BioOne COMPLETE

# SIX ALIEN APHID SPECIES (HEMIPTERA: APHIDIDAE) RECORDED FOR THE FIRST TIME FROM SOUTH AMERICA

Authors: Ortego, Jaime, Pérez Hidalgo, Nicolás, Nieto Nafría, Juan M., and Durante, M. Pilar Mier

Source: Florida Entomologist, 89(2) : 111-116

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/0015-4040(2006)89[111:SAASHA]2.0.CO;2

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

# SIX ALIEN APHID SPECIES (HEMIPTERA: APHIDIDAE) RECORDED FOR THE FIRST TIME FROM SOUTH AMERICA

JAIME ORTEGO[1], NICOLÁS PÉREZ HIDALGO[2], JUAN M. NIETO NAFRÍA[2] AND M. PILAR MIER DURANTE[2]
[1]INTA EEA Junín, CC. Nro. 78; 5570 San Martín, Mendoza, Argentina

[2]Departamento de Biología Animal, Universidad de León, 24071 León, España

ABSTRACT

Six aphid species: *Saltusaphis scirpus* Theobald, *Myzocallis boerneri* Stroyan, *Macrosiphoniella absinthii* (Linnaeus), *Macrocrosiphoniella abrotani* (Walker), *Macrosiphoniella pseudoartemisiae* Shinji and *Macrosiphoniella tapuskae* (Hottes & Frison) are recorded for the first time in South America. They were all collected in Argentina. Comments for each species and identification keys for Myzocallidina and *Macrosiphoniella* known in South America are given.

Key Words: Hemiptera, Aphididae, Neotropical, alien species

RESUMEN

Se citan por vez primera para Sudamérica seis especies de pulgones: *Saltusaphis scirpus* Theobald, *Myzocallis boerneri* Stroyan, *Macrocrosiphoniella abrotani* (Walker), *Macrosiphoniella absinthii* (Linnaeus), *Macrosiphoniella pseudoartemisiae* Shinji y *Macrosiphoniella tapuskae* (Hottes & Frison). Todas ellas recogidas en la Argentina. Se presentan comentarios de cada especie y claves de identificación para las especies de Myzocallidina y de *Macrosiphoniella* conocidas en Sudamérica.

The distribution of most aphid species (Hemiptera: Aphididae) is limited to holarctic territory. Only those belonging to the subfamilies Greenideinae, Lizeriinae, Neophyllaphidinae, Pterasteriinae, and Spicaphidinae (with approximately 150, 33, 12, 5, and 13 species, respectively) and most of the subfamily Hormaphidinae (with approximately 180 species) are found in gondwanic territories. The species in the remaining subfamilies are characteristic of holarctic territories with some penetration in neighboring Oriental, Ethiopian, or Neotropical regions. The number of species in the subfamilies Calaphidinae, Eriosomatinae, Chaitophorinae, Lachninae, Saltusaphidinae (with, respectively, 332, 319, 165, 124, and 68 species, according to Eastop 1998) and the large subfamily Aphidinae (with around 2800 species) recorded in one or another southern territory is limited or very low. Some of these species may be considered as natives of these territories due to the evolution into lineages of holarctic origin (see Nieto Nafría et al. 2002 for several South American macrosiphins). Many others, the alien species, inhabit these territories due to direct introduction from holarctic populations.

The introduction of these species could be the result of (1) natural invasions during recent geological periods, as in the case of species colonizing (especially high regions) northern Neotropical and northern Oriental regions and the suboriental border of the Ethiopian region; and (2) human activities and displacements, which, in the case of South America date to no more than to 500 years. In most cases, however, this period of time is no more than 100 or 150 years, when traffic to and from other parts of the world increased and journeys lasted much shorter periods of time (Remaudière et al. 1985; Dixon 1998; Blackman & Eastop 2000; Rapoport 2000). The exotic component of aphid fauna in continental Argentina is considerable, accounting for just over 75% according to the latest review (Ortego et al. 2004), and is still growing.

## MATERIALS AND METHODS

In this paper we follow the classification of the family Aphididae used by Remaudière & Remaudière (1997), completed by Quednau (1999), with the nomenclatural adaptations by Nieto Nafría et al. (1998a).

