

Information on and Identification of *Diuraphis noxia* (Homoptera: Aphididae) and Other Aphid Species Colonizing Leaves of Wheat and Barley in the United States

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ABSTRACT In the United States, *Diuraphis noxia* (Mordvilko), variously called the "Russian wheat aphid," the "Russian grain aphid," and the "barley aphid," was first collected and identified in March 1986, near Muleshoe, Bailey County, Tex. By the end of 1986, *D. noxia* had been collected in Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming on wheat, barley, oats, rye, triticale, and several grasses. Damage to wheat and barley during 1986 was extensive in some fields in Texas, New Mexico, and Colorado; crop losses were heavy in these areas. In addition to *D. noxia*, 12 other aphid species are known to colonize leaves of wheat, barley, and other small grains and some related grasses in the United States. A brief summary of taxonomic characteristics, usual hosts, and known distribution within the United States is given here for each species along with a couplet key and pictorial plates. This information should prove very useful to county, state, and federal personnel involved with surveys of grain aphids, particularly those surveys for *D. noxia* as it spreads into other grain-growing areas of the United States.

KEY WORDS *Diuraphis noxia*, aphids, wheat, barley, keys

IN THE UNITED STATES, *Diuraphis noxia* (Mordvilko), variously called the "Russian wheat aphid," the "Russian grain aphid," and the "barley aphid," was first collected and identified in March 1986, near Muleshoe, Bailey County, Tex. Subsequently it was learned (Gilchrist et al. 1984) that *D. noxia* had been found in Mexico in 1980. By the end of 1986, specimens of *D. noxia* had been collected in Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming. It is believed that prevailing wind currents were responsible for moving *D. noxia* into Texas from Mexico at least as early as 1985 (W. P. Morrison, Texas Agricultural Extension Service, The Texas A&M University System, Lubbock, TX 79401, personal communication) and for dispersing the aphid to the other states. During 1986, *D. noxia* was collected on wheat, barley, rye, oats, triticale, and several related grasses. Damage to wheat and barley during 1986 was extensive and crop losses were heavy in some fields on the Texas High Plains and in New Mexico (W. P. Morrison, personal communication) and in Colorado (F. B. Peairs, Department of Entomology, Colorado State University, Fort Collins, CO 80523, personal communication). Surveys at the county and state levels are being initiated for the 1987 growing season.

A brief summary of taxonomic characteristics, usual hosts, and known distribution within the United States is given for *D. noxia* and each of the 12 other aphid species colonizing leaves of wheat,

barley, and other small grains and grasses. This information and the pictorial plates and couplet key have been prepared as aids to those charged with detecting *D. noxia* as it appears in fields in the infested areas and as it spreads into other grain-growing areas of the United States.

Materials and Methods

Many of these aphids are known to colonize small grains in addition to wheat and barley, and of course those species that alternate hosts have their primary hosts. However, not wishing to include aphids that colonize corn, rice, and other small grains but not wheat and barley, I have deliberately limited this paper to those aphids reported to colonize wheat and barley in the United States. With the exception of *Rhopalosiphum rufiabdominalis* (Sasaki), the rice root aphid, this paper does not treat aphid species that are root feeders.

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 (Werner 1982) are given, and frequently used common names are included in quotation marks for some species without ESA-approved common names. Two aphids currently do not have fre-

quently used common names and none are proposed.

Information on distribution and hosts is taken from labels on slides in the National Collection of Insects, Beltsville, Md., and from Palmer (1952) and Blackman & Eastop (1984). Scientific and common names for hosts are those listed in Terrell et al. (1986).

In the pictorial keys, the species are grouped by the length of the cornicles relative to their widths, the color of the cornicles, and the color of the cauda. Characters used in the keys can be seen using a dissecting scope with a power of at least 120 \times .

Results and Discussion

Diuraphis noxia (Mordvilko) (Fig. 1)

Synonymy:

Brachycolus noxius Mordvilko
Cavahyalopterus graminearium Mimeur
Cavahyalopterus noxius (Mordvilko)
Cuernavaca noxia (Mordvilko)
*****Diuraphis noxia*** (Mordvilko)

Frequently used common name: "Russian wheat aphid."

Taxonomic Characteristics. In life yellow-green or gray-green and often covered with wax. Small aphids (<2.3 mm), convex, elongate. Antenna 6-segmented, unguis straight and 2.0 to 2.2 fold longer than base of last antennal segment; no secondary sensoria on third antennal segment of aptera, 4–8 on third antennal segment, and 1–3 on fourth antennal segment of alata. Antennal and body hairs fine, inconspicuous. Last rostral segment 0.080–0.084 mm long. Cornicle short, truncate, about as long as wide, pale. Cauda elongate, usually with only three pairs of lateral setae, pale. Supracaudal process present on the dorsum of the eighth abdominal tergite, about as long as cauda in aptera but only a short knob in alata.

