

NEWLY ESTABLISHED AND RARELY COLLECTED APHIDS
(HOMOPTERA: APHIDIDAE) IN FLORIDA AND THE
SOUTHEASTERN UNITED STATES

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ABSTRACT

Several aphid species are reported as newly established in Florida and/or the southeastern United States, including *Acyrtosiphon kondoi* Shinji, *Aphis amaranthi* Holman, *Brachycaudus helichrysi* (Kaltenbach), *Coloradoa achilleae* Hille Ris Lambers, *Hyadaphis coriandri* (Das), *Hyperomyzus carduellinus* (Theobald), *Melanaphis* sp., *Schizaphis rotundiventris* (Signoret), *Shivaphis celti* Das, *Takecallis arundicolens* (Clarke), and *Toxoptera citricida* (Kirkaldy). Further establishment records are reported for *Trichosiphonaphis polygona* (van der Goot) that was previously reported from a few counties in Florida and Georgia. Recent Florida finds are reported for three native species, including *Aphis minima* Tissot, *Kaltenbachiella ulmifusa* (Walsh & Riley), and *Uroleucon elephantopica* Robinson. Identification information is provided for newly introduced exotic species.

Key Words: Aphididae, aphid, exotic pest, Florida, Southeastern USA

RESUMEN

Se ha reportado que varias especies de áfidos se han establecido recientemente en Florida y/o el Sureste de los Estados Unidos. Entre éstas se encuentran *Acyrtosiphon kondoi* Shinji, *Aphis amaranthi* Holman, *Brachycaudus helichrysi* (Kaltenbach), *Coloradoa achilleae* Hille Ris Lambers, *Hyadaphis coriandri* (Das), *Hyperomyzus carduellinus* (Theobald), *Melanaphis* sp., *Schizaphis rotundiventris* (Signoret), *Shivaphis celti* Das, *Takecallis arundicolens* (Clarke) y *Toxoptera citricida* (Kirkaldy). También se reporta el establecimiento de *Trichosiphonaphis polygona* (van der Goot), cuya presencia se había reportado en algunos condados de los estados de Florida y Georgia. En Florida se reporta el reciente hallazgo de tres especies nativas, *Aphis minima* Tissot, *Kaltenbachiella ulmifusa* (Walsh y Riley) y *Uroleucon elephantopica* Robinson. Se provee información para la identificación de las especies exóticas introducidas recientemente.

In the past two years, several aphid species have been collected in Florida and other southeastern states that represent new records, range extensions, or recollections of rare species. This paper lists these species and provides notes and identification information. Reference specimens are deposited at the Florida State Collection of Arthropods (FSCA), Gainesville, FL.

Acyrtosiphon kondoi Shinji

Acyrtosiphon kondoi was found in Florida for the first time in pan traps sampled as part of a study of temporal and spatial dynamics of cucurbit potyviruses in Leesburg, Lake County, FL (14 April 1993, 30 April 1993, 8 April 1994; Susan E. Webb) (Mora-Aguilera 1995). Reproducing colonies were found on *Trifolium pratense* L. (red clover) in a University of Florida greenhouse in Gainesville, Alachua County (17 May 1995; David E. Moon). *Acyrtosiphon kondoi* is a native of Asia, where it occurs from India to Japan. It was introduced into California in the mid 1970's (Blackman & Eastop 1984) and since has colonized much of the United States. It also is established in Australia and New Zealand, South Africa, the Middle East and Mexico and also has spread into many Central and South American countries (Blackman & Eastop 1984). *Acyrtosiphon kondoi* can be a major pest of alfalfa, *Medicago sativa* L.; however, it is not likely to be a major problem in Florida because alfalfa production is very limited. Damage to Florida clover is unknown but unlikely. *Acyrtosiphon kondoi* is reported as a vector of bean yellow mosaic virus, a potyvirus (Chan et al. 1991). It may also vector other non-persistently transmitted plant viruses, but it does not seem to be a significant vector pest species.

Two species of *Acyrtosiphon* occur on alfalfa in the United States: *Acyrtosiphon pisum* (Harris) has dark antennal joints, and *A. kondoi* does not. *Macrosiphum creelii* Davis, a rare species with a similar overall appearance, also is reported on alfalfa in the United States. *Macrosiphum creelii* can be distinguished from the *Acyrtosiphon* spp. by the presence of several rows of polygonal reticulation at the distal ends of its siphunculi.

