First report of the genus *Cymodusa* (Ichneumonidae: Campopleginae) from Iran

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**ABSTRACT.** A survey was conducted to identify the parasitic wasps of the subfamily Campopleginae (Hym.: Ichneumonidae) in Fars province (southern Iran) during February 2011 – August 2013. Specimens were collected using Malaise traps and sweeping nets. Two new record species of the genus *Cymodusa* (Ichneumonidae, Campopleginae) were identified: *C. longiterebra* Dbar, 1985 and *C. australis* (Smits van Burgst, 1913). An identification key, morphological diagnosis and geographical distribution of Iranian *Cymodusa* are provided.

**Key words:** Ichneumonidae, Campopleginae, Fars province, new record, Taxonomy

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**Introduction**

The family Ichneumonidae with 39 subfamilies and more than 23000 described species is one of the largest families in the class Insecta (Quick, 2015). In recent years, some studies about Ichneumonidae subfamilies from Iran have been done (Mohammadi-Khoramadadi, Talebi, & Zwakhals, 2013; Mohammadi-Khoramadadi & Talebi, 2013; Amiri et al., 2015a, b; Amiri et al., 2016; Barahoei et al., 2013, 2014; Ghahari et al., 2014; Ghahari & Jussila, 2014; Sarafi et al., 2015), however the subfamily Campopleginae has poorly studied in our countries (Barahoei, Rakhshani & Riedel, 2012). Campopleginae is one of the largest and important subfamilies of ichneumonid wasps that widely investigated from biocontrol aspects (Gauld, 1995; Quicke, 2015). The genus *Cymodusa* Holmgren, 1859 is a moderately large genus in this subfamily (Kolarov & Yurtcan, 2008; Choi, Kolarov & Lee, 2013). This genus contains about 42 described species from the Palaeartic, Neartic, Neotropical and Oriental regions (Yu, van Achterberg & Horstmann, 2012; Choi, Kolarov & Lee, 2013) but the majority of species are distributed in Palaeartic region (Yu, van Achterberg & Horstmann, 2012). Palaeartic species of *Cymodusa* was reviewed and keyed by Dbar (1984, 1985), after that five species...
have been added to his work (Kolarov & Yurtcan, 2008; Kolarov & Coruh, 2008; Choi, Kolarov & Lee, 2013). Dbar (1985) divided the members of Cymodusa into four species groups (jaceki group, leucocera group, australis group and convergator group). The australis group includes eight species (e.g., C. australis Smits van Burgst (1913), C. orientalis Uchida (1956), C. longiterebra Dbar (1985), C. tibialis Dbar (1985), C. rufiventris Dbar (1985), C. aenigma Dbar (1985), C. parva Dbar (1985) and C. oculator Dbar (1985)) in the Palaearctic region and three species (e.g., C. dravida Gupta & Gupta (1974), C. josephi Gupta & Gupta (1974) and C. shiva Gupta & Gupta (1974)) in Oriental region. Members of this genus usually occur among grasses and they are parasitoids of Lepidoptera (Kolarov & Yurtcan, 2008). The “australis” group can easily be distinguished from the other species groups by the following characteristics: temple very narrowed, areolet receiving second recurrent vein before the middle, sixth and seventh tergites deeply emarginated in dorsal view (Dbar, 1985). Current study is the first report of the genus Cymodusa with two record species belong to “australis” group were collected from Fars province in southern Iran.

**Material and methods**

Materials used in this study were collected using sweeping net and Malaise traps that were installed at two locations in Jahrom (Citrus garden) and Eghlid County, Dejekord in south and north of Fars province, respectively. Specimens were collected during February 2011 to August 2013. Samples were extracted from the collecting jars in an interval of two weeks and transferred to the laboratory in Tarbiat Modares University. The collected wasps were sorted from the samples and then chemically dried and mounted for taxonomic study. Specimens treated with mixture of ethanol (60%) /Xylene (40%) for 18 hours, followed by Amyl acetate for 12 hours (AXA) and finally placed on the filter paper for drying (van Achterberg 2009). The dried specimens were then card mounted and labeled. Morphological terminology predominantly follows Townes (1969) and (Yoder et al., 2010).