## RESULTS AND DISCUSSION

After studying specimens collected during recent years in the Andean Argentinian strip we recorded another six alien aphid species, also recorded for the first time in South America.

### New Data for the subfamiliy Saltusaphidinae:

The subfamily Saltusaphidinae Baker, 1920 is of holarctic origin, though there is currently one exclusive species in Chile (Quednau 1990):

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

*Thripsaphis* (*T.*) *unciniae* Quednau, 1990. A few species have been recorded in other regions (Australia, New Zealand, sub-Saharan Africa) as a result of human activities and displacements (Eastop 1986). Saltusaphidinae live on species of the family Cyperaceae or more unusually, Juncaceae, Poaceae, or other monocotyledonous species. They are generally very globose or flattened aphids, sometimes elongate and even bacilliform, with scarcely or no discernible siphunculi and a claviform cauda; they are an attractive yellow or green (in different shades) color mixed with black; microscopic examination (or even stereoscopic magnification) reveals numerous dorsal setae, mostly claviform, spatulate, flabelliform, or fungiform and often short or very short.

*Saltusaphis scirpus* Theobald, 1915

Studied Material: Maipú (Mendoza), yellow water trap, 28-II-2004, 1 alate viviparous female (J. Ortego *leg.*); *Cyperus rotundus* Linnaeus, 1753, 29-IV-2004, alate and apterous viviparous females and nymphs (J. Ortego *leg.*). Viviparous females greenish-black, relatively large (usually over 2 mm), somewhat depressed and oval-shaped, with a concave front and eyes fairly separated from the antennal insertion (very common characters in the subfamily). Antennae almost reaching body length, fore femur much more voluminous than the others, siphunculi subcylindrical, low, pigmented and very rough. Dorsum of apterae with small and abundant segmental sclerites (with pigmentation very similar to that of intersegmental sclerites) and numerous short and flabelliform setae, except the marginal ones on final segments, which are long (in particular on the two blunt tubercles of abdominal segment VIII) and claviform, blunt or pointed. Alatae with marginal and spinal (one or two) sclerites and small pleural plates on each abdominal segment, antennal segment III bearing 9 to 21 oval-transverse secondary sensoria, and wings with slightly bordered veins and spots on edge of pterostigma and tip of the veins.

*Saltusaphis scirpus* has been recorded in most of Europe (Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Italy, Poland, Portugal, Rumania, Russia [with doubts], Slovakia, Spain, Sweden, and the Ukraine) and sub-Saharan Africa (Angola, Burundi, Kenya, Lesotho, Malawi, Mozambique, South Africa, Sudan, and Zimbabwe), several Asian countries (from the Mediterranean to India) and North America (U.S.A.), either under its valid name, or as *Hiberaphis iberica* Börner, 1949, *Saltusaphis africana* Eastop, 1953 and *Bacillaphis afghanica* Narzikulov & Umarov, 1970 (Nieto Nafría et al. 1998b). It is easily differentiated from *Thripsaphis unciniae*, so far the only species in the subfamily recorded from South America, by its dorsal sclerotization and pigmentation and shape of abdominal segment VIII (in apterae and alatae) and by the pigmentation of the wings. The presence of this species in Argentina could be due to (1) eggs in the soil of ornamental plants living in water or nearby, or in soil adhered to plant bulbs or tubercles, or (2) eggs or specimens living on ornamental Cyperaceae, for example *Cyperus*. The latter option is the most likely. The invasion could have originated from Europe, North America, or even South Africa.

New Data on the Subtribe Myzocallidina (Calaphidinae: Panaphidini):

The subfamily Calaphidinae Oestlund, 1918 is of holarctic origin, though some if its species now inhabit other parts of the world. Most of the genera and nearly all the species of *Myzocallis* Passerini, 1860 live on Fagaceae. This genus includes 42 taxa of species level, divided into 10 subgenera (Quednau 1999), two of which, *M.* (*Agrioaphis*) *castanicola* Baker, 1917 (specifically, the nominotypical subspecies) and *M.* (*M.*) *coryli* (Goeze, 1778), have been recorded in Argentina, Brazil, and Chile (Blackman & Eastop 1994; Quednau 1999). There are records (Fuentes-Contreras et al. 1997; Pérez Hidalgo et al. 1998; Bergmann et al. 2002; Ortego et al. 2004) of another four species of the subtribe in South America: *Hoplocallis picta* (Ferrari, 1872) in Argentina and Chile, *Tuberculatus* (*T.*) *querceus* (Kaltenbach, 1843) in Argentina, *Tuberculatus* (*Nippocallis*) *kuricola* (Matsumura, 1917) in Brazil, and *Tuberculatus* (*Tuberculoides*) *annulatus* (Hartig, 1841) in Argentina, Brazil, and Chile.