Aphis amaranthi Holman

A severe infestation of *Aphis amaranthi* was found on *Amaranthus spinosus* L. (spiny pigweed) in Gainesville, Alachua County, FL (25 April 1997; Michael C. Thomas) in a laboratory culture of *Conotrachelus cervinus* Hustache established using plants obtained from the University of Florida Tropical Research and Extension Center, Homestead, Dade County, FL. The identification of *A. amaranthi* was confirmed by Dr. Jaroslav Holman, Czech Republic. *Aphis amaranthi* was described from Cuba and also has been found in Brazil on *Amaranthus deflexus* L. (largefruit amaranth) (Remaudière 1994). It has not been reported formally in the USA, although it is included in Smith et al. (1992) key to alatae from North Carolina. We think it is likely that the plants on which *A. amaranthi* was found in Gainesville were infested originally in Homestead, because infestations on *A. spinosus* could not be found in the Gainesville area. Specimens identified as *Aphis fabae* Scopoli from Miami, Dade County, FL (David Storch and Willio L. Francillon; 8 March 1990) are actually *A. amaranthi* suggesting that this species has been in Miami for several years.

Four *Aphis* spp. have been reported previously from *Amaranthus* in Florida according to Florida Department of Agriculture and Consumer Services, Division of Plant Industry (DPI) records: *Aphis craccivora* Koch, *A. fabae*, *Aphis gossypii* Glover, and *Aphis spiraeicola* Patch. All are polyphagous worldwide pest species. *Aphis fabae* has been recorded on *Amaranthus* in Florida twice, but in each case, specimens were misidentified; thus, it is doubtful that *A. fabae* colonizes *Amaranthus* in Florida. A key to the remaining four *Aphis* on Florida *Amaranthus* follows:

- 1a. Abdominal dorsum of apterous adults heavily sclerotized and shiny in life; alate forms with dorsal abdominal banding, especially on posterior segments; antennal segment III of alate form with about 7 somewhat

tuberculate rhinaria that vary in size so the segment looks lumpy in profile; cauda as dark as siphunculi, somewhat pointed at the tip and with 6-7 stiff curved setae (Fig. 1).....*A. craccivora*

- 1b. Abdominal dorsum of alate and adult apterous forms at most with lateral sclerites and bands on segments VII and VIII and not shiny in live specimens; number of rhinaria variable, but if varying much in size then more than 7 rhinaria and antennal segment III not lumpy in profile; cauda variable but not pointed..... 2
- 2a. Cauda distinctly paler than the siphunculi, with 4-7 stiff curled setae*A. gossypii*
- 2b. Cauda as dark as the siphunculi, usually with more than 7 setae; if cauda is paler than siphunculi, then it has at least 8 setae 3
- 3a. Length of dorsal setae on hind femur equal to or less than the diameter of antennal segment III at the base; lateral abdominal tubercle on segment VII about twice the diameter of the spiracle; antennal segment III of alatae with 8-22 rhinaria, not in a row; cauda not constricted; ultimate rostral segment often with 3-4 accessory setae; aphids dingy colored and rotund *A. amaranthi*
- 3b. Length of dorsal setae of hind femora two to three times the diameter of antennal segment III at the base; lateral abdominal tubercle on segment VII about the same diameter as the spiracle; antennal segment III of alatae with 6-12 rhinaria, usually in a row, except in late fall and early spring specimens; cauda constricted; ultimate rostral segment

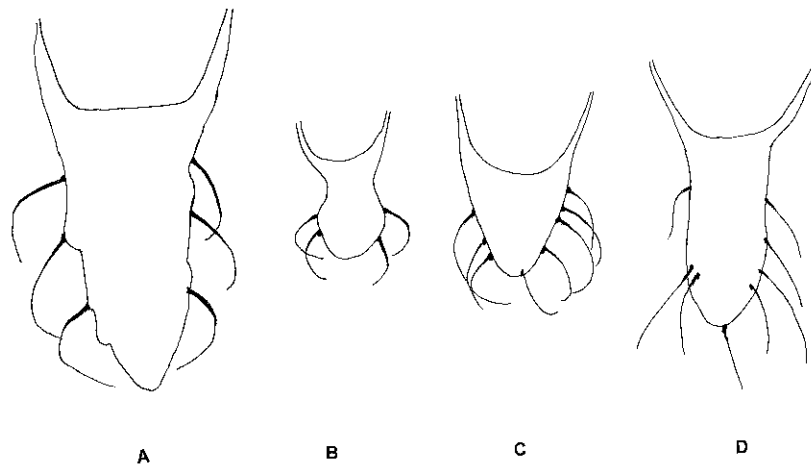


Fig. 1. Cauda shape and setae for A: *Aphis craccivora* Koch, B. *Aphis gossypii* Glover, C. *Aphis amaranthi* Holman, and D. *Aphis spiraecola* Patch.

