

A new aphid genus and species (Hemiptera: Aphididae) from Argentina on *Mulinum* (Apiales: Apiaceae)

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Abstract. *Capraphis* n. g. is described and placed in the tribe Macrosiphini Wilson 1910(1887) (Hemiptera: Aphididae: Aphidinae), and its taxonomic position and differences with other American related genera discussed. The apterous and alate viviparous females and the apterous oviparous females and males of its type-species, *Capraphis blackmani* n. sp., are described and illustrated from aphids collected on *Mulinum spinosum* (Cav.) Pers. in Mendoza province, Argentina.

Résumé. Un nouveau genre d'aphide (Hemiptera : Aphididae) de l'Argentine sur *Mulinum* (Apiales : Apiaceae). *Capraphis blackmani* n. g., n. sp., est décrit d'Argentine. Ce genre est placé dans la tribu des Macrosiphini Wilson 1910 (1879) et les caractères permettant de le distinguer des autres genres américains de la tribu sont fournis. L'espèce vit sur l'ombellifère *Mulinum spinosum* (Cav.) Pers. Nous décrivons et illustrons les femelles vivipares aptères et ailées, les femelles ovipares et les mâles aptères.

Keywords: Aphids, Aphididae, *Capraphis* n. g., Apiaceae, South-America.

The Macrosiphini Wilson 1910 (1879) contains the most genera and is the more specious in the family Aphididae (Hemiptera); however, few genera and species have a distribution area limited to territories in the Neotropical region. Even fewer can be considered indigenous to South America as this part of the world has been less exposed to natural aphid invasions from the Nearctic subregion than Mexico, Central America and the Caribbean. Based on data provided by Nieto Nafría *et al.* (2002), Carvalho *et al.* (2004), Blackman & Eastop (2006), Footitt *et al.* (2006), and Nieto Nafría *et al.* (2007) 35 species and one subspecies apparently indigenous to South America are as follows.

(1) Twenty-four species belonging to the *Macrosiphum*-like group of genera; 21 *Uroleucon* species, *Blanchardaphis capitophoroides* (Blanchard 1944), *B. poikila* (Ortego, Nieto Nafría & Mier Durante 1997) and *Nietonafriella euclypeata* Ortego 1998. Some specimens collected on *Cuphea* in Brazil and deposited in the collection of the Natural History Museum, in London, were attributed to an unpublished species of *Blanchardaphis* by Blackman & Eastop (2006) and are

in fact *Impatientinum paranaense* Carvalho *et al.* 2004 (Blackman personal communication). *Macrosiphum mesosphaeri* (Tissot 1934), recorded from Venezuela and Argentina under the names of *M. hyptidis* Blanchard, 1944 or *M. salviae* (Bartholomew 1932), is not included in this list because it is also known from Cuba, Puerto Rico, Mexico and Florida, and the large genus *Macrosiphum* Passerini 1860 is distributed throughout North America and the Old World.

(2) Four species of *Pentamyzus* Hille Ris Lambers 1966. The fifth species in the genus, *P. graminis* Hille Ris Lambers 1966, is only known from California.

(3) Four species belonging to genera characterized by siphunculi long and inflated; *Impatientinum paranaense* Carvalho, Cardoso & Lazzari 2004, *Wahlgreniella australis* Delfino 1981, *Utamphorophora peruviana* (Essig 1953) and *U. commelinensis* (Smith 1960); the latter has also been recorded outside South America, in Puerto Rico, Costa Rica and Guatemala. However, all or some of them may not be native of South America, because the other species in these genera are found in North America including Mexico (as is *Utamphorophora* Knowlton 1947) or in North America and Eurasia (*Wahlgreniella* Hille Ris Lambers 1949 and *Impatientinum* Mordvilko 1914), though it could also be that the current generic adscription of the first three species (together with *I. americanum* Remaudière 1981, known from Mexico) is different.

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(4) Three species and one subspecies of subgenus *Picturaphis* Blanchard 1922; though we have doubts that *M. (P.) brasiliensis* (Moreira 1925) and *M. (P.) vignaphilus* (Blanchard 1922) are really native to South America because their distribution areas reach Puerto Rico and Mexico, respectively, in the north. *M. (P.) venezuelensis venezuelensis* (Cermeli & Smith 1979) and *M. (P.) venezuelensis meridensis* (Smith & Cermeli 1979) have only been reported from Venezuela.

Thus, the description of species in the tribe Macrosiphini on indigenous plants in South American territory, and therefore presumably native to the subcontinent, is of particular interest with regard to biodiversity knowledge.

Material and methods

During the collecting expeditions in Mendoza province (Argentina), one of the authors (J.O.) collected in three places several aphids green coloured. These aphids can be easily classified into Macrosiphini Wilson 1910(1887) (Aphididae Aphidinae), but for the reasons explained in the discussion they cannot be placed in any known genus. In consequence a new genus and a new species are described.

