JUAN M. NIETO NAFRÍA^a - PAUL A. BROWN^b - SARA I. LÓPEZ CIRUELOS^c - JAIME ORTEGO^d

A NEW SPECIES OF *APHIS* (HEMIPTERA APHIDIDAE) LIVING ON *TROPAEOLUM* SPECIES (TROPAEOLACEAE) FROM CHILE AND ARGENTINA

^a Departamento de Biodiversidad y Gestión Ambiental, Universidad de León, 24071 León, Spain. E-mail: jmnien@unileon.es. ORCID ID: <http://orcid.org/0000-0001-6714-2415>

^b Department of Life Sciences, Natural History Museum, Cromwell Road, London, SW7 5BD (United Kingdom). E-mail: p.brown@nhm.ac.uk

^c Servicio de Microscopía, Universidad de León, 24071 León, Spain. E-mail: sara.i.l.c@hotmail.com. ORCID ID: <http://orcid.org/0000-0002-0032-5302>

^d Instituto Nacional de Tecnología Agropecuaria (INTA), Estación Experimental Agropecuaria Mendoza, San Martín, 3853, 5507 Luján de Cuyo, Mendoza, Argentina; E-mail: ortegojaime@yahoo.com.ar; ORCID ID 0000-0001-9738-7085
Corresponding Author: Juan M. Nieto Nafria; jmnien@unileon.es

Nieto Nafria J.M., Brown P.A., López Ciruelos S.I., Ortego J. – A new species of *Aphis* (Hemiptera Aphididae) living on *Tropaeolum* species (Tropaeolaceae) from Chile and Argentina.

A species of *Aphis* collected in a low-altitude Chilean locality in the region of Coquimbo and in two high-altitude Argentinian locations in the Mendoza province on plants of the genus *Tropaeolum* (Brassicales: Tropaeolaceae) is described from apterous and alate viviparous females and is named as *Aphis tropaeoli* Nieto Nafria and Brown, **sp. n.** Similarities of and differences between 71 species known in South America belonging to five genera of the subtribe Aphidina (Aphidinae, Aphidini) are presented in a partial identification key; the new species is most similar to *Aphis berberidorum* Ortego & Mier Durante. The new species must be able to live on several species of *Tropaeolum* and may be widespread in a large area of South America. It is recommended the monitoring plants of *Tropaeolum* species used in gardening anywhere in the World.

KEY WORDS: Aphids, Aphidina, new species, South America, Tropaeolaceae, identification key.

INTRODUCTION

In August 1974, Roberto Carrillo found two apterous female aphids on an unspecified species of *Tropaeolum* in Chile. These he gave to Dick Hille Ris Lambers, who mounted them on slides and which he considered to be a new species and labelled them as manuscript “*Aphis tropaeoli* n. sp.”.

He did not describe the species and both slides were transferred with the rest of his collection to the British Museum of Natural History (currently Natural History Museum, London) in 1984 after the death of that eminent aphidologist. BLACKMAN and EASTOP (2006, 2018) maintained that these specimens could not belong to any species known and it was not one of the 14 species of *Aphis* described in South America between both 2006 and 2018.

In the aphid collection of the University of Leon (Leon, Spain) there are several apterous and alate viviparous females belonging to three aphid samples collected on *Tropaeolum incisum* Speg. (Sparre) in Argentina between 1996 and 2000 by J. Ortego, who was alone or in company with M.P. Mier Durante and J.M. Nieto Nafria.

A comparative study of all of these specimens together and with specimens of other South American *Aphis* species, has allowed us to establish that they are of a single new species.

The new species exhibits larger and smaller apterous viviparae (“big” and “small” forms, respectively), a bimodal phenomenon also seen in other Argentinian *Aphis* species, e. g.: *Aphis cuyana* López Ciruelos & Ortego, 2017, *A. euclinae* López Ciruelos & Ortego, 1999, *A.*

mendocina Mier Durante & Ortego, 2006 and *A. melosae* Mier Durante & Ortego, 1999, as well in some species in other parts of the World. The “big form” is present during most of the parthenogenetic phase of the species and the “small form” is the aestivating form, a form to resist the adverse conditions of drought and higher temperatures and can more easily survive on stressed plants. “Big” and “small” apterae of the mentioned South American species differ from each other by body length and volume, on different thoracic-abdominal sclerotisation which is extensive in “big” apterae and is not extensive or may be absent in “small” apterae, and sometimes by other qualitative or quantitative features.