with two accessory setae; aphids bright yellow or yellow-green and not particularly rotund *A. spiraeicola*

Aphis minima Tissot

A severe infestation was found on *Prunus serotina* Ehrh. (wild black cherry) in a natural area in Gainesville, Alachua County, FL (25 April 1997; Robert P. Esser). This aphid causes severe leaf curling on its host. Although the aphid was described from Florida, it has been collected rarely. There are no DPI records for this species since 1938. *Aphis minima*, as its name suggests, is tiny. It can be identified easily using the key to aphids on *Prunus* in Blackman & Eastop (1994).

Brachycaudus helichrysi (Kaltenbach)

Brachycaudus helichrysi was found on two *Erechtites hieracifolia* (L.) Raf. ex DC. (American burnweed) plants in Melbourne, Brevard County, FL (21 April 1997; Karen L. Garrett-Kraus). Another infestation on the same plant species was found in Vero Beach, Indian River County, FL (9 May 1997; Kenneth L. Hibbard). This aphid species is a cosmopolitan pest on *Prunus* spp. (winter hosts) and various Compositae (summer hosts), especially *Dendranthema × grandiflora* (Ramat.) Kitam (chrysanthemum), on which it can be a major pest (Blackman and Eastop 1984). Apparently, this is the first Florida record for an established population of this species in spite of a large chrysanthemum industry in the state. *Brachycaudus helichrysi* has been collected in pan traps in the past by plant virus epidemiologists in Leesburg, Lake County, FL (Webb et al. 1994). On the positive side, in separate host transfer attempts by DPI inspectors Kenneth L. Hibbard and Karen L. Garrett-Kraus, the eastern Florida population from *Erechtites* failed to establish colonies on chrysanthemum.

Coloradoa achilleae Hille Ris Lambers

Several specimens of *C. achilleae* were found on a wild *Achillea millefolium* L. (common yarrow) plant at the B.H. Corpening North Carolina Forest Service Training Facility, Crossnore, NC (22 October 1996; Susan E. Halbert). Apparently, this is a new record for the Western Hemisphere for this Eurasian species.

Coloradoa achilleae can be separated easily from most other aphids on *Achillea*. Most other aphid species infesting this host in North America include species of *Uroleucon* and *Macrosiphoniella*, which are relatively large, conspicuous aphids with dark siphunculi. *Coloradoa achilleae* is small, pale and cryptic. Species reported from *Achillea* that might be confused with *C. achilleae* include *B. helichrysi*, which lacks the capitate setae and acute ultimate rostral segment of *C. achilleae*, and several *Pleotrichophorus* spp. The latter species have the processus terminalis at least 3 3/4 times the base of antennal segment VI, which clearly separates them from *C. achilleae*. Several *Achillea* species have become popular ornamental plants, so it is likely that these inconspicuous aphids will be distributed widely in the near future. It is unknown if *C. achilleae* will be damaging to plants grown under cultivated conditions.

Coloradoa is a Eurasian genus with 31 currently accepted species (Remaudière and Remaudière 1997). There are now six species of *Coloradoa* reported in North America, all of them introduced. *Coloradoa achilleae* can be recognized by its association with *Achillea* and by its short processus terminalis, which is just barely longer than the base of antennal segment VI. Hille Ris Lambers (1939) has the original description of *C. achilleae* and a key that includes five of the six North American species.

Some specimens of *Coloradoa angelicae* (del Guercio), the sixth species, may come out to, *C. achilleae* using Hille Ris Lambers key; however, the two species can be separated easily because *C. angelicae* has swollen siphunculi and *C. achilleae* has straight ones. Heie (1992) has a key to European species that includes all the North American species. *Coloradoa angelicae* is included under its junior synonym *Coloradoa absinthiella* Ossiannilsson (Ossiannilsson 1962).

Several *Coloradoa* spp. have been in North America for many years, but *Coloradoa tanacetina* (Walker), which is specific to *Tanacetum* spp., was first found in North America in Rhode Island in 1974. By 1977, it could be found in New York and Maine (Smith and Parron 1978). In 1992, the senior author collected it in northern Minnesota. It is a mystery how Eurasian *Coloradoa* spp., which are host specific to various weeds, keep getting introduced into North America.