*Myzocallis* (*Myzocallis*) *boerneri* Stroyan, 1957

Studied Material: Junín (Mendoza), *Quercus suber* Linnaeus, 1753, 27-VIII-2004, alatae females and nymphs (J. Ortego *leg.*). *Myzocallis boerneri* was recorded (Nieto Nafría & Mier Durante 1998; Blackman & Eastop 1994; Quednau 1999) on various species of *Quercus* (*canariensis*, *castaneaefolia*, *cerris*, *ilex*, *infectoria*, *faginea*, *macedonica*, *persica*, *rotundifolia*, *suber*, and *variabilis*) in most of Europe, the Macaronesian Islands; Lebanon, Israel, Iran; South Africa; New Zealand, and U.S.A. (California). The species almost certainly entered Argentina via seedlings of European species of *Quercus* from Europe. It is differentiated from the other 6 species recorded for South America by the following key. Any doubts can be clarified by consulting the key by Quednau (1999).

1a. Abdomen with spinal tubercles . . . . . 2

1b. Abdomen without spinal tubercles . . . . . 3

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

2a. Abdominal segment III with one pair of large spinal tubercles joined at base. On Eurasian species of *Quercus*. When alive greyish-brown to brown with abundant powdered to filamentous wax . . . . . *Tuberculatus* (*T.*) *querceus*

2b. Abdominal segments I and II with one pair of pale or slightly pigmented spinal tubercles and abdominal segment III with another bigger pigmented pair; all of them clearly separated at the base. On *Quercus* spp. When alive, pale green to yellowish–green or with shades of pink and even crimson coloring . . . . . *Tuberculatus* (*Tuberculoides*) *annulatus*

3a. Setae of the antennal segment III at least 4.0 times the joint width of article. Siphunculi rising from marginal sclerites. On Eurasian species of *Castanea* and *Quercus*. When alive, pale green to red and with whitish wax. Alar veins (particularly the anterior ones) widely bordered. . . . . *Tuberculatus* (*Nippocallis*) *kuricola*

3b. Antennal setae much shorter (at most 1.0 times the joint width of article) . . . . . 4

4a. Dorsum of the head and prothorax evenly dark and abdomen with a band of dark spinal plates (each with a small central depigmented area), marginal plates not close together and less pigmented than spinal ones. On Eurasian species of *Quercus*. When alive, yellow (cream to lemon) and black . . . . . *Hoplocallis picta*

4b. Abdomen without dark spinal band and head completely pale or with a dark spinal band . . . . . 5

5a. Dorsum completely pale or with very faint marginal spots on prothorax and/or several abdominal segments. On *Corylus*. When alive, pale yellow or whitish-yellow . . . . . *Myzocallis* (*M.*) *coryli*

5b. Head and prothorax with a dark spinal band and abdomen with pairs of spinal and marginal sclerites (spread out and well-pigmented in the nominotypical subspecies). On species of *Castanea* and *Quercus*. When alive, lemon to creamy yellow with black spots of varying size and intensity . . . . . *Myzocallis* (*Agrioaphis*) *castanicola*

5c. Prothorax pale or with a pair of marginal spots at most and abdomen with pairs of marginal and spinal sclerites, less pigmented than the former. On Eurasian species of *Quercus*. When alive pale yellow to yellowish-green or even very pale greenish-yellow, with a cream-colored or dull brown thorax . . . . . *Myzocallis* (*M.*) *boerneri*

New Data on the Tribe Macrosiphini (Aphidinae): Genus *Macrosiphoniella*:

The genus *Macrosiphoniella* Del Guercio, 1911 is one of the big genera in the very extensive tribe Macrosiphini, with approximately 140 species, 100 of which are classified in the nominotypical genus and some are little known. It belongs to the group of genera with long reticulate siphunculi, like *Macrosiphum* Passerini, 1860 and *Uroleucon* Mordvilko, 1914. Species of *Macrosiphoniella* have monoecious and basically holocyclic cycles (some are confirmed as being anholocyclic) and almost all of them live on species of Asteraceae. The distribution of each species varies greatly within the holarctic distribution of the genus as a whole. Some, such as *M. absinthii* (Linnaeus, 1758), are very widespread (possibly due to human activities spreading), while others have only been recorded in a few localities, for example, *M. aetnensis* Barbagallo, 1979 (Nieto Nafría et al. 2004). To date, four species from this genus had been recorded for South America (Smith & Cermeli 1979; Remaudière et al. 1991; Costa et al. 1993; Nieto Nafría et al. 1994): *Macrosiphoniella* (*M.*) *artemisiae* (Boyer de Fonscolombe, 1841) and in particular its nominotypical subspecies (known from Argentina only), *M.* (*M.*) *sanborni* (Gillette 1908) (recorded in Argentina, Brazil, Bolivia, Chile, Colombia and Venezuela), *M.* (*M.*) *tanacetaria* (Kaltenbach, 1843), and specifically its subspecies *bonariensis* E. E. Blanchard 1922, (described in Buenos Aires and former synonym of *italica* Hille Ris Lambers, 1966, and recorded from Argentina and Chile), and *M.* (*M.*) *yomogifoliae* (Shinji, 1924) (recorded in Brazil). Another four species: *M.* (*M.*) *abrotani* (Walker, 1852), *M.* (*M.*) *absinthii* (Linnaeus, 1758), *M.* (*M.*) *pseudoartemisiae* Shinji, 1933, and *M.* (*M.*) *tapuskae* (Hottes & Frison, 1931) are recorded for the first time.

*Macrosiphoniella absinthii* (Linnaeus, 1758)

Studied Material: Junín de Cuyo (Mendoza), *Artemisia absinthium* Linnaeus, 1753, 14-IX-2004, apterous and alate viviparous females (J. Ortego *leg.*). The species is normally found on *Artemisia absinthium*, but has been recorded (Heie 1995) on *Chrysamthemum zawadzkii*. It is widely distributed in Europe and there are records for North Africa and Canada (Nieto Nafría et al. 2004).

*Macrosiphoniella abrotani* (Walker, 1852)

Studied Material: Esperanza (Santa Fe), yellow water trap, 29-IX-1999, alate viviparous fe-

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

male (J. Ortego *leg.*); Malargüe: El Challao (Mendoza), *Artemisia* sp., 31-X-1999, apterous and alate viviparous females and nymphs (J. Ortego *leg.*); Maipú (Mendoza), *Artemisia* sp., 9-II-2002, apterous viviparous females (J. Ortego *leg.*); Rafaela (Santa Fe), *Artemisia annua*, 26-II-2001, apterous viviparous females and nymphs (I. Bertolaccini *leg.*). This species has been recorded on species of *Artemisia* and less frequently on some species of *Matricaria* and *Achillea*, in numerous European countries, Australia, and North America (Nieto Nafría et al. 2004).

*Macrosiphoniella pseudoartemisiae* Shinji, 1933

Studied Material: Malargüe (Mendoza), *Artemisia absinthium*, 5-IV-1994, apterous viviparous females (J. Ortego *leg.*); Trevelín (Chubut), *Artemisia absinthium*, 20-I-2000, apterous viviparous females (J. M. Nieto Nafría, J. Ortego and M. P. Mier Durante *leg.*). This aphid has been recorded (Lee et al. 2002) on *Artemisia annua*, *mongolica*, *princeps*, and *stolonifera* in North and South Korea, China, Russia (Far East), Japan and India. *Artemisia absinthium* is therefore a new host plant for this species. This is the most surprising of the four species now included in the South American aphid fauna catalogue, given its origin and distribution; but *Macrosiphoniella yomogifoliae* has been recorded in Brazil.

