

***APHIS PRIMA* SP. N. (HEMIPTERA, APHIDIDAE), FROM ARGENTINA AND CHILE, FIRST APHID SPECIES WORLDWIDE COLLECTED ON SCHOEPFIACEAE (SANTALALES)**

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ABSTRACT

The study of the first samples of aphids collected on Schoepfiaceae (Santalales) is presented. *Aphis prima* sp. n. is described from viviparous females collected in the Argentina provinces of Neuquén, Río Negro and Santa Cruz and in Chilean region of Maule on plants of genera *Quinchamalium* and *Arjona*, which are endemic to South America. The new species is characterized by the presence of marginal tubercles on 5 or 6 abdominal segments, tibiae homogeneously pigmented and triangular cauda in both apterae and alatae, secondary sensoria on antennal segment III in apterae, and once-branched forewing media in alatae. This last is a very rare characteristic in subfamily Aphidinae.

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Keywords: Aphids, Aphididae, *Aphis*, Schoepfiaceae, once-branched media, new species, Argentina, Chile.

RESUMEN

***Aphis prima* sp. n. (Hemiptera, Aphididae), de Argentina y Chile, primera especie de áfido colectada en el Mundo sobre Schoepfiaceae (Santalales).**

Se presenta el estudio de las primeras muestras de pulgones recolectadas en Schoepfiaceae (Santalales). *Aphis prima* sp. n. se describe a partir de hembras vivíparas colectadas en localidades de las provincias argentinas de Neuquén, Río Negro y Santa Cruz y en la región chilena del Maule sobre plantas de los géneros *Quinchamalium* y *Arjona*, que son endémicos de América del Sur. La nueva especie se caracteriza por la presencia de papilas marginales en 5 o 6 segmentos abdominales, tibias pigmentadas homogéneamente y cauda triangular tanto en ápteras como en aladas, de sensorios secundarios en el segmento antenal III en ápteras y de la vena medial de las alas anteriores ramificada una sola vez en aladas. El último carácter de los mencionados es muy raro en la subfamilia Aphidinae.

Palabras clave: Pulgones, áfidos, Aphididae, *Aphis*, Schoepfiaceae, medial ramificada una vez, especie nueva, Argentina, Chile.

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Introduction

Taxonomic studies of aphids are often aimed at studying the diversity related to plant genera or families. This procedure is especially useful to assess the possible novelty of aphid species, especially if they belong to aphid genera with many species, such as *Aphis*, *Uroleucon*, *Dysaphis* or *Macrosiphum* (Aphidinae), *Chaitophorus* (Chaitophorinae) or *Cinara* (Lachninae) (see Blackman & Eastop, 2021). The authors of this paper have applied this procedure in their taxonomic studies of aphids in temperate or cold-temperate Argentine and Chilean regions for over 20 years (see Blackman & Eastop, 2021: “Bibliography”), having described several species of *Aphis* and also of *Uroleucon* (Aphidinae) and *Neuquenaphis* (Spicaphidinae).

In this work, results of the study of seven samples of aphids collected on *Quinchamalium chilense* and one from an unidentified species of *Arjona* (Schoepfiaceae), possibly *A. patagonica*, are presented, which show the characteristics of the genus *Aphis* Linnaeus, 1758 (Hemiptera, Aphididae, Aphidina). These plants are herbs with perennial rhizomes.

The Schoepfiaceae family was recognized in APG III, and remains in APG IV (Angiosperm Phylogeny Group, 2009, 2016). It currently includes three genera: *Schoepfia*, *Arjona* and *Quinchamalium* (Hassler, 2019). *Schoepfia* was classified in Olacaceae until 2009. It currently includes 27 species, 23 of which are South American. *Arjona* and *Quinchamalium* were previously classified in Santalaceae; they include respectively 5 and 20 South American species (Hassler, 2019), although Vidal-Russell (2019) and López Laphitz *et al.* (2015) consider that each of these different genera includes a single species.

No aphids have yet been collected from Schoepfiaceae anywhere in the world. Two *Aphis* species are known from Santalaceae: *A. thesii* Holman, 1966 and *A. neothesii* Pashchenko, 1996 (Blackman & Eastop, 2021); these are palaeartic.

The viviparous females collected on *Quinchamalium* and *Arjona* are markedly different from those of *A. thesii* and *A. neothesii*. They are also different from those of the other *Aphis* species known in South America (see the Taxonomic Discussion section).

