SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

A New Species of *Aphis* L (Hemiptera: Aphididae) from South Patagonia

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Uma Nueva Especie de *Aphis* L. (Hemiptera: Aphididae) del Sur de la Patagonia

RESUMEN - *Aphis adesmiae* Delfino sp. n. se describe del sur de la Patagonia (Argentina). Esta nueva especie de áfido está asociada con el arbusto nativo *Adesmia boronioides* (Fabaceae). Los caracteres morfológicos de la hembra vivípara áptera y aspectos de su biología son descriptos e ilustrados.

PALABRAS CLAVES: *Aphis adesmiae*, Argentina

ABSTRACT - *Aphis adesmiae* Delfino sp. n. is described from South Patagonia (Argentina). This new aphid species is associated with a native shrub *Adesmia boronioides* (Fabaceae). Morphological characters of the apterous viviparous female are described and illustrated and biological remarks are given.

KEY WORDS: *Aphis adesmiae*, Argentina

South Patagonia includes three provinces (Chubut, Santa Cruz and Tierra del Fuego) located between 42º and 56º South latitude. Santa Cruz province has an area of 243,943 km^2, from 46º to 52º 30' S with three main ecosystems: temperate *Nothofagus* native forests, steppe, and the valleys cutting the plateau from West to East with soils of glacial and alluvial origin. The Andinopatagonic native forest (bordering with Chile on the west side) is a narrow (ca. 50-km wide) and long (ca. 800 km) strip of land where lenga (*Nothofagus pumilio*) and ñire (*Nothofagus antarctica*) forests are the most common ecosystems. The steppe ecosystem, mainly characterised by the presence of tussock (*Festuca* spp.), *Poa* spp. and shrubs, represents 85% of the total province area. According to Soriano (1983), the physiognomy in this region is 45% shrub desert, 30% shrub-grass semi-desert, 20% grass steppe and 5% meadow. This area supports extensive sheep production with nearly 2 million sheeps. The impact of commercial activities on the environment affects the ecological equilibrium and species diversity (Haight 1995). Therefore, sustainable management, including biodiversity conservation strategies, is needed in the steppe environment.

The goal of the present work was to describe an unknown species of *Aphis* L associated with native shrubs of South Patagonia. The aphid samples were collected from Güer Aike Department (51º38'S, 69º38'W) in Santa Cruz province. Climate in this area is dry, cold and one of the windiest places of the world (Soto 2004). Mean rainfall is 225 mm per year (part of that is snow) and potential evapo-transpiration ranges between 0.5 mm/d in winter and 4.5 mm/d in summer with low relative humidity (Soto 2004). Temperature is maximum from December to February (mean maximum temperature of 18ºC) and minimum in June-July (mean minimum temperature of -3ºC) (Soto 2004). Summer is short, but with long days because of the high latitude. The windiest season is from November to March, decreasing in winter. Severe and frequent windstorms occur in spring-summer seasons with wind gusts over 120 km/h (Soto 2004).

Material and Methods

Samples of aphids were collected during February 2003 on *Adesmia boronioides* (Fabaceae). *Adesmia boronioides* is an erect shrub up to 2 m tall and 1 m in diameter, with branched stems (Correa 1984). Leaves have 15-40 glabrous leaflets with apical resin glands (Moore 1983). Yellow inflorescence of 10-30 flowers in lateral or terminal racemes (Moore 1983). Blooming occurs from November to January. Fruit (15-18 mm) has black resin glands (Moore 1983). *Adesmia boronioides* occupies mainly disturbed or eroded soils as those near routes, on hills with slopes up to 50º and on sandy dunes near the coast, forming dense populations sometimes associated with *Senecio* shrubs (Boelcke *et al* 1985). Soils preferred by *Adesmia* spp. are sandy clay loam, sandy loam, sandy clay and sandy textures over gravels with