Distribution in the United States: Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming.

Hosts: *Avena sativa* L. (oats), *Bromus madritensis* L. (Spanish brome), *Elytrigia elongata* (Host) Nevski (tall wheatgrass), *Hordeum murinum* L. (wall barley), *Hordeum vulgare* L. (barley), *Oryza sativa* L. (rice), *Phalaris canariensis* L. (canary-grass), *Phleum pratense* L. (timothy), *Secale cereale* L. (rye), \times *Triticosecale rimpau* Wittm. (triticale), and *Triticum aestivum* L. (wheat).

Diuraphis (Holcaphis) tritici (Gillette) (Fig. 1)

Synonymy:

****Brachycolus tritici*** (Gillette)
*****Diuraphis (Holcaphis) tritici*** (Gillette)

ESA-approved common name: western wheat aphid.

Taxonomic Characteristics. In life yellow-green and often covered with wax. Small aphids (<2.0 mm), convex, elongate. Antenna 6-segmented, unguis straight and <1.5 fold longer than base of last antennal segment; no secondary sensoria on third antennal segment of aptera, 4–8 in an irregular row on third antennal segment of alata. Antennal and body hairs fine, inconspicuous. Last rostral segment 0.12 mm long. Cornicle short, truncate, about as long as wide, pale. Cauda elongate, with 2–3 pairs of lateral setae and 1 dorsal preapical seta, pale. Supracaudal process not present on the dorsum of the eighth abdominal tergite.

Distribution in the United States: Colorado, Illinois, Minnesota, Montana, New Mexico, Oklahoma, South Dakota, Texas, Utah, Washington, Wyoming.

Hosts: *Triticum aestivum* (wheat), *Paspalum distichum* L. (knotgrass).

Sipha (Rungisia) elegans del Guercio (Fig. 1)

Synonymy:

*****Sipha (Rungisia) elegans*** del Guercio

Taxonomic Characteristics. In life yellowish brown. Aptera often with a paler spinal stripe on dorsum, alata with transverse bars on posterior tergites of dorsum. Small aphids (1.5–2.0 mm), elongate oval and dorsoventrally flattened. Antenna 5-segmented; no secondary sensoria on third antennal segment of aptera, 3–7 on third antennal segment of alata. Antennal and body hairs long and stout, spinelike. Cornicle short, truncate, about as long as wide, pale. Cauda broadly rounded, arc-shaped, with 1–2 pairs of lateral setae and 1 preapical seta, pale.

Distribution in the United States: Throughout the United States.

Hosts: Several species of Gramineae, especially species of grasses, and also sometimes wheat and barley.

Sipha flava (Forbes) (Fig. 1)

Synonymy:

****Sipha flava*** (Forbes), in key
*****Sipha flava*** (Forbes)

ESA-approved common name: yellow sugarcane aphid.

Taxonomic Characteristics. In life yellow. Aptera often with paired, intersegmental markings on dorsum, alata with a variable dark pattern on dorsum. Small aphids (1.5–2.0 mm), elongate and dorsoventrally flattened. Antenna 5-segmented; no secondary sensoria on third antennal segment of aptera, 3–40 on third antennal segment of alata.