These differences have allowed the establishment of *Aphis prima* sp. n.

Material and methods

Standard protocols for collection, rearing, ethanol preservation, slide preparation, and morphometric study have been employed (see Nieto Nafría & Mier Durante, 1998). Microphotographs were taken using a smartphone iPhone 11 through an eyepiece adapted to an Olympus CX41 microscope and were subsequently

treated with Corel Photo-Paint 2018 and Microsoft Publisher 2010.

In the collection data: (a) Spanish orthography, diacritics included, was retained in the geopolitical names; (b) geographical coordinates and altitudes were validated using Google Earth Pro, v.7.3.2; and (c) authors' surnames as collectors of paratypes are abbreviated to M.D., N.N. and O. For the vein terminology see Franieleczyk-Pietyra & Wegierek (2017).

In the description, text and table, the quantities in parentheses show an exceptional limit on the range of variation of the characteristic.

Results and discussion

Aphis (Aphis) prima sp. n.

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Figs. 1–3

TYPE MATERIAL. **Holotype**, apterous viviparous female (ARG-371-ap.5, on a slide with 3 paratypes), ARGENTINA, Río Negro, Bariloche, San Carlos de Bariloche (41°09' S, 71°12' W, 860 m), on *Quinchamalium chilense*, 19-January-2000, Mier Durante, Nieto Nafría and Ortego leg.; *Universidad de León* collection (León, Spain).

Paratypes, 124 apterous viviparous females and 49 alate viviparous females: (1) same data as the holotype, 34 apterae and 23 alatae; (2) same locality, host plant and collectors as the holotype, 14-December-2009, 15 apterae and 10 alatae; (3) same locality and host plant as the holotype, 18-April-2012, O. leg., 6 apterae and 8 alatae; (4) same locality and host plant as the holotype, 11-January-2019, O. leg., 12 apterae; (5) Neuquén, Minas, Lagunas Epulafquen (36°52' S, 70°57' W, 1440 m), on *Q. chilense*, 25-January-2000, M.D., N.N. and O. leg.; (6) Neuquén, Los Lagos, Puerto Huemul (41°01' S, 71°20' W, 860 m), on *Q. chilense*, 21-January, 2000; M.D., N.N. and O. leg., 1 alate; (7) Santa Cruz, Lago Argentino, El Chaltén (49°20' S, 72°53' W, 750 m), on *Arjona ?patagonica*, 8-February-2010, Cuesta Segura leg., 14 apterae; and (8) CHILE, Maule, Talca, Paso Pehuenche high slopes (35°59' S, 70°24' W, 2520 m) on *Q. chilense*, 31-January, 2000; M.D., N.N. and O. leg., 24 apterae and 6 alatae.

APTEROUS VIVIPAROUS FEMALES (Fig. 1). Based on 125 specimens. 1.125–2.125 mm long. When alive neutral green to light green or yellow-green with a very fine layer of waxy powder, with brown antennae and legs. When mounted, light brown or beige because thorax and abdomen are widely membranous, with head, antennae, rostrum, legs and siphunculi brown, and darker than genital and anal plates, cauda and spiracular and dorsal sclerites. Marginal tubercles present in prothorax and abdominal segments 1–(6)7, all of them round, big, low and pale, the abdominal ones sometimes sitting in small sclerites; if these sclerites are not present, the tubercles can go unnoticed because they are as poorly pigmented as the surrounding cuticle. Setae very long, fine and pointed. Head with very few scattered rectilinear ridges. Frons slightly wavy. Ocelli or ocellar spots present on specimens of 5 samples: one in 6.4% of type specimens, two in 4.0%, and three in 6.4%, up