Hyadaphis coriandri (Das)

Colonies of *H. coriandri* were found on fennel (*Foeniculum vulgare* Mill.) at Orange County, FL residences in Apopka (11 September 1997; Anthony N. Capitano) and Orlando (29 September 1997; Anthony N. Capitano and Barbara J. Wilder). In December, 1998, an infestation was found at a residence in Tampa, Hillsborough County (27 December 1998; Anthony N. Capitano). No commercial operations that raise or sell plants are known to be infested. *Hyadaphis coriandri* probably is native to Central Asia, where it is holocyclic and heteroecious, migrating from *Lonicera nummulariifolia* Jaub. & Spach. and other *Lonicera* spp. to various Umbelliferae (Remaudière and Halbert, unpublished data). Its current distribution includes southern Europe, Central Asia and the whole of Africa, where it lives anholocyclically on Umbelliferae. *Hyadaphis coriandri* is a serious pest of coriander (*Coriandrum sativum* L.) and fennel. It is not known how it was introduced into Florida, but a possible source would be imported fresh herbs.

Two more other species of *Hyadaphis* occur in North America: *Hyadaphis tataricae* (Aizenberg) (formerly suspected to be a synonym of *H. coriandri* (Hille Ris Lambers 1966)), and *Hyadaphis foeniculi* (Passerini). The first one is strictly monoecious on *Lonicera* spp. and is a serious pest. It was introduced into North America in the mid 1970s (Voegtlin 1984). In about 10 years, it could be found as far west as western Idaho (Voegtlin and Stoetzel 1988). The second one, *H. foeniculi*, is heteroecious, like *H. coriandri*, and it has been in North America for many years. Voegtlin (1984) has excellent drawings, photos and other taxonomic and morphological information on *H. tataricae* and *H. foeniculi*. The three species can be separated by the following key:

- 1a. Siphunculi dark and 3.5-5 times as long as wide (Fig. 2) and markedly swollen on the distal half; on *Lonicera* and various Umbelliferae *H. foeniculi*
- 1b. Siphunculi pale or lightly pigmented and about 3 times as long as wide and slightly swollen; host variable 2
- 2a. Ultimate rostral segment 0.067-0.093 mm long; setae on abdominal segment VIII about 0.02-0.044 mm; siphunculi of apterae pale and constricted at the base; rhinaria on antennal segment III of alatae tuberculate; inside folded leaves of *Lonicera* in northern states, causing severe distortion and "witches' broom" deformation of infested terminals.....*H. tataricae*

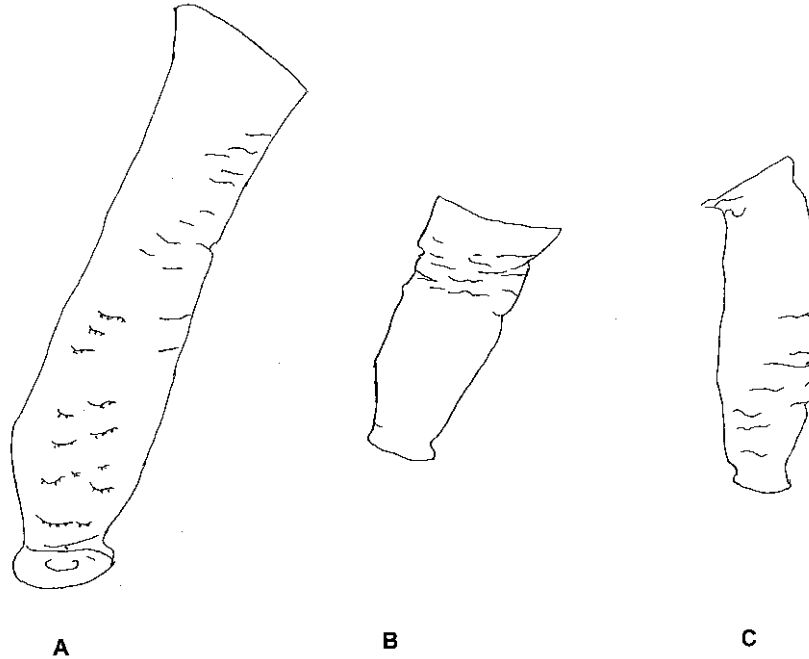


Fig. 2. Siphunculi of A. *Hyadaphis foeniculi* (Passerini), B. *Hyadaphis coriandri* (Das), and C. *Hyadaphis tataricae* (Aizenberg).

