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Aphelinus species (Hymenoptera: Aphelinidae) from the Iberian Peninsula, with the description of one new species from Portugal

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Aphelinus species (Hymenoptera: Aphelinidae) from the Iberian Peninsula, with the description of one new species from Portugal

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Abstract
The aphelinid genus *Aphelinus* is recorded for the first time from Portugal, with new records for eight species. *Aphelinus daucicola* Kurdjumov is recorded for the first time for the Iberian Peninsula and *A. lusitanicus* Japoshvili and Abrantes sp. n. is described as new. *Aphelinus toxopteraphidis* Kurdjumov is synonymized with *A. varipes* (Förster). Distribution, synonyms, and host information, where available, are given for each species treated. A key to *Aphelinus* species from the Iberian Peninsula is provided.

Keywords: *Aphelinidae,* Aphelinus lusitanicus*, Iberian Peninsula, Portugal*

Introduction

One of the most important groups for the biological control of plant-feeding insects is the parasitic wasps of the superfamily Chalcidoidea (Yasnosh 1995; Noyes 2005). Aphelinidae attack Hemiptera, Orthoptera, Hymenoptera, Diptera, and Lepidoptera. Most species are parasitic upon Hemiptera in the superfamilies Coccoidea, Aleyrodoidea, and Aphidoidea (Yasnosh 1995). *Aphelinus* is one of the most important for regulation of aphids. Species have been used against many aphid pests, most successfully *A. mali* (Haldeman) for biological control of *Eriosoma lanigerum*, the woolly apple aphid (Nikol'skaya and Yasnosh 1966; Yasnosh 2002).

Prior to our studies on *Aphelinus* species from the Iberian Peninsula, the following eight species were known from Spain: *A. abdominalis* (Dalman), *A. asychis* Walker, *A. chaonia* Walker, *A. flaviventris* Kurdjumov, *A. humilis* Mercet, *A. mali* (Haldeman), *A. semiflavus* Howard, and *A. varipes* (Förster). For Portugal there were no previous records of *Aphelinus* species (Noyes 2005).

Terminology follows that of Nikol'skaya and Yasnosh (1966), Graham (1976), and Yasnosh (1978, 1995, 2002).

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The following abbreviations are used in the text: DAO, diameter of anterior ocellus; DPO, diameter of posterior ocelli; EL, maximum eye length; F1, F2, etc. first funicle segment, second funicle segment, etc.; FV, maximum frontovertex width; GL, maximum gonostylus (=third valvula) length; GW, gonostylus width; MS, malar space (=the shortest distance from the eye to mouth margin); MSL, length of mesoscutum; MT, mid-tibia length; OOL, ocular–ocellar line (=the shortest distance between posterior ocellus and adjacent eye margin); POL, posterior ocellar line (=the shortest distance between the posterior ocelli).

Aphelinus Dalman, 1820

Aphelinus Dalman 1820, p 181.
Type species *Entedon abdominalis* Dalman, by original designation.

Diagnosis

Body black, rarely with yellow parts. Head width equal or slightly wider than thorax. Mandibles with one tooth and a truncation. Maxillary palps two-segmented, labial palps one-segmented. Antennae six-segmented, with three funicular segments. First two flagellar segments shorter than third segment. Thorax slightly longer than wide. Mesoscutum setose, with a pair of elongate setae at the apex. Scutellum shorter than mesoscutum. Fore wings 2–2.5 times as long as wide. Marginal vein as long as, or slightly shorter, than submarginal vein. Stigmal vein very short, almost sessile, and postmarginal vein not developed. Legs with five tarsal segments. Mid-tibial spur as long as, or slightly shorter, than tarsus first segment. Ovipositor very slightly exserted. Sternite 7 almost reaching apex of gaster.

Key to females of Iberian species of *Aphelinus*

1. Brachypterous: tip of forewing, at rest, not reaching apex of gaster. *asychis* Walker
– Macropterous: tip of forewing, at rest, reaching beyond apex of gaster . . . 2

2. Costal cell of forewing with only one complete row of setae or without setae . . 3
– Costal cell of forewing with two or three complete rows of setae 5

3. Hind ocelli larger, separated by less than their own major diameter from the orbits of eyes, antenna with third funicular segment subquadrate, F2 slightly longer than F3 . . . . . *abdominalis* Dalman
– Hind ocelli very small, separated by more than their own major diameter from the orbits of eyes, antenna with third funicular segment slightly longer than broad, F2 almost as long as F3 4

