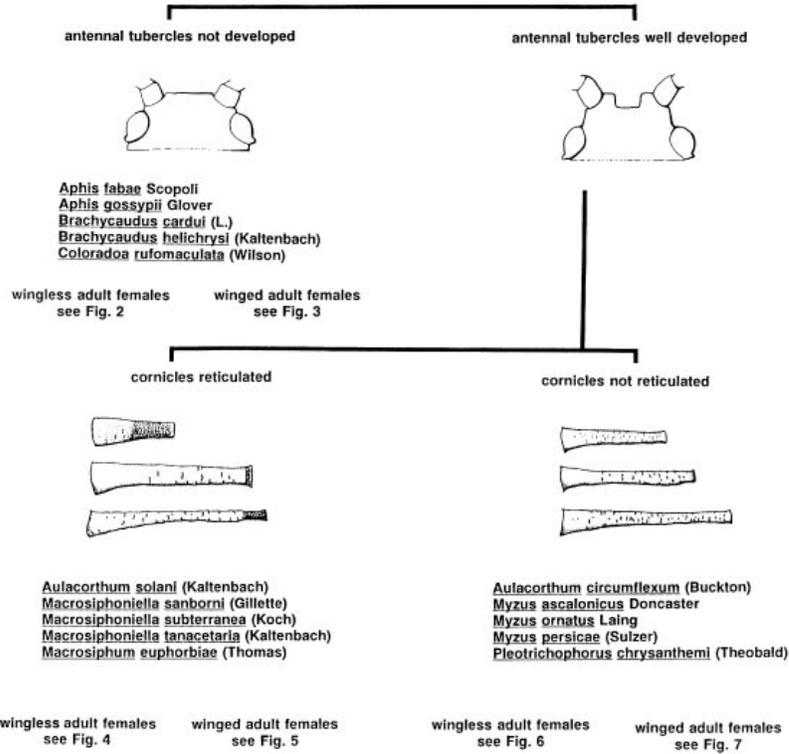
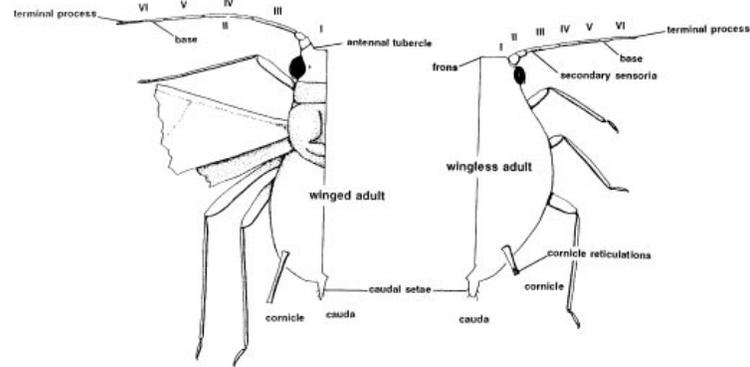


Fig. 1. Pictorial key to fifteen aphid species that colonize chrysanthemums in the United States.

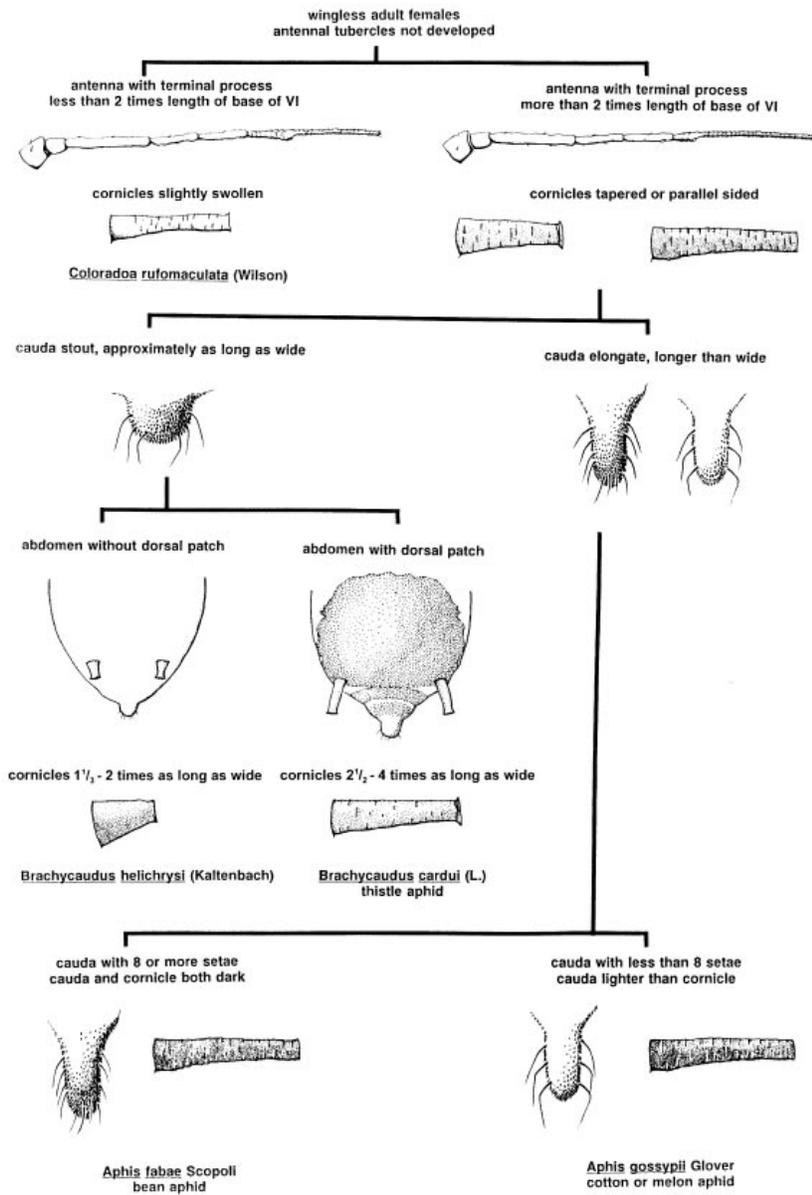


Fig. 2. Pictorial key to wingless adult females of five aphid species that colonize chrysanthemum in the United States and have antennal tubercles not developed.