- 2b. Ultimate rostral segment 0.10-0.126 mm long; setae on abdominal segment VIII about 0.008-0.016 (0.027) mm long; siphunculi of apterae lightly pigmented and not constricted at the base; rhinaria on antennal segment III of alatae not tuberculate; on umbelliferous herbs (*Anethum*, *Coriandrum*, *Foeniculum*, etc.), celery (*Apium graveolens* L. var. *dulce* (Miller) DC.) carrots (*Daucus carota* L. var. *sativus* Hoffm.) and possibly blond psyllium (*Plantago ovata* Forssk.) (Blackman and Eastop 1984; Kumar and Sagar 1994)..... *H. coriandri*

Hyperomyzus carduellinus (Theobald)

Single specimens of *H. carduellinus* were collected in Florida suction traps in Kendall, Dade County, FL (14-21 March 1997), Fort Pierce, St. Lucie County, FL (14-21 March 1997) and Quincy, Gadsden County, FL (28 March-4 April 1997). These collections represent a new North American record for this species. *Hyperomyzus carduellinus* is an Asian species that is found from Afghanistan to Korea and Taiwan. It also has been collected in Argentina (Nieto Nafria et al. 1994), Bolivia (Remaudière, Weemaels and Nicolas 1992), Australia, and Africa. Infestations of *H. carduellinus* were found on *Sonchus oleraceus* L. (common sowthistle) weeds in Homestead, Dade County, FL (3 April 1997; Edward T. Putland), Fort Pierce, St. Lucie County, FL (4 April 1997; Kenneth L. Hibbard), Apopka, Orange County, FL (7 April 1997; Leslie J. Wilber) and Winter Haven, Polk County (7 April 1997; Susan E. Halbert and Martha

A. 'Ginger' Simpson). The aphid is specific to *Sonchus* and related plants and is not likely to become a pest. The colony in Winter Haven was a mixed infestation with *Hyperomyzus lactucae* (L.), which has been in North America for a long time. *Hyperomyzus* is a large genus, but most of the species that occur in North America are in the New World subgenus *H. (Neonasonovia)*. *Hyperomyzus (Neonasonovia)* spp. can be separated from *H. sensu stricto* most easily using alate forms. Alatae of *H. sensu stricto* have well-defined dorsal abdominal patches, whereas those of *H. (Neonasonovia)* do not. Only three *Hyperomyzus sensu stricto*, all occurring on *Sonchus*, are found in North America. *Hyperomyzus lactucae* (L.) and *Hyperomyzus pallidus* Hille Ris Lambers migrate to *Ribes* as a winter host in northern climates. *Hyperomyzus pallidus* appears to be restricted to northern states (Smith & Parron 1978). They can be separated using the following key:

- 1a. Siphunculi of apterae swollen only to 1.1-1.3 times their minimum diameter; siphunculi of alatae swollen to 1.2-1.6 times their minimum diameter; setae on the dorsum of abdominal segment VIII of apterae and alatae less than 0.02 mm; patch on abdominal dorsum of alate form pale and usually restricted to segments IV-V.....*H. carduellinus*
- 1b. Siphunculi of apterae swollen to 1.5-1.9 times their minimum diameter; siphunculi of alatae swollen to 1.5-2.2 times their minimum diameter; setae on dorsum of abdominal segment VIII more than 0.02 mm in length; patch on abdominal dorsum of alate form darker and extending to abdominal segment III 2
- 2a. Setae on antennal segment III about ½ the basal diameter of the segment; rhinaria on antennal segment III of apterous form clustered toward the base of the segment; alatae with patch on abdominal dorsum broken into bars, especially anteriorly; siphunculi of alate form dusky *H. lactucae*
- 2b. Setae on antennal segment III about ¼ the basal diameter of the segment; rhinaria on antennal segment III of apterous form more or less distributed the length of the segment; alatae with patch on abdominal dorsum dark and dense, with no broken bar on abdominal segment III; siphunculi of alate form dark *H. pallidus*

Kaltenbachella ulmifusa (Walsh & Riley)

An infestation of this native species was found on its winter host, *Ulmus rubra* Muhl. (slippery elm), in Florida Caverns State Park north of Marianna, Jackson County, FL (6 May 1997; Paul E. Skelley). The summer hosts are roots of Labiatae (Blackman and Eastop 1994). This find in the Florida panhandle represents a major range extension for this species, which was previously known only as far south as North Carolina (Smith and Parron 1978).

Melanaphis sp.

