

# Aphids (Homoptera: Aphididae) Colonizing Leaves of Asparagus in the United States

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**ABSTRACT** In the United States, a single alate vivipara of *Brachycorynella asparagi* (Mordvilko), the asparagus aphid, was first collected and identified in July 1969 on *Agrostis alba* L. at Orient, Long Island, N.Y. By the end of 1973, *B. asparagi* had been collected in most of the states along the eastern seaboard from Massachusetts south to North Carolina. It was collected in Missouri and Washington in 1979, in Idaho, Ohio, Oklahoma, and Oregon in 1981, and in California in 1984. Damage to asparagus has been extensive in some fields in Washington, Oregon, and California; and crop losses have been heavy in these areas. In addition to *B. asparagi*, six other aphid species are known to colonize asparagus in the United States. A brief summary of taxonomic characteristics, usual hosts, and known distribution within the United States is given for each species along with a couplet key and pictorial plates. This information should prove useful to county, state, and federal personnel involved with the detection of *B. asparagi* as it spreads into other asparagus-producing regions of the United States.

**KEY WORDS** Insecta, *Brachycorynella asparagi*, aphids, asparagus

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*Brachycorynella asparagi* (Mordvilko), the asparagus aphid, but also known as the "European asparagus aphid," is European in origin. In the United States, a single alate vivipara of *B. asparagi* was first collected and identified in July 1969 on *Agrostis alba* L. at Orient, Long Island, N.Y. (Leonard 1970). In August 1969 populations of *B. asparagi* were found on plants of *Asparagus officinalis* L. in a greenhouse at Rutgers University, New Brunswick, N.J. (Race 1970). By the end of 1973, *B. asparagi* had been collected in most of the states along the eastern seaboard from Massachusetts south to North Carolina. I identified as *B. asparagi* aphids collected in various traps in Illinois in 1977, on asparagus in Missouri and in Washington in 1979, and on asparagus in Indiana and Michigan in 1980. In December 1980, I collected the asparagus aphid on *A. officinalis* in Alabama and Georgia. I identified as *B. asparagi* aphids collected on asparagus in Idaho, Ohio, Oklahoma, and Oregon in 1981; in California and North Dakota in 1984; and in South Carolina in 1985. The asparagus aphid also has been collected in Canada (Forbes 1981).

Feeding of the asparagus aphid causes a characteristic distortion of terminal called a "witches' broom" that often is blue-green in color. Heavy infestations of this aphid on asparagus can kill seedlings (Capinera 1974) and severely dwarf mature plants. The sexuales and overwintering eggs are produced on asparagus in October and November. The males are winged. Even though the asparagus aphid dispersed rapidly up and down the East Coast, it was not reported to be a very serious pest in asparagus fields until it became established in fields in Washington (Tamaki et al. 1983).

Of the seven aphids discussed in this paper, only *B. asparagi* is limited in its host range to species of *Asparagus*. The six other aphids are known to colonize many plants in addition to *Asparagus*, and those species that alternate hosts also have their primary hosts.

A brief summary of taxonomic characteristics, usual hosts, and known distribution within the United States is given for *B. asparagi* and each of the six other aphid species known to colonize leaves of *A. officinalis* in the United States. A discussion of the generic placement of *asparagi* Mordvilko 1929 is also included. This information, the pictorial plates, and the couplet keys have been prepared as aids to those charged with detecting *B. asparagi* as it spreads into other asparagus-producing regions of the United States.

## Materials and Methods

Information on distribution and hosts is taken from labels on slides in the USNM Collection of Insects, Beltsville, Md., and from Palmer (1952). Scientific and common names for hosts are those as listed in Terrell et al. (1986).

In the synonymy section, one asterisk (\*) represents the name under which the aphid is treated in Palmer (1952) and two asterisks (\*\*) represent the name under which the aphid is treated in Blackman & Eastop (1984). Common names approved by the Entomological Society of America (Stoetzel 1989) are given.

In the pictorial keys, the species are grouped by the color of the cornicles and the length of the cornicles relative to their widths. Characters used

in the keys can be seen using a dissecting scope with a power of at least 120 $\times$ .