Microsculpture terminology follows Eady (1968). Relevant literatures (Townes, 1970; Dbar, 1984, 1985; Kolarov & Coruh, 2008; Kolarov & Yurtcan, 2008; Choi, Kolarov & Lee, 2013) were used for identification of the specimens. Illustrations were taken using an Olympus™ SZX9 stereo-microscope equipped with a Sony™ digital camera. A series of 7–10 captured images were merged into a single in-focus image using the image-stacking software Helicon Focus 6. The specimens (C. australis 35 f*, 22 m*; C. longiterebra 7 f*, 11 m*) are deposited in the Collection of Department of Entomology, Tarbiat Modares University (TMUC), Tehran, Iran. One sample from each species (C. australis and C. longiterebra) is deposited in General Station of Forest Pest Management, Shenyang, Liaoning collection, China (GSFPMC). The following abbreviations and acronyms were used: OOL: Ocular ocellar line; POL: Posterior ocellar line; TMUC: Collection of Department of Entomology, Tarbiat Modares University; GSFPMC: General Station of Forest Pest Management, Shenyang, Liaoning collection, China.

**Results**

Two species (C. australis and C. longiterebra) of the genus Cymodusa (australis group) were collected and identified from non-tropical and tropical orchard ecosystems. Genus Cymodusa is recorded for the first time for Iranian fauna.
Cymodusa Holmgren, 1859

Sagaritis Holmgren, 1859; Sagaritopsis Hincks, 1944; Thersitia Schmiedeknecht, 1907

Diagnosis: Eyes sparsely to densely hairy, inner margins of eyes strongly convergent ventrally; clypeus small, weakly convex, not separated from face, apical margin rounded; mandible short, upper tooth as long as or a little longer than lower tooth; fore wing with areolet, nervulus opposite or distad of basal vein; thyridia longitudinally elliptic, ovipositor straight, with dorsal subapical notch (Dbar, 1984).

Key to the Iranian Cymodusa Holmgren, 1859

Ovipositor sheet 1.2X as long as hind tibia, area petiolaris almost depressed and strongly rugose (Fig. 12), metasomal tergites entirely black. …………..…………

…………………C. longiterebra Dbar, 1985

- Ovipositor sheet no t longer than hind tibia, area petiolaris not depressed and not strongly rugose (Fig. 3), metasomal tergites black except of second tergite with posterior reddish margin. ……..……C. australis (Smits van Burgst, 1913)

Cymodusa australis (Smits van Burgst, 1913) (Figs. 1–6)


Description: Female – Body length 6.8–7.4mm, fore wing 3.8mm, 0.54X as long as body length, antenna 31–33 segmented, 0.57X as long as body length, clypeus transverse, 1.5X as wide as its length, punctuate, anterior margin convex (Fig. 2); face not transverse, 0.57X as wide as its length, its surface punctuate; inter ocular distance 0.4X as wide as maximal distance (Fig. 2); malar space strongly shortand 0.1X as long as basal width of mandible (Fig. 2); occipital carina complete; tempore 0.43X as wide as transverse diameter of the eye in dorsal view (Fig. 1), OOL as long as and POL 1.6X as long as lateral ocelli diameter (Fig. 1), mesonotum densely punctuate, scutellum and propodeum granulate, speculum smooth (Fig. 4), propodeum striated, propodeal spiral round (Fig. 4), area supermedia hexagonal not strongly rugose and not separated from area petiolaris by carina (Fig. 3), areolet with short stalk anteriorly, receiving second recurrent vein before the middle (Fig. 6), length of hind femur 8.0 X as long as its width, length of hind tibia 9.6 X as long as hind basitarsus, first metasomal tergite 2.9X as long as its width at posterior margin, second metasomal tergite 0.86X as long as first tergite and 1.6X as long as its posterior width, postpetiole and second tergite granulate, ovipositor 0.9X as long as hind tibia, 1.4X as long as first metasomal tergite.