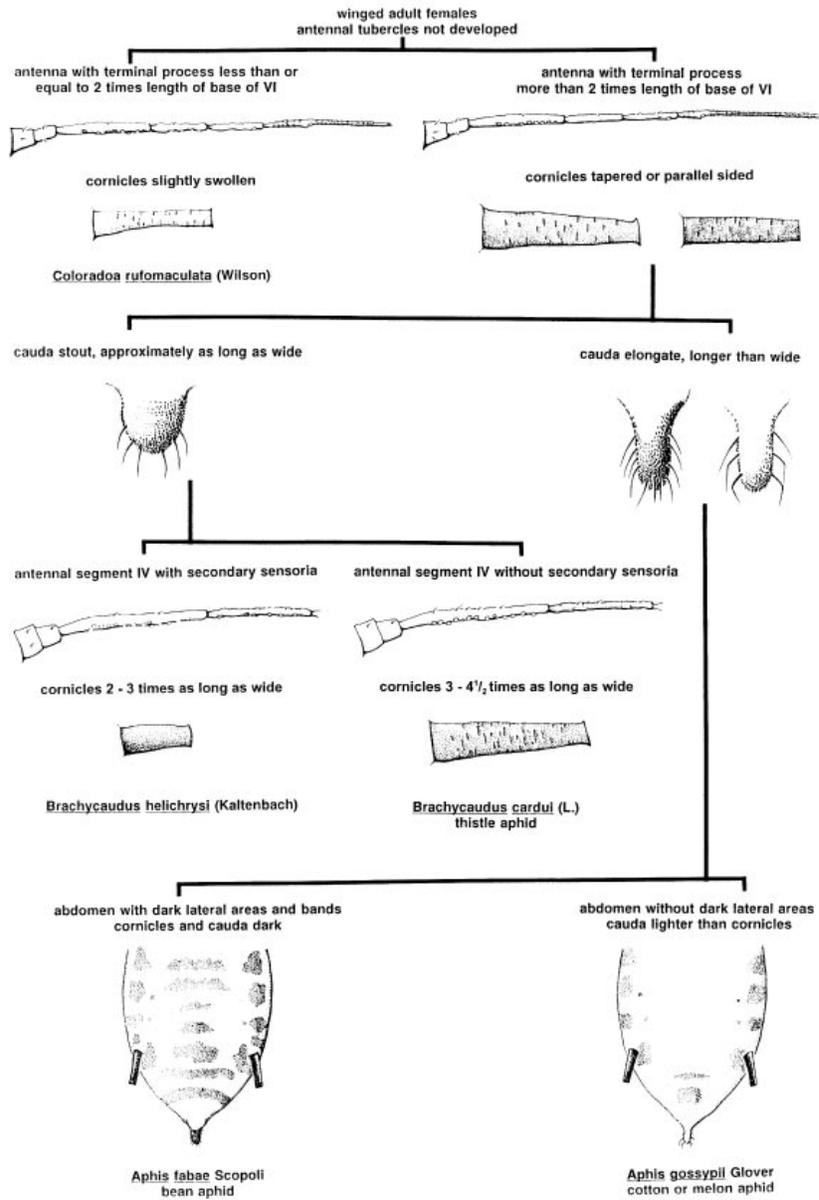


Fig. 3. Pictorial key to winged adult females of five aphid species that colonize chrysanthemum in the United States and have antennal tubercles not developed.

3¼ times length of base of antennal segment VI; 6-16 secondary sensoria of variable size on antennal segment III; 0-7 secondary sensoria on antennal segment IV; setae on antennal segment III longer than diameter of segment. Cornicle dark, cylindrical, ¾-4½ times as long as wide. Cauda dark, elongate with 8-12 lateral setae and 0-4 dorso-lateral setae.

Hosts: Principal hosts are species of *Euonymus* and *Viburnum*, however, *A. fabae* is polyphagous on many additional plants.

U.S. distribution: Throughout.

World distribution: Widely distributed throughout the world.

Comments: *Aphis fabae* transmits 42 plant viruses but is not a known vector of the chrysanthemum viruses (Chan et al. 1991).

Aphis gossypii Glover 1877

Figs. 1, 2, 3

Synonymy:

* & ** *Aphis gossypii* Glover

ESA approved common name: cotton or melon aphid

Other common names: none

Taxonomic characters: Wingless adult female.—In life, body color varying from dark green to pale yellow or nearly white. Small sized, body length 1.4-1.7 mm, rounded. Antenna 6 segmented; tubercles not developed; length variable, terminal process approximately 2-3¼ times length of base of antennal segment VI; antennal segment III without secondary sensoria; setae on antennal segment III shorter than diameter of segment. Cornicle dark, cylindrical, slightly tapering to apical flange, approximately 3-4 times as long as wide. Cauda pale to dusky, elongate with 4-6 (usually 6) lateral setae.

Winged adult female.—In life, body shape and coloration similar to wingless adult female. Small sized, body length 1.4-2.0 mm, rounded. Antenna 6 segmented; tubercles not developed; terminal process approximately 2-3 times length of base of antennal segment VI; antennal segment III with 4-9 secondary sensoria; antennal segment IV with 0-1 secondary sensorium; setae on antennal segment III shorter than diameter of segment. Cornicle dark, cylindrical with apical flange, approximately 3-5 times as long as wide. Cauda pale to dusky, elongate with 4-6 (usually 6) lateral setae.

Hosts: Polyphagous and very damaging to many plants of economic importance, including species of *Chrysanthemum*.

U.S. distribution: Throughout.

World distribution: Widespread.

Comments: *Aphis gossypii* transmits 76 plant viruses but is not a known vector of the chrysanthemum viruses (Chan et al. 1991).

Aulacorthum circumflexum (Buckton 1876)

Figs. 1, 6, 7

Synonymy:

* *Myzus circumflexum* (Buckton)

** *Aulacorthum* (*Neomyzus*) *circumflexum* (Buckton)

ESA approved common name: crescent marked lily aphid

Other common names: mottled arum aphid

Taxonomic characters: Wingless adult female.- In life, body color varying from nearly white to yellow or green, abdomen with dark U-shaped dorsal patch, thorax with a pair of dorsolateral patches or transverse bars. Small to medium sized, body length 1.7-2.2 mm, spindle shaped. Antennae 6 segmented; tubercles well developed with inner faces parallel; terminal process approximately 4-5 times length of base of antennal segment VI; antennal segment III with 0-3 (usually 1) secondary sensoria, antennal segment IV without secondary sensoria. Cornicle pale, cylindrical, flaring slightly apically, approximately $3\frac{3}{4}$ -6 times as long as wide. Cauda pale, elongate with 4-6 (usually 4) lateral setae and occasionally a single dorsal preapical seta.

Winged adult female.—In life, head and thorax black, abdomen yellow to green with dark bands often coalescing to form a single patch; body shape similar to wingless adult female. Small to medium sized, body length 1.4-2.2 mm. Antennae 6 segmented; tubercles well developed with inner faces parallel; terminal process approximately $4\frac{1}{3}$ - $7\frac{1}{3}$ times length of base of antennal segment VI; antennal segment III with 10-17 secondary sensoria; antennal segment IV with 0-1 secondary sensoria. Cornicle pale cylindrical, approximately 4-7 times as long as wide. Cauda pale, elongate with 4 lateral setae and 1-2 dorsal preapical setae.

Hosts: Extremely polyphagous, occurring on many greenhouse and house plants, including *Chrysanthemum*.

U.S. distribution: Throughout.

World distribution: Widespread.

Comments: *Aulacorthum circumflexum* transmits 31 plant viruses but is not a known vector of the chrysanthemum viruses (Chan et al. 1991).

Aulacorthum solani (Kaltenbach 1843)

Figs. 1, 4, 5

Synonymy:

**Myzus solani* (Kaltenbach)

***Aulacorthum solani* (Kaltenbach)

ESA approved common name: foxglove aphid

Other common names: glasshouse-potato aphid

Taxonomic characters: Wingless adult female.- In life, body color varying from pale green to yellow. Small to large sized, body length 1.8-3.0 mm, ovoid. Antennae 6 segmented, apices dark; tubercles well developed with inner faces parallel; terminal process approximately 5-6 times length of base of antennal segment VI; antennal segment III with 1-6 secondary sensoria, antennal segment IV without secondary sensoria. Cornicle pale with dark tips, cylindrical, gradually tapering with distinct large apical flange and 2 rows of reticulations, reticulations less than $\frac{1}{3}$ length; approximately $4\frac{1}{4}$ - $5\frac{1}{4}$ times as long as wide. Cauda pale, elongate with 4-6 (usually 6) lateral setae and a single dorsal preapical seta.