4. Hind femora yellow . . . . . *asychis* Walker
– Hind femora dark brown . . . . . *lusitanicus* sp. n.

5. Legs, including fore and mid coxae and usually the distal part of the hind coxae, also the antennae, yellow . . . . . *flaviventris* Kurdjumov
– Legs more extensively darkened 6

6. All the femora broadly, or mainly darkened, if pale then gaster entirely black . . . . . *daucicola* Kurdjumov
– At least hind femora entirely yellow or very slightly infuscate in the middle . . 7

7. Fore wing basad of speculum, with only one complete line of hairs *mali* (Haldeman)
– Fore wing basad of speculum, with more numerous hairs in two or more lines . 8

8. All femora entirely yellow 9
– At least the mid-femora slightly infuscate medially 10

9. First segment of hind tarsi yellow or yellowish; head black or brown but never with any clear yellow markings . . . . . *varipes* (Förster)
– First segment of hind tarsi infuscate at least basally; at least partly yellow . . . . . *humilis* Mercet

10. First segment of hind tarsi yellow or yellowish; forewing with speculum partly to almost wholly closed below by a line of hairs on the upper surface of the wing . . . . . *varipes* (Förster)
– First segment of hind tarsi infuscate at least basally; forewing with speculum open below 11

11. Gaster clear yellowish at least at apex, often also at its base . . . *humilis* Mercet
– Gaster and head entirely black . . . . . *chaonia* Walker

Aphelinus **species from Portugal**

Aphelinus abdominalis (Dalman, 1820)

Material examined

Portugal: 31 March 2005, G. Japoshvili; 1♀, Coimbra, 1 April 2005, G. Japoshvili (MZUC, Museum of Zoology, University of Coimbra); 2♀, Alentejo, 12 April 2005, G. Japoshvili; 1♀, Coimbra, 7 April 2005, G. Japoshvili (IZGAS, Institute of Zoology, Georgian Academy of Sciences).

Distribution

Argentina, Australia, Austria, Azerbaijan, Belgium, Brazil, Channel Islands (British Is), Chile, Croatia, Czech Republic, Germany, Denmark, France, Georgia, Hungary, India, Ireland, Iraq, Italy, Japan, Kazakhstan, Pakistan, Poland, Russia, Slovakia, Spain (incl. Canary Islands), Switzerland, Yugoslavia (Federal Republic), Sweden, South Africa, UK and Zimbabwe (Noyes 2005).

Hosts

Acyrthosiphon caraganae, *A. papaverinum*, *A. pisum*, *Acyrthosiphon* sp., *Aphis craccivora*, *A. fabae*, *A. gossypii*, *A. spiraecola*, *A. viburni*, *Aphis* sp., *Corylobium avellanae*, *Dysaphis reaumuri*, *Ericaphis* sp., *Hyalopterus arundinis*, *H. pruni*, *Lipaphis erysimi*, *Macrosiphoniella pulvera*, *Macrosiphum euphorbiae*, *M. funestum*, *M. rosae*, *Macrosiphum* sp., *Metopolophium dirhodum*, *Myzus ascalonicus*, *M. persicae*, *Myzus* sp., *Neomyzus* sp., *Rhopalosiphum maidis*, *R. padi*, *Schizaphis graminum*, *Sitobion avenae*, *Thelaxes dryophila*, *Toxoptera aurantii*, *T. graminum*, and *Wahlgreniella ossiannilssoni* (Hemiptera: Aphididae) (Noyes 2005).

Aphelinus asychis Walker, 1839

= *A. semiflavus* Howard.

Material examined

Portugal: 1♀, Coimbra, 13 October 2004, G. Japoshvili; 1♀, Coimbra, 17 October 2004, G. Japoshvili (MZUC); 1♂, Porto, Gaia, 23 October 2004, G. Japoshvili; 1♂, Coimbra, 26 October 2004, G. Japoshvili; 1♂, Coimbra, 26 October 2004, G. Japoshvili; 2♀, Coimbra, 31 March 2005, G. Japoshvili; 4♀, Coimbra, 7 April 2005, G. Japoshvili; 1♀, Lisbon, 9 April 2005, G. Japoshvili (IZGAS).

Distribution

Angola, Argentina, Australia, Azerbaijan, Brazil, Chile, China, Colombia, Croatia, Czech Republic, Finland, France, Greece, Georgia, Germany, Hungary, India, Iran, Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Morocco, Mexico, Nepal, Pakistan, Russia, Slovakia, South Africa, Spain (incl. Canary Islands), Sweden, Turkey, Ukraine, UK and USA (Noyes 2005).