MATERIAL AND METHODS

Aphids collected were preserved in 70% ethanol and cleared and mounted using the method described in NIETO NAFRÍA and MIER DURANTE (1998). The mounting medium in Hille Ris Lambers’s slides is Canada balsam. Measurements of specimens were taken as detailed by NIETO NAFRÍA and MIER DURANTE (*op. cit.*).

Papers describing all native South American species of Aphidina have been consulted, and particularly the description of *Aphis berberidorum* and the comparative table of features of *Andinaphis*, *Aphis* and *Protaphis* species (ORTEGO and MIER DURANTE, 1997; LÓPEZ CIRUELOS *et al.*, 2017). In addition, we have studied specimens of several South American native and introduced species of Aphidina that are preserved in the collection of the University of

Leon, only three South American species of Aphidina are not represented in this collection.

The distribution of host plant species have been taken from BELOV (2018), INSTITUTO DE BOTÁNICA DARWINION (2018) and THE CATALOGUE OF LIFE PARTNERSHIP (2018).

Microphotographs were taken in the Service of Microscopy of the University of Leon using an Olympus set: BX61 microscope, DP70 digital camera and DP Manager Software version 2.1.1.163.

RESULTS AND DISCUSSION

Aphis (Aphis) tropaeoli Nieto Nafria & Brown, sp. n.
(Fig. I; Table 1)

TYPES

Holotype, apterous viviparous female (measured specimen number 1, mounted separately, “big form”): CHILE, Region de Coquimbo (IV), province Elqui, La Serena [probably and approximately 29° 55' S 71° 14' W, 90 m.a.s.l.], on *Tropaeolum* sp., 23rd August 1974, Carrillo *leg.*, Natural History Museum London collection (BMNH(E) 1984-340).

Paratypes: 50 apterous viviparous females [apt] and 29 alate viviparous females [al]; Natural History Museum London and *Universidad de León* collections. CHILE: same data as the holotype (1 big apt). ARGENTINA, Mendoza province, Malargüe, Refugio del Club Andino (35° 23' S, 69° 54' W, 2160 m.a.s.l.), on *Tropaeolum incisum*, 7th December 1996 (8 big apt, 3 small apt, 3 al) and 6th January 1997 (23 big apt, 8 small apt, 26 al), Ortego *leg.*; ARGENTINA, Mendoza province, Malargüe, Provincial Route 222 Valle Hermoso viewpoint, near Las Leñas ski resort (35° 08' S, 70° 11' W, 2370 m.a.s.l.), on *Tropaeolum incisum*, 5th February 2000 (1 big apt, 6 small apt), Nieto Nafria, Mier Durante & Ortego *leg.*

DESCRIPTION

Apterous viviparous females, big form (Figs. I, 1 and 2). From 34 specimens. When alive bright brown and slightly waxy white powdered. 1.95-2.40 mm long with cauda. Metric and meristic features in Table 1. Head, including clypeus and mandibular and maxillar lames and rostrum brown. Frons sinuate. Antennal segments I and II dark-brown and at least as pigmented as cephalic dorsum and antennal segment VI, with spines and small transversal striae; antennal flagellum progressively pigmented from the

Fig. I – *Aphis (A.) tropaeoli* Nieto Nafria & Brown, sp. n. - 1. Apterous viviparous female big form (with dorsoabdominal transversal bands), holotype; 2. Apterous viviparous female big form (with dorsoabdominal wide plate); 3. Apterous viviparous female small form; 4. Alate viviparous female.