A species of *Melanaphis* was found on *Miscanthus* (Gramineae) plants at an amusement park in Orange County, FL (19 December 1996; Barbara J. Wilder). The plants had been obtained recently from a nursery in California. The aphid is an East

Asian species that is apparently specific to *Miscanthus*. A host choice experiment in DPI quarantine confirmed that the aphids on *Miscanthus* were not *Melanaphis sacchari* (Zehntner), the sugarcane aphid, because the aphids from *Miscanthus* avoided the sugarcane (*Saccharum officinarum* L.), but heavily colonized the *Miscanthus*. The species name for this *Melanaphis* sp. has not been determined due to sketchy descriptions of Asian species and missing type material, but this find is certainly a new record for the Western Hemisphere. The status of the North American *Melanaphis* spp. will be the subject of another paper.

An attempt was made to eradicate the Florida population by eliminating the entire infested shipment. At the time of this writing, no more infestations have been found in Orange County, FL; however, another infestation was found in Alachua, Alachua County, FL (16 March 1998; Teresa Estok) that was traced to a nursery near Pensacola, Santa Rosa County FL (26 March 1998; Steven B. Matthews).

Schizaphis rotundiventris (Signoret)

Schizaphis rotundiventris, an aphid native to the Old World tropics and subtropics, was identified positively for the first time in the Western Hemisphere when a severe infestation was found on *Cyperus papyrus* L. (papyrus) in a wetlands experiment at a University of Florida greenhouse in Gainesville, Alachua County, FL (Mark Otto; February, 1996). Two aphids collected in Tampa, Hillsborough County in 1988 (27 April 1988; Howard L. Wallace and E. Ray Simmons), also from *Cyperus papyrus* and found among FSCA unknowns, are also this species, indicating that *S. rotundiventris* has been in Florida for at least 10 years. Börner and Heinze (1957, p. 104) stated that *Schizaphis cyperi* van der Goot (Ainslie), has some importance as a vector of sugarcane mosaic virus in the USA; however, there is no citation for this information, and we could not find its source. The record may be the result of confusion of *S. cyperi* van der Goot, a junior synonym of *S. rotundiventris*, with *Carolinaia cyperi* Ainslie, which is common on *Cyperus* in Florida. Börner and Heinze list (Ainslie) after van der Goot as the describer, evidently synonymizing the two species. This mistaken synonymy easily explains the apparent Florida record. According to DPI records, although other species of aphids were collected from *Cyperus* in Florida prior to 1988, there were no *S. rotundiventris*, and no unknowns that are likely to be *S. rotundiventris*. Thus, the Florida records listed above comprise the first positive report for *S. rotundiventris* in the Western Hemisphere. A single specimen of *S. rotundiventris* was found in a sample collected in a green tile water pan trap in Leesburg, Lake County, FL (23 September 1992; Susan E. Webb). In 1996 and 1997, the same species was found in suction trap samples from Fort Pierce, Immokalee (Collier County), Kendall, Quincy, and Winter Haven. Specimens were collected in 1997 in a suction trap in Belle Glade, Palm Beach County, FL (Gregg S. Nuessly). Collections were most frequent in the fall. A single *S. rotundiventris* was collected in a suction trap in Key West, Monroe County, FL in September 1998. *Schizaphis rotundiventris* also was collected in suction trap samples from Blackville, South Carolina on numerous occasions (1994 and 1995; Jay W. Chapin).

Schizaphis rotundiventris can be identified using the key by Eastop (1961), in which it comes out to *S. cyperi*. All of the North American species are included in Eastop's key except *Schizaphis gracilis* Richards, which has been collected only in the Canadian Arctic. *Schizaphis rotundiventris* is distinctive because of its long black siphunculi and dark cauda. *Schizaphis viridirubra* (Gillette & Palmer) also has long black siphunculi, but the cauda is usually quite pale, and setae are much longer and more numerous than those of *S. rotundiventris*. Setae on antennal segment III of *S.*

viridirubra are at least as long as the diameter of the segment at the base; whereas those on antennal segment III of *S. rotundiventris* are less than half as long as the diameter of the segment at the base. Alatae in trap samples can be separated from *Aphis* spp. by the once-branched media on the fore wing and short ultimate rostral segment that is characteristic of *Schizaphis*.

Schizaphis rotundiventris is normally host specific to several species of *Cyperus*, including yellow nutsedge (*Cyperus esculentus* L.) and purple nutsedge (*C. rotundus* L.), but it has been reported from a few other plants (Cyperaceae: *Fimbristylis*, *Kyllingia*, *Mariscus*; and Palmae: *Cocos nucifera* L., coconut palm and *Elaeis guineensis* Jacq., oil palm) (Blackman and Eastop 1984). It is not likely to become a pest in North America.