Abbreviations used: AntI, AntII, AntIII, AntIV, AntV, AntVIb, AntVIpt are respectively segments I, II, III, IV, V, VI (basis) and VI (terminal process) of antenna; *D* is the basal articular diameter of AntIII; *Ars* is apical rostral segment; *Ht2* is second segment of tarsus of hind leg; *AbdI*, *AbdII*, *AbdIII* and *AbdVIII* are respectively the first, second, third and eighth abdominal segments.

Results and discussion

Capraphis n. g.

Type species. *Capraphis blackmani* Mier Durante, Ortego and Nieto Nafría n. sp., described below.

Diagnosis. Belonging to Macrosiphini (Aphidinae), *AbdI* and *AbdII* spiracles very close together, cauda elongate, siphunculi lacking apical reticulation, slightly and asymmetrically swollen, lacking subapical incision, with thick flange, frons with lateral tubercles more developed than medial, enlarged, diverging and slightly rugose. Triommatidion not discernible. Dorsum pale in both apterae and alatae, with pale but slightly rugose stigmatic, marginal, pre- and postsiphuncular (fig. 3C) sclerites and a band on *AbdVIII*. Antennae rigid in appearance and arcuate, longer than body; AntVIpt very long. Primary sensoria small and ciliate. Secondary sensoria present on AntIII (and absent on the other segments) in both apterae and alatae. Mesothoracic furca pedunculate. Setae short; setae on body dorsum, antennae and legs (except distal ones on tibiae) blunt; tarsal formula 3.3.3.

Etymology. The name of the genus is a noun in feminine gender, composed of two names, “aphis” and “capra”; aphis is the name-bearing genus of the family, in feminine gender, and “capra” is the genus-name of the goat alluding to the long arcuate antennae of these aphids.

Discussion. In the tribe (and even the whole family), the genus *Capraphis* is perfectly characterised by

the triommatidion which is not discernible. The absence (apparent or real) of the trimmatidion is a very infrequent characteristic in Macrosiphini. In America only three genera present this characteristic (Footitt & Richards 1993; Blackman & Eastop 2006): *Coloradoa* Wilson 1910, *Mastopoda* Oestlund 1886, and *Pseudoepameibaphis* Gillette & Palmer 1932.

Coloradoa is usually considered an Old World genus (Blackman & Eastop 2006) but several of its species have been recorded from America; it is characterized for sinuous and smooth frons, the stiletto-shaped *Ars* and the spatulate dorsal body setae.

Maspopoda includes one species (*Maspopoda pteridis* Oestlund 1886) recorded from North America on *Pteris*, a fern; it is characterised for antennae five-segmented, long, thin, tubular and scabrous siphunculi in all morphs, plus in aptera eyes with number of ommatidia much reduced.

Pseudoepameibaphis, with four species known from North America living on *Artemisia* and *Seriphidium* species (Asteraceae) is characterized for convex frons, stiletto-shaped *Ars*, thin but enlarged to apex siphunculi, and long and blunt or spatulate- or funnel-shaped dorsal setae.

Other characters based on the information given by the above-mentioned authors and our own knowledge also differentiate the new genus from others genera of Macrosiphini with South American native species.

It is clearly distinguished from *Uroleucon*, *Blanchardaphis*, *Nietonafriella* and *Macrosiphum* by shape and reticular ornamentation of their siphunculi.

It is easily differentiated from *Pentamyzus* by its five-segmented antennae, convex frons and sclerotized abdominal dorsum (Nieto Nafría *et al.* 2002).

Despite resembling *Microparsus* in the frons shape, and some of its species in the general shape of the siphunculi (the tip is always different), *Microparsus* (Patch 1909, Smith & Medina Gaud 1974, Remaudière & Peña Martínez 1994) has tegumentary ornamentation (spines on head and legs, dorsal reticulation) on thorax and abdomen, pigmented abdominal sclerites, and in alatae edging cubital forewings veins.

It is distinguished from *Impatientinum* species by the extensive dorsal sclerotization present in both apterous and alate females of this genus (Remaudière 1981, Carvalho *et al.* 2004).

It is distinguished from *Utamphorophora* because in this genus (Essig 1953, Remaudière 1998): frontal-lateral tubercles are smooth and clearly divergent, secondary sensoria are absent on viviparous apterae, and pigmented sclerites are present on abdominal dorsum in alatae.

Some of characters of the new genus are also present in *Hyalomyzus* Richards 1958, but they differ for the frons shape, lack of secondary sensoria on AntIV and AntV in alate viviparous females, lack of polygonal microsculpture on the dorsum of the abdomen in

apterae and alatae, and lack of spinules on the distal part of the hind tibiae in nymphs (Stoetzel *et al.* 1999).