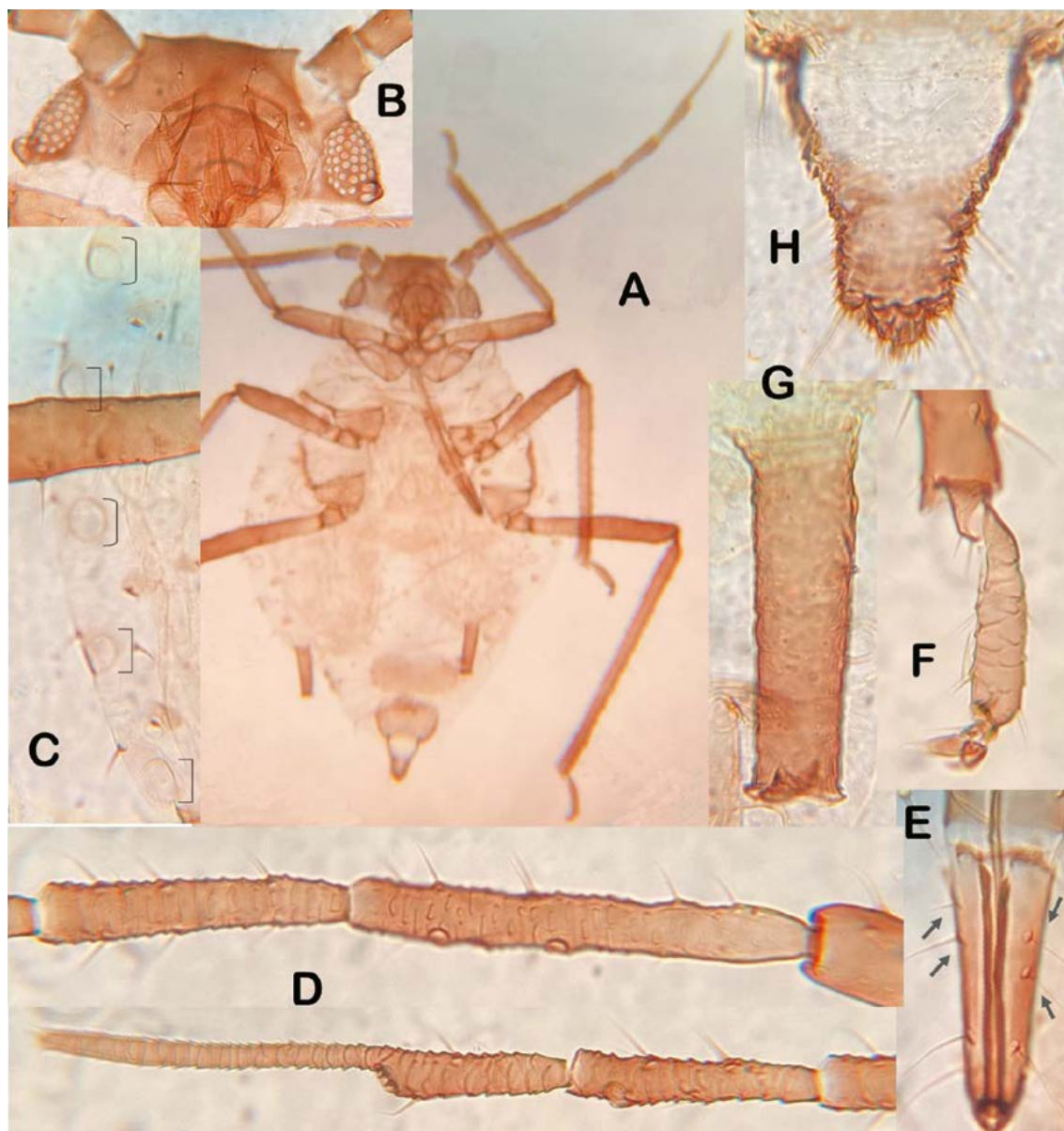


Fig. 1.— *Aphis (A.) prima* sp. n., apterous viviparous females [A–C, F–H, specimen ARG-371-*apt.1.*; D and E, specimen ARG-371-*apt.15.*]. A, hábitus (body length, 1.375 mm); B, head in dorsal view (note the two ocellar spots very close to the postero-internal edge of the antennal alveoli); C, abdominal segments 1 to 5 left marginal zone, the tubercles are in the concavity of the brackets, they are poorly distinguished from the immediate cuticle; D, antennal segments II, III (0.24 mm), IV (0.15 mm), V (0.13 mm) and VI (0.11 + 0.16 mm); E, ultimate rostral segment (0.14 mm), exceptional for the presence of four accessory setae that are marked with arrows; F, hind leg, apex of tibiae and tarsus (second segment, 0.10 mm); G, siphunculus (0.14 mm); H, cauda (0.11 mm).