## Results and Discussion

### *Brachycorynella asparagi* (Mordvilko)

(Fig. 2 and 4)

*Brachycolus asparagi* Mordvilko

\*\**Brachycorynella asparagi* (Mordvilko)

*Cuernavaca asparagi* (Mordvilko)

ESA-approved common name: asparagus aphid

**Taxonomic Characteristics.** *Apterous Vivipara.* In life green or grey-green and often covered with mealy wax. Small aphids (1.2–1.7 mm), convex or oval, elongate. Antenna 6-segmented, unguis less than twice length of base of antennal segment VI; no secondary sensoria on antennal segment III. Cornicle short and truncate, porelike, about as long as wide, pale. Cauda elongate, with 3–4 pairs of lateral setae and 1 preapical seta, pale to almost white. Legs and antenna rather short and held close to body.

*Alate Vivipara.* In life green and sometimes covered with mealy wax. Small aphids (1.2–1.7 mm), convex, elongate. Antenna 6-segmented, unguis less than twice length of base of antennal segment VI; 7–10 secondary sensoria, varying in size with the smallest half the size of the largest, on antennal segment III; no secondary sensoria on antennal segment IV. Cornicle short and truncate, mammariiform, about as long as wide, pale. Cauda elongate, usually with 3–4 pairs of lateral setae and 1 preapical seta, pale to almost white.

**Distribution in the United States.** Alabama (1980), California (1984), Delaware (1971), Georgia (1980), Idaho (1981), Illinois (1977), Indiana (1980), Maryland (1971), Massachusetts (1972), Michigan (1980), Missouri (1979), New Jersey (1969), New York (1969), North Carolina (1973), North Dakota (1984), Ohio (1981), Oklahoma (1981), Oregon (1981), Pennsylvania (1970), South Carolina (1985), Virginia (1970), Washington (1979).

**Hosts.** Several species of *Asparagus* such as *densiflorus* (Kunth) Jessop cv. *Sprengeri*, *officinalis*, and *setaceus* (Kunth) Jessop (= *plumosus* Baker).

**Discussion of Generic Placement.** In his 1929 description of *asparagi*, Mordvilko stated that the antennal tubercles were not developed and the unguis was 1.5 times as long as the base of antennal segment VI; and he placed the species in the genus *Brachycolus*. Later, Aizenberg (1956) described the monotypic genus *Brachycorynella* for the single species *asparagi* Mordvilko.

Many aphidologists have continued to place *asparagi* Mordvilko in *Brachycolus*; however, recently some workers have accepted its placement in *Brachycorynella*. *Apterous viviparae* of *stellariae* Hardy 1850, the type species of *Brachycolus*, have short and rounded or barrel-shaped cornicles, long, finely pointed dorsal abdominal setae, and an

unguis 2.5–3.3 times the length of the base of antennal segment VI. *Apterous viviparae* of *asparagi* Mordvilko 1929 have short and truncated or cone-shaped cornicles, short and blunt or spatulate dorsal abdominal setae, and an unguis 1.2–2.0 times the length of the base of antennal segment VI. Because of its differences with *stellariae* Hardy 1850, I accept the placement of *asparagi* Mordvilko 1929 in the genus *Brachycorynella*.

### *Aphis craccivora* Koch

(Fig. 1 and 3)

\**Aphis medicaginis* Koch (misidentification)

\*\**Aphis craccivora* Koch

ESA-approved common name: cowpea aphid

**Taxonomic Characteristics.** *Apterous vivipara.* In life body shiny black with large black patch on dorsum of abdomen and strikingly white legs; immatures often covered with grayish wax. Small aphids (1.4–2.0 mm), rounded. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; no secondary sensoria on antennal segment III. Cornicle cylindrical, more than 3 times as long as wide, black. Cauda with 2–4 (usually 3) pairs of lateral setae and 1 dorsal preapical seta, black.

*Alate Vivipara.* In life body shiny black with black lateral areas and bands on dorsum of abdomen and strikingly white legs; immatures often covered with wax. Small aphids (1.4–1.9 mm), rounded. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; 4–8 secondary sensoria, with 1 being noticeably larger than the others, on antennal segment III; no secondary sensoria on antennal segment IV. Cornicle cylindrical, more than 3 times as long as wide, black. Cauda with 2–4 (usually 3) pairs of lateral setae and 1 dorsal preapical seta, black.