The division of the tribe Macrosiphni into subtribes used in the past (Börner & Heinze 1957;

Table 1. Metric characteristic of apterous and alate viviparous females, oviparous females and males of *Capraphis blackmani* n. sp.

	aptera n=12	alatae n=1	ovipara n=11	males n=2
body (mm)	1.72–2.20	2.43	1.67–2.23	1.50–1.63
body / hind tibia (times)	1.6–1.9	1.9	1.5–2.1	1.7
body / siphunculus	4.8–5.7	6.2	4.3–5.8	4.8–5.2
antennae (mm)	3.05–3.42	3.33	3.00–3.36	2.73
antennae / body (times)	1.5–1.6	1.4	1.5–1.9	1.7
secondary sensoria on each Ant III	2–7	13–15	0–3(5)	12–22
secondary sensoria on both Ant III	5–13	28	0–5(8)	26–40
AntIII (mm)	0.43–0.65	0.6	0.49–0.57	0.44–0.46
AntIV (mm)	0.41–0.61	0.56	0.50–0.57	0.40–0.43
AntV (mm)	0.36–0.50	0.46	0.43–0.51	0.36–0.41
AntVIb (mm)	0.15–0.18	0.17	0.14–0.17	0.11–0.13
AntVIpt (mm)	1.06–1.39	1.27	1.10–1.29	1.06
AntVIpt / AntIII (times)	1.8–2.5	2.1	2.0–2.4	2.3
AntVIpt / AntVIb (times)	6.1–9.3	7.5	7.1–8.5	8.2
rostrum (mm)	0.42–0.50		0.40–0.55	0.42–0.43
rostrum / body (times)	0.2–0.3		0.2–0.3	0.3
Ars (mm)	0.10–0.13	0.12	0.10–0.12	0.11
Ars / its basal width (times)	1.4–2.1		1.7–2.2	2.2
Ars / AntVIb (times)	0.6–0.8	0.7	0.6–0.8	0.8–1.0
Ars / Ht2 (times)	0.8–0.9	0.9	0.8–0.9	0.8–0.9
hind femur (mm)	0.60–0.75	0.75	0.55–0.65	0.52–0.58
hind tibia (mm)	1.07–1.33	1.30	1.05–1.18	0.87–0.98
Ht2 (mm)	0.12–0.14	0.13	0.12–0.13	0.12–0.13
siphunculus (mm)	0.36–0.42	0.39	(0.31)0.36–0.41	0.31
siphunculus / its maximum width (times)	2.8–3.8	3.3	(2.4)3.0–3.6	2.8
siphunculus maximal / minimal widths (times)	1.1–1.3	1.2	1.1–1.2	1.6
cauda (mm)	0.20–0.25	0.24	0.20–0.24	0.21
cauda / its basal width (times)	1.4–1.9	2.0	1.5–2.0	1.8–1.9
cauda / siphunculus (times)	0.5–0.7	0.6	0.5–0.7	0.7
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head, dorsal (number)	12–21	14	12–16	12–13
head, dorsal (µm)	10–20	13	11–18	7–13
head, dorsal / D (times)	0.2–0.5	0.4	0.3–0.5	0.3–0.4
AntI (number)	8–16	10–13	7–15	11–13
AntI (µm)	5–14	10	7–10	7–8
AntI / D (times)	0.1–0.4	0.3	0.2–0.3	0.2–0.3
AntIII (µm)	7–13	8	6–13	7–10
AntIII / D (times)	0.2–0.3	0–2	0.2–0.3	0.3
Ars (number)	2–5	4	3–8	5
Ars (µm)	11–20	15	10–18	13
hind coxa (µm)	12–30	23	22–30	12–23
hind trochanter (µm)	15–23	15	12–23	12–15
hind femur (µm)	5–10	8	5–10	7–8
hind tibia, proximal (µm)	7–13	10	5–10	7–8
hind tibia, distal outside (µm)	22–35	25	25–35	22–23
hind tibia, distal inside (µm)	12–25	15	12–18	15
AbdIII, ventral (µm)	20–28	25	17–25	20
AbdIII, ventral / D (times)	0.4–0.7	0.8	0.5–0.8	0.6–0.7
AbdIII, dorsal (µm)	5–10	5	5–10	5–8
AbdIII, dorsal / D (times)	0.1–0.3	0.1	0.1–0.3	0.1–0.2
AbdVIII, dorsal (number)	4–8	4	5–9	8
AbdVIII, dorsal (µm)	10–15	10	10–15	7–10
AbdVIII, dorsal / D (times)	0.2–0.4	0.3	0.3–0.5	0.2–0.4
genital plate, discal (number)	2–6	10	12–22	--
genital plate, posterior (number)	9–14		18–35	--
cauda (number)	5–9	7	6–9	6–8
cauda, dorsal (µm)	15–35	18	25–38	27–30
cauda, lateral (µm)	40–63	50	42–55	40