Hosts

Agromyzidae (unspecified), *Phytomyza atricornis* (Diptera: Agromyzidae); *Acyrthosiphon* sp., *Acyrthosiphon kondoi*, *A. pisum*, *Acyrthosiphon* sp., *Aphis chloris*, *A. citricola*, *A. craccivora*, *A. gossypii*, *A. helianthi*, *A. nerii*, *Aphis* sp., *Aulacorthum solani* (=*Myzus convolvuli*, *Macrosiphum convolvuli*) (Hille Ris Lambers 1949), *Brachycaudus persicae*, *Brachycolus korotnevi* (Shaposhnikov 1964), *Brevicoryne brassicae*, *Brevicoryne* sp., *Chaetosiphon fragaefolii*, *Diuraphis noxia* (=*Brachycolus noxius*) (Blackman and Eastop 2000), *Diuraphis* sp., *Elatobium abietinum*, *Holcaphis tritici* (=*Diuraphis tritici*) (Miller and Stoetzel 2005), *Hyperomyzus lactucae*, *Lipaphis erysimi*, *Lipaphis* sp., *Macrosiphoniella* sp., *Macrosiphum* sp., *M. euphorbiae*, *Megoura viciae*, *Metopolophium dirhodum*, *M. festucae*, *Myzaphis* sp., *M. rosarum*, *Myzus ornatus*, *M. persicae* (=*Myzodes persicae*) (Blackman and Eastop 1994), *Myzus* sp., *Nasonovia ribisnigri*, *Neomyzus* sp., *Rhopalosiphum maidis*, *R. padi*, *Sipha* (=*Rungsia*) *maydis* (Blackman and Eastop 2000), *S. flava*, *S. glyceriae*, *Schizaphis graminum*, *Schizaphis* sp., *Sitobion avenae* (=*Macrosiphum avenae*) (Blackman and Eastop 2000), *Therioaphis maculata*, *T. trifolii*, *Toxoptera citricidus*, *Uroleucon* (=*Dactynotus*) *helianthicola* (Remaudière and Remaudière 1997; Noyes 2005).

Aphelinus chaonia Walker, 1839

Material examined

Portugal: 1♀, Coimbra, 26 October 2004, G. Japoshvili (slide); 1♀, Figueira da Foz, 23 March 2005, G. Japoshvili (IZGAS).

Distribution

Austria, Azerbaijan, Brazil, Chile, China (incl. Hong Kong), Croatia, Czech Republic, Germany, France, Georgia, Hungary, Ireland, Lithuania, Pakistan, Poland, Russia, Novosibirsk Oblast, Slovakia, Yugoslavia (Federal Republic), Serbia, Spain, Sweden, Turkey, Ukraine, UK and USA (Noyes 2005).

Hosts

Aphis craccivora, *A. euonymi*, *A. fabae*, *A. gossypii*, *A. sambuci*, *A. spiraecola*, *A. taraxacicola*, *Aphis* (=*Doralis*) sp. (Shaposhnikov 1964), *Brachycaudus helichrysi*, *Dysaphis* sp., *Hayhurstia atriplicis* (=*Semiaphis atriplicis*) (Miller and Stoetzel 2005), *Phorodon* sp., *Ovatus crategarius* (=*Phorodon crataegaria*) (Blackman and Eastop 1994), *Rhopalosiphum padi*, *Toxoptera aurantii*, *Toxoptera* sp. (Noyes 2005).

Aphelinus daucicola Kurdjumov, 1913

Material examined

Portugal: 1♀, Coimbra, 11 November 2004, G. Japoshvili (slide) (IZGAS).

Distribution

Azerbaijan, Croatia, Czech Republic, France, Georgia, Hungary, Kazakhstan, Macedonia, Slovakia, Serbia, UK and Yugoslavia (Noyes 2005).

Hosts

Acuticauda erigerontis, *Aphis* sp., *Brachycaudus* sp., *B. cardui*, *Uroleucon* (=*Dactynotus*) sp. (Remaudière and Remaudière 1997), *Dysaphis* sp., *Hyadaphis* sp., *H. foeniculi* (=*H. passerinii*) (Miller and Stoetzel 2005), *Phorodon* sp., *Rhopalosiphum* sp., *Toxoptera* sp. (Hemiptera: Aphididae) (Noyes 2005).