Winged adult female.—In life, yellow green with brown head, dark thorax and abdomen with pale to dark transverse bands; body shape similar to wingless adult female; medium to large sized, body length 2.0-3.0 mm. Antennae 6 segmented; tubercles well developed with inner faces parallel; terminal process approximately 5-6 times length of base of antennal segment VI; antennal segment III with 8-13 secondary sensoria; antennal segment IV without secondary sensoria. Cornicle pale with dark tips, cylindrical, gradually tapering with distinct large apical flange and 2 rows of reticulations, reticulations less than $\frac{1}{3}$ length; approximately $4\frac{2}{3}$ - $7\frac{2}{3}$ times as long

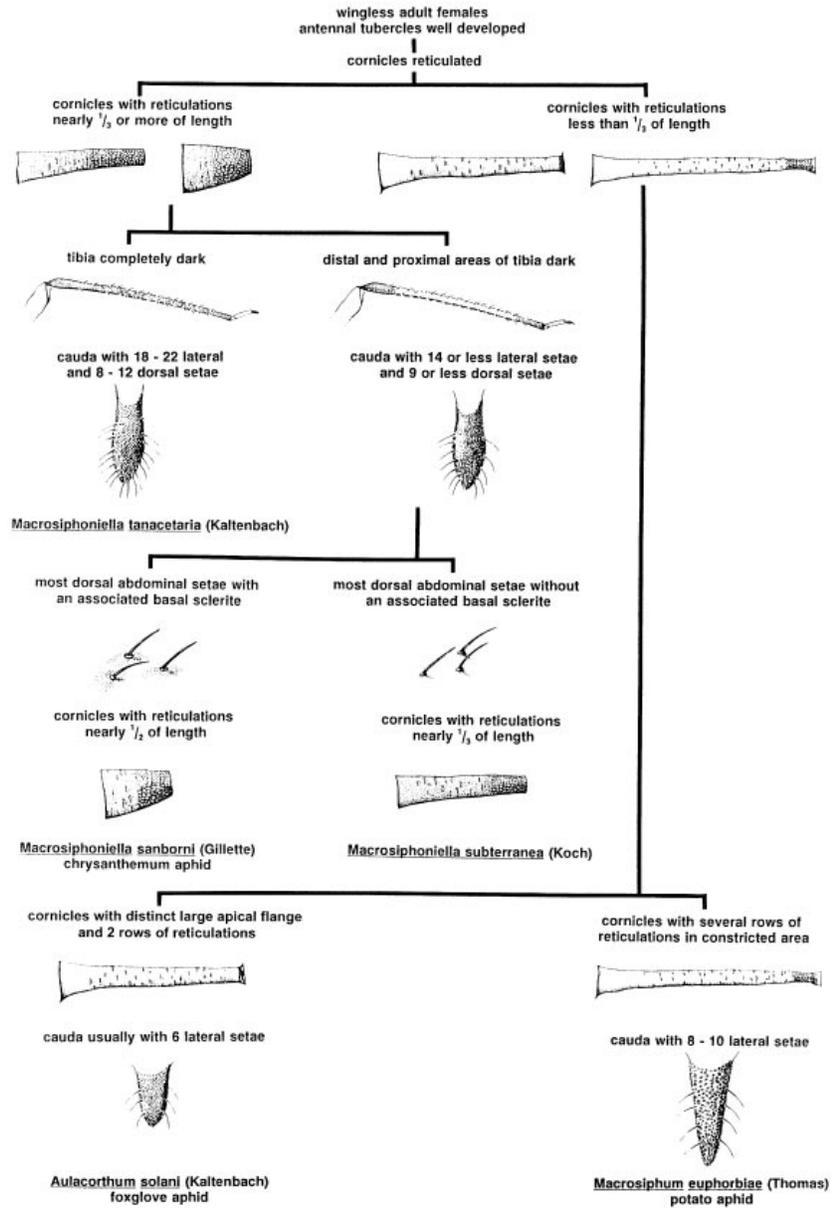


Fig. 4. Pictorial key to wingless adult females of five aphid species that colonize chrysanthemum in the United States and have antennal tubercles well developed and cornicles reticulated.

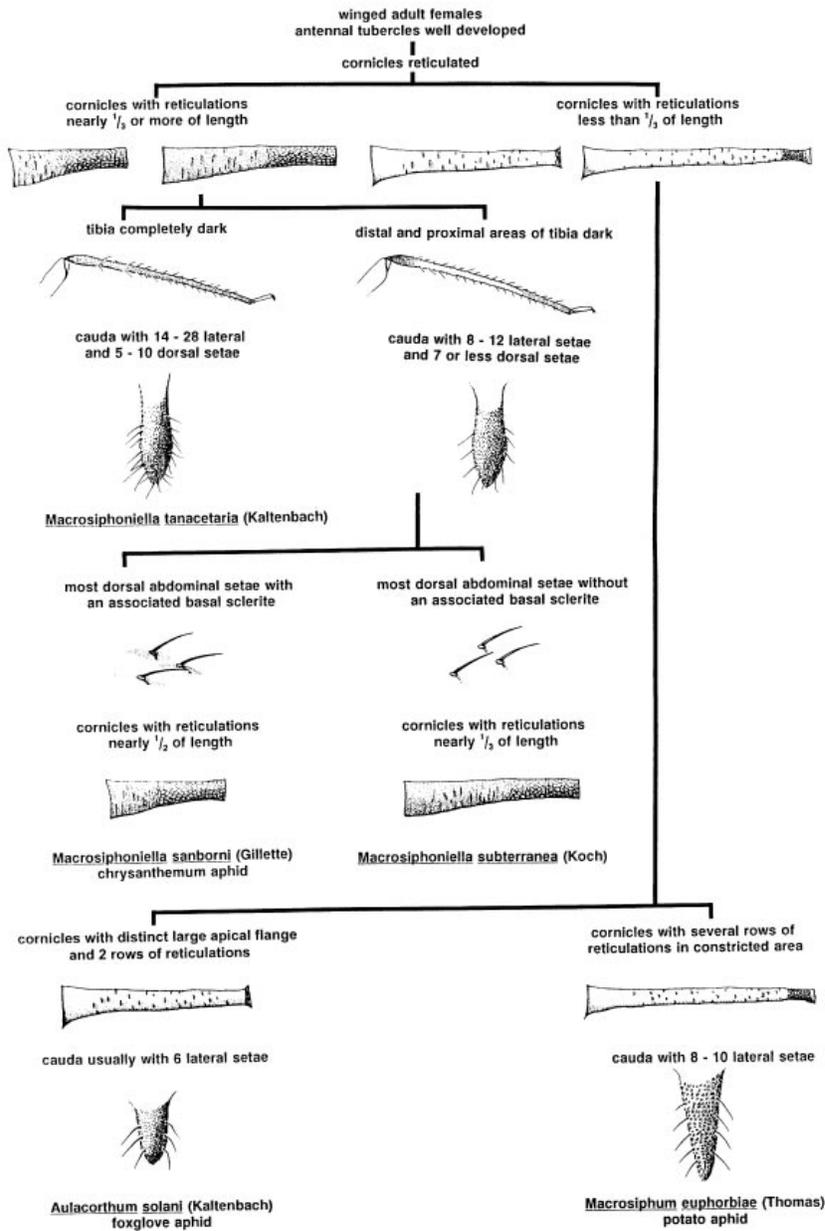


Fig. 5. Pictorial key to winged adult females of five aphid species that colonize chrysanthemum in the United States and have antennal tubercles well developed and cornicles reticulated.

as wide. Cauda pale, elongate with 4-6 (usually 6) lateral setae and a single dorsal preapical seta.