Shaposhnikov 1964) has in fact been abandoned (Heie 1992; Remaudière & Remaudière 1997) because it was based on a complicated network of characters that was extremely difficult to work out. Sometimes (for example in the ordination of the collection of photographs in Blackman & Eastop 2006) genera are grouped together but the limits of these groups are, in some cases, very inaccurate. The new genus could be placed in the *Myzus*-group of genera, in which *Microparsus* and *Hyalomyzus* are also placed, due to the position of the AbdII spiracle, the shape and ornamentation (though not well developed) of the frons, the length of the antennae and the shape and size of the siphunculi and cauda.

Capraphis blackmani n. sp.

Type material. Holotype: apterous viviparous female (number 3 in the measurements series), Argentina, Mendoza, Malargüe: “El Azufre” (35°19’S, 70°25’W, 2615 m), 26.III.2002, on *Mulinum spinosum*, J. Ortego leg.; University of León collection.

Paratypes: two apterous viviparous females, 11 oviparous females and 2 males, same data than the holotype; 1 alate viviparous female, Argentina, Mendoza, Malargüe: “Ranquil Norte” (36°38’S, 69°50’W, 1620 m), 26.I.2003, on *M. spinosum*, J. Ortego leg.; 9 apterous viviparous females, Argentina, Mendoza, Malargüe: “Castillos de Pincheira” (35°31’S, 69°43’W, 1643 m), 5.II.2007 on *M. spinosum*, J. Ortego leg.; Universidad de León (León, Spain), J. Ortego (Luján de Cuyo, Argentina), the Natural History Museum (London, U.K.), and Muséum national d’Histoire naturelle (Paris, France) collections.