Aphelinus humilis Mercet, 1927

Material examined

Portugal: 1♂, Coimbra, 7 November 2004, G. Japoshvili (IZGAS).

Distribution

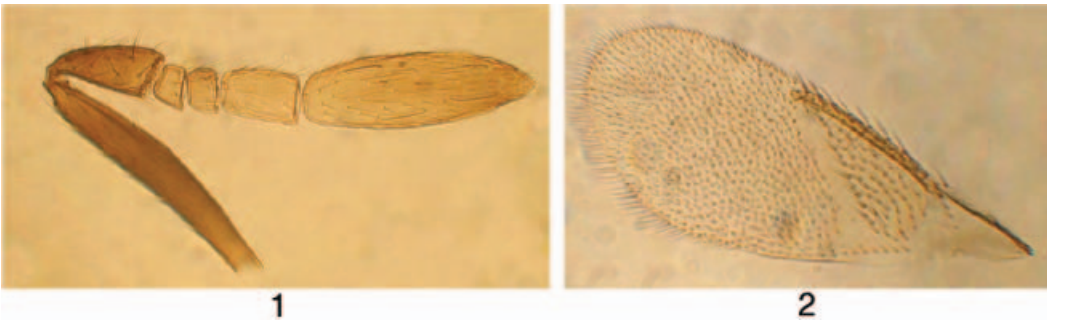
Argentina, Belarus, Chile, Czech Republic, India, Moldavia, Netherlands, Slovakia, Spain, Sweden, Ukraine and UK (Noyes 2005).

Hosts

Aphis (=*Protaphis*) sp., *Brachycaudus helichrysi*, *B. spiraceae*, *Hyalopterus pruni*, *Macrosiphum* sp., *Myzus* (=*Myzodes*) *ligustri* (Smits and Parron 1978) (Hemiptera: Aphididae) (Miller and Stoetzel 2005; Noyes 2005).

Aphelinus lusitanicus Japoshvili and Abrantes sp. n.
(Figures 1, 2)

Holotype: Portugal: 1♀, Porto, Gaia, 23 October 2004, G. Japoshvili (Institute of Zoology, Georgian Academy of Sciences).



Figures 1, 2. *Aphelinus lusitanicus* new species, female. (1) Antenna. (2) Fore wing.

Description

Parts of the following description, notably colour and relative dimensions of the head, were made from the holotype before it was mounted on a slide.

Head and thorax very dark brown, almost black, with green metallic reflection. Gaster brown, only basal and apical parts slightly paler than centrally. Legs brown, only apical tibiae and first tarsal segment infuscate yellow. Antennal scape and pedicel also brown, remainder infuscate yellow. Forewings infuscate.

Scape slightly more then 7 × as long as wide. Pedicel 2.5–2.6 × as long as wide. First two flagellar segments almost 0.6 × as long as pedicel. F3 1.5–1.6 × as long as wide. Clava 2.8–3 × as long as F3, 3 × as long as wide and 2 × as long as scape. F5 about 3 × as wide as head. Head about 1.25 × as wide as high.

Pronotum with one long seta on each side. Mesoscutum covered by setae, and at the apex a pair of long setae. Axillae with a long seta on each side. Scutellum with three pairs of long setae. Forewings 2.6 × as long as wide. Longest setae on the fore wing margin 1/18 as long as forewing. In front of linea calva five to six lines of setae varying from 60 to 64. Number of setae in costal cell: one to seven. Marginal vein almost 1.5 × as long as submarginal. Hind wing about 4.4 × as long as wide. Mid-tibial spur 0.7 × as long as tarsal first segment on the longer side.

Exserted part of ovipositor no longer than three-quarters of mid-tibial spur. Gonostylus 0.4 × as long as mid-tibia.

Relative measurements: DAO 8; DPO 5; EL 70; GL 43; GW 9; MS 37; MT 100; MTS 22; OOL 7; POL 32.

Diagnosis

The new species is most closely related to *A. asychis*, but differs by the following morphological characters: distal pronotum of the new species with one pair of long setae on each side; in *A. asychis* the pronotum bears three to five pairs of long setae on each side; hind femora of the new species are dark brown, while those of *A. asychis* are entirely yellow; clava of new species about 0.82 × as long as scape, while clava of *A. asychis* 0.88 × as long as scape.

Aphelinus mali (Haldeman, 1851)

Material examined

Portugal: 1♀, Figueira da Foz, 23 March 2005, G. Japoshvili (IZGAS).