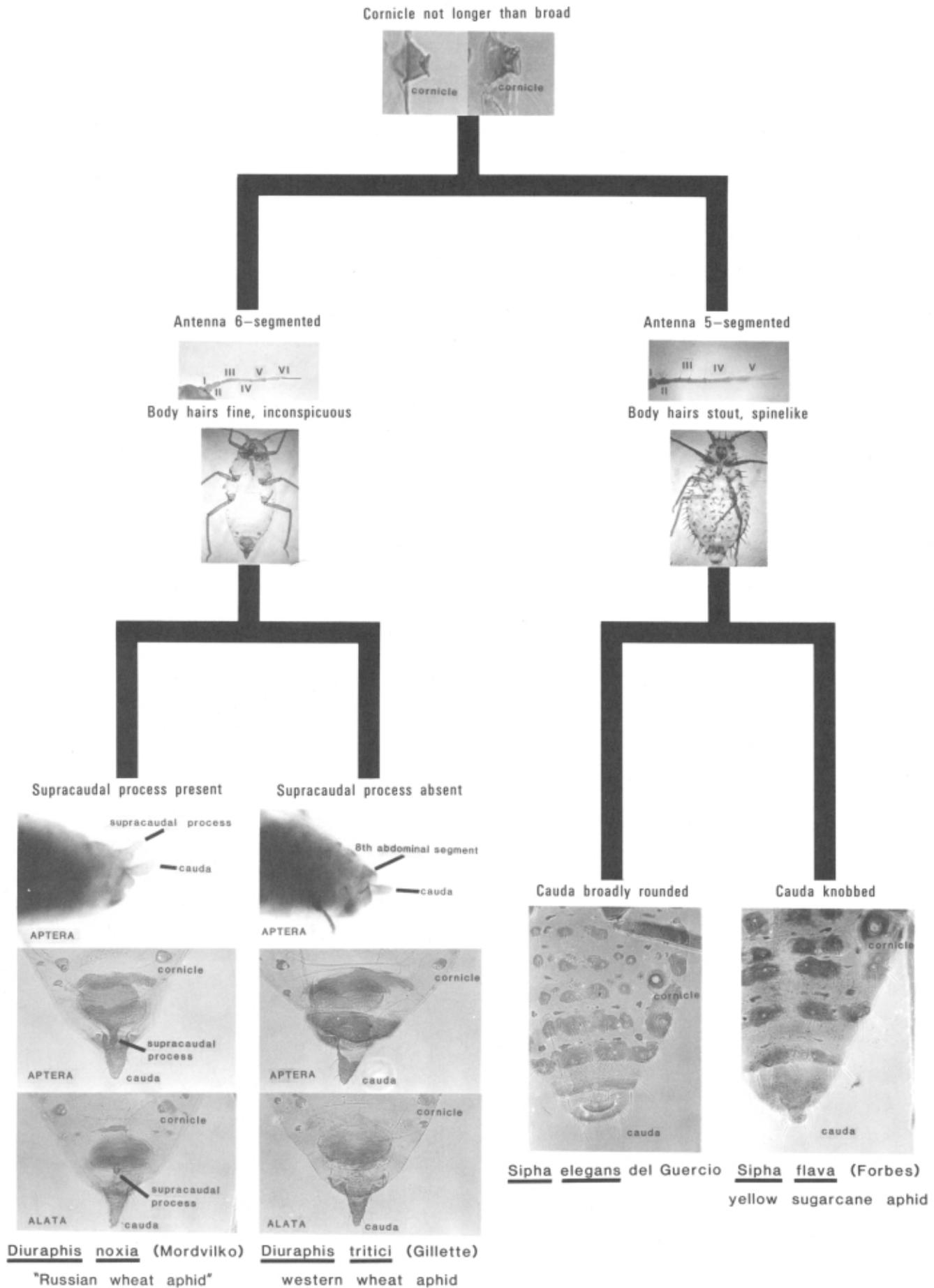
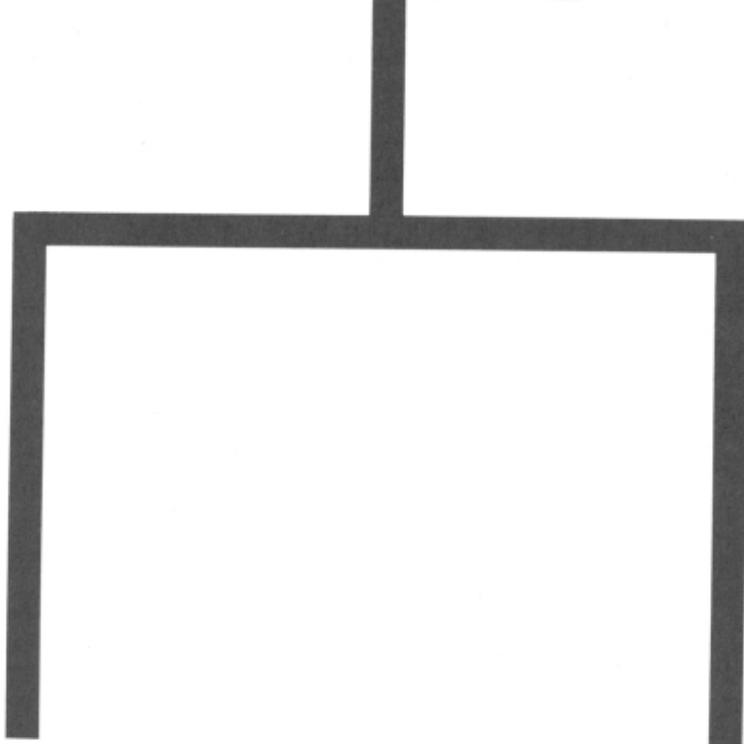
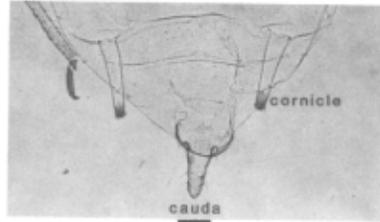


Fig. 1. Pictorial key to four species of aphids that have short, truncate cornicles and that colonize leaves of wheat and barley in the United States.