*Macrosiphoniella tapuskae* (Hottes & Frison, 1931)

Studied Material: Barreal (San Juan), *Anthemis cotula* Linnaeus, 1753, 23-XI-2002, alate and apterous viviparous females and nymphs (M. P. Mier Durante, J. Ortego and J. M. Nieto Nafría *leg.*); San Rafael: El Sosneado (Mendoza), *Tanacetum vulgare* Linnaeus, 1753, 29-I-2000, apterous viviparous females (J. M. Nieto Nafría, J. Ortego and M. P. Mier Durante *leg.*). It has been recorded on different Asteraceae species, in particular *Achillea* and *Matricaria* in most European countries, and others in the Near East, North Africa, and North America (Nieto Nafría et al. 2004).

The following key can be used to differentiate the eight species, but carefully, due to the richness of species in the genus. Other characters (in square brackets) are given in order to corroborate the identification. Should any discrepancies arise regarding the described characters and those of the studied specimens another key for differentiating holarctic species must be used (for example, see Heie 1995).

1a. Siphunculi clearly longer than the cauda (Fig. 1g) and only 12-18% of their length reticulate. [Dark grey color, more or less yellowish or reddish, with ash-colored waxy powder, except for a spinal band and a strip in front of the insertion of the siphunculi. Without segmental sclerites on dorsum of abdomen (Fig. 1g). Antennal segment III with 6 to 26 secondary sensoria on proximal 2/3] ..... *M. tapuskae*

1b. Siphunculi shorter (Figs. 1a-f, h) or slightly longer than cauda, and at least 40% of their length reticulate. ..... 2

2a. Siphunculi pigmented, with pale basal area (Fig. 1a). [Green aphids, with waxy powder. Siphunculi 50-67% reticulate in length. Presiphuncular sclerites usually absent (Fig. 1a). Cauda with 11 to 25 setae. Antennal segment III with 2 to 13 secondary sensoria in proximal half] ..... *M. abrotani*

2b. Siphunculi wholly pigmented, though not with the same intensity (Figs. 1b-f, h) ..... 3

3a. Spinal sclerites fully-pigmented on abdominal segments II to VI (Fig. 1b). Antennal segment III with 29 to 55 secondary sensoria in proximal half. [Dark reddish-grey or purple aphids with waxy powder. Hind tibiae strongly pigmented (Fig. 1b). Siphunculi reticulate on 48-60% of its length. Cauda with 12 to 18 setae] ..... *M. absinthii*

3b. Without spinal sclerites on abdominal segments II to VI (Figs. 1c-f, h). Secondary sensoria of antennal segment III varying in number and distribution ..... 4

4a. Mid part of hind tibiae, at least, pale or scarcely pigmented (Figs. 1d, e) ..... 5

4b. Hind tibiae strongly pigmented (Figs. 1c, f, h) ..... 6

5a. Antennal segment III with 8 to 32 secondary sensoria, distributed along its entire length. Presiphuncular sclerites well-pigmented. On *Chrysanthemum*. [Dark grey or toffee-colored, without waxy powder. Siphunculi with 63-81% of its length reticulate. Cauda with 9 to 11 setae] ..... *M. sanborni*

5b. Antennal segment III with 2 to 6 secondary sensoria, spread along proximal half. Presiphuncular sclerites tenuous (as tenous as setiferous sclerites on dorsum of abdomen) (Fig. 1d). On *Artemisia* [Green aphids with some waxy powder. Siphunculi with 62-71% of its length reticulate. Cauda with 9 to 13 setae. Dorsoabdominal setae blunt or with slightly expanded tip] ..... *M. pseudoartemisiae*

6a. Processus terminalis 4.8 to 6.8 times ultimate rostral segment, which is 0.7 to 0.9 times second segment of hind tarsus. Cauda with 26 to 32 setae. Presiphuncular sclerites