Fig. 1.— *Aphis (A.) prima* sp. n., hembras vivíparas ápteras [A–C, F–H, espécimen ARG-371-*apt.1.*; D y E, espécimen ARG-371-*apt.15.*]. A, hábitus (1,375 mm de longitud corporal); B, cabeza en vista dorsal (apréciense las dos manchas ocelares muy próximas al borde postero-interno de los alveolos antenales); C, segmentos abdominales 1 a 5, zona marginal izquierda, las papilas, que quedan en la parte cóncava de los corchetes, se distinguen mal de la cutícula circundante; D, artejos antenales II, III (0,24 mm), IV (0,15 mm), V (0,13 mm) and VI (0,11 + 0,16 mm); E, artejo apical del rostro (0,14 mm), excepcional por llevar cuatro setas accesorias, que se marcan mediante flechas; F, pata posterior, ápice de la tibia y tarso (segundo artejo, 0,10 mm); G, corniculo (0,14 mm); H, cola (0,11 mm).

to maximum per sample of 33.3%, 8.6% and 14.4%. Antennae six-segmented and longer than half body length. Antennal segments I and II smooth. Antennal flagellum imbricated, although the ventral face on segment III is almost smooth. Antennal segment III with 6–14 setae, and usually with secondary sensoria

placed on distal three quarters, 1–8(13) on each antenna and 1–15(26) on both antennae. Rostrum long, reaching back beyond hind coxae. Ultimate rostral segment relatively broad and usually with 2 accessory setae, two specimens have 4 setae (1.6% of type specimens), and 18 specimens have 3 setae (14.4%

of type specimens). Tibiae as dark as femora, usually homogeneously pigmented, but in poorly pigmented specimens progressively darkening towards the apex. Tarsal formula 3.3.2. Dorsum of thorax and abdomen in general membranous and tenuously reticulated or smooth; metathorax with a light brown and reticulated spino-pleural patch; abdominal segment 7 sometimes with small and light brown setiferous sclerites; abdominal segment 8 with a narrow arc-shaped sclerite carrying scattered spinules. Spiracular sclerites usually inconspicuous. Siphunculi usually subcylindrical, sometimes tapering, with transverse linear roughness and very marked flange. Genital plate with 2–8(12) discal and (3)6–12 posterior setae. Abdominal segment 8 with (3)4–6(8) setae. Cauda triangular, with (3)5–8 setae. Metric features in Table 1.

ALATAE VIVIPAROUS FEMALES (Figs. 2, 3). Based on 49 specimens. 1.225–1.750 mm. When alive head and thorax (including antennae and legs) brown to dark brown, and abdomen neutral green, light green or yellow green. Pigmentation when mounted similar to apterae but with dark brown thorax. Frons straight. Antennal segment III with 7–18 secondary sensoria placed on the ventral face of almost the entire length of the segment; total for both antennae 18–35. Antennal segment IV with (0)1–4 secondary sensoria on each antenna, total for both antennae 1–7. Antennal segment V sometimes (22% of specimens) with 1–2 secondary sensoria. Ultimate rostral segment with 2–3(4) accessory setae, three or four are present in 16 specimens (32.7% of specimens). The veins of the forewings are costal, radial 1, radial sector, media with only two branches [M1+2 and M3] and anterior cubitals 1 and 2; the once-branched media is very unusual in the subfamily. Abdominal dorsum widely membranous with marginal sclerites, which are more extensive than those in aptera, peri-siphuncular sclerites, small setiferous sclerites on abdominal segments 7 and infrequently on segment 6, and an arc-shaped band on segment 8, all of them with spinules. Intersegmental sclerites usually conspicuous, although small and less pigmented than the corresponding marginal ones. The qualitative and meristic characteristics like those of the apterae have been omitted. Metric features in Table 1.

BIONOMICS. Specimens of *Aphis prima* **sp. n.** live on *Quinchamalium chilense* and *Arjona* sp. (possibly *A. patagonica*), in loose or disturbed soils. It may also live on other species of these plant genera, perhaps with the exception of *A. megapotamica*, because this is the only species of the genus that lives outside the Andean territories.

Aphids usually form compact groups on the basal part of the stem, basal leaves, and highest part of the roots; the specimens in very large colonies invade the highest parts of the plant, especially the nymphs of alate viviparae. They are visited by ants.