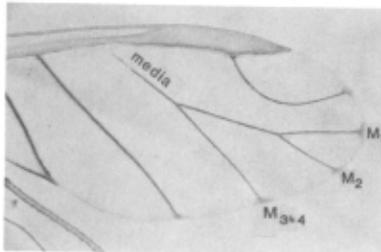
Cornicle longer than broad, pale
tip may be dark



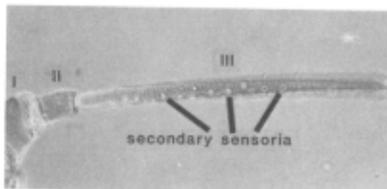
Cauda with more than 8 setae



Fore wing with media forked twice



18-28 secondary sensoria
on III of alata

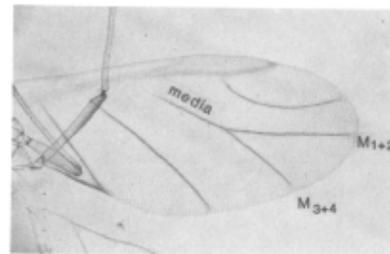


Acyrthosiphon dirhodum (Walker)
"rose-grass aphid"

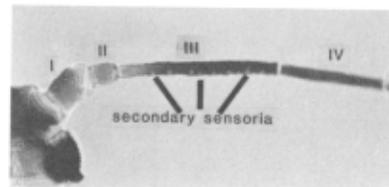
Cauda usually with 4 setae



Fore wing with media forked once



6-10 secondary sensoria
on III of alata



Schizaphis graminum (Rondani)
greenbug

Fig. 2. Pictorial key to two species of aphids that have pale (tips may be dark), longer than broad cornicles and pale caudas and that colonize leaves of wheat and barley in the United States.

Antennal and body hairs long and stout, spinelike. Cornicle short, truncate, about as long as wide, pale. Cauda knobbed, with 3–4 pairs of lateral setae and sometimes 1 preapical seta, pale.

Distribution in the United States: Throughout the United States.

Hosts: Several species of Gramineae.

Acyrtosiphon (Metopolophium) dirhodum
(Walker)
(Fig. 2)

Synonymy:

**Macrosiphum dirhodum* (Walker)

***Metopolophium dirhodum* (Walker)

Frequently used common name: "rose-grass aphid."

Taxonomic Characteristics. In life green to yellow-green. Apterata with a darker green longitudinal stripe down the middle of the dorsum, alata with a darker green abdomen. Small to medium-sized aphids (1.6–3.3 mm), elongate. Antenna 6-segmented, unguis straight; secondary sensoria 1–2 on third antennal segment of aptera, 18–28 on third antennal segment of alata. Antennal and body hairs fine. Cornicle not reticulated, long, pale, tip sometimes dark. Cauda long, usually with 3–4, but sometimes 5, pairs of lateral setae and 1–3 dorsal preapical setae, pale. Forewing of alata with media forked twice.

Distribution in the United States: Throughout the United States.

Hosts: Primary hosts are wild and cultivated species of *Rosa*. Secondary hosts are several species of Gramineae.

Schizaphis graminum (Rondani)
(Fig. 2)

Synonymy:

***Schizaphis graminum* (Rondani)

**Toxoptera graminum* (Rondani)

ESA-approved common name: greenbug.

Taxonomic Characteristics. In life green to yellow-green. Apterata most often with a green longitudinal stripe down the middle of the dorsum (varies among the biotypes), alata with a green to yellow-green abdomen. Small aphids (1.5–2.0 mm), elongate oval. Antenna 6-segmented, unguis straight; no secondary sensoria on third antennal segment of aptera, 6–10 on third antennal segment of alata. Antennal and body hairs fine. Cornicle long, pale, tip sometimes dusky. Cauda long, usually with 2 pairs of lateral setae, and pale. Forewing of alata with media forked only once.

Distribution in the United States: Throughout the United States.

Hosts: Several species of Gramineae, including many grasses and cereals such as *Avena*, *Hordeum*, *Oryza*, *Poa*, *Sorghum*, × *Triticosecale*, *Triticum*, and *Zea*.

Rhopalosiphum maidis (Fitch)
(Fig. 3)

Synonymy:

**Rhopalosiphum maidis* (Fitch)

***Rhopalosiphum maidis* (Fitch)

ESA-approved common name: corn leaf aphid.