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

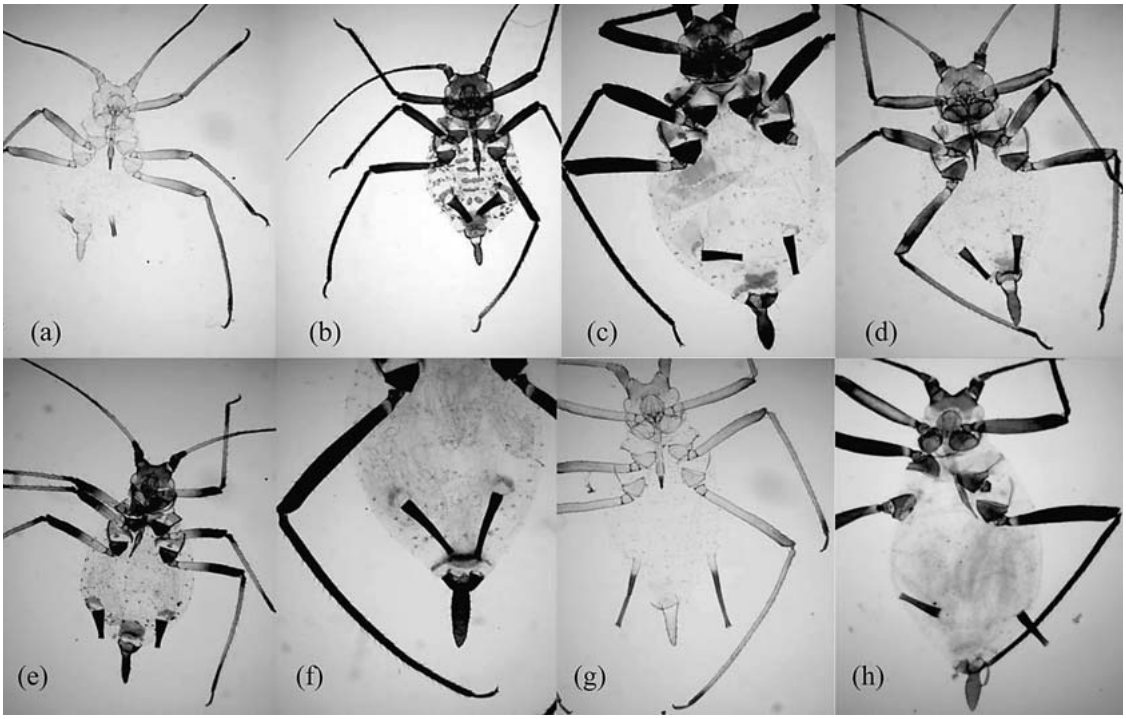



Fig. 1. (a) *Macrosiphoniella* (*M.*) *abrotani*, (b) *Macrosiphoniella* (*M.*) *absinthii*, (c) *Macrosiphoniella* (*M.*) *artemisiae*, (d) *Macrosiphoniella (M.) pseudoartemisiae*, (e) *Macrosiphoniella* (*M.*) *sanborni*, (f) *Macrosiphoniella* (*M.*) *tanacetaria bonariensis*, (g) *Macrosiphoniella* (*M.*) *tapuskae* and (h) *Macrosiphoniella* (*M.*) *yomogifoliae*.

absent or present but scarcely pigmented (Fig. 1f). [Green to grey-brown aphids with waxy powder. Antennal segment III with 2 to 8 secondary sensoria in proximal half only]. . . . . *M. tanacetaria bonariensis*

6b. Processus terminalis 2.4 to 5.0 times ultimate rostral segment, which is 0.8 to 1.3 times second segment of hind tarsus. Cauda with 10 to 36 setae (but with 27 setae at most if the processus terminalis is less than 1.0 times the cauda) . . . . . 7

7a. Ultimate rostral segment 1.0 to 1.3 times second segment of hind tarsus. Processus terminalis 2.4 to 3.5 times ultimate rostral segment. Genital plate usually with 4-6 discal setae (exceptionally 2 or 8). On *Artemisia* and *Chrysanthemum*. [Green aphids covered with waxy powder. Presiphuncular sclerites absent or scarcely pigmented (Fig. 1h). Cauda with 17 to 24 setae. Antennal segment III with 2 to 8 secondary sensoria] . . . . . *M. yomogifoliae*

7b. Ultimate rostral segment 0.8 to 1.1 times second segment of hind tarsus. Processus terminalis 3.6 to 5.0 times ultimate rostral segment. Genital plate with 2-3 discal setae. On *Artemisia vulgaris* and *A. absinthium*. [More or less greyish-green aphids with waxy powder. Presiphuncular sclerites present, though scarcely pigmented (Fig. 1c). Cauda with 19 to 27 setae. Antennal segment III with 3 to 14 secondary sensoria] . . . . . *M. artemisiae*