Table 1 – Metric and meristic features of apterous (big and small forms) and alate viviparous females of *Aphis tropaeoli* Nieto Nafria & Brown, **sp. n.** Note: trochanter, femur, tibia and tarsus of the hind legs. Abbreviations: Abd, abdominal; Ant, antennal segment; D, subarticular diameter of Ant. III; segm, segment or segments.

	apterous viviparous females			alate viviparous females
	small	big	in all	
Body / hind tibia [times]	1.63–1.97	1.58–2.09	1.58–2.09	1.733–1.96
Antenna [mm]	0.98–1.31	1.34–1.79	0.98–1.79	1.47–1.77
Antenna / Body [times]	0.66–0.85	0.67–0.84	0.66–0.85	0.70–0.77
Antennal segm. III [mm]	0.23–0.35	0.36–0.50	0.23–0.50	0.39–0.46
Antennal segm. IV [mm]	0.15–0.25	0.24–0.35	0.15–0.35	0.25–0.38
Antennal segm. V [mm]	0.17–0.22	0.21–0.29	0.17–0.29	0.24–0.32
Antennal segm. VI base [mm]	0.09–0.12	0.12–0.14	0.09–0.14	0.12–0.16
Antennal segm. VI processus terminalis [mm]	0.21–0.28	0.26–0.35	0.21–0.35	0.31–0.34
Antennal segm. III / Antennal segm. processus terminalis [times]	1.05–1.50	1.30–1.68	1.05–1.68	1.25–1.38
Antennal segm. VI: processus terminalis / base [times]	1.92–2.45	1.89–2.62	1.89–2.62	2.09–2.71
Femur [mm]	0.45–0.55	0.63–0.83	0.45–0.83	0.60–0.73
Tibia [mm]	0.75–0.95	1.05–1.43	0.75–1.43	1.05–1.33
Ultimate rostral segm. [mm]	0.12–0.14	0.13–0.15	0.12–0.15	0.13–0.14
Ultimate rostral segm. / its basal width [times]	2.00–2.80(3.13)	1.81–2.90	1.81–2.90(3.13)	2.17–3.11
Ultimate rostral segm. / Ant. VI base [times]	1.13–1.25(1.50)	(0.96)1.07–1.26	(0.96)1.07–1.26(1.50)	(0.93)1.07–1.13
Ultimate rostral segm. / tarsus, 2 nd segm. [times]	0.81–0.93	0.78–0.91	0.78–0.93	0.74–0.81
Tarsus, 2 nd segm. [mm]	0.14–0.16	0.15–0.19	0.14–0.19	0.16–0.19
Siphunculus [mm]	0.16–0.28	0.28–0.43	0.16–0.43	0.24–0.33
Siphunculus / its middle width [times]	3.00–5.25	3.65–5.67	3.00–5.67	3.79–5.91
Siphunculus / cauda [times]	0.84–1.56	1.22–1.71	0.84–1.71	1.23–2.00
Cauda [mm]	0.16–0.20	0.22–0.27	0.16–0.27	0.16–0.21
Cauda / its basal width [times]	1.17–1.73	1.31–2.08	1.17–2.08	1.00–1.56
Setae on ...				
... vertex [μm]	27–40	27–48	27–48	30–40
... vertex [times D]	1.1–2.0	1.0–1.9	1.0–2.0	1.3–1.8
... Antennal segm. III [number]	6–13	8–14	6–14	8–10
... Antennal segm. III [μm]	12–25	20–30	12–30	20–25
... Antennal segm.. III [times D]	0.6–1.3	0.7–1.2	0.6–1.3	0.9–1.1
... trochanter, posterior [μm]	37–53	40–73	37–73	40–50
... trochanter, posterior / trochantero-femoral suture [times]	0.8–1.2	0.6–1.2	0.6–1.2	0.8–1.0
... femur, dorsal [μm]	25–30	30–40	25–40	28–33
... femur, dorsal [times D]	1.1–1.7	1.1–1.5	1.1–1.7	1.2–1.4
... femur, ventral [μm]	27–48	40–50	27–50	35–50
... femur, ventral [times D]	1.2–2.1	1.3–2.2	1.2–2.2	1.6–2.2
... tibia, at middle, dorsal [μm]	25–38	27–43	25–43	28–35
... tibia, at middle, dorsal / tibial diameter at middle [times]	0.3–0.4	0.3–0.5	0.3–0.5	0.3–0.4
... Abdominal segms. 2 to 4, marginal [μm]	15–28	25–35	15–35	28–30
... Abdominal segms. 2 to 4, marginal [times D]	0.6–1.4	0.9–1.4	0.6–1.4	1.2–1.3
... Abdominal segm. 8 [number]	2–3	2–4	2–4	2–2
... Abdominal segm. 8 [μm]	25–40	35–58	25–58	38–63
... Abdominal segm. 8 [times D]	1.0–2.1	1.2–2.3	1.0–2.3	1.7–2.8
... genital plate, discal [number]	2(3)	2(4)	2(4)	2–5
... genital plate, marginal [number]	9–12	10–14	9–14	8–12
... cauda [number]	5–8	5–12	5–12	7–10(12)