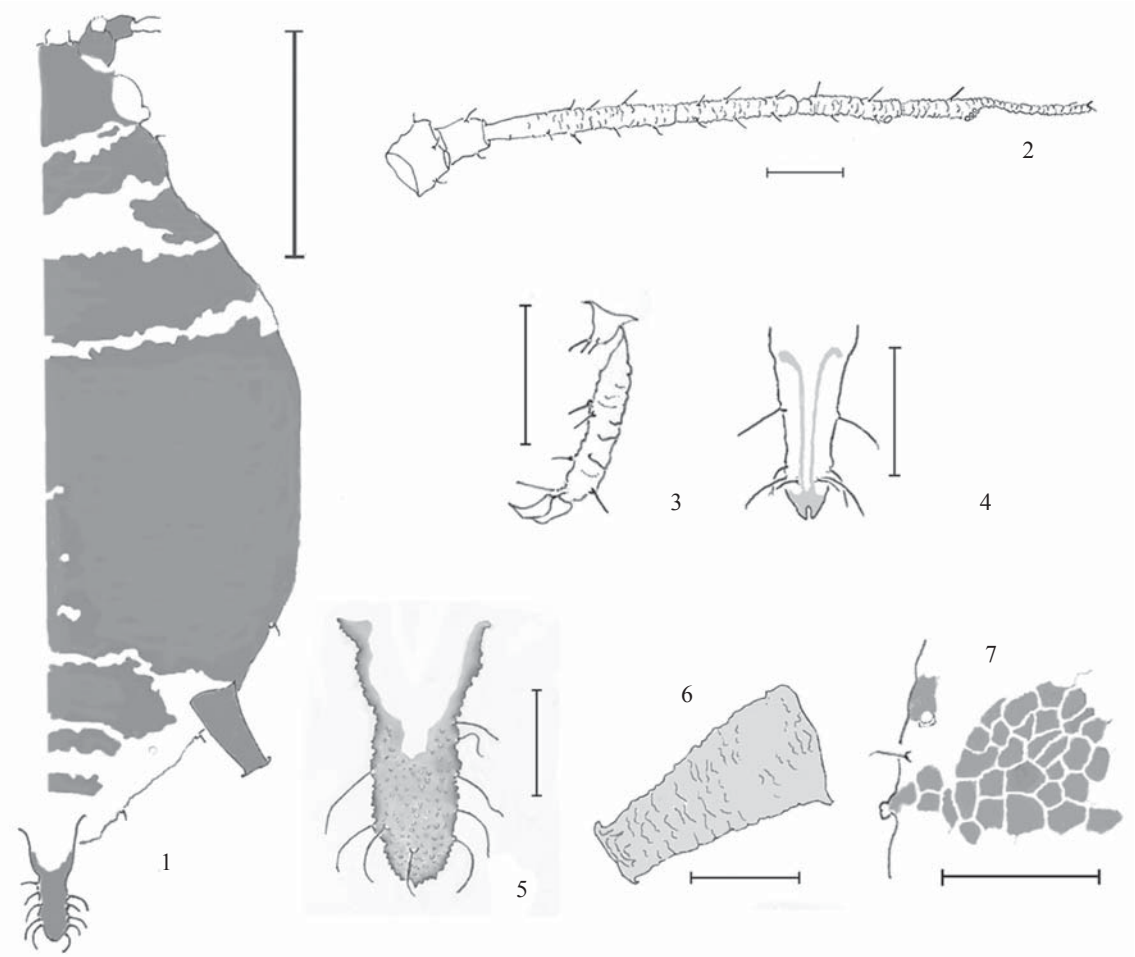
medium to free draining, pH = 6.0-6.5 and medium-poor content of organic matter (1.0-1.6%) in the first horizon of 5-10 cm (Boelcke *et al* 1985). Aphids for morphological examination were preserved in tightly stoppered tubes filled with 65% ethanol, and prepared for mounting in Canada balsam following Remaudière (1992).

Abbreviations used in the key are as follows: AntI, AntII and AntIII are antennal segments I, II and III, respectively; AbdVIII is abdominal segment VIII.