**Distribution in the United States.** Throughout the United States.

**Hosts.** Polyphagous but especially on plants in the Leguminosae.

### *Aphis fabae* Scopoli

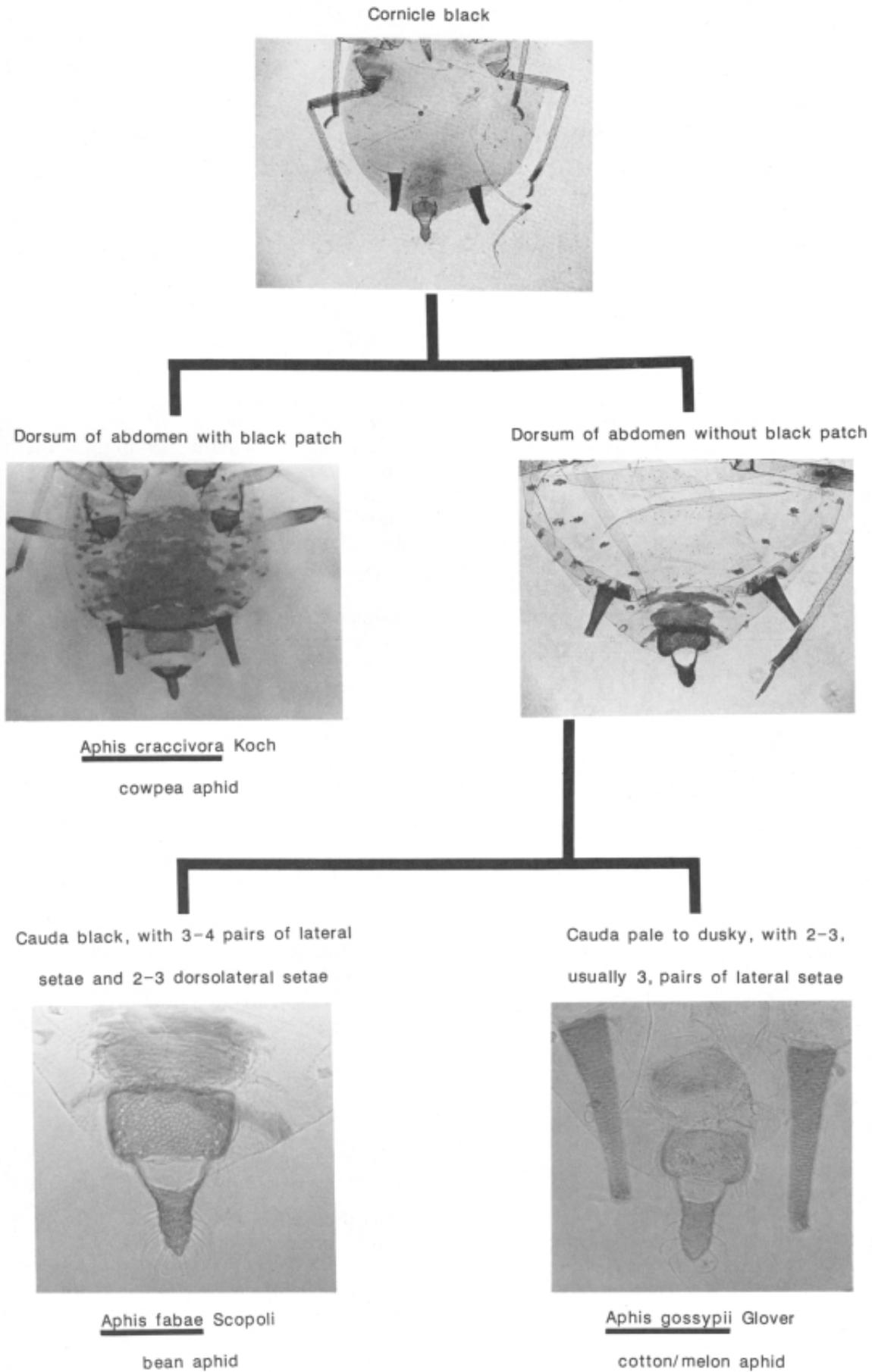
(Fig. 1 and 3)

\*\*\**Aphis fabae* Scopoli

ESA-approved common name: bean aphid

**Taxonomic Characteristics.** *Apterous Vivipara.* In life body shiny black. Small aphids (1.5–3.1 mm), rounded. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; no secondary sensoria on antennal segment III. Cornicle cylindrical, more than 3 times as long as wide, black. Cauda with 3–4 pairs of lateral setae and 2–3 dorsolateral setae, black.

*Alate Vivipara.* In life body shiny black with black lateral areas and bands on dorsum of abdomen; immatures often covered with wax; alatoid nymphs with tessellated abdomen. Small aphids



**Fig. 1.** Pictorial key to the apterous viviparae of three aphid species that colonize asparagus in the United States and that have black cornicles.