Hosts: Extremely polyphagous, occurring on many greenhouse and house plants, including *Chrysanthemum*.

U.S. distribution: Throughout.

World distribution: Widespread.

Comments: *Aulacorthum solani* transmits 45 plant viruses, including three viruses affecting chrysanthemums: chrysanthemum good news mosaic virus; chrysanthemum virus B; and tomato aspermy virus (Chan et al. 1991).

Brachycaudus cardui (Linnaeus 1758)

Figs. 1, 2, 3

Synonymy:

**Aphis cardui* Linnaeus

***Brachycaudus cardui* (Linnaeus)

ESA approved common name: thistle aphid

Other common names: none

Taxonomic characters: Wingless adult female.—In life, body color varying from yellow to green or red, abdomen with large dark dorsal patch; legs yellow with tarsi and tips of tibiae dark; apices of antennal segments dusky. Small to medium sized, body length 1.9-2.5 mm, pear shaped. Ultimate rostral segment more than three times as long as wide. Antennae 6 segmented; tubercles not developed; terminal process approximately $3\frac{1}{4}$ - $4\frac{1}{2}$ times length of base of antennal segment VI; antennal segment III and IV without secondary sensoria. Cornicle dusky, cylindrical, slightly tapering to apical flange, approximately $2\frac{1}{2}$ -4 times as long as wide. Cauda dusky, stout, nearly as long as wide with 6 lateral setae.

Winged adult female.—In life, body shape and coloration similar to wingless adult female; antennal segments dark; small to medium sized, body length 1.7-2.5 mm. Ultimate rostral segment more than four times as long as wide. Antennae 6 segmented; tubercles not developed; terminal process approximately $2\frac{3}{4}$ - $4\frac{1}{4}$ times length of base of antennal segment VI; antennal segment III with 21-30 secondary sensoria; antennal segment IV without secondary sensoria. Cornicle dusky, cylindrical, slightly tapering to apical flange, approximately 3 - $4\frac{1}{4}$ times as long as wide. Cauda dusky, stout with 6 lateral setae and 1 preapical seta.

Hosts: Principal hosts are *Prunus* spp., however, additional hosts include species of Asteraceae and Boraginaceae.

U.S. distribution: Throughout.

World distribution: Central Asia, Europe, India, Middle East, North Africa, North America.

Comments: *Brachycaudus cardui* transmits seven plant viruses but is not a known vector of the chrysanthemum viruses (Chan et al. 1991).

Brachycaudus helichrysi (Kaltenbach 1843)

Figs. 1, 2, 3

Synonymy:

**Aphis helichrysi* Kaltenbach

***Brachycaudus helichrysi* (Kaltenbach)

ESA approved common name: none

Other common names: leaf-curl plum aphid, leaf-curling plum aphid, plum leaf-curl aphid

Taxonomic characters: Wingless adult female.—In life, body color varying from green to yellow to nearly white or sometimes pink; legs pale; apex of antennal segments III-V and base of VI dusky on slide-mounted specimens. Small sized, body length 1.1-2.0 mm, pear shaped. Ultimate rostral segment less than three times as long as wide. Antennae 6 segmented; tubercles not developed; terminal process approximately 2-3¼ times length of base of antennal segment VI; antennal segment III without secondary sensoria. Cornicle apically dusky, cylindrical, slightly tapering to apical flange; approximately 1½-2 times as long as wide. Cauda dusky, stout, nearly as long as wide with 4-6 lateral setae and 1 preapical seta.

Winged adult female.—In life, body shape and coloration similar to wingless adult female with the addition of dark dorsal patch; antennal segments I-VI dusky on slide-mounted specimens; small sized, body length 1.5-1.9 mm. Ultimate rostral segment less than four times as long as wide. Antennae 6 segmented; tubercles not developed; terminal process approximately 3½-4 times length of base of antennal segment VI; antennal segment III with 14-28 secondary sensoria; antennal segment IV with 1-7 secondary sensoria. Cornicle completely dark, cylindrical, slightly tapering to apical flange; approximately 2-3 times as long as wide. Cauda dusky, stout with 4-6 lateral setae and 1 preapical seta.

Hosts: Principal hosts are *Prunus* spp., however, *B. helichrysi* is polyphagous on many additional hosts.

U.S. distribution: Throughout.

World distribution: Widespread.

Comments: *Brachycaudus helichrysi* transmits nine plant viruses but is not a known vector of the chrysanthemum viruses (Chan et al. 1991); it is however, an important pest of greenhouse chrysanthemums.

Coloradoa rufomaculata (Wilson 1908)

Figs. 1, 2, 3

Synonymy:

**Rhopalosiphum rufomaculatum* (Wilson)

***Coloradoa rufomaculata* (Wilson)

ESA approved common name: none

Other common names: pale chrysanthemum aphid, green chrysanthemum aphid

Taxonomic characters: Wingless adult female.—In life, body green. Small sized, body length 0.9-1.6 mm, pear shaped; dorsal body setae fan shaped. Antennae 6 segmented; tubercles not developed; terminal process approximately 1½-1¾ times length of base of antennal segment VI; antennal segment III without secondary sensoria. Cornicle dusky, cylindrical, slightly swollen apically; approximately 5-8½ times as long as wide. Cauda dusky, elongate with 4 lateral setae and a single dorsal preapical seta.

Winged adult female.—In life, head and thorax dusky, abdomen green; antennae, tarsi, and tips of tibiae dark; body shape similar to wingless adult female; small sized, body length 1.1-1.6 mm; dorsal body setae fan shaped. Antennae 6 segmented; tubercles not developed; terminal process approximately 1½-2 times length of base of antennal segment VI; antennal segment III with 8-15 secondary sensoria; antennal segment IV with 4-12 secondary sensoria. Cornicle dusky, cylindrical, slightly swollen apically; approximately 5½-7 times as long as wide. Cauda dusky, elongate with 4 lateral setae and a single dorsal preapical seta.

Hosts: Principal hosts include cultivated chrysanthemums and *Artemisia* spp.

U.S. distribution: Throughout.

World distribution: Canada, Central Asia, Europe, India, Middle East, North Africa, and North America.

Comments: *Coloradoa rufomaculata* transmits three plant viruses including one affecting chrysanthemums: chrysanthemum virus B (Chan et al. 1991). *Coloradoa rufomaculata* can become problematic on greenhouse chrysanthemums.