The life cycle of *A. prima* **sp. n.** cannot be specified because no sexuals have been collected. It can be speculated that it is holocyclic due to the climatic characteristics of the collection sites, with cold winters and frequent snowfalls, or on the contrary that it is anoholocyclic because some specimens could subsist on the roots of their host plants during the winter, even under snow, as other aphids do, for example *Acyrtosiphon matilei* Remaudière & Leclant, 2000 (Nieto Nafría & Mier Durante, 2013).

DISTRIBUTION. *Aphis prima* **sp. n.** is known in the Argentine provinces of Neuquén, Río Negro and Santa Cruz and in the Chilean region of Maule, but it can be estimated that this aphid is much more widespread in both countries, and even in Bolivia and Peru, because the altitudes of the collection localities are very diverse (750 to 2500 m) and because there are 1500 km between the northernmost and the southernmost collection localities —Paso Pehuenche in Chile and El Chaltén in Argentina, respectively.

ETYMOLOGY. The specific name of the new species, *prima*, is an adjective in nominative feminine singular that means first, because it is the first aphid species collected on species of Schoepfiaceae.

TAXONOMIC DISCUSSION. The characteristics of the studied specimens correspond to those of the subgenus *Aphis*, including the usual presence of only 2 accessory setae on the ultimate rostral segment (García Prieto & Nieto Nafría, 2005), although there is a small quantity of specimens with 3 or 4 accessory setae.

The twice-branched media in the forewings is one of the archetypical characteristics of Aphididae, which remains as such in Aphidinae and Aphidini. The media is only once-branched in some genera of this tribe, for example *Schizaphis* Börner, 1931 (Aphidini Rhopalosiphina) and *Casimira* Eastop 1966 (Aphidini Aphidina), and also in three species of *Aphis*, in addition to *Aphis* (*A.*) *prima* **sp. n.**; namely *A. (Toxoptera) aurantii* Boyer de Fonscolombe, 1841 —which is polyphagous and worldwide distributed—, *A. (A.) cottieri* Carver, 2000 —living on species of *Muehlenbeckia* (Polygonaceae) in New Zealand—, and *A. (A.) elena* Lagos-Kutz and Voegtlin, 2017 —living on *Pycnanthemum virginianum* (Lamiaceae) in the northern United States—. Thus, the once-branched media is not unique to either the subtribe or the genus, but it is extremely rare in the genus and it is not present in any of the species of the genus known in South America, with the exception of *A. (T.) aurantii*. *Aphis prima* **sp. n.** can easily be distinguished from *A. cottieri* and *Aphis elena*, because these species lack marginal tubercles on intermediate abdominal segments and have a finger-shaped cauda (Carver, 2000; Lagos-Kutz *et al.*, 2017).

Table 1.— *Aphis (A.) prima* **sp. n.**, apterous viviparous females. Metric features; in millimeters if body or body parts, in microns if setae. NOTES— ^A: 1.125–1.688 on *Quinchamalium* and 1.775–2.125 on *Arjona*; ^B: 0.60–0.82 on *Quinchamalium* and 0.53–0.62 on *Arjona*; ^C: 0.325–0.513 on *Quinchamalium* and 0.500–0.538 on *Arjona*; ^P: 0.9–0.11 on *Quinchamalium* and 0.12–0.13 on *Arjona*; ^E: 1.0–1.7 on *Quinchamalium* and 1.7–2.1 on *Arjona*; ^F: 20–34 on *Quinchamalium* and 32–59 on *Arjona*; ^G: 23–38 on *Quinchamalium* and 40–63 on *Arjona*; ^H 30–55 on *Quinchamalium* and 48–80 on *Arjona*;

Tabla 1.— *Aphis (A.) prima* **sp. n.**, hembras vivíparas. Características métricas; cuerpo y sus partes en milímetros y setas en micras. NOTAS— ^A: 1,125–1,688 en *Quinchamalium* y 1,775–2,125 en *Arjona*; ^B: 0,60–0,82 en *Quinchamalium* y 0,53–0,62 en *Arjona*; ^C: 0,325–0,513 en *Quinchamalium* y 0,500–0,538 en *Arjona*; ^P: 0,9–0,11 en *Quinchamalium* y 0,12–0,13 en *Arjona*; ^E: 1,0–1,7 en *Quinchamalium* y 1,7–2,1 en *Arjona*; ^F: 20–34 en *Quinchamalium* y 32–59 en *Arjona*; ^G: 23–38 en *Quinchamalium* y 40–63 en *Arjona*; ^H 30–55 en *Quinchamalium* y 48–80 en *Arjona*;