Taxonomic Characteristics. In life bluish green to dark olive green often with dark areas around cornicle bases, sometimes wax-covered. Small aphids (<2.5 mm), elongate. Antenna 6-segmented, unguis straight and <2.5 fold longer than base of last antennal segment; no secondary sensoria on third antennal segment of aptera, 14–18 on third antennal segment, 0–8 on fourth antennal segment, and 0–3 on fifth antennal segment of alata. Antennal and body hairs fine. Cornicle slightly swollen, <1.5 fold longer than cauda, dark. Cauda short, usually with 2, but sometimes 3, pairs of lateral setae, dark.

Distribution in the United States: Throughout the United States.

Hosts: *Hordeum vulgare* (barley), *Sorghum bicolor* (L.) Moench (sorghum), *Triticum aestivum* (wheat), *Zea mays* L. subsp. *mays* (corn), and many other genera of Gramineae.

Rhopalosiphum padi (L.)
(Fig. 3)

Synonymy:

**Rhopalosiphum padi* (L.)

***Rhopalosiphum padi* (L.)

Frequently used common name: "bird cherry-oat aphid."

Taxonomic Characteristics. In life orange-green, olive green to dark olive green, and even greenish black; aptera sometimes with reddish patches around bases of the cornicles. Small aphids (<2.5 mm), usually broadly oval. Antenna usually 6-segmented, unguis straight and >3 fold longer than base of last antennal segment; no secondary sensoria on third antennal segment of aptera, 18–20 on third antennal segment, 6–9 on fourth antennal segment, and 1–2 on fifth antennal segment of alata. Antennal and body hairs fine. Cornicle >1.5 fold longer than cauda, dark. Cauda short, usually with 2 but sometimes with 3 pairs of lateral setae and 1 dorsal preapical seta, dark.

Distribution in the United States: Throughout the United States.

Hosts: Primary host is *Prunus padus* L. (bird cherry). Secondary hosts are several species of Gramineae, including all the major cereals and pasture grasses.

Rhopalosiphum rufiabdominalis (Sasaki)
(Fig. 3)

Synonymy:

***Rhopalosiphum rufiabdominalis* (Sasaki)

**Rhopalosiphum splendens* (Theobald)

**Rhopalosiphum subterraneum* Mason

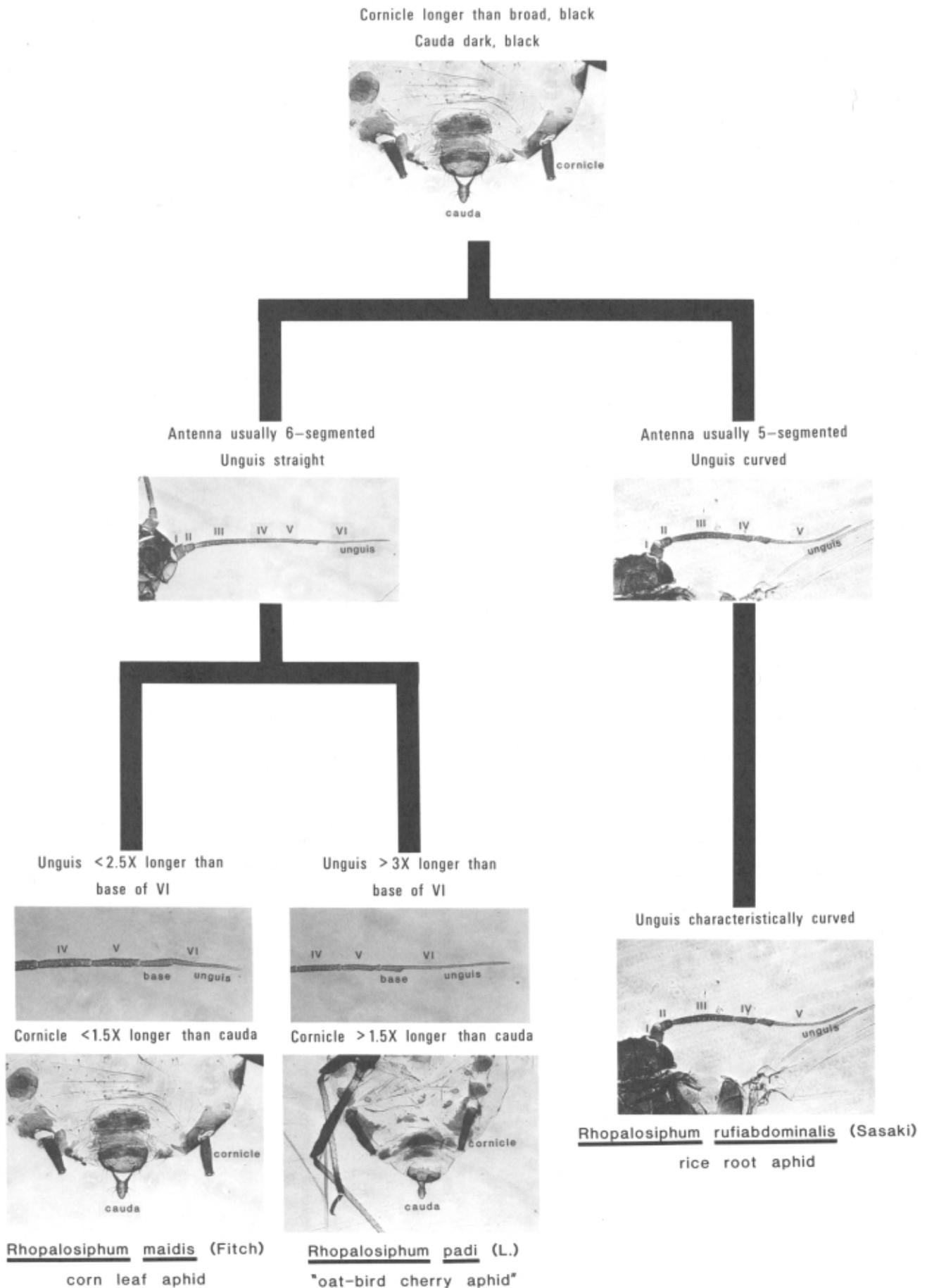


Fig. 3. Pictorial key to three species of aphids that have black, longer than broad cornicles and dark to black caudas and that colonize leaves of wheat and barley in the United States.

ESA-approved common name: rice root aphid.

Taxonomic Characteristics. In life yellow-green, olive green to dark olive green, even greenish black; aptera sometimes with reddish or orange patches around bases of the cornicles. Small aphids (<2.5 mm), usually broadly oval. Antenna usually 5-segmented, sometimes 6-segmented, with unguis characteristically curved; no secondary sensoria on third antennal segment of aptera, 12–18 on third antennal segment, 1–4 on fourth antennal segment of alata. Antennal and body hairs fine. Cornicle >1.5 fold longer than cauda, dark. Cauda short, with 2 pairs of lateral setae, dark.

Distribution in the United States: Throughout the United States.

Hosts: Primary hosts are species of *Prunus*. Secondary hosts are several species of Gramineae, including all the major cereals and pasture grasses. This aphid is found in leaf bases and on roots and is included here because of its possible confusion with *R. maidis* and *R. padi*.

***Glabromyzus howardii* (Wilson)**

(Fig. 4)

Synonymy:

**Rhopalosiphum rhois* Monell, in part

***Glabromyzus howardii* (Wilson)

Taxonomic Characteristics. In life yellow-green. Apta often with faint intersegmental markings, light in aptera, more distinct and darker in alata. Small aphids (1.5–2.0 mm), broadly elongate. Antenna 6-segmented, unguis straight; no secondary sensoria on third antennal segment of aptera, 2–8 on third antennal segment of alata. Antennal and body hairs fine. Cornicle not reticulated, swollen, longer than wide, black. Cauda elongate, with 2 pairs of lateral setae and 1 dorsal preapical seta, pale.

Distribution in the United States: Throughout the United States.

Hosts: Primary hosts are species of *Rhus*. Secondary hosts are several species of wild and cultivated Gramineae. Often found in flower heads.

***Hysteroneura setariae* (Thomas)**

(Fig. 4)

Synonymy:

**Aphis setariae* (Thomas)

***Hysteroneura setariae* (Thomas)

ESA-approved common name: rusty plum aphid.

Taxonomic Characteristics. In life brown. Apta often with faint intersegmental markings, light in aptera, more distinct and darker in alata. Small aphids (1.5–2.0 mm), broadly elongate. Antenna 6-segmented, unguis straight and longer than third antennal segment; no secondary sensoria on third antennal segment of aptera, 15–20 on third antennal segment, and 3–7 on fourth antennal segment of alata. Antennal and body hairs fine. Cornicle not reticulated, longer than wide, tapering, but not

swollen, black. Cauda elongate, parallel-sided, with 2 pairs of lateral setae, pale to white. Hind wing of alata with only one oblique vein.

Distribution in the United States: Throughout the United States.