Macrosiphoniella sanborni (Gillette 1908)

Figs. 1, 4, 5

Synonymy:

**Macrosiphum sanborni* Gillette

***Macrosiphoniella sanborni* (Gillette)

ESA approved common name: chrysanthemum aphid

Other common names: none

Taxonomic characters: Wingless adult female.—In life, body color varying from light brown to nearly dark; most dorsal abdominal setae with associated basal scleroite; distal area of femur and proximal and distal areas of tibia dark. Small to medium sized, body length 1.7-2.6 mm, spindle shaped. Antennae 6 segmented, dusky (except segment III); tubercles well developed with inner faces divergent; terminal process approximately 4½-5 times length of base of antennal segment VI; antennal segment III with 11-24 secondary sensoria; antennal segment IV with 0-2 (usually 0) secondary sensoria. Cornicle dark, subconical with polygonal reticulation nearly ½ its length; approximately 2-3 times as long as wide. Cauda dark, elongate with 8-10 lateral setae and 3-7 dorsal setae.

Winged adult female.—In life, body coloration and shape similar to wingless adult female; most dorsal abdominal setae with associated basal scleroite; distal area of femur and proximal and distal areas of tibia dark; small to medium sized, body length 1.8-2.8 mm. Antennae 6 segmented; tubercles well developed with inner faces divergent; terminal process approximately 4¼-5¼ times length of base of antennal segment VI; antennal segment III with 18-30 secondary sensoria; antennal segment IV with 0-13 secondary sensoria. Cornicle dark, cylindrical, gradually tapering toward apex with polygonal reticulation nearly ½ its length; approximately 2-5 times as long as wide. Cauda dark, elongate with 8-10 lateral setae, 3-5 dorsal setae, and occasionally 1-6 ventral setae.

Hosts: Hosts include cultivated chrysanthemums as well as *Chrysanthemum leucanthemum* L., *Chrysanthemum maximum* Ramond, and other species of Asteraceae.

U.S. distribution: Throughout.

World distribution: Of east Asian origin, not distributed throughout the world.

Comments: *Macrosiphoniella sanborni* transmits five plant viruses including two viruses affecting chrysanthemums: chrysanthemum virus B and chrysanthemum virus B [chrysanthemum vein mottle virus strain] (Chan et al. 1991).

Macrosiphoniella subterranea (Koch 1855)

Figs. 1, 4, 5

Synonymy:

* & **not listed in Palmer (1952) or Blackman and Eastop (1984)

ESA approved common name: none

Other common names: none

Taxonomic characters: Wingless adult female.—In life, body dark brown with a darker dorsal spot; femur and proximal and distal areas of tibia dark. Medium to large sized, body length 2.8-3.2 mm, spindle shaped. Antennae 6 segmented, dusky (except segment III); tubercles well developed with inner faces divergent; terminal process approximately 4-4 $\frac{3}{4}$ times length of base of antennal segment VI; antennal segment III with 8-15 secondary sensoria; antennal segment IV without secondary sensoria. Cornicle dark, cylindrical, gradually tapering with polygonal reticulation nearly $\frac{1}{3}$ its length; approximately 4 $\frac{1}{2}$ -7 times as long as wide. Cauda dark, elongate with 8-14 lateral setae and 4-9 dorsal setae.

Winged adult female.—In life, body coloration and shape similar to wingless adult female; femur and proximal and distal areas of tibia dark; medium to large sized, body length 2.7-3.2 mm. Antennae 6 segmented; tubercles well developed with inner faces divergent; terminal process approximately 5 $\frac{1}{3}$ -8 $\frac{3}{4}$ times length of base of antennal segment VI; antennal segment III with 26-32 secondary sensoria; antennal segment IV without secondary sensoria. Cornicle dark, cylindrical, gradually tapering with polygonal reticulation nearly $\frac{1}{3}$ its length; approximately 5 $\frac{1}{3}$ -8 $\frac{3}{4}$ times as long as wide. Cauda dark, elongate with 8-12 lateral setae and 2-7 dorsal setae.

Hosts: Hosts include cultivated chrysanthemums.

U.S. distribution: PA.

World distribution: Canada (Ontario), Europe.

Comments: *Macrosiphoniella subterranea* is not recorded as a known vector of any plant viruses (Chan et al. 1991).

Macrosiphoniella tanacetaria (Kaltenbach 1843)

Figs. 1, 4, 5

Synonymy:

***Macrosiphoniella tanacetaria* (Kaltenbach)

ESA approved common name: none

Other common names: none

Taxonomic characters: Wingless adult female.—In life, body light grey green, covered with fine powder; legs dark. Large sized, body length 3.1-3.5 mm, spindle shaped. Antennae 6 segmented, dark; tubercles well developed with inner faces divergent; terminal process approximately 3 $\frac{1}{4}$ -4 $\frac{1}{3}$ times length of base of antennal segment VI; antennal segment III with 10-25 secondary sensoria; antennal segment IV without secondary sensoria. Cornicle dark, cylindrical, gradually tapering with polygonal reticulation nearly $\frac{1}{3}$ its length; approximately 4-8 times as long as wide. Cauda dark, elongate with 18-22 lateral setae and 8-12 dorsal setae.

Winged adult female.—In life, body coloration and shape similar to wingless adult female; legs dark; medium to large sized, body length 2.9-3.6 mm. Antennae 6 segmented; tubercles well developed with inner faces divergent; terminal process approximately 3-4 times length of base of antennal segment VI; antennal segment III with 30-42 secondary sensoria; antennal segment IV without secondary sensoria. Cornicle dark, cylindrical, gradually tapering with polygonal reticulation nearly $\frac{1}{3}$ its length; approximately 3 $\frac{3}{4}$ -6 times as long as wide. Cauda dark, elongate with 14-28 lateral setae and 5-10 dorsal setae.

Hosts: Principle hosts include *Tanacetum* spp., however chrysanthemums, including *Chrysanthemum balsamita* L., also serve as occasional hosts.

U.S. distribution: DE, MA, NJ, NY, PA.

World distribution: Canada, Europe, Israel, Morocco, South America., and USA.

Comments: *Macrosiphoniella tanacetaria* transmits a single plant virus but is not a known vector of a chrysanthemum virus (Chan et al. 1991).

Macrosiphum euphorbiae (Thomas 1878)

Figs. 1, 4, 5

Synonymy:

**Macrosiphum solanifolii* (Ashmead 1882)

***Macrosiphum euphorbiae* (Thomas)

ESA approved common name: potato aphid.

Other common names: none

Taxonomic characters: Wingless adult female.- In life, body usually of varying shades of green. Medium to large sized, body length 2.7-3.5 mm, pear shaped or elongate. Antennae 6 segmented; tubercles well developed with inner faces divergent; terminal process approximately 5-8½ times length of base of antennal segment VI; 3-6 secondary sensoria on basal half of antennal segment III; either entirely dark or only dark apically. Cornicle entirely pale or becoming increasingly dusky towards tip, cylindrical with slight apical constriction, several rows of polygonal reticulations in constricted area, reticulation less than ⅓ of length; 6-7½ times as long as wide. Cauda pale, elongate with 8-10 lateral setae and 1-2 dorsal preapical setae.

Winged adult female.—In life, body usually of varying shades of green, shape similar to wingless adult female; medium to large sized, body length 2.5-3.0 mm. Antennae 6 segmented; frontal tubercles well developed with inner faces divergent; terminal process approximately 5½-7 times length of base of antennal segment VI; 13-18 secondary sensoria of similar size on antennal segment III and in a straight row; no secondary sensoria on antennal segment IV; entirely dark except for segments I and II and base of III. Cornicle sometimes pale but usually progressively darker towards tip, cylindrical with slight apical constriction, several rows of polygonal reticulations in constricted area, reticulation less than ⅓ of length; 6¼-10 times as long as wide. Cauda pale, elongate with 8-10 lateral setae and 1-2 dorsal preapical setae.