	Apterous viviparae n = 123	Alate viviparae n = 49
Body	1.125–2.125 ^A	1.225–1.750
Body / Siphunculus	8.0–12.1	9.03–14.09
Antenna	0.825–1.200	0.925–1.275
Antenna / Body	0.53–0.82 ^B	0.69–0.81
Antennal segment III	0.20–0.35	0.17–0.37
Antennal segment IV	0.11–0.20	0.09–0.21
Antennal segment V	0.10–0.24	0.10–0.21
Antennal segment VI, base	0.10–0.14	0.07–0.15
Antennal segment VI, processus terminalis	0.15–0.24	0.18–0.25
Antennal segment III /Antennal flagellum	0.26–0.38	0.26–0.33
Antennal segment VI: processus terminalis / base	(1.2)1.4–1.9(2.2)	1.3–2.6
Antennal segment VI processus terminalis / Antennal segment III	0.6–0.9	0.6–1.1
Ultimate rostral segment	0.11–0.16	0.11–0.14
Ultimate rostral segment / its basal width	1.9–3.1	2.3–3.4
Ultimate rostral segment / Hind tarsi second segment	1.0–1.6	1.0–1.4
Hind femur	0.325–0.538 ^C	0.34–0.51
Hind femur / Body	0.25–0.35	0.28–0.33
Hind tibia	0.575–0.938	0.650–0.950
Hind tibia / Body	0.42–0.62	0.52–0.60
Hind tarsi second segment	0.09–0.13 ^P	0.10–0.12
Siphunculus	0.11–0.21	0.10–0.18
Siphunculus / its basal width	1.6–4.9	2.1–5.0
Siphunculus / its width at middle length	2.8–5.4	3.3–5.5(6.2)
Siphunculus width / Hind tibia width, both at medium length	0.8–1.4	(0.8)1.9–1.4
Siphunculus / Cauda	1.0–2.1 ^E	1.0–1.8
Cauda	0.09–0.13	0.08–0.13
Cauda / its basal width	0.6–1.3	0.7–1.3
Longest seta on ...		
... antennal segment III	20–58 ^F	15–28
... antennal segment III / Antennal segment III subarticular width	1.3–2.9	0.6–2.2
... head, dorsal	25–58	20–33
... head, dorsal / Antennal segment III subarticular width	2.0–4.2	0.8–2.4
... hind trochanter, ventral	25–55	23–35
... hind trochanter, ventral / Trochantero-femoral suture	0.5–1.3	0.6
... hind femur (dorsal and ventral)	23–58	15–35
... hind femur / Antennal segment III subarticular width	1.4–3.5	0.9–2.6
... hind tibia, dorsal at middle length	30–73	(20)30–43
... hind tibia, dorsal / Hind tibial width, both at middle length	0.8(1.0)–1.8	(0.7)1.0–1.5
... abdominal segments 2–4	23–63 ^G	20–28
... abdominal segments 2–4 / Antennal segment III subarticular width	(1.5)1.8–3.3	0.9–1.2
... abdominal segment 8	35–65	30–53
... abdominal segment 8 / Antennal segment III subarticular width	2.5–4.9	1.5–4.0
... genital plate	30–80 ^H	20–50



Fig. 2.— *Aphis (A.) prima* sp. n., alate viviparous female [specimen ARG-371-*al.1*]. **A**, habitus (1.375 mm); **B**, abdominal segments 1 to 5 right marginal zone, tubercles on sclerites; **C**, antennal segments II (in part), III (0.30 mm), IV (0.14 mm), V (0.15 mm) and VI (0.11 + 0.20 mm).

Fig. 2.— *Aphis (A.) prima* sp. n., hembra vivipara alada [especimen ARG-371-*al.1*]. **A**, hábitus (1,375 mm); **B**, segmentos abdominales 1 a 5, zona marginal derecha, con papilas sentadas en escleritos; **C**, artejos antenales II (en parte), III (0,30 mm), IV (0,14 mm), V (0,15 mm) y VI (0,11 + 0,20 mm).



Fig. 3.— *Aphis (A.) prima* sp. n., alate viviparous females [specimen ARG-1650-al.3]. Wings, note the forewing media once-branched.