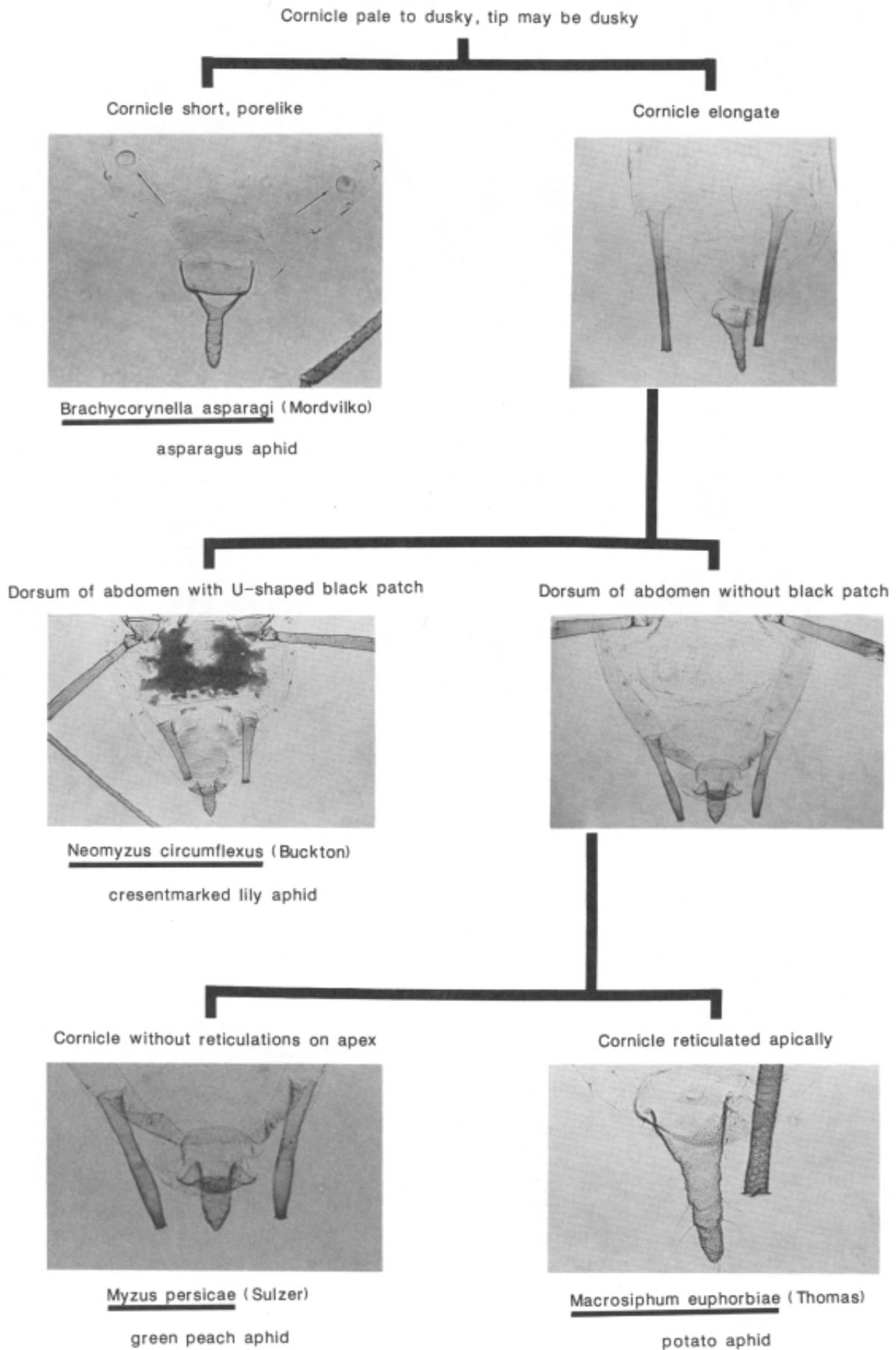
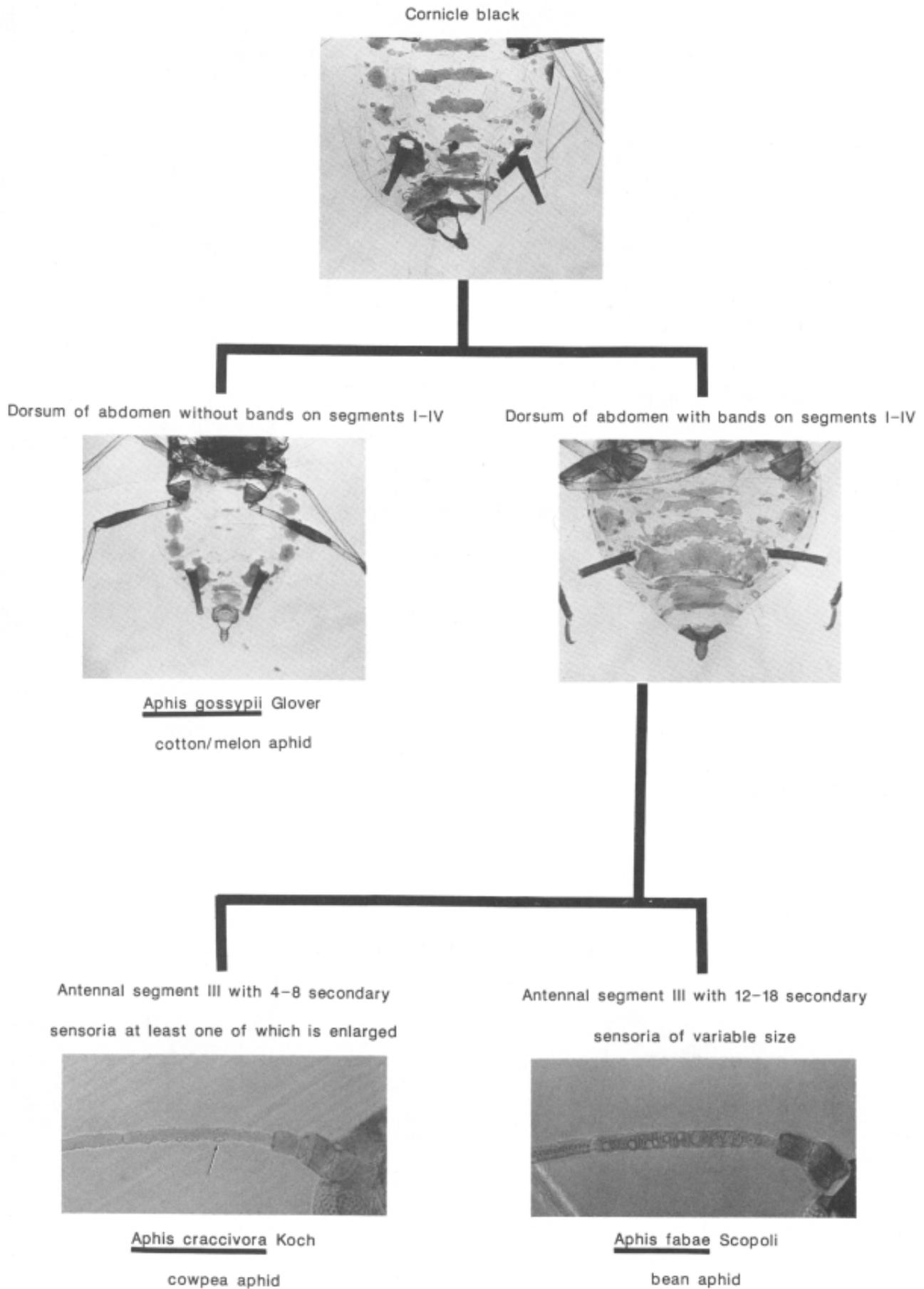