Distribution

Argentina, Australia, Austria, Azerbaijan, Bolivia, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Germany, Ecuador, Egypt, France, Georgia, Indonesia, India, Iraq, Israel, Italy, Japan, Korea, Lebanon, Malta, Mexico, Moldova, Netherlands, New Zealand, Pakistan, Paraguay, Peru, Philippines, Poland, Puerto Rico, Romania, Russia, Saudi Arabia, Senegal, Slovakia, Spain (incl. Canary Islands), Sweden, Switzerland, Tadzhikistan, Trinidad & Tobago, Turkey, Ukraine, UK, Uruguay, USA, Uzbekistan, Venezuela, Yugoslavia (former), South Africa, Zambia and Zimbabwe (Noyes 2005).

Hosts

Anuraphis schwartzi, *Aphis gossypii*, *A. monardae*, *A. pomi*, *A. spiraecola*, *A. tavaresi*, *Aphis* sp., *Brevicoryne brassicae*, *Ceratovacuna lanigera*, *Colopha eragrostidis*, *C. graminis*, *Dactynotus floridae*, *Eriosoma americanum*, *E. crataegi*, *E. lanigerum*, *E. pyricola*, *Eriosoma* sp., *Macrosiphum floridae*, *M. rosae*, *Macrosiphum* sp., *Mordwilkoia vagabunda*, *Myzus lythri*, *M. persicae*, *Prociphilus fraxinifolii*, *Schizaphis graminum*, *Schizoneura americanum*, *Tetraneura graminis*, *Toxoptera aurantii* (Hemiptera: Aphididae) (Noyes 2005).

Aphelinus varipes (Forster, 1841)

Aphelinus toxopteraphidis Kurdjumov syn. nov.

Material examined

Portugal: 1♀, Coimbra, 10 November 2004, G. Japoshvili; 1♀ (large), Coimbra, 13 October 2004, G. Japoshvili; 1♀ (small) Coimbra, 13 October 2004, G. Japoshvili; 2♀, 1♂, Coimbra, 11 November 2004, G. Japoshvili; (slides) 1♀, Coimbra, 17 October 2004, G. Japoshvili; 1♀, Coimbra, 7 November 2004, G. Japoshvili; 1♀, 1♂, Coimbra, 11 November 2004, G. Japoshvili (IZGAS). 1♀, Coimbra, 11 November 2004, G. Japoshvili; 1♂, Porto, Gaia, 23 October 2004, G. Japoshvili; 1♀, Coimbra, 26 October 2004, G. Japoshvili (MZUC, Museum of Zoology, Coimbra University).

Variation

All coxae dark brown. Only femora yellow, tibia and tarsal segments infuscated. Gonostyles 0.4–0.6 × as long as mid-tibia.

Remarks

In the authors' opinion *Aphelinus toxopteraphidis* Kurdjumov is a synonym of *A. varipes*. We base this on the fact that the morphological variation observed in specimens of *A. varipes*, particularly the transition from smaller to larger specimens, easily accommodates our understanding of *A. toxopteraphidis* morphology. However, we have not examined type material of either species, so the synonymy must remain provisional pending a thorough revision based on available type material. In the first author's opinion, *A. flaviventris* Kurdjumov is another probable synonym of *A. varipes*.

Distribution

Australia, Chile, Croatia, Czech Republic, Egypt, France, Germany, Georgia, Hungary, Ireland, Israel, Italy, Japan, Kazakhstan, Morocco, Mexico, Nepal, Russia (Primor'ye Kray), Slovakia, Yugoslavia (Federal Republic), Serbia, Spain, Turkey, Ukraine, UK and USA (Noyes 2005).

Hosts

Aleyrodidae (Aleyrodoidea); *Acyrthosiphon pisum*, *Aphis fabae*, *A. gossypii*, *A. helianthi*, *Aphis* sp., *Diuraphis noxia* (=*Brachycolus noxius*) (Blackman and Eastop 2000), *Diuraphis* (=*Brachycolus*) *muehlei* (Miller and Stoetzel 2005), *Hysteroneura setariae*, *Melanaphis donacis*, *Metopolophium dirhodum*, *Rhopalosiphum insertum*, *R. maidis, R. padi*, *Schizaphis graminum* (=*Toxoptera graminum*) (Miller and Stoetzel 2005), *Sipha* sp., *Sitobion avenae* (Aphididae); *Pseudococcus* sp. (Pseudococcidae) (Hemiptera) (Noyes 2005).

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