Hosts: Primary host is *Prunus domestica* L. (plum). Secondary hosts are several species of Gramineae including *Hordeum*, *Setaria*, *Sorghum*, and *Triticum*. Usually at the bases of the spikelets of Gramineae, sometimes on leaves or unripened seeds, and often tended by ants.

***Macrosiphum (Sitobion) avenae* (F.)**

(Fig. 4)

Synonymy:

**Macrosiphum granarium* (Kirby)

***Sitobion avenae* (F.)

ESA-approved common name: English grain aphid.

Taxonomic Characteristics. In life yellow-green to reddish brown. Apta often with faint intersegmental markings, more distinct and darker in alata. Small to medium-sized aphids (1.9–3.5 mm), broadly elongate. Antenna 6-segmented, unguis straight; 1–2 secondary sensoria on third antennal segment of aptera, 7–12 on third antennal segment of alata. Antennal and body hairs fine. Cornicle reticulated, less than twice as long as cauda, black. Cauda elongate, with 3–4 pairs of lateral setae and 2 dorsal preapical setae, pale to white.

Distribution in the United States: Throughout the United States.

Hosts: Several species of Gramineae, including all the major cereals and pasture grasses.

***Macrosiphum (Sitobion) fragariae* (Walker)**

(Fig. 4)

Synonymy:

***Sitobion fragariae* (Walker)

Frequently used common name: "blackberry-cereal aphid."

Taxonomic Characteristics. In life yellow-green. Apta often with faint intersegmental markings, more distinct and darker in alata. Small to medium-sized aphids (2.0–3.0 mm), broadly elongate. Antenna 6-segmented, unguis straight; 1–2 secondary sensoria on third antennal segment of aptera, 12–20 on third antennal segment of alata. Antennal and body hairs fine. Cornicle reticulated, at least twice as long as cauda, usually dark but may be pale basally and dark apically. Cauda elongate, with 3–4 pairs of lateral setae and 1–2 preapical setae, pale.

Distribution in the United States: Throughout the United States.

Hosts: Primary hosts are species of *Rubus*. Secondary hosts are several species of Gramineae. Reportedly only small populations occur on wheat and barley.