## ACKNOWLEDGMENTS

We express our thanks to Dr. Isabel Bertolaccini (Universidad Nacional del Litoral, Esperanza, Santa Fe, Argentina) for lending us a sample of *M. abrotani*, Dr. Franz Wolfgang Quednau (Laurentian Forestry Centre, Sainte-Foy, Québec, Canada) for the information on *Saltusaphis* and *Myzocallis*; Drs. Roger L. Blackman and Victor F. Eastop (The Natural History Museum, London, UK) for help in identifying the *M. pseudoartemisiae* specimens and Prof. Georges Remaudière for comments. This study was granted by the Regional Government of Castilla y León (Spain) [LE-45/02 and LE034A05].

## REFERENCES CITED

BERGMANN, E. C., F. A. ILHARCO, AND C. R. SOUSA-SILVA. 2002. Presença de *Myzocallis kuricola* (Matsumura, 1917) (Hemiptera: Aphidoidea: Drepanosiphidae) no Brasil e primeiro registro da espécie na

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

região neotropical. Arquivos do Instituto Biológico São Paulo 69: 97-99.

BLACKMAN, R. L., AND V. F. EASTOP. 1994. Aphids on the World's Trees. An Identification and Information Guide. CAB International, Wallingford. 8 + 987 pp. + 16 plates.

BLACKMAN, R. L., AND V. F. EASTOP. 2000. Aphids on the World's Crops. An Identification Guide (Second Edition). J. Wiley & Sons, Chichester. 8 + 414 pp. + 51 plates.

COSTA, C. L., V. F. EASTOP, AND R. L. BLACKMAN. 1993. Brazilian Aphidoidea: I. Key to Families, Subfamilies and Account of the Phylloxeridae. Pesquisas Agropecuarias, Brasilia 28: 197-215.

DIXON, A. F. G. 1998. Aphid Ecology, An Optimization Approach (Second Edition). Chapman and Hall, London. 300 pp.

EASTOP, V. F. 1986. Key to the genera of the subfamily Saltusaphidinae (Homoptera: Aphididae). Systematic Entomology 11: 423-425.

EASTOP, V. F. 1998. Why do aphids do that? pp. 37-47 *In* J. M. Nieto Nafría and A. F. G. Dixon [eds.], Aphids in Natural and Managed Ecosystems. Universidad de León, Secretariado de Publicaciones, León. 688 pp.

FUENTES-CONTRERAS, E., R. MUÑOZ, AND H. M. NIEMEYER. 1997. Diversidad de áfidos (Hemiptera: Aphidoidea) en Chile. Revista Chilena de Historia Natural 70: 531-542

HEIE, O. E. 1995. The Aphidoidea (Hemiptera) of Fennoscandia and Denmark. VI. Family Aphididae: Part 3 of the tribe Macrosiphini of subfamily Aphidinae, and family Lachnidae. Fauna Entomologica Scandinavica 31: 1-217.

LEE, S. H., J. HOLMAN, AND J. HAVELKA. 2002. Illustrated Catalogue of Aphididae in the Korean Peninsula. Part I, Subfamily Aphidinae (Hemiptera Sternorrhyncha), *In* K.-T. Park [ed.], Insects of Korea 9. Shinseol-dong Dongdaemun-gu, Seoul. 331 pp.

NIETO NAFRÍA, J. M., AND M. P. MIER DURANTE. 1998. Hemiptera, Aphididae I, *In* M. A. Ramos, J. Alba Tercedor, X. Bellés i Ros, J. Gosálbez i Noguera, A. Guerra Sierra, E. Macpherson Mayol, F. Martín Piera, J. Serrano Marino, and J. Templado González [eds.], Fauna Ibérica, volumen 11. Museo Nacional de Ciencias Naturales, CSIC, Madrid. 424 pp.

NIETO NAFRÍA, J. M., M. A. DELFINO, AND M. P. MIER DURANTE. 1994. La afidofauna de la Argentina, su conocimiento en 1992. Universidad de León, Secretariado de Publicaciones, León. 235 pp.