distal half of segment V and imbricate from the proximal part of segment III. Rostrum reaches nearly to the hind leg coxae with darkened ultimate rostral segment, which carries 2 long accessory setae. Coxae, trochanters, tarsi, most femora (progressively) and apex of tibiae brown like head; proximal portion of femora and most of tibiae pale. First segment of tarsi with 3 or occasionally 2 setae. Thoracic segments with variable dorsal sclerotisation, from very small and disperse sclerites to discontinuous transversal bands, always brown. Dorsal abdominal sclerotisation is also variable, abdominal segments 1 to 6 with brown spinopleural bands and brown and spinuled marginal sclerites, although the latter are absent on segment 1; each band and closely associated sclerites, can be fused in a transverse band more frequently on segment 4; in most sclerotized specimens spinopleural or complete transverse bands can merge with each other, forming a more-or-less wide and compact patch. Abdominal segments 7 and 8 have individual transverse and spinulate bands. Intersegmental and spiracular sclerites on thorax and abdomen are darker than segmental sclerotisation. Prothorax and abdominal segments 1 and 7 with marginal papillae, pronounced but less voluminous than the triommatidium. Intermediate abdominal segments without marginal tubercles. Siphunculi more or less tapered on proximal half and sub-cylindrical on distal half, with small flange and conspicuously longer than cauda, homogeneously pigmented and at least as dark as the abdominal dorsum and with scales. Genital and anal plates dark-brown. Cauda long-triangular, sometimes with a very slight proximal constriction or tenuously enlarged at the beginning of its distal half. Setae in general slender and pointed.

Apterous viviparous females, small form (Fig. I, 3). From 17 specimens. When alive matt-brown with greyish powder. 1.42–1.75 mm long with cauda. Metric and meristic features in Table 1. When mounted yellowish brown in general, with head including clypeous and laminae brown, antennae and legs pigmented as with “big form” except femora, which are uniform pale-brown. Most sclerotized specimens with a near complete transversal band on prothorax, wide spinal and marginal sclerites on each segment from mesothorax to abdominal segment 6 and isolated transverse bands on segments 7 and 8; in the less pigmented specimens sclerites only occur on prothorax and reduced or fractured isolated transverse bands on abdominal segments 7 and 8. Frons delicately sinuous or almost flat. Rostrum reaching hind coxae. Siphunculi tapering. Other qualitative features as with “big forms”.

Alate viviparous females (Fig. I, 4). From 29 specimens. When alive matt-dark-brown to matt-black covered with greyish powder. 1.92–2.43 mm long with cauda. Metric and meristic features in Table 1. Head, including clypeus and mandibular and maxillary lamellae and rostrum, antennae (except a very small proximal part of segment III, which is pale), most part of legs (see below), dorsal-abdominal sclerites (see below), siphunculi, genital and anal plates and cauda brown to very dark-brown. Frons flat. Antennal segments IV–VI and ventral face of antennal segment III strongly imbricate. Secondary sensoria on antennal segment III circular, with slight flange, somewhat different in size, more or less aligned along the ventral side of almost the entire segment; 9–17 on each antenna (21–32 on both). Coxae, trochanters, dorsal face of most of the length of front femora, most part of intermediate and hind femora, apex of tibiae and tarsi pigmented. Abdominal segments 1–6 usually with a spinal band with irregular edges and marginal round sclerites (pre- and post-siphuncular sclerites on segments 5

and 6), on segment 1 sometimes reduced to a small setiferous sclerite or are absent; segments 2–6 frequently with pleural sclerites; sometimes segments 5 and 6 with transverse bands; in some poorly sclerotized specimens sclerites reduced in size and pleural on all segments and spinal anterior ones can be absent. Abdominal segments 7 and 8 with individual transverse bands. Siphunculi very imbricated. Cauda narrow and with more-or-less marked proximal constriction, losing the triangular aspect usual in apterae. Other qualitative feature as in “big large” apterous viviparous females.