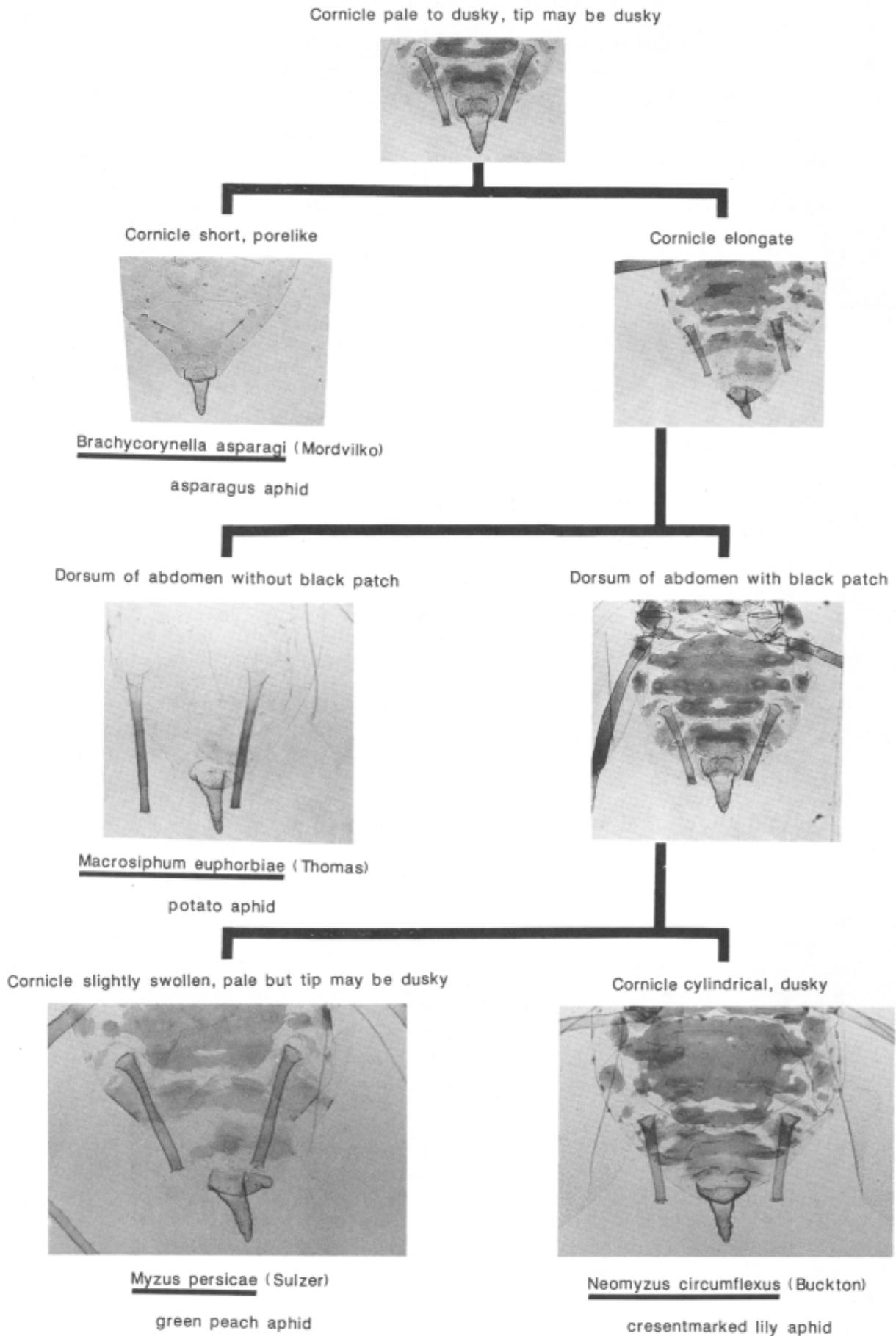