Shivaphis celti Das

Shivaphis celti was found for the first time in Florida in Jacksonville, Duval County, on *Celtis laevigata* Willd., sugarberry (13 August 1997; Flewellyn W. Podris). *Shivaphis celti* is an Asian species that colonizes leaves of *Celtis* spp. *Shivaphis celti* is conspicuous because it secretes copious quantities of bluish white wax. Additional locations where *S. celti* was found in Florida include Lake Jem, Lake County, FL (28 August 1997; Christine M. Murphy), Gainesville, Alachua County, FL (9 September 1997; Robert P. Esser), and Scottsmeer, Brevard County, FL (17 September 1998; Gregory A. Brown). *Shivaphis celti* was found in suction trap samples from Winter Haven, Polk County, FL (5 September 1997) and Quincy, Gadsden county (3 October 1997). In 1998, *S. celti* was collected in suction traps in Belle Glade (10 September 1998; Gregg S. Nuessly) and Kendall. A specimen was found in a fruit fly detection trap in Palmetto, Manatee County, FL (4 September 1998; Elmer Goodroad). *Shivaphis celti* is easy to identify because it is the only waxy aphid on *Celtis* in North America. Sexuales of *S. celti* were found on 10 October 1997 in Gainesville. In late summer of 1998, *S. celti* became a conspicuous pest in north Florida on *Celtis* used in urban landscape situations.

Although this is the first published report, *S. celti* has been in North America for at least a year. Dr. John Graham, Evans, Georgia, found *S. celti* in Aiken County, South Carolina on *Celtis laevigata* on 17 November 1996, and then in Columbia County, Georgia on *Celtis occidentalis* L. (beaverwood) on 23 November 1996 about a year prior to its discovery in Florida, which explains the aphid's sudden and extensive distribution throughout northern Florida in the fall of 1997. *Shivaphis celti* was also collected by Jim Soloman in Stoneville, Washington County, Mississippi on 31 July 1998 (data courtesy of Dr. Andrew S. Jensen, USNM).

In recent years, a number of Asian aphids that are specific to trees, particularly *Ulmus*, have been introduced into Europe and North America (Remaudière et al. 1988; Halbert & Pike 1990). Prior (1974) has shown how bonsai *Ulmus* are responsible for spreading East Asian aphids in Britain. *Celtis*, like the small-leaved *Ulmus* spp., is a popular plant for bonsai. Georgia has a major bonsai importing business, so it is possible that *S. celti* was introduced into Georgia on imported Asian bonsai *Celtis* and has since extended its range into Florida.

Takecallis arundicolens (Clarke)

Small colonies of *T. arundicolens* were found on *Arundinaria gigantea* (Walter) Muhl. (cane) in Torreya State Park in Bristol, Liberty County, FL (6 January 1997; Susan E. Halbert and Letitia C. Croom). Another collection was made on the same host at a botanical park in Gainesville, Alachua County, FL (25 March 1997; Su-

san E. Halbert, Nancy C. Coile and Norma McGinn). This Asian aphid was previously known in the USA only from California (Smith & Parron 1978) and Oregon (Andrew Jensen, personal communication).

Takecallis spp., which colonize only bamboo and related plants, can be recognized by a tubercle on the clypeus that characterizes the genus. The three species in North America, all of which probably occur in the southeastern states, can be separated by the following key:

- 1a. Aphid pale except for antennal joints. Cauda and siphunculi may be dusky *T. taiwanus* (Takahashi)
- 1b. Aphid with black markings other than on antennal joints 2
- 2a. Elongate black spots on abdominal dorsum; cauda dusky; antennal segment III dark near the base..... *T. arundinariae* (Essig)
- 2b. No spots on the abdominal dorsum; cauda jet black; antennal segment III pale near the base but with a dark portion distally around the rhinaria *T. arundicolens*

Toxoptera citricida (Kirkaldy)

Toxoptera citricida (Kirkaldy), brown citrus aphid, was discovered in Florida in early November, 1995 (Halbert & Brown 1996). It is one of the world's most damaging pests of citrus, primarily because it is an efficient vector of citrus tristeza virus (CTV). A delimiting survey was initiated immediately that involved both state and USDA personnel. The metropolitan areas of Miami, Dade County, FL and Ft. Lauderdale, Broward County, FL were found to be infested, with the highest density in Miami. The initial distribution implicated introduction on illegally imported citrus plants rather than natural spread from the Caribbean Basin. By late June of 1996, infestations had been found in the southeastern Florida urban areas from Islamorada, Monroe County, in the Florida Keys to Palm Beach, Palm Beach County. There was also a single find in a trailer park in Naples, Collier County (19 June 1996; Floyd E. Crim) on the southwest coast. Two commercial lime groves and three commercial lime nurseries in southern Dade County had slight infestations. The remainder of the finds were in dooryards, ornamental nurseries and small abandoned citrus groves in urban areas.