BIOLOGY

Aphis tropaeoli sp. n. has been collected on *Tropaeolum incisum* in the Argentinian province of Mendoza at above 2,000 meters altitude, and on an unidentified species of *Tropaeolum* in the Chilean Region of Coquimbo, a very low altitude. *Tropaeolum incisum* is present in several Argentinean provinces, including Mendoza, and in some Chilean regions, including Coquimbo in localities between 1,000 and 3,000 m.a.s.l. The host plant for specimens collected in Chile could belong to *T. azureum* Bert. ex Colla, *T. hookerianum* Bérneoud, *T. majus* L. or *T. tricolor* Sweet, which are known in this Region at low altitude. Thus it can be assumed that *Aphis tropaeoli* sp. n. might live on several *Tropaeolum* species.

Sexual forms are not known so we are uncertain of their life cycle, but as the populations survive at high altitude, the species may be holocyclic with as yet undiscovered sexual forms.

DISTRIBUTION

It is possible that the range of *Aphis tropaeoli* sp. n. corresponds with that of *Tropaeolum* species, and might be found in other Chilean regions and Argentinian provinces in addition to Coquimbo and Mendoza, respectively, as well as in other parts of the Andes mountain range. It must also be considered that it could affect cultivated plants of several species of the genus (i.e. *T. majus*, *T. peregrinum* L., *T. tuberosum* Ruiz & Pav.) in their natural distribution and in other parts of the World where they have been introduced.

ETYMOLOGY

The specific epithet *tropaeoli* is the name of the genus plant hosts of the new species in genitive.

TAXONOMIC DISCUSSION

Typical features of the genus *Aphis* are present in the studied specimens. Along with *Aphis*, there are 21 genera included in Aphidina (Aphidinae Aphidini); *Aphis* includes 588 species and the other 21 genera include 140 species (FAVRET, 2018) worldwide. In South America there are 70 species of Aphidina currently known (LÓPEZ CIRUELOS *et al.*, 2017; LÓPEZ CIRUELOS *et al.*, 2018; GONZÁLEZ RODRÍGUEZ *et al.*, 2018), which are distributed as follows: 63 species in *Aphis* (including two species belonging to subgenus *Toxoptera*, which was considered in the past as an independent genus), 1 in *Andinaphis*, 2 in *Brachyunguis* (one of each subgenera *Brachyunguis* and *Xerophilaphis*), 2 in *Pehuenchaphis* and 2 in *Protaphis*. Of these, 44 are South American native species consisting of 39 *Aphis* species and all the *Andinaphis*, *Brachyunguis* and *Pehuenchaphis* species. Most of the introduced species are widely distributed and are polyphagous or oligophagous species.

Aphis tropaeoli sp. n. is the 71st species recorded in South America and the 45th South American native species belonging to subtribe Aphidina. To distinguish it from the

other species currently known in South America, including the new species, the following identification key for apterous viviparous females can be used. This key does not pretend to identify all Aphidina species in South America as to include them here would be inappropriate. The number of characters used has been reduced to a minimum, and those that are more easily discernible have been chosen. Dorso-abdominal sclerotisation has not been used because of the extreme variability of this character in many species. Seven species are accessible by two, or exceptionally three, places within the keys, for example *A. fabae* and *A. martinezi* by two and *A. rumicis* by three.

- A Siphunculi absent or placed on abdominal segment 6
 Pehuenchaphis species [Table 2, group 1]
 – Siphunculi placed on abdominal segment 5, as is typical in Aphidinae **B**
B Clypeous enormous *Brachyunguis* (*X.*) *blanchardi*
 – Clypeous not enlarged **C**
C Stridulatory apparatus (a pattern of ridges on ventro-lateral areas of abdominal sternites 5 and 6 and a row of short peg-like hairs on hind tibiae) present *Toxoptera* species [Table 2, group 2]
 – Stridulatory apparatus absent **D**