Fig. 2. Pictorial key to the apterous viviparae of four aphid species that colonize asparagus in the United States and that have pale cornicles, the tips of which may be dusky.



**Fig. 3.** Pictorial key to the alate viviparae of three aphid species that colonize asparagus in the United States and that have black cornicles.



**Fig. 4.** Pictorial key to the alate viviparae of four aphid species that colonize asparagus in the United States and that have pale cornicles, the tips of which may be dusky.

(1.3–2.6 mm), rounded. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; 12–18 secondary sensoria of similar size on antennal segment III; 0–5 secondary sensoria on antennal segment IV. Cornicle cylindrical, more than 3 times as long as wide, black. Cauda with 3–4 pairs of lateral setae and 2–3 dorsolateral setae, black.

**Distribution in the United States.** Throughout the United States.

**Hosts.** Polyphagous on many secondary host plants. Primary hosts are species of *Euonymus* and *Viburnum*.

*Aphis gossypii* Glover  
(Fig. 1 and 3)

\*,\*\**Aphis gossypii* Glover

ESA-approved common name: cotton or melon aphid

**Taxonomic Characteristics.** *Apterous Vivipara.* In life body color varies from blackish green to green to pale yellow to almost white. Body size also variable (0.9–1.8 mm), apparently influenced by crowding, temperature, and host. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; no secondary sensoria on antennal segment III. Cornicle cylindrical, more than 3 times as long as wide, black. Cauda usually with 2–4, usually 3, pairs of lateral setae, pale to dusky.