NIETO NAFRÍA, J. M., M. P. MIER DURANTE, AND G. REMAUDIÈRE. 1998a. Les noms des taxa du groupe-famille chez les Aphididae (Hemiptera). Revue Française d'Entomologie (N.S.) [1997] 19: 77-92.

NIETO NAFRÍA, J. M., M. P. MIER DURANTE, M. A. ALONSO-ZARAZAGA, AND G REMAUDIÈRE. 1998b. Apendice 1: Nomenclatura: Lista de sinónimos y combinaciones, pp. 383-424 *In* J. M. Nieto Nafría and M. P. Mier Durante: Hemiptera, Aphididae I, *In* M. A. Ramos, J. Alba Tercedor, X. Bellés i Ros, J. Gosálbez i Noguera, A. Guerra Sierra, E. Macpherson Mayol, F. Martín Piera, J. Serrano Marino, and J. Templado González [eds.], Fauna Ibérica, volumen 11. Museo Nacional de Ciencias Naturales, CSIC, Madrid, Spain. 424 pp.

NIETO NAFRÍA, J. M., M. P. MIER DURANTE, AND J. ORTEGO. 2002. *Pentamyzus* Hille Ris Lambers, a neotropical genus of the Tribe Macrosiphini (Hemiptera: Aphididae: Aphidinae), with the description of a new species. Proc. Entomol. Soc. Washington 104: 918-927.

NIETO NAFRÍA, J. M., A. V. ANDREEV, A. BINAZZI, M. P. MIER DURANTE, N. PÉREZ HIDALGO, R. RAKAUSKAS, AND A. V. STEKOLSHCHIKOV. 2004. Aphidoidea. Fauna Europaea version 1.1. http://www.faunaeur.org.

ORTEGO, J., M. E. DIFABIO, AND M. P. MIER DURANTE. 2004. Nuevos registros y actualización de la lista faunística de los pulgones (Hemiptera: Aphididae) de la Argentina. Revista de la Sociedad Entomológica Argentina 63: 19-30.

PÉREZ HIDALGO, N., L. M. BARTHOLDY, AND J. M. NIETO NAFRÍA. 1998. Two new aphid records for South America and a list of aphids from Rio Grande do Sul State and Brazil, pp. 407-415 *In* J. M. Nieto Nafría and A. F. G. Dixon [eds.], Aphids in Natural and Managed Ecosystems. Universidad de León, Secretariado de Publicaciones, León. 688 pp.

QUEDNAU, F. W. 1990. Two new genera and three new species of drepanosiphine aphids from the Neartic and Neotropical Regions (Homoptera: Aphididae). The Canadian Entomol. 122: 907-919.

QUEDNAU, F. W. 1999. Atlas of the Drepanosiphine aphids of the World. Part I: Panaphidini Oestlund, 1922—Myzocallidina Börner, 1942 (1930) (Hemiptera: Aphididae: Calaphidinae). Contributions of the American Entomological Institute 31: 1-281.

RAPOPORT, M. 2000. Historia económica, política y social de la Argentina (1880-2000). Ediciones Macchi, Buenos Aires. 1148 pp.

REMAUDIÈRE, G., V. F. EASTOP, AND A. AUTRIQUE. 1985. Distribution des aphides de la Region Ethiopienne, pp. 77-93 *In* G. Remaudière and A. Autrique [eds.], Contritution à l'Ecologie des Aphides Africains. FAO (Étude FAO Production végétale et protection des plantes, 64), Roma. 214 pp.

REMAUDIÈRE, G., WEEMAELS N., AND J. NICOLAS. 1991. Contribution à la connaissance de la faune aphidienne de la Bolivie (Homoptera: Aphididae). Parasitica 47: 19-46.

REMAUDIÈRE, G., AND M. REMAUDIÈRE. 1997. Catalogue des Aphididae du monde/Catalogue of the world's Aphididae. Homoptera Aphidoidea. INRA Editions, Versailles. 478 pp.

SMITH, C. F., AND M. CERMELI. 1979. An Annoted List of Aphididae (Homoptera) of the Caribbean Islands and South and Central America. North Carolina Agric. Res. Ser., Tech. Bull. No. 259. 131 pp.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use