- D** Marginal tubercles absent on abdominal segments 1, 8 or both two
 Andinaphis paradoxa and three *Aphis* species [Table 2, group 3]
 – Marginal tubercles on both abdominal segments 1 and 8 present [sometimes one of them absent in *A. (A.) patagonica*] **E**
E Genital plate without posterior setae *Aphis* (*A.*) *paravanoii*
 – Genital plate with posterior setae **F**
F Antennal segment III with secondary sensoria
 Protaphis species and four *Aphis* species [Table 2, group 4]
 – Antennal segment III without secondary sensoria (they can be present in alatiform specimens of several species, and unusually in *Aphis fabae*) **G**
G Marginal tubercles present in several intermediate abdominal segments sixteen *Aphis* species [Table 2, group 5]
 – Marginal tubercles absent in intermediate abdominal segments; some may be sporadic in some species **H**
H Siphunculi pale, sometimes darkened to apex
 eight *Aphis* species [Table 2, group 6]
 – Siphunculi dark or black, sometimes with a small proximal paler portion **I**
I Ultimate rostral segment longer than second segment of hind tarsi ..
 Brachyunguis (*B.*) *bahamondesi* and twenty six *Aphis* species [Table 2, group 7]
 – Ultimate rostral segment as long as second segment of hind tarsi at most **J**
J Abdominal segment 8 with three setae at least (sometimes 2 in

Table 2 – Groups of species mentioned in the identification key. In order to distinguish the species included in each group between them, features of each species provided by López Ciruelos *et al.* (2017) or the keys by Blackman and Eastop (2018) for apterous viviparous females of species associated with different plant genera, should be used.