Description. Apterous viviparous females: From 12

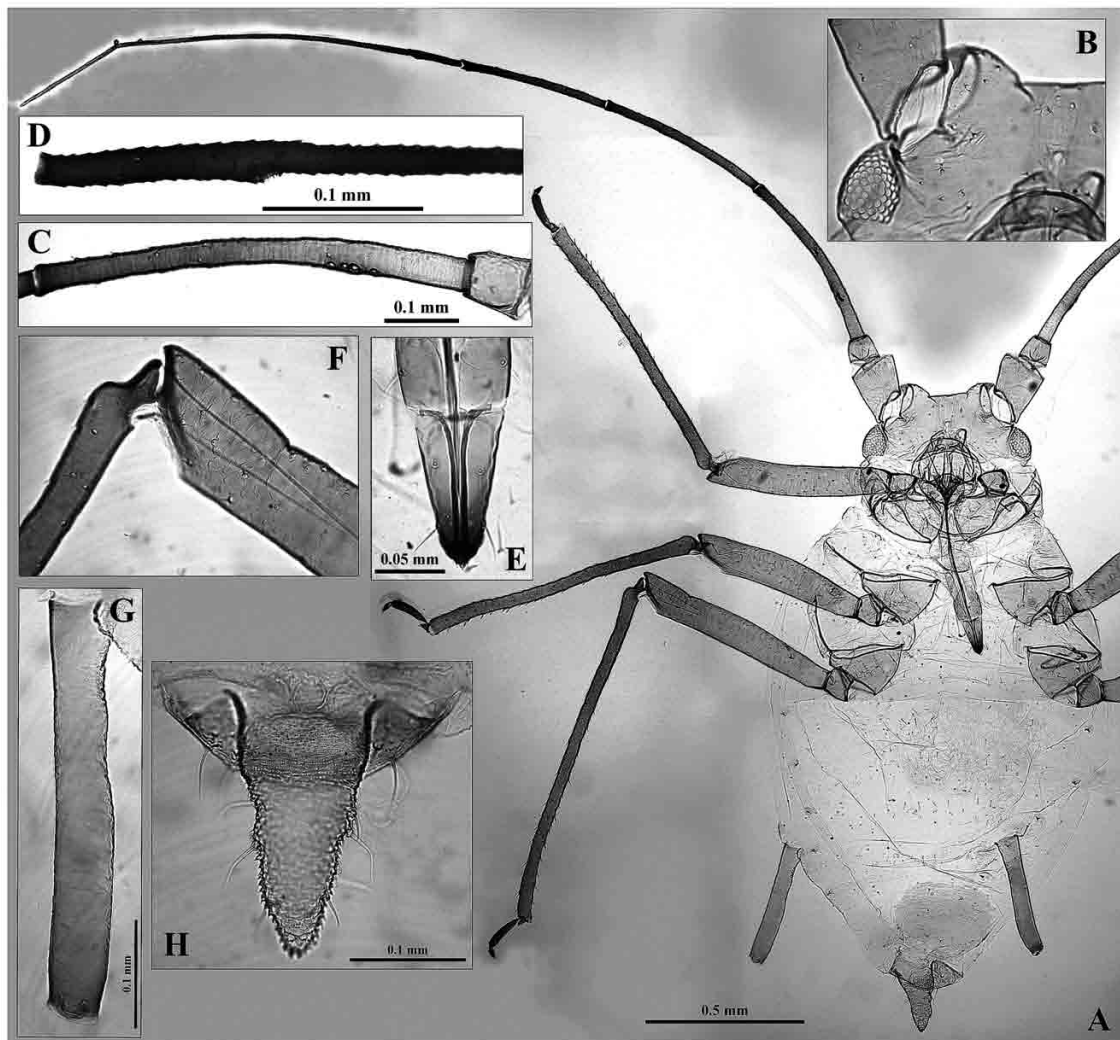


Figure 1
Capraphis blackmani n. sp. apterous viviparous female. A, habitus. B, head in part. C, AntII and AntIII. D, AntVI in part. E, apical rostral segments. F, distal part of femur and proximal part of tibia of hind leg. G, Siphunculus. H, Cauda.

specimens. Table 1. Figure 1. Yellow to pale green when alive. Slide-mounted pale, with head, AntI, AntII, legs (tarsi more intensively pigmented), rostrum, siphunculi, anal plate and cauda light cream; the rest of the antennae dark cream to brown. Papillae absent.

Frons sinuate; lateral tubercles more raised than median one, swollen, diverging and slightly rough. The rest of the surface of the head is smooth with some wrinkles near the antennal acetabulum and the clypeus. Dorsal setae short and blunt, some slightly expanded at apex and even club-shaped. Ventral setae somewhat longer and also blunt. Triummatidion not discernible in composed eyes. Antennae long, rigid and curved resembling the horns of a goat, and with a very long AntVIpt. AntI with diverging edges, wide at apex, tegumentum as rugose as frontal-

lateral tubercles (fig. 1B), especially ventrally and even more so in the expanded internal apical angle, and bearing setae of similar shape to those on the dorsum of the head and slightly shorter. AntII tapering and also slightly rugose (fig. 1C). The rest of the antenna is scaly (except on the ventral part of a proximal portion of AntIII in one specimen). Antennal setae also short and blunt. Secondary sensoria of AntIII relatively small, round, set out in a line on the proximal third of the segment and very close together; the rest of the antennal segments lacking secondary sensoria. Primary sensoria ciliate (fig 1D), also small and flanged. Rostrum reaching hind coxae. Ars (fig. 1E) with weakly converging edges, and short and pointed secondary setae.