Fig. 3.— *Aphis (A.) prima* sp. n., hembra vivípara alada [especimen ARG-1650-al.3]. Alas, apréciase la medial de las alas anteriores ramificada tan solo una vez.

The apterous viviparae collected on *Arjona* (one sample) differ from those collected on *Quinchamalium* (remaining samples) in some morphological characters (see Table 1, legend). These differences are interpreted as intraspecific variations, which could be related to the latitude of the collection localities or with the species of host plant or with both.

As noted in the introduction, there are two species of *Aphis* hosted in species of Santalaceae—the family in which the *Quinchamalium* and *Arjona* were previously classified— somewhere in the world, specifically on species of *Thesium* in palaeartic territories. *Aphis thesii* has been recorded from France, Hungary, Poland and Slovakia and *A. neotheresii* from east Siberia (Russian Federation). Apterous viviparae of both species are very different of those of the new species, because they lack secondary sensoria on antennal segment III and marginal tubercles on intermediate abdominal segments, and they have a finger-like and dark cauda, conspicuously extensive dorso-abdominal sclerotization, and short setae on antennae, legs and body dorsum, and they are when alive dark brown (Holman, 1966; Pashchenko, 1993; Osiadacz & Hałaj, 2010, 2015).

In Argentina and Chile are known: (i) eight species of *Aphis* whose aptera always or occasionally have secondary sensoria on antennal segment III [six species included in “group 4” of the keys for apterous viviparae of Aphidina known in South America by Nieto Nafria *et al.* (2019), plus *A. lugentis* Williams, 1911 and *A. ortegoi* Mier Durante, García Gómez & Nieto Nafria, 2021], and (ii) twenty species without secondary sensoria but always or sometimes with marginal tubercles on the intermediate abdominal segments [16 species included in group 5 of the above-mentioned keys, plus *A. conspicua* Nieto Nafria & Mier Durante, 2019, *A. fuentesii* Nieto Nafria & Ortego, 2019, *A. gutierreziae* Ortego, Mier Durante & Nieto Nafria, 2021 and *A. ingeborgae* Nieto Nafria & Brown, 2019]. The viviparae of *A. prima* sp. n. have both secondary sensoria on antennal

segment III and marginal tubercles on intermediate abdominal segments, and also a triangular cauda and homogeneously brown tibiae. The viviparae of all of these other species have a finger-shaped cauda; most of them have bicolored tibiae (pale with a dark and contrasted distal portion). Only viviparae of *A. lugentis*—which also have secondary sensoria on antennal segment III— have homogeneously pigmented tibiae, but these are black or very dark brown.

The presence of secondary sensoria on antennal segment III of apterae, the abundant and big marginal tubercles, the long setae on antennae and legs, and the short cauda are features that *A. prima* sp. n. shares with *Pehuenchaphis agilissima* Mier Durante, Nieto Nafria & Ortego, 2003, which lives on the roots of *Senecio* (Mier Durante *et al.* 2003). However, apterous viviparae of *A. prima* can easily be separated from those of this last species, in which the siphunculi are very short (at most a little longer than their basal widths) and are placed on abdominal segment 6 (not on segment 5 as usual in Aphidini), and the antennal setae are much more abundant. The specimens of both species colonize the same part of their respective host plants, are attended by ants and move quickly when disturbed (Mier Durante *et al.*, 2003).

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References

- Angiosperm Phylogeny Group, 2009. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. *Botanical Journal of the Linnean Society*, 161 (2): 105-121. <https://doi.org/10.1111/j.1095-8339.2009.00996.x>
- Angiosperm Phylogeny Group, 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society*, 181 (1): 1-20. <https://doi.org/10.1111/boj.12385>
- Blackman, R. L. & Eastop, V. F., 2021. Aphids on World's plants. An online identification and information guide. Available from <http://www.aphidsonworldsplants.info/> (accessed October 2021).
- Carver, M., 2000. A new indigenous species of *Aphis* Linnaeus (Hemiptera: Aphididae) on *Muehlenbeckia* (Polygonaceae) in New Zealand. *New Zealand Entomologist*, 22: 3-7. <https://doi.org/10.1080/00779962.1999.9722049>