Group 1	Group 6 (continuation)
<i>P. agilissima</i> Mier Durante, Nieto Nafria & Ortego, 2003 <i>P. americana</i> (Mier Durante & Ortego, 1998)	<i>A. renjifoanae</i> Ortego & Nieto Nafria, 2016 <i>A. ruborum</i> (Börner, 1931)
Group 2	Group 7
<i>A. (Toxoptera) aurantii</i> Boyer de Fonscolombe 1841 <i>A. (Toxoptera) citricidus</i> (Kirkaldy, 1907)	<i>A. acuminata</i> Nieto Nafria & von Dohlen, 2016 <i>A. affinis</i> Del Guercio, 1911 <i>A. alstroemeriae</i> Essig, 1953 <i>A. amaranthi</i> Holman, 1974 <i>A. asclepiadis</i> Fitch, 1851 <i>A. biobiensis</i> Nieto Nafria & Mier Durante, 2016 <i>A. conflicti</i> Nieto Nafria, Ortego & Mier Durante, 2008 <i>A. coreopsidis</i> (Thomas, 1878) <i>A. craccivora</i> Koch, 1854 <i>in part</i> <i>A. cytisorum</i> Hartig, 1841 <i>in part</i> <i>A. forbesi</i> Weed, 1889 <i>A. gossypii</i> Glover, 1877 <i>A. illinoisensis</i> Shimer, 1866 <i>A. intybi</i> Koch, 1854 <i>A. junelliae</i> González Rodríguez & Nieto Nafria, 2018 <i>A. luzuriagae</i> López Ciruelos, Brown & Nieto Nafria, 2018 <i>A. marthae</i> Essig, 1953 <i>in part</i> <i>A. martinezi</i> Nieto Nafria, Ortego & Mier Durante, 1999 <i>in part</i> <i>A. melosae</i> Mier Durante & Ortego, 1999 <i>in part</i> <i>A. mendocina</i> Mier Durante, Ortego & Nieto Nafria, 2006 <i>A. mulgurae</i> Nieto Nafria & Mier Durante, 2018 <i>A. nerii</i> Boyer de Fonscolombe, 1841 <i>A. roberti</i> Nieto Nafria, Ortego & Mier Durante, 1999 <i>A. rumicis</i> De Geer, 1773 <i>in part</i> <i>A. sedi</i> Kaltenbach, 1843 <i>A. spiraeicola</i> Patch, 1914 <i>B. bahamondesi</i> Remaudière & Halbert, 1996
Group 3	Group 8
<i>A. matilei</i> Nieto Nafria, Ortego & Mier Durante, 2000 <i>A. maulensis</i> Mier Durante & García-Tejero, 2016 <i>A. vurillocensis</i> Nieto Nafria, Brown & López-Ciruelos, 2016 <i>An. paradoxa</i> (Mier Durante, Ortego & Nieto Nafria, 1997)	<i>A. cuyana</i> López Ciruelos & Ortego, 2017 <i>A. danielae</i> Remaudière, 1994 <i>A. fabae</i> Scopoli, 1763 <i>in part</i> <i>A. rumicis</i> De Geer, 1773 <i>in part</i> <i>A. solanella</i> Theobald, 1914 <i>in part</i>
Group 4	Group 9
<i>A. acaenaevora</i> Mier Durante & Ortego, 1998 <i>A. hederiae</i> Kaltenbach, 1843 <i>A. intrusa</i> Ortego, 1998 <i>A. melosae</i> Mier Durante & Ortego, 1999 <i>in part</i> <i>Pr. middletonii</i> (Thomas, 1879) <i>Pr. terricola</i> (Rondani, 1847)	<i>A. cinerea</i> Nieto Nafria & Ortego, 2002 <i>A. craccivora</i> Koch, 1854 <i>in part</i> <i>A. cytisorum</i> Hartig, 1841 <i>in part</i> <i>A. gaultheriae</i> López Ciruelos, Brown & Nieto Nafria, 2018 <i>A. patagonica</i> Blanchard, 1944 <i>in part</i>
Group 5	
<i>A. carrilloi</i> Ortego, Mier Durante & Nieto Nafria, 2013 <i>A. coridifoliae</i> Mier Durante & Ortego, 1999 <i>A. fabae</i> Scopoli, 1763 <i>in part</i> <i>A. malalhuina</i> Mier Durante, Nieto Nafria & Ortego, 1999 <i>A. mulini</i> Hille Ris Lambers, 1974 <i>A. mulinicola</i> Hille Ris Lambers, 1974 <i>A. papillosa</i> Mier Durante, Nieto Nafria & Ortego, 2003 <i>A. pomi</i> De Geer, 1773 <i>A. pseudopulchella</i> Blanchard, 1944 <i>A. rumicis</i> De Geer, 1773 <i>in part</i> <i>A. sambuci</i> Linnaeus, 1758 <i>A. schinivora</i> Ortego, Nieto Nafria & Mier Durante, 2007 <i>A. senecionoides</i> Blanchard, 1944 <i>A. solanella</i> Theobald, 1914 <i>in part</i> <i>A. tehuelchis</i> Nieto Nafria & López Ciruelos, 2016 <i>A. zapalina</i> Mier Durante & Ortego, 2016	
Group 6	
<i>A. eucollinae</i> López Ciruelos & Ortego, 2016 <i>A. farinosa</i> Gmelin, 1790 <i>A. lippiae</i> Ortego & Nieto Nafria, 2018 <i>A. nasturtii</i> Kaltenbach, 1843 <i>A. schinifoliae</i> Blanchard, 1939 <i>A. patagonica</i> Blanchard, 1944 <i>in part</i>	
continue in the next column	

apterous viviparous “small” females of *A. cuyana* five species of subgenus *Aphis* [Table 2, group 8]
 – Abdominal segment 8 with only 2 setae **K**
K Cauda finger-shaped, sub-proximal constriction marked five species of subgenus *Aphis* [Table 2, group 9]
 – Cauda more-or-less triangular, sub-proximal constriction absent or very small **L**
L Intersegmental sclerites (muscular sclerites) not darker than other sclerites (segmental and spiracular) *Aphis* (*A.*) *marthae*, in part
 – Intersegmental sclerites (muscular sclerites) darker than other sclerites, very distinguishable from them, even if they are included into segmental ones **M**
M Siphunculus 1.6–3.0 times its width at middle, sometimes curved out. In antennal segment VI, processus terminalis 1.2–1.9 times base *Aphis* (*A.*) *martinezi*
 – Siphunculus 2.7–5.7 times width at middle (3.0–5.7 times in *A. tropaeoli*, 2.7–5.1 but usually more than 2.9 times in *A. berberidorum*) and never curved out **N**
N Longest seta on vertex 7–18 µm. Abdominal segments 2 and 3 usually without complete transversal bands or patch even in well sclerotized specimens; abdominal segments 4–6 more widely sclerotized, with transversal bands or a wide plate (in this species there are not two forms, big and small) *Aphis* (*A.*) *berberidorum*
 – Longest seta on vertex 27–48 µm. Abdominal segments 2 and 3 with similar pattern of sclerotization to abdominal segments 4–6 in “big” form (which are well sclerotized specimens) *Aphis* (*A.*) *tropaeoli* **sp. n.**