Prothorax with stigmatic sclerites and extensive marginal

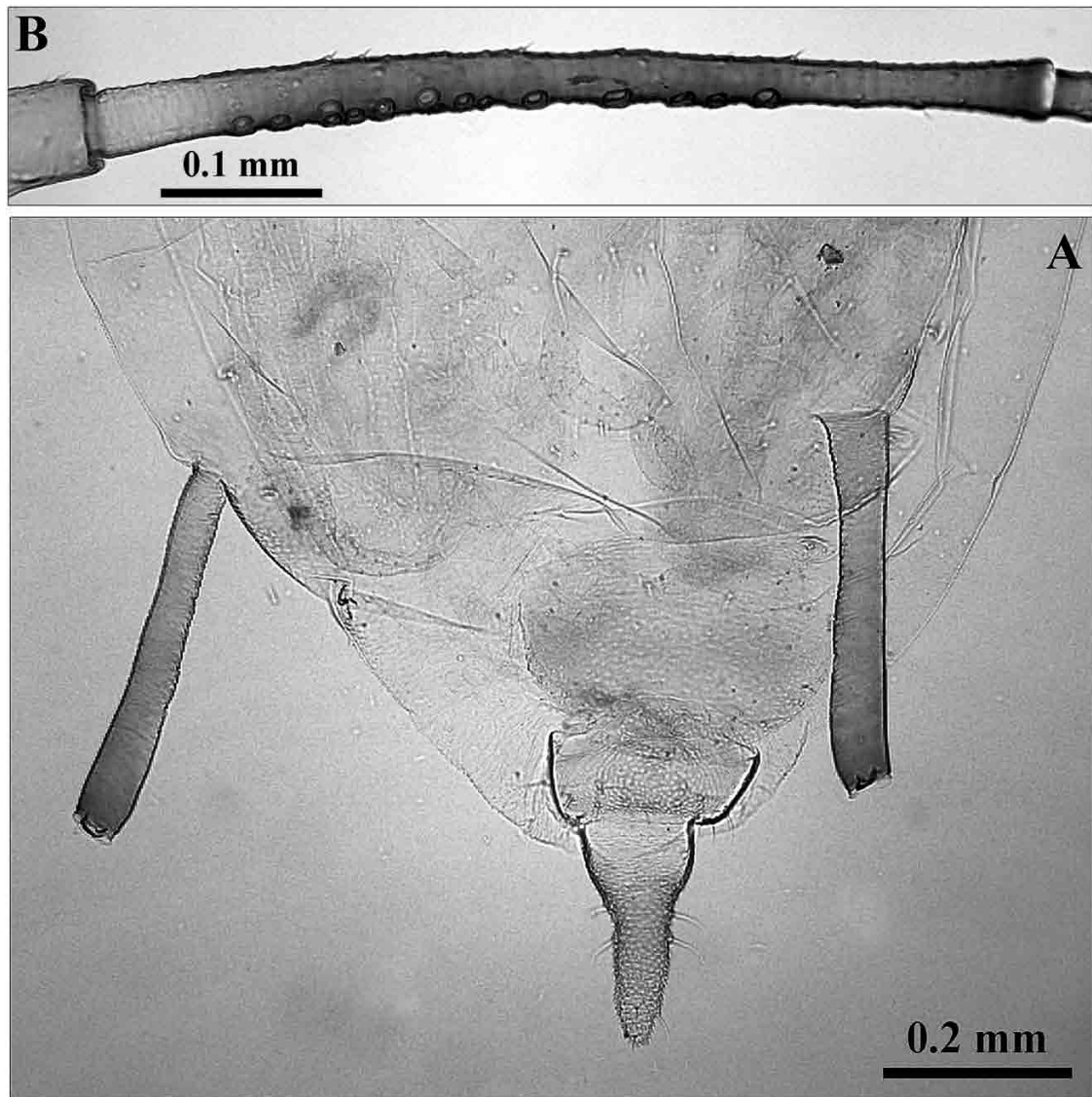


Figure 2
Capraphis blackmani n. sp. alate viviparous female. A, end of abdomen. B, AntII and AntIII.

sclerites, rugose and non-pigmented (one specimen has a similar rugose area in the spinal area). Mesothoracic furca penduculate. Legs relatively short. Setae of coxae, tronchanters and femurs blunt and short. Setae of tibiae varied, those in the proximal part are similar in shape and size to those of the femora, becoming longer and more pointed towards the apex (fig. 1F). First segment of tarsi with 3 setae.

With pale but somewhat rugose stigmatic, pre- and post-siphuncular sclerites, and transverse band on AbdVIII. Small transverse reniform spiracles. AbdI and AbdII spiracles very close to each other (the distance between the centre of AbdII and AbdIII spiracles is approximately 2.4 times the distance between the centre of AbdI and AbdII spiracles). AbdI–AbdV with 4–6

setae in spinal and pleural position, with 2–3 marginal setae on each side, all very short and not easily discernible; ventral setae pointed and longer. AbdVIII setae, also blunt but slightly longer. Siphunculi (fig. 1G) moderately long, with a slightly expanded base, proximal ½ cylindrical, and distal ½ slightly and asymmetrically swollen (the outer edge is almost straight though somewhat curved outwards, whereas the inner edge is convex); delicately rugose in most of its length, particularly on outer part of proximal half; one or two very faint terminal lines insinuating a reticulation; apical flange thick and lacking subapical incision. Genital plate with two long and several short and pointed discal setae, and several short and blunt posterior setae. Setae on anal plate long and fine. Cauda (fig. 1H) long-