Hosts: Principle hosts *Rosa* spp., however, *M. euphorbiae* is polyphagous and very damaging to many additional host plants of economic importance.

U.S. distribution: Throughout.

World distribution: Widespread.

Comments: *Macrosiphum euphorbiae* transmits 67 plant viruses, including two viruses affecting chrysanthemums: chrysanthemum virus B and tomato aspermy virus (Chan et al. 1991).

Myzus ascalonicus Doncaster 1946

Figs. 1, 6, 7

Synonymy:

***Myzus ascalonicus* Doncaster

ESA approved common name: shallot aphid

Other common names: none

Taxonomic characters: Wingless adult female.- In life, body varying from yellow to green brown, dorsum of abdomen without spots and bands. Small to medium sized, body length 1.5-2.1 mm, spindle shaped. Antennae 6 segmented, pale except apex of

segment V and entire segment VI dark; tubercles well developed with inner faces parallel; terminal process approximately $2\frac{1}{2}$ - $3\frac{1}{4}$ times length of base of antennal segment VI; antennal segments III-IV without secondary sensoria. Cornicle not reticulated, dusky, swollen apically with narrow medial constriction; approximately $5\frac{1}{2}$ -8 times as long as wide. Cauda elongate with 4-6 (usually 4) lateral setae.

Winged adult female.—In life, head and thorax dark, dorsum of abdomen with large dark patch; body shape similar to wingless adult female; medium sized, body length 2.0-2.6 mm. Antennae 6 segmented, dark; tubercles well developed with inner faces parallel; terminal process approximately $2\frac{1}{2}$ -3 times length of base of antennal segment VI; number of secondary sensoria on segments III-IV bimodal, antennal segment III with 25-35 secondary sensoria and antennal segment IV with 7-24 secondary sensoria or antennal segment III with 11-13 secondary sensoria and antennal segment IV with 0-1 secondary sensoria. Cornicle not reticulated, dusky, swollen apically with narrow medial constriction; approximately $5\frac{1}{3}$ -8 times as long as wide. Cauda elongate with 6-8 (usually 6) lateral setae.

Hosts: Polyphagous with preference for the Alliaceae, especially bulbs in storage.

U.S. distribution: Widespread.

World distribution: Antipodes, Auckland Isles, Australia, Europe, India, Japan, New Zealand, North America, South America.

Comments: *Myzus ascalonicus* transmits 16 plant viruses but none are recorded as affecting chrysanthemums (Chan et al. 1991).

Myzus ornatus Laing 1932

Figs. 1, 6, 7

Synonymy:

***Myzus ornatus* Laing

ESA approved common name: ornate aphid

Other common name: violet aphid

Taxonomic characters: Wingless adult female.—In life, body varying from light yellow to green; dorsum of abdomen with dark green or brown spots and transverse bands. Small to medium sized, body length 1.6-2.0 mm, oval shaped. Antennae 6 segmented; tubercles well developed with inner faces convergent; terminal process approximately $1\frac{2}{3}$ - $2\frac{1}{3}$ times length of base of antennal segment VI; without secondary sensoria on antennal segment III. Cornicle not reticulated, dusky, cylindrical, constricted at tip, 4-6 times as long as wide. Cauda dusky, elongate with 6 lateral setae.

Winged adult female.—In life, dorsum of abdomen with a large dark patch; body shape similar to wingless adult female; small to medium sized, body length 1.6-2.3 mm. Antennae 6 segmented; tubercles well developed; terminal process approximately $1\frac{3}{4}$ - $2\frac{1}{4}$ times length of base of antennal segment VI; 7-11 secondary sensoria of similar size on antennal segment III; without secondary sensoria on antennal segment IV. Cornicle dusky, cylindrical, constricted at tip, 4- $5\frac{3}{4}$ times as long as wide. Cauda dusky, elongate with 6 lateral setae.

Hosts: Polyphagous on many different hosts including cultivated chrysanthemums and *Chrysanthemum maximum*.

U.S. distribution: CA, NC, OR, PA, WA (probably found in all states).

World distribution: Widespread.

Comments: *Myzus ornatus* transmits 18 plant viruses but none are recorded as affecting chrysanthemums (Chan et al. 1991).

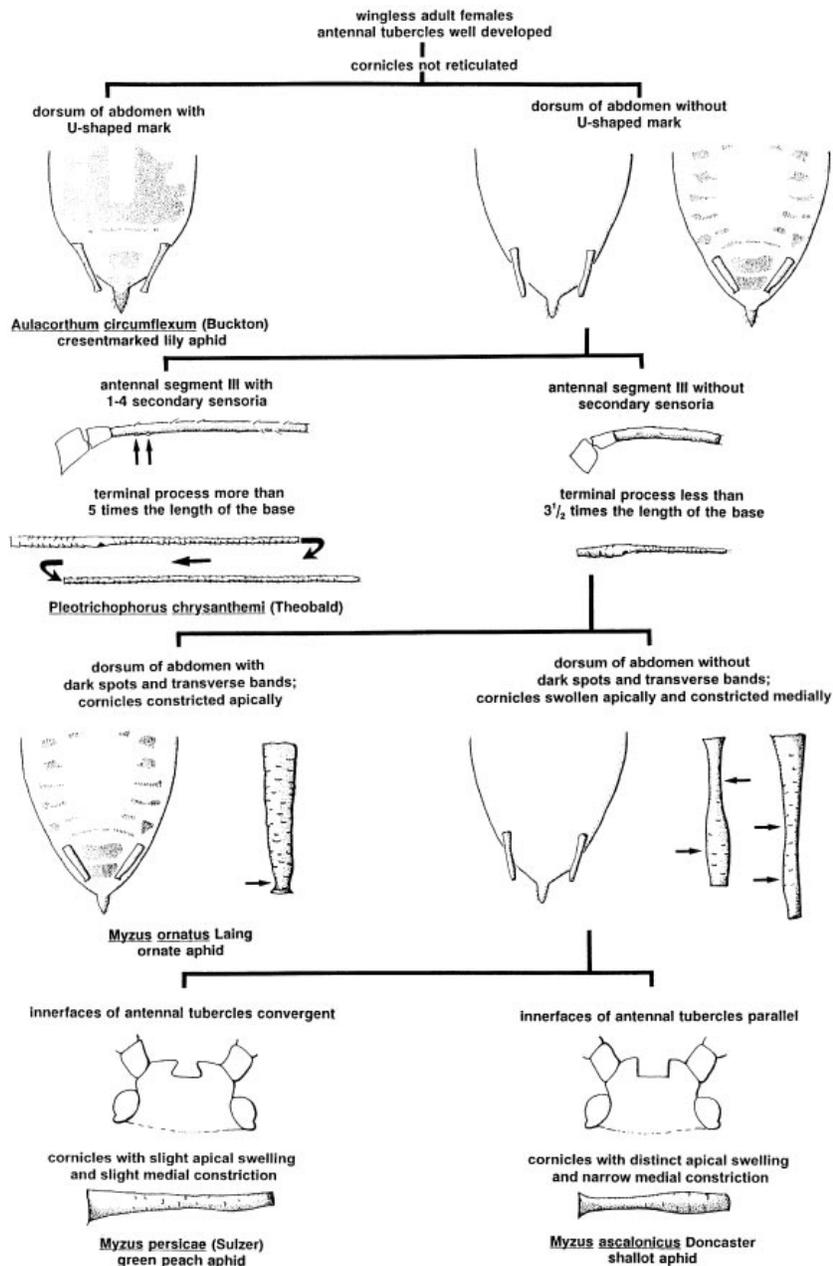


Fig. 6. Pictorial key to wingless adult females of five aphid species that colonize chrysanthemum in the United States and have antennal tubercles well developed and cornicles not reticulated.