Aphis adesmiae Delfino sp. n.

Apterous viviparous female. Color in life: shiny black, without waxy powder. Color in cleared specimens: head, antennal segments I, II, distal part of V and VI, rostrum, legs except for basal part of femora and basal ¾ of tibiae, dorsal sclerites, siphunculi, genital and anal plates, and cauda brown to dark brown. Morphological characters: body plump oval, 1.26-2.14 mm long, 2.33-3.37 times as long as siphunculus (Fig 1). Fronts sinuate with median convexity and lateral prominences of about equal height. Dorsal cephalic hairs from 0.022-0.030 mm long with blunt apices. Antenna 6-segmented (Fig 2); proportions of the antennal segments III-VI (ranges): 100(III): 57-74 (IV): 56-70 (V): 36-52 (base of VI) + 54-87 (proc. term.). Antennal segment III = 0.18-0.34 mm, IV = 0.13-0.25 mm, V = 0.12-0.22, VI (base) = 0.09-0.12 mm, VI (processus terminalis) = 0.15-0.19 mm; flagellar segments (III-VI) together 0.44-0.56 times body length; processus terminalis 1.46-1.69 times as long as basal part of last segment. Antennal segment III with pale and acute hairs with clearly defined apices, (0.018) 0.024-0.028 mm long and 0.82-1.27 times basal diameter of this segment; secondary sensoria absent. Rostrum reaching the hind coxae, ultimate rostral segment 0.12-0.15 mm long, 2.25-2.71 times as long as its basal width (Fig 4), 1.00-1.12 longer than hind tarsal segment II, 2.25-2.71 times base of antennal segment VI, with straight sides and 2 accessory lateral setae.

Spino-pleural bars present on thoracic segments. Marginal tubercles present on pronotum which are distinctively conical, very small, and irregularly absent on one side. Hind femora (0.35) 0.47-0.63 mm, about 0.25-0.31 of the body length; hind tibiae (0.70) 0.86-1.12 mm



Figs 1-7 *Aphis adesmiae* Delfino sp. n., apterous viviparous female. 1) Dorsal right half; 2) Antenna; 3) Hind tarsus; 4) Apical rostral segment; 5) Cauda; 6) Siphunculus; 7) Marginal papilla and seta of abdominal segment I. Scale bars: 1= 0.5 µm; 2-7= 0.10 µm.

long and about 0.45-0.57 (0.68) of the body length. Femur mostly dark with pale basal portion. Posterior hair on hind trochanter 0.050-0.064 mm long, 0.86-1.09 times as long as diameter of trochantro-femoral suture. First tarsal segment with 3:3:3 hairs. Hind tarsal segment II 0.12-0.14 mm long (Fig 3).

Abdominal dorsum with a solid black carapace-shape sclerite, extending from metanotum to tergite VII inclusive and reaching the abdominal margins to include the marginal sclerites, sometime with small pale perforations. Tergite VIII with whole cross bar reaching the margins, bearing four hairs 0.030-0.034 mm long and 1.15-1.83 times basal diameter of antennal segment III. Cuticle of dorsal sclerites on thorax and abdomen with reticulate pattern of hexagonal fields. Tergal hairs with blunt apices, those on tergite II maximally 0.020-0.032 mm long (Fig 7). Marginal tubercles (papillae) usually present on abdominal tergites I and VII, like those on pronotum, and irregularly absent on one side. Siphunculus (Fig 6) evenly black, densely imbricated, tapering from base to small flange, 0.12-0.28 mm long, 1.93-3.33 times its basal width and 0.80-1.09 times as long as cauda. Genital plate with 2-8 setae on anterior half and 10-16 arranged along posterior margin. Cauda finger-shaped, (0.15) 0.21-0.25 mm long and with 11-18 rather recumbent setae (Fig 5).