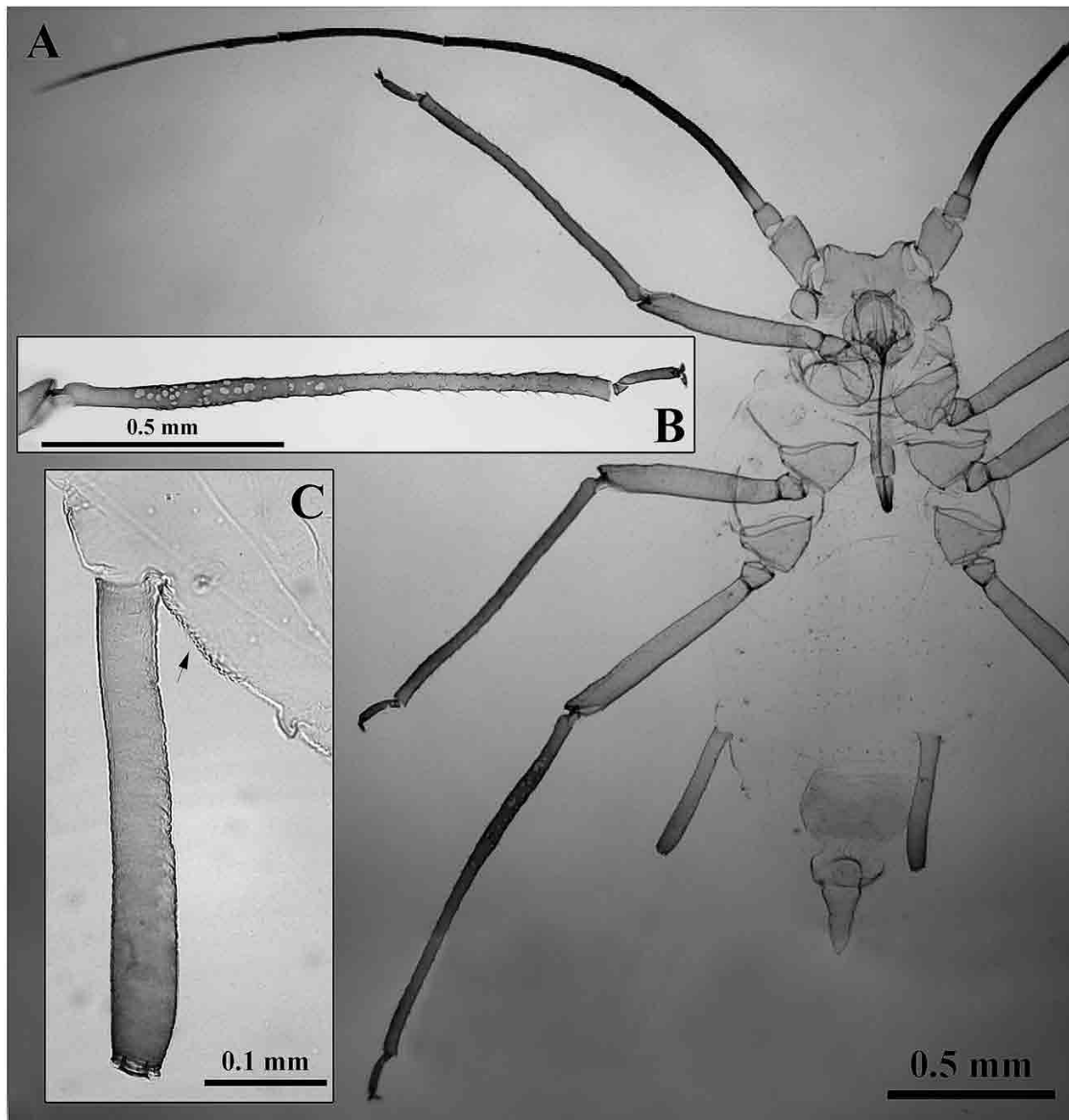


Figure 3
Capraphis blackmani n. sp. apterous oviparous female. **A**, habitus. **B**, hind tibia and tarsus. **C**, Siphunculus and post-siphuncular sclerite (arrow).

triangular-elongate, its dorsal setae (2–3) are blunt or sharp and thicker and shorter than curved and sharp lateral setae.

Alate viviparous females: From one specimen. Table 1. Figure 2. Pale yellow when alive. Like the viviparous apterae, with the usual differences, in pterothorax (which is somewhat pigmented), wings and secondary sensoria, and small differences in some quantitative characters, listed below. Secondary sensoria (fig. 2B) set out in line and occupying almost entire length of AntIII. The wings of the specimen are much deteriorated and only the following can be stated: Forewings pterostigma elongate and weakly pigmented, beginning of radial sector very weakly pigmented and weakly curved, medial with three branches, cubitus 1 and 2 weakly pigmented; hindwings veins very pale, possibly two oblique. Cauda (fig. 2A) narrower in distal 3/5 than in apterae.

Oviparous females: From 11 specimens. Table 1. Figure 3. Pale green when alive. Similar to viviparous apterae, with hind tibiae slightly darker (fig. 3A), very slightly and uniformly swollen, with 27–52 scent plates on 2/3 of their length (fig. 3B).

Males: From 2 specimens. Table 1. Figure 4. Apterous. Pale green when alive. Similar to apterous viviparous females but smaller, and with the logical secondary sexual differences:

genitalia and a larger number of secondary sensoria, AntIII with 12–22 (a total of 26–36), AntIV with 0–12 (a total of 7–12), AntV with 0–7 (a total of 7–9).

Etymology. The specific name is in honor of Dr. Roger Blackman, The Natural History Museum, London, for his large contribution to the knowledge of the aphid-fauna of the World, in particular for his magnificent books written in collaboration with Dr. Victor F. Eastop on aphids living on cultivated plants, trees and herbaceous plants and shrubs, which will make the task of identifying aphids much easier for entomologists for several generations.