- Franielczyk-Pietrya, B. & Wegierek, P., 2017. The forewing of the *Aphis fabae* (Scopoli 1763) (Hemiptera, Sternorrhyncha): a morphological and histological study. *Zoomorphology* 136: 349-358. <https://doi.org/10.1007/s00435-017-0358-7>
- García Prieto, F. & Nieto Nafría, J. M., 2005. Género *Aphis*. In: Nieto Nafría, J. M., Mier Durante, M. P., García Prieto, F. & Pérez Hidalgo, N. *Hemiptera Aphididae III*. In M.A. Ramos *et al.* (eds.). *Fauna Ibérica vol. 28*: 30-173.
- Hassler M., 2019. World Plants: Synonymic Checklists of the Vascular Plants of the World (version Nov 2018). In: Y. Roskov, G. Ower, T. Orrell, D. Nicolson, N. Bailly, P.M. Kirk, T., Bourgoin, R.E. DeWalt, W, Decock, E. van Nieuwerkerken, J. Zarucchi & L. Penev (eds.): *Species 2000 & ITIS Catalogue of Life, 2019 Annual Checklist* Digital resource at www.catalogueoflife.org/annual-checklist/2019. Species 2000: Naturalis, Leiden, The Netherlands.
- Holman, J., 1966. Contributions to the taxonomy of the genus *Aphis* (Homoptera, Aphididae) – II. *Acta Entomologica Bohemoslovaca*, 63 (2): 91-110.
- Lagos-Kutz, D., Voegtlin, D.J. & Hartman, G., 2017. Identification of a new species of *Aphis* (Hemiptera: Aphididae) based on distinct morphology rather than DNA barcoding. *Insecta Mundi*, 0535: 1-11.
- López Laphitz, R. M., Ezcurra, C. & Vidal-Russell, R., 2015. Revisión taxonómica del género sudamericano *Quinchamalium* (Schoepfiaceae). *Boletín de la Sociedad Argentina de Botánica*, 50 (2): 235-246. <https://doi.org/10.31055/1851.2372.v50.n2.11667>
- Mier Durante, M. P., Nieto Nafría, J. M. & Ortego, J., 2003. Aphidini (Hemiptera: Aphididae) living on *Senecio* (Asteraceae), with descriptions of a new genus and three new species. *The Canadian Entomologist*, 135 (2): 187-212. <https://doi.org/10.4039/n02-065>
- Nieto Nafría, J. M., Brown, P. A., López Ciruelos, S. I. & Ortego, J., 2019. A new species of *Aphis* (Hemiptera Aphididae) living on *Troapaeolum* species (Tropaeolaceae) from Chile and Argentina. *Redia*, 102: 35-40. <https://doi.org/10.19263/REDIA-102.19.05>
- Nieto Nafría, J. M. & Mier Durante, M.P. 1998. *Hemiptera Aphididae I*. In: M.Á. Ramos *et al.* (Eds). *Fauna Ibérica, Volumen II*. Museo Nacional de Ciencias Naturales, CSIC. Madrid. 424 pp.
- Nieto Nafría, J.M. & Mier Durante, M.P., 2013. *Acyrtosiphon matilei* (Hemiptera Aphididae) in the Cantabrian Mountains (Spain). *Boletín de la Asociación Española de Entomología*, 37 (3-4): 383-384.
- Osiadacz, B. & Hałaj, R., 2010. Systematic Review of Aphids of Poland with Host Plant Index. *Silesian Natural History Monographs*, 1: 1-191.
- Osiadacz, B. & Hałaj, R., 2015. Aphids in jeopardy? Aphid communities on xerothermic habitats. *Biologia*, 70: 1118-1135, <https://doi.org/10.1515/biolog-2015-0119>
- Pashchenko, N. F., 1993. Tli roda *Aphis* (Homoptera, Aphidinea, Aphididae) zhivushchiye na rasteniyakh semeytv Lamiaceae, Limoniaceae, Onagraceae, Polemoniaceae, Primilaceae i Santalaceae na Dal'nem Vostoke Rossii {Aphids on the genus *Aphis* [...] living on plants of the families [...] in the Russian Far East}. *Zoologicheskii Zhurnal*, 72 (10): 41-53.
- Vidal-Russell, R., 2019. Phylogenetic Relationships in *Arjona* (Schoepfiaceae), a hemiparasitic herb from Southern South America. *Systematic Botany*,

44 (3): 592-599. <https://doi.org/10.1600/036364419X15620113920626>