During the next year (July 1996-June 1997), *T. citricida* colonized the citrus belt of Florida. Infestations were widespread but low in density in the Gulf Citrus and Indian River citrus production areas in July/August 1996. By late spring of 1997, colonies could be found in the Central Florida Ridge area. Infestations became heavy, particularly in the Immokalee, Collier County, area in the fall of 1996, and localized outbreaks involving up to 20 acres occurred in commercial groves in the late spring of 1997. Several registered scion groves became infested. The impact of the aphid populations on spread of CTV is not known at this time.

Toxoptera citricida is native to East Asia, but it has now colonized virtually all of the world's citrus production areas except the Mediterranean region and the remaining citrus producing states in the USA. *Toxoptera citricida* was introduced into South America in the 1930s (Carver 1978) and gradually moved north. It was first reported in Central America by Voegtlin & Villalobos (1992) and spread quickly throughout the Caribbean Basin thereafter (Stoetzel 1994).

The Division of Plant Industry was instrumental in organizing a Task Force on *T. citricida* and CTV two years before *T. citricida* was discovered in Florida. Thus, the mechanism was in place to assess risk and plan rational strategy. Although *T. citri-*

cida was detected very early after its initial establishment (we estimate about 4 months), it was not possible to eradicate it. Regular nursery inspections in infested areas, combined with compliance agreements, ensured that nurseries did not spread *T. citricida* to uninfested locations by moving infested citrus plants. In fact, *T. citricida* did not colonize Florida any faster than would be expected by natural spread (Wellings 1994; Halbert et al. 1998).

Toxoptera citricida is easy to identify. The long setae on antennal segment III (about as long as the diameter of the segment) will separate even small *T. citricida* nymphs from all the other aphid species on North American citrus. A recent key to common North American aphids on citrus (Halbert & Brown 1996) is designed for use in the field with the aid of a good hand lens. Stoetzel (1994) treats the world citrus aphid fauna.

Trichosiphonaphis polygoni (van der Goot)

Trichosiphonaphis polygoni was reported in Florida and Georgia by Smith and Denmark (1982) and has since become abundant enough in Florida to be collected in 1996 and 1997 in suction traps in Immokalee, Fort Pierce, Winter Haven, and Quincy, and in 1997 in Belle Glade (Gregg S. Nuessly). Most collections occurred in the fall. *Trichosiphonaphis polygoni* was also collected in a green tile water pan trap in Leesburg, Lake County (5 April 1994; Susan E. Webb). It was also collected in traps in Blackville, South Carolina (1994 and 1995; Jay W. Chapin) and in Guntersville, Alabama (October-November 1996; Kathy L. Flanders). *Trichosiphonaphis polygoni* is an East Asian species that occurs in India, China and Japan. It has become established in Africa (Burundi and Kenya) (Remaudière et al. 1994) and in Panama (Remaudière, Serain, Trouvbe and Demeester 1992). *Trichosiphonaphis polygoni* may have been introduced into Florida on contaminated *Polygonum* with shipments of aquarium plants (Polhemus 1997).

Trichosiphonaphis polygoni is specific to *Polygonum* and is easy to recognize. Frontal tubercles are well developed similar to those of *Ovatus*. There is a tendency for the hind wing of *T. polygoni* to have only one oblique vein. Siphunculi are relatively close together and dark with a slight, but rather abrupt swelling near the distal end, and the siphuncular opening is slightly oblique, with no flange. Several minute setae are present laterally on the siphunculi near the proximal end. The only North American aphid with similar siphuncular setae is *Glendennigia philadelphia* MacGillivray, but it has much more swollen siphunculi and a dense patch on the abdominal dorsum of the alate form and occurs only in Idaho, Montana, Washington and British Columbia.

Uroleucon elephantopica Robinson

Uroleucon elephantopica, a native species specific to *Elephantopus* spp., was found in Gainesville by DPI nematologist Dr. Robert P. Esser in July, 1995. His collection nearly doubled the total number of these aphids that have ever been collected and extended its range from Illinois to Florida. *Uroleucon elephantopica* can be found on the undersides of leaves until the plant produces a flower stalk, after which the aphids are on the stalk and under the inflorescence. *Uroleucon elephantopica* is dark in color and can be recognized by its long ultimate rostral segment and its association with the host plant. Robinson (1985) described the species and provided an excellent key that includes it.

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