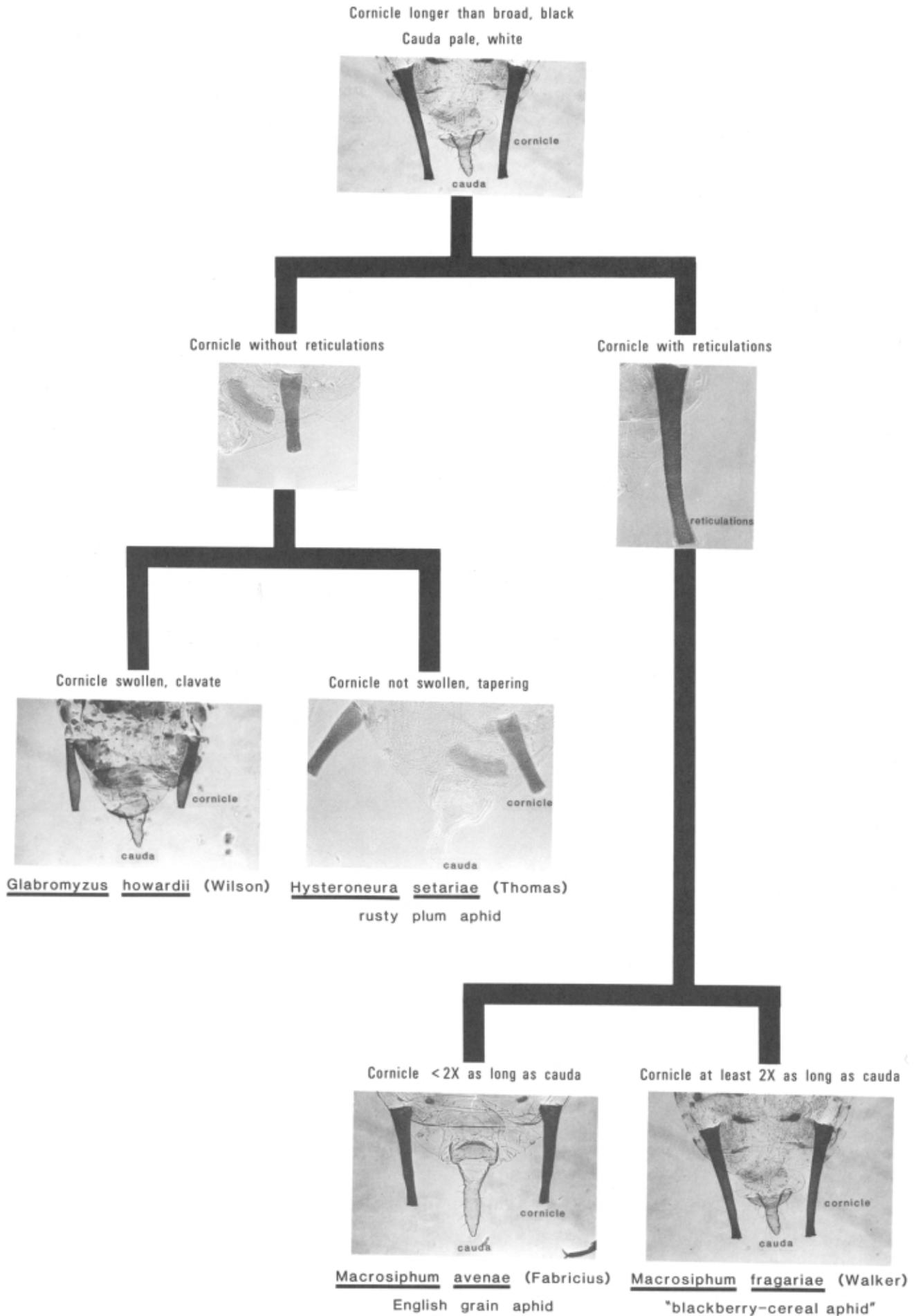


Fig. 4. Pictorial key to four species of aphids that have black, longer than broad cornicles and pale to white caudas and that colonize leaves of wheat and barley in the United States.

**Key to 13 Aphid Species Colonizing
Leaves of Wheat and Barley in
the United States**

1. Cornicle very short, not longer than broad 2
 Cornicle long, longer than broad 5
- 2(1). Antenna 6-segmented; body convex and elongate, hairs on body fine, inconspicuous; cauda elongate 3
 Antenna 5-segmented; body flat and elongate, hairs on body appear as long, stout spines; cauda knobbed or broadly rounded 4
- 3(2). Supracaudal process present on dorsum of eighth abdominal segment; unguis 2.0 to 2.3 fold longer than base of last antennal segment (Fig. 1)
 *Diuraphis noxia* (Mordvilko)
 Supracaudal process absent; unguis <1.5 fold longer than base of last antennal segment (Fig. 1)
 *Diuraphis (Holcaphis) Tritici* (Gillette)
- 4(2). Cauda knobbed (Fig. 1)
 *Sipha flava* (Forbes)
 Cauda broadly rounded (Fig. 1)
 .. *Sipha (Rungisia) elegans* del Guercio
- 5(1). Cornicle pale, tip may be dusky 6
 Cornicle black or at least much darker than color of body 7
- 6(5). Cauda usually with >8 setae; secondary sensoria: 1-2 on third antennal segment of aptera, 18-28 on third antennal segment of alata; forewing of alata with media forked twice (Fig. 2) ...
 *Acyrtosiphon (Metopolophium) dirhodum* (Walker)
 Cauda usually with 4 setae; secondary sensoria: none on antenna of aptera, 6-10 on third antennal segment of alata; forewing of alata with media forked only once (Fig. 2)
 *Schizaphis graminum* (Rondani)
- 7(5). Cauda dark, black 8
 Cauda pale, white 10
- 8(7). Antenna usually 5-segmented, sometimes 6-segmented, unguis characteristically curved (Fig. 3)
 *Rhopalosiphum rufiabdominalis* (Sasaki)
 Antenna usually 6-segmented, unguis straight 9
- 9(8). Unguis <2.5 fold longer than base of last antennal segment; cornicle <1.5 fold longer than cauda (Fig. 3)
 *Rhopalosiphum maidis* (Fitch)
 Unguis >3 fold longer than base of last antennal segment; cornicle >1.5 fold longer than cauda (Fig. 3)
 *Rhopalosiphum padi* (L.)
- 10(7). Cornicle without reticulations (netlike markings) 11

- Cornicle with reticulations (netlike markings) 12
- 11(10). Cornicle distinctly swollen, clavate (Fig. 4) ... *Glabromyzus howardii* (Wilson)
 Cornicle not swollen, tapering (Fig. 4)
 *Hysteroneura setariae* (Thomas)
- 12(10). Cornicle at least twice as long as cauda (Fig. 4)
 *Macrosiphum (Sitobion) fragariae* (Walker)
 Cornicle less than twice as long as cauda (Fig. 4)
 .. *Macrosiphum (Sitobion) avenae* (F.)

Note Added in Proof

Diuraphis noxia was collected on wheat, Maricopa, AZ, 17 March 1987 by D. Fullerton.

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