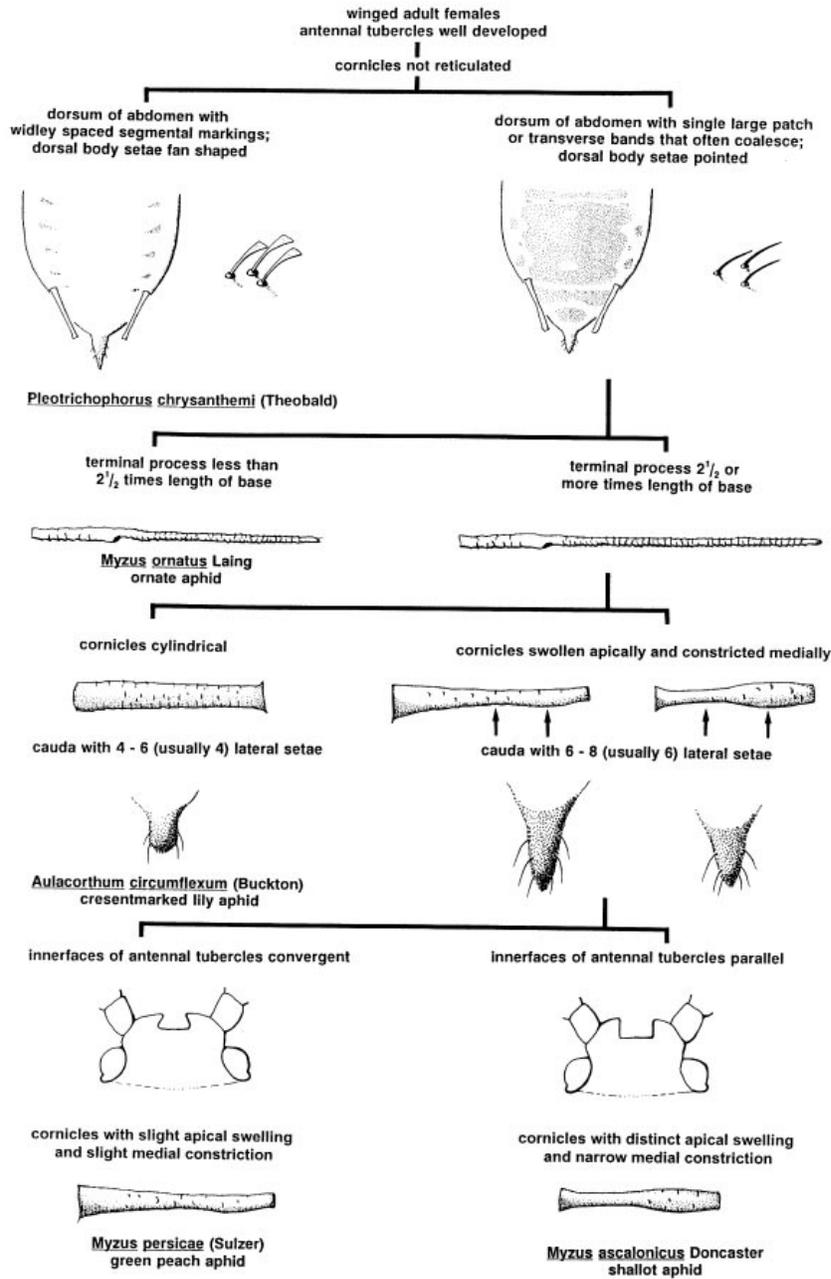


Fig. 7. Pictorial key to winged adult females of five aphid species that colonize chrysanthemum in the United States and have antennal tubercles well developed and cornicles not reticulated.

Myzus persicae (Sulzer 1776)

Figs. 1, 6, 7

Synonymy:

* & ** *Myzus persicae* (Sulzer)

ESA approved common name: green peach aphid

Other common name: peach-potato aphid

Taxonomic characters: Wingless adult female.- In life, body varying from green to pale yellow, dorsum of abdomen without dark spots and transverse bands. Small to medium sized, body length 1.5-2.2 mm, pear shaped. Antennae 6 segmented; tubercles well developed with inner faces convergent; terminal process approximately $2\frac{3}{4}$ - $3\frac{3}{4}$ times length of base of antennal segment VI; without secondary sensoria on antennal segment III. Cornicle pale, usually with dark tip; 5-7 times as long as wide. Cauda pale to dusky, elongate with 6 lateral setae. Tarsi sometimes noticeably dark.

Winged adult female.—In life, body varies from green to pale yellow with dorsum of the abdomen with a large dark patch, body shape similar to wingless adult female; small to medium sized, body length 1.7-2.3 mm. Antennae 6 segmented; tubercles well developed with inner faces convergent; terminal process approximately 3- $3\frac{3}{4}$ times length of base of antennal segment VI; 10-13 secondary sensoria of similar size in a straight row on antennal segment III; without secondary sensoria on antennal segment IV. Cornicle pale, usually with dark tip, slight apical swelling and slight medial constriction; $4\frac{3}{4}$ -8 times as long as wide. Cauda pale to dusky, elongate with 6 lateral setae. Tarsi may be noticeably dark.

Hosts: Principal hosts are *Prunus* spp., however, *M. persicae* is polyphagous and very damaging to many other host plants of economic importance.

U.S. distribution: Throughout.

World distribution: Widespread.

Comments: *Myzus persicae* transmits 182 plant viruses, including three viruses affecting chrysanthemums: chrysanthemum good news mosaic virus; chrysanthemum virus B; and tomato aspermy virus (Chan et al. 1991).

Pleotrichophorus chrysanthemi (Theobald 1920)

Figs. 1, 6, 7

Synonymy:

** *Pleotrichophorus chrysanthemi* (Theobald)

ESA approved common name: none

Other common names: none

Taxonomic characters: Wingless adult female.- In life, body varying from light green to yellow with widely spaced dusky segmental markings. Medium sized, body length 2.1-2.9 mm, spindle shaped; dorsal body setae fan shaped. Antennae 6 segmented; tubercle well developed with inner faces divergent; terminal process approximately $5\frac{1}{2}$ -6 times length of base of antennal segment VI; antennal segment III with 1-4 secondary sensoria, antennal segment IV without secondary sensoria. Cornicle not reticulated, pale, cylindrical, flaring apically; approximately 7-10 times as long as wide. Cauda pale, elongate with 4 lateral and a single (occasionally 2) dorsal preapical seta.

Winged adult female.—In life, abdomen green to yellow with widely spaced dusky segmental markings. Medium sized, body length 2.0-2.6 mm, spindle shaped; dorsal body setae fan shaped. Antennae 6 segmented; terminal process approximately $5\frac{3}{4}$ -6

times length of base of antennal segment VI; antennal segment III with 12-17 secondary sensoria; antennal segment IV without secondary sensoria. Cornicle pale, cylindrical, flaring apically, approximately 8-11½ times as long as wide. Cauda pale, elongate with 4 lateral and a single dorsal preapical seta.