Bionomics. The species live on the leaves of *Mulinum spinosum* (Cav.) Pers., the only known host-plant. It is holocyclic and monoecious, as demonstrated by the apterous nature of the males. This aphid might also live on other species in the same genus, some of which have a more northern distribution.

Geographic distribution. It has only been reported in Malargüe (Mendoza, Argentina) and we know that it does not occur frequently and is perhaps restricted to considerably high regions because the host-plant

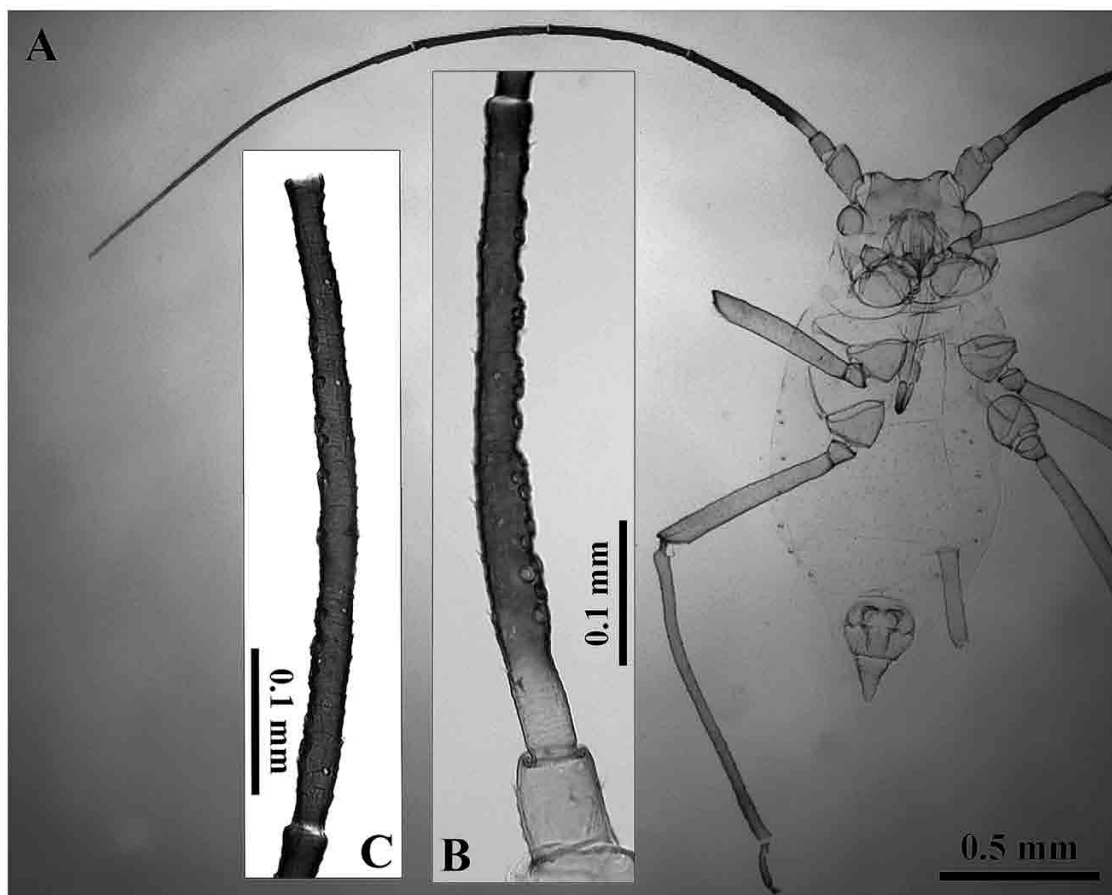


Figure 4
Capraphis blackmani n. sp. male. A, habitus. B, AntII and AntIII. C, AntIV.

was widely sampled for aphids in this area and others in Argentina. No other colonies of this species were found, however, colonies of several species of the genus *Aphis* L. 1758 were reported quite frequently (Nieto Nafría *et al.* 1999). One viviparous alate female was found at a lower altitude, perhaps because the species lives there or was transported by the wind, which usually blows from the east in this part of the country. “El Azufre” is also a type-locality of another aphid-species, *Uroleucon (Lambersius) malarguense* Ortego & Nieto Nafría 2005.

Discussion. The species is the only one in the genus at the moment. The separation of the other species has been dealt with in the discussion on the genus, but it would be appropriate to amend the key by Blackman & Eastop (2006) for the identification of the aphids living on *Mulinum* spp. by adding “0” to the key as follows:

0. Eyes with triommatidion 1
 – Eyes without triommatidion *Capraphis blackmani*

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