*Alate Vivipara.* In life body color varies from green to almost black to pale yellow to almost white. Body size also variable (1.1–1.8 mm), apparently influenced by crowding, temperature, and host. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; 6–12 secondary sensoria of similar size on antennal segment III; no secondary sensoria on antennal segment IV. Cornicle cylindrical, more than 3 times as long as wide, black. Cauda usually with 2–3 (usually 3) pairs of lateral setae, dusky to black.

**Distribution in the United States.** Throughout the United States.

**Hosts.** Polyphagous and very damaging to many plants of economic importance including cotton and various Cucurbitaceae.

*Neomyzus circumflexus* (Buckton)  
(Fig. 2 and 4)

\**Myzus circumflexus* (Buckton)

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

ESA-approved common name: crescentmarked lily aphid

**Taxonomic Characteristics.** *Apterous Vivipara.* In life body color varies from green to pale yellow to almost white, with a large, horseshoe- or U-shaped black or dark brown patch on dorsum of abdomen. Small aphid (1.2–2.6 mm). Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; no secondary sensoria on antennal seg-

ment III. Cornicle cylindrical, more than 3 times as long as wide, dusky but tip may be dark. Cauda with 2–3 pairs of lateral setae, pale.

*Alate Vivipara.* In life body color varies from green to almost black with black or dark brown lateral areas and bands on dorsum of abdomen or with bands coalesced to form a black or dark brown patch on dorsum of abdomen. Small aphid (1.6–2.4 mm). Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; 14–17 secondary sensoria of similar size on antennal segment III; 1–5 secondary sensoria on antennal segment IV. Cornicle cylindrical, more than 3 times as long as wide, dusky. Cauda with 2–3 pairs of lateral setae, dusky.

**Distribution in the United States.** Throughout the United States.

**Hosts.** Polyphagous and is a common pest in greenhouses and on house plants.

*Myzus persicae* (Sulzer)  
(Fig. 2 and 4)

\*,\*\**Myzus persicae* (Sulzer)

ESA-approved common name: green peach aphid

**Taxonomic Characteristics.** *Apterous Vivipara.* In life body color varies from dark green to grey-green to pale yellow. Small aphid (1.2–2.3 mm). Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; no secondary sensoria on antennal segment III. Cornicle cylindrical to slightly swollen, more than 3 times as long as wide, pale but tip may be dark. Cauda with 3 pairs of lateral setae, pale to dusky. Tarsi may be noticeably dark.

*Alate Vivipara.* In life body color varies from dark green to grey-green with a large black patch on the dorsum of the abdomen. Small aphid (1.2–2.3 mm). Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; 10–15 secondary sensoria of similar size on antennal segment III; no secondary sensoria on antennal segment IV. Cornicle slightly swollen, more than 3 times as long as wide, pale but tip may be dark. Cauda with 3 pairs of lateral setae, pale to dusky. Tarsi may be noticeably dark.

**Distribution in the United States.** Throughout the United States.

**Hosts.** Polyphagous and very damaging to many plants of economic importance that are secondary host plants. Primary hosts are several species of *Prunus*.

*Macrosiphum euphorbiae* (Thomas)  
(Fig. 2 and 4)

\**Macrosiphum solanifolii* (Ashmead)

\*\**Macrosiphum euphorbiae* (Thomas)

ESA-approved common name: potato aphid

**Taxonomic Characteristics.** *Apterous Vivipara.* In life body color usually varying shades of green with eyes distinctly reddish. Medium-sized aphid

(1.7–3.6 mm), pear-shaped. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; 1–5 secondary sensoria on basal half of antennal segment III; either entirely dark or only dark apically. Cornicle slightly swollen, reticulated apically and slightly indented in area of reticulations; more than 3 times as long as wide; entirely pale or getting increasingly dusky towards tip. Cauda with 4–5 pairs of lateral setae and 1–2 dorsal preapical setae, pale.

*Alate Vivipara.* In life body color usually varying shades of green with eyes distinctly reddish. Medium-sized aphid (1.7–3.4 mm), pear-shaped. Antenna 6-segmented, unguis more than twice length of base of antennal segment VI; 10–18 secondary sensoria of similar size on antennal segment III; no secondary sensoria on antennal segment IV; entirely dark except for segments I and II and base of III. Cornicle slightly swollen, reticulated apically and slightly indented in area of reticulations; more than 3 times as long as wide; may be pale but usually progressively darker towards tip. Cauda with 4–5 pairs of lateral setae and 1–2 dorsal preapical setae.