Type material. Holotype: apterous viviparous female collected on *A. boronioides* at Güer Aike (Santa Cruz province, Argentina), 27-II-2003, Delfino & Monelos, leg., in the collection of the Universidad Nacional de Córdoba (Cátedra de Entomología). One slide containing the holotype and three paratypes (the holotype is the upper right specimen). Paratypes: 11 apterous viviparous females. Three in the same slide as the holotype, 4 in another slide (all in the collection of Universidad Nacional de Córdoba, Córdoba, Argentina); and 4 in a third slide kept in the collection of The Natural History Museum (London, United Kingdom).

Biology and distribution. *Aphis adesmiae* is possibly monoecious and holocyclic on *A. boronioides*. Dense colonies have been found on the aerial parts of the plant, mainly on stems and inflorescences. The magnitude of the colonization rate of the population of *Adesmia* monitored was very important: varying from no (0%) colonized plants in spring to 100% of colonized plants in mid-summer (every plant with a huge number of colonies). Observations of colonies were made over several stems of 30 plants. The rate of population decrease was also dramatic: by late summer there were nearly no aphids alive.

The host plant *A. boronioides* is distributed in Argentina from 48º00' to 51º52'S (Toursarkissian 1980). This range may constitute the potential area of distribution of the new aphid species. The alatae and sexual forms are not known.

Discussion. *Aphis adesmiae* belongs to the rather difficult species-group often referred to by the name *craccivora* or *Pergandeida*. According to Stroyan (1972), the limits of this group are hard to define, since no morphological characters seem to be exclusive to their members. Predominantly, the group is characterized by a strong tendency to develop an extensive dorsal sclerotic pattern in the apterous vivipare, by the possession of a rather darkly pigmented cauda and by a biological association with Fabaceae and Euphorbiaceae plants. But there are a number of species living on other families including Asteraceae, Polygonaceae, Ericaceae and Rosaceae (Blackman & Eastop 2006). Furthermore, none of the species are known to be heteroecious, although one at least (*Aphis craccivora* Koch) is rather strongly polyphagous (Blackman & Eastop 2006).

The new species is closely related to *Aphis craccae* L, from which it is distinguished by the different patterns of its dorsal sclerotization which is more extended, covering the margins of the body and occasionally broken up into cross bars. It differs from *A. craccae* by the following combination of characters (characters of *A. craccae* taken from Stroyan 1972): The hind tarsal segment II is shorter than in *A. craccae* (0.12-0.14 mm and 0.15-0.16 mm, respectively) and the higher ratio of the last rostral segment /hind tarsal segment II (1.00-1.12 and 0.85-0.87 respectively). The ratio of the processus terminalis/base of antennal segment VI is 1.40-1.69 in *A. adesmiae* and 1.70-2.4 in *A. craccae*. *Aphis adesmiae* is shining black, while *A. craccae* is black and wax powdered and the host plant is *Vicia cracca*; it had also been recorded from other *Vicia* spp., but not from *Vicia faba*.

The identification key provided by Mier Durante *et al* (2006) to the apterous viviparous females of *Aphis* species with large dorsal abdominal sclerotization recorded from South America can be modified to include the new species as follows:

Key couplets 1-10 [without modifications]

11. Femora mostly dark pigmented, with a pale basal portion. Ant. II as dark as Ant. I, and both are darker than Ant. III. Setae on Abd. VIII 20-38 µm long..... 11b

- Femora (specially prothoracic and mesothoracic) mostly pale, sometimes dusky to brown on distal portion. Ant. II paler than Ant. I and nearly as pale as Ant. III. Setae on Abd. VIII 30-65 µm long..... 12

11b. Setae of Ant. III 10-14 µm long. Posterior seta on hind trochanter 22-43 µm long. First tarsal segment with 3:2:2 setae. Abd. VIII with two (occasionally three or four) setae. Cauda with 4-10 setae..... *A. roberti*

- Setae of Ant. III 24-28 µm long. Posterior seta on hind trochanter 50-64 µm long. First tarsal segment with 3:3:3 setae. Abd. VIII with four setae. Cauda with 11-18 setae .... *A. adesmiae*

Couplets 12 and beyond without change.

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