Hosts: Principal hosts include *Chrysanthemum* spp.

U.S. distribution: CA, DC, NC, WA.

World distribution: Widespread.

Comments: *Pleotrichophorus chrysanthemi* is not recorded as a vector of any plant viruses (Chan et al. 1991).

KEY TO THE WINGLESS FEMALE APHID SPECIES COLONIZING CHRYSANTHEMUMS IN THE UNITED STATES

1. Antennal tubercles well developed 6
 Antennal tubercles not developed 2
2. Terminal process ≤ 2 times the base, cornicles slightly swollen apically *Coloradoa rufomaculata* (Wilson)
 Terminal process ≥ 2 times the base, cornicles tapered or parallel sided, not swollen 3
3. Cauda stout in dorsal view, approximately as long as wide 4
 Cauda elongate in dorsal view, obviously longer than wide 5
4. Abdomen without large dorsal patch; cornicle 1½-2 times as long as wide; ultimate rostral segment < 3 times as long as wide *Brachycaudus helichrysi* (Kaltenbach)
 Abdomen with large dorsal patch; cornicle 2½-4 times as long as wide; ultimate rostral segment > 3 times as long as wide *Brachycaudus cardui* (L.)
5. Cauda with 10 or more total setae; cornicle and cauda both dark *Aphis fabae* Scopoli
 Cauda with fewer than 10 total setae; cauda lighter colored than cornicles *Aphis gossypii* Glover
6. Antennal segment III without secondary sensoria 7
 Antennal segment III with secondary sensoria, or if without secondary sensoria, then terminal process of antenna ≥ 4 times length of the base 9
7. Cornicle constricted apically; dorsum of abdomen with dark spots and transverse bands *Myzus ornatus* Laing
 Cornicle swollen apically with medial constriction; dorsum of abdomen without dark spots and transverse bands 8
8. Cornicle with distinct apical swelling and narrow medial constriction; inner faces of antennal tubercles parallel *Myzus ascalonicus* Doncaster
 Cornicle with slight apical swelling and slight medial constriction; inner faces of antennal tubercles convergent *Myzus persicae* (Sulzer)
9. Dorsum of abdomen with distinct, dark, U-shaped marking *Aulacorthum circumflexum* (Buckton)
 Dorsum of abdomen without distinct, dark, U-shaped marking 10
10. Cornicle subconical, approximately 2-3 times as long as wide at its base, with polygonal reticulation nearly ½ its length *Macrosiphoniella sanborni* (Gillette)
 Cornicle cylindrical, > 3 times the width at its base and without polygonal reticulation or polygonal reticulation less than ½ its length 11
11. Cornicle either completely pale, pale with dark tips, or completely dusky; cauda pale 12
 Cornicle dark; cauda dark or dusky 14

12. Dorsal abdominal setae pointed; cornicle with some rows of reticulations anterior to apical flange 13
Dorsal abdominal setae fan shaped; cornicle without rows of striations anterior to apical flange *Pleotrichophorus chrysanthemi* (Theobald)
13. Cornicle tapering gradually to a distinct large apical flange with 2 rows of reticulations anterior to flange *Aulacorthum solani* (Kaltenbach)
Cornicle cylindrical with slight apical constriction and several rows of polygonal reticulations in constricted area, no large flange *Macrosiphum euphorbiae* (Thomas)
14. Tibiae with dark distal and proximal regions *Macrosiphoniella subterranea* (Koch)
Tibiae completely dark *Macrosiphoniella tanacetaria* (Kaltenbach)

KEY TO THE WINGED FEMALE APHID SPECIES COLONIZING CHRYSANTHEMUMS IN THE UNITED STATES

1. Antennal tubercles well developed 6
Antennal tubercles not developed 2
2. Terminal process ≤ 2 times the base, cornicles slightly swollen apically *Coloradoa rufomaculata* (Wilson)
Terminal process ≥ 2 times the base, cornicles tapered or cylindrical 3
3. Cauda stout, nearly as long as wide 4
Cauda elongate, obviously longer than wide 5
4. Cornicle 2-3 times as long as wide; antennal segment IV with secondary sensoria; ultimate rostral segment < 4 times as long as wide *Brachycaudus helichrysi* (Kaltenbach)
Cornicle 3-4½ times as long as wide; antennal segment IV without secondary sensoria; ultimate rostral segment > 4 times as long as wide *Brachycaudus cardui* (L.)
5. Abdomen usually with dark lateral areas and bands on dorsum; cornicle and cauda both dark; setae on antennal segment III longer than diameter of segment *Aphis fabae* Scopoli
Abdomen usually without dark lateral areas and bands on dorsum; cauda lighter colored than cornicle; setae on antennal segment III shorter than diameter of segment *Aphis gossypii* Glover
6. Apical region of cornicle with several rows of polygonal reticulations; cauda usually with > 10 setae 7
Apical region of cornicle with 3 or fewer rows of polygonal reticulations; cauda usually with < 10 setae 10
7. Cornicle entirely pale or becoming darker toward tip, slightly constricted in region of apical reticulation *Macrosiphum euphorbiae* (Thomas)
Cornicle completely dark, region of apical reticulation not constricted 8
8. Terminal process of antenna ≤ 4 times length of the base; antennae and legs completely dark *Macrosiphoniella tanacetaria* (Kaltenbach)
Terminal process of antenna > 4 times length of the base; antennae and legs with light and dark regions 9
9. Cornicle ≤ 5 times as long as wide; most dorsal abdominal setae associated with basal scleroite *Macrosiphoniella sanborni* (Gillette)
Cornicle > 5 times as long as wide; dorsal abdominal setae without associated basal scleroite *Macrosiphoniella subterranea* (Koch)

10. Dorsal body setae fan shaped; cornicle ≥ 8 times as long as wide
 *Pleotrichophorus chrysanthemi* (Theobald)
 Dorsal body setae pointed; cornicle ≤ 8 times as long as wide 11
11. Cornicle with apical swelling and medial constriction 12
 Cornicle without apical swelling and medial constriction 13
12. Inner faces of antennal tubercles convergent; terminal process ≥ 3 times length
 of the base *Myzus persicae* (Sulzer)
 Inner faces of antennal tubercles nearly parallel; terminal process ≤ 3 times
 length of the base *Myzus ascalonicus* Doncaster
13. Terminal process < 4 times length of the base; cornicle and cauda dusky
 *Myzus ornatus* Laing
 Terminal process > 4 times length of the base; cornicle entirely pale or pale with
 dusky tip and cauda pale 14
14. Dorsum with single large dark patch
 *Aulacorthum circumflexum* (Buckton)
 Dorsum with several transverse pale to dark bands
 *Aulacorthum solani* (Kaltenbach)

ACKNOWLEDGMENTS

We thank J. W. Neal, Jr. (USDA-ARS, Beltsville, MD), D. C. Ferguson (USDA-ARS, Washington, DC), A. S. Jensen (USDA-ARS, Beltsville, MD), and A. G. Wheeler, Jr. (Clemson University, Clemson, SC) for their helpful comments and critiques. We also thank M. A. Solis (USDA-ARS, Washington, DC) for providing a Spanish translation of the abstract.

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