**Distribution in the United States.** Throughout the United States.

**Hosts.** Polyphagous and very damaging to many plants of economic importance which are secondary host plants. Primary hosts are several species of *Rosa*.

**Key to the Apterous Viviparae of Seven Aphid Species Colonizing Asparagus in the United States**

- 1. Cornicle short, porelike (Fig. 2) .....  
     ... *Brachycorynella asparagi* (Mordvilko)  
     Cornicle elongate ..... 2
- 2(1). Cornicle black ..... 3  
     Cornicle pale, tip may be dusky ..... 5
- 3(2). Dorsum of abdomen with black areas usually coalesced into a large black patch (Fig. 1) ..... *Aphis craccivora* Koch  
     Dorsum of abdomen without black patch ..... 4
- 4(3). Cauda black, as dark as cornicles, with 3–4 pairs of lateral setae and 2–3 dorsolateral setae (Fig. 1) .. *Aphis fabae* Scopoli  
     Cauda pale to dusky, distinctly lighter than cornicles, with 2–5, usually 3, pairs of lateral setae (Fig. 1) .....  
     ..... *Aphis gossypii* Glover
- 5(2). Dorsum of abdomen with large U- or horseshoe-shaped black or dark brown patch (Fig. 2) .....  
     ..... *Neomyzus circumflexus* (Buckton)  
     Dorsum of abdomen without black or dark brown patch ..... 6
- 6(5). Cornicle without reticulations on apex, slightly swollen; color of cornicle pale, but tip may be dusky (Fig. 2) .....  
     ..... *Myzus persicae* (Sulzer)

Cornicle reticulated apically, slightly indented in area of reticulations, and slightly swollen; color of cornicle entirely pale or getting increasingly dusky towards tip (Fig. 2) .....  
     ..... *Macrosiphum euphorbiae* (Thomas)

**Key to the Alate Viviparae of Seven Aphid Species Colonizing Asparagus in the United States**

- 1. Cornicle short, porelike (Fig. 4) .....  
     ... *Brachycorynella asparagi* (Mordvilko)  
     Cornicle elongate ..... 2
- 2(1). Cornicle black ..... 3  
     Cornicle pale to dusky, tip may be dusky ..... 5
- 3(2). Dorsum of abdomen without bands on segments I–IV (Fig. 3) .....  
     ..... *Aphis gossypii* Glover  
     Dorsum of abdomen with bands on segments I–IV ..... 4
- 4(3). Cauda black, with 3–4 pairs of lateral setae and 2–3 dorsolateral setae; antennal segment III with 12–18 secondary sensoria of equal or variable size (Fig. 3) .....  
     ..... *Aphis fabae* Scopoli  
     Cauda black, with 2–4, usually 3, pairs of lateral setae and 1 dorsal preapical seta; antennal segment III with 4–8 secondary sensoria at least one of which is enlarged (Fig. 3) ..... *Aphis craccivora* Koch
- 5(2). Dorsum of abdomen without large patch; cornicle with reticulations on apex; cauda pale (Fig. 4) .....  
     ..... *Macrosiphum euphorbiae* (Thomas)  
     Dorsum of abdomen with large black patch; cornicle without reticulations; cauda pale to dusky (Fig. 4) ..... 6
- 6(5). Cornicle slightly swollen, pale but tip may be dusky; antennal segment IV without secondary sensoria (Fig. 4) .....  
     ..... *Myzus persicae* (Sulzer)  
     Cornicle cylindrical, dusky; antennal segment IV with secondary sensoria; (Fig. 4) ... *Neomyzus circumflexus* (Buckton)

**Acknowledgment**

As the asparagus aphid, *Brachycorynella asparagi*, has been detected in various states, voucher specimens have been submitted to me for confirmation and deposition in the National Collection of Insects; and I am grateful to those individuals who have provided these specimens. Victor F. Eastop provided comparative data on specimens of *Brachycolus stellata* (Hardy 1850) in the Collection in the British Museum (Natural History), London. The following individuals contributed to the improvement of this manuscript through their review comments: Wyatt W. Cone, Irrigated Agriculture Research and Extension Center, Washington State University, Prosser; Tokuwo Kono, California Department of Food and Agriculture, Sacramento, Calif.; and Donald M. Anderson

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