Apterous viviparous females of *Aphis berberidorum* and *A. tropaeoli* sp.n. present different quantitative characters although with some overlap. Alate viviparous females of both species separate very well from each other, because *A. tropaeoli* have abdominal segmental cross bands while *A. berberidorum* only have marginal sclerites and scarce and scattered spinal and pleural sclerites.

ACKNOWLEDGMENTS

The field work in Argentina was partially financed by the Regional Government of Castile and Leon, Spain (research projects LE 45/02 and LE 034A05).

REFERENCES

- BLACKMAN R.L., EASTOP V.F., 2006 – *Aphids on the World's Herbaceous Plants and Shrubs*. Wiley & Natural History Museum. 2 Volumes. VII+1439 pp.
- BLACKMAN R.L., EASTOP V.F., 2018 – *Aphids on the World's Plants. An online identification and information guide*. Available from [http:// www.aphidsonworldsplants.info/](http://www.aphidsonworldsplants.info/) Accessed September 2018.
- BELOV M., 2018 – *Chile Flora*. Available from <http://www.chileflora.com/Florachilena/FloraSpanish/SHSearchengine.htm> Accessed September 2018.
- FAVRET C., 2018 – *Aphid Species File*. Version 5.0/5.0. Available from [http:// Aphid.SpeciesFile.org](http://Aphid.SpeciesFile.org) Accessed September 2018.
- GONZÁLEZ RODRÍGUEZ S., MIER DURANTE M.P., ORTEGO J., NIETO NAFRÍA J.M., 2018 -. *Tres nuevas especies del género Aphis Linnaeus (Hemiptera, Aphididae) viviendo sobre verbenáceas (Verbenaceae) en la Argentina*. - Graellsia, 74(1), e070: 1–11.
- INSTITUTO DE BOTÁNICA DARWINION, 2018 – *Flora del Cono Sur. Catálogo de las plantas vasculares*. Available from [http:// www.darwin.edu.ar/Proyectos/FloraArgentina/fa.htm](http://www.darwin.edu.ar/Proyectos/FloraArgentina/fa.htm) Accessed September 2018.
- LÓPEZ CIRUELOS S.I., BROWN P.A., NIETO NAFRÍA J.M., 2018 – *Two new species of the genus Aphis (Hemiptera, Aphididae) from Chile on host species of Astroemeriaceae and Ericaceae*. - ZooKeys, 738: 37–45.
- LÓPEZ CIRUELOS S.I., ORTEGO J., MIER DURANTE, M.P., NIETO NAFRÍA J.M., 2017 – *A new species of Aphis Linnaeus, 1758 (Hemiptera, Aphididae) collected on Gymnophyton Clos (Apiaceae) in Argentina*. - Graellsia, 73(1), e055: 1–9.
- MIER DURANTE M.P., ORTEGO J., 1999 – *Two new species of Aphis L. (Hemiptera: Aphididae) from Argentina living on Asteraceae*. - Proceedings of the Entomological Society of Washington, 101 (2): 428–437.
- NIETO NAFRÍA J.M., MIER DURANTE J.M., 1998 – *Hemiptera Aphididae I*. In: Ramos, M.A. et al. (Eds.) *Fauna Ibérica. Vol. 11*. Museo Nacional de Ciencias Naturales, CSIC, Madrid (Spain). 424 pp.
- ORTEGO J., MIER DURANTE M.P., 1997 - *Les espèces sud-américaines d'Aphis inféodées au genre Berberis (Hemiptera: Aphididae)*. - Annales de la Société Entomologique de France, Nouvelle Série, 33(4): 411–418.
- THE CATALOGUE OF LIFE PARTNERSHIP, 2018 – *World Plants: Synonymic Checklists of the Vascular Plants of the World in the Catalogue of Life. Checklist dataset*. Available from <https://doi.org/10.15468/7ppkhn> Accessed September 2018.