Coloration: Antenna, head, thorax and metasomal tergites black, second tergite with two red spot at posterior margin, in some samples third to sixth tergites black in dorsal and brownish in lateral margin, ovipositor and ovipositor sheet brownish, mandible whitish with black tooth, fore leg yellowish, coxae and trochanters in middle legs yellowish, femora brownish, tibia yellow and tarsi brown, hind coxa blackish in basal half with redapical half, trochanter, femur, tibia and tarsi brown.

Distribution in Iran: Fars province (New for Iranian fauna).


*Cymodusa longiterebra* Dbar, 1985 (Figs. 6–12)


Description: Female – Body length 7–8 mm; fore wing 4.3 mm, 0.57X as long as body length; antenna 32–35 segmented, 0.58X as long as body length, clypeus transverse, 2.25X as wide as its length, granulate, anterior margin convex (Fig. 8); face not transverse, 0.65X as wide as its...
length, its surface granulate; inter ocular distance 0.37X as wide as maximal distance with longitudinal carina (Fig. 8); malar space strongly short, 0.1X as long as basal width of mandible (Fig. 10); occipital carina complete; temple 0.53X as wide as transverse diameter of the eye in dorsal view (Fig. 7), OOL 1.4X and POL 1.15X as long as lateral ocelli diameter (Fig. 7), frons, vertex and temple granulate, mesonotum punctuate, scutellum and propodeum granulate, speculum smooth and shiny (Fig. 9), lower half of mesopleuron punctuate (Fig. 9), propleuron striated in front edge (Fig. 9), propodeal spiracle round (Fig. 9), area supermedia elongated, not separated from area petiolaris, area petiolaris strongly rogues (Fig. 12), areolet stalked, receiving second recurrent vein near the middle, length of hind femur 5.7 X as long as its width, length of hind tibia 2.0X as long as hind basitarsus, first metasomal tergite 2.8X as long as its width at posterior margin, second metasomal tergite as long as first tergite and 1.5X as long as its posterior width, postpetiole granulate, ovipositor 1.4X as long as hind tibia, 2.12X as long as first metasomal tergite.

Coloration: Antenna, head, thorax, first and second metasomal tergites black, third to seventh tergites black in dorsal and reddish brown in lateral margin, ovipositor and ovipositor sheet brownish, mandible reddish with black tooth, fore and middle coxae and trochanters blackish brown, femur, tibia, first and second tarsal segments red; hind coxa and trochanter black, hind femur and tibia red, apical end of tibia darkened, tarsi and dorsal surface of tibia brownish (Fig. 11).

Distribution in Iran: Fars province (New for Iranian fauna).

General distribution: Western Palearctic (Yu et al., 2012).

Discussion

In this survey the genus Cymodusa Holmgren (1859) was identified and recorded for the first time for Iranian fauna. This genus comprises 24 species in the Palearctic region of which 15 species were found in the west Palearctic (Yu, van Achterberg & Horstmann, 2012). According to the information about geographical distribution of the recorded species (Yu, van Achterberg & Horstmann, 2012), C. australis and C. longiterebra are only distributed in the west Palearctic region. Among neighboring countries, both species have previously reported from Turkey and Azerbaijan (Dbar, 1985; Kolarov & Beyarslan, 1995).

The biology of these species is unknown but some species of the genus Cymodusa usually occurs among grasses and they are parasitoids of Lepidoptera (Kolarov & Yurtcan, 2008). In the present study Cymodusa samples were collected in specific locations (C. australis in tropical orchards and C. longiterebra in non-tropical orchards only) whereas Malaise traps were installed in different sites (agro and rangeland ecosystems) in Fars province. It seems that these two species prefer the hosts and habitats in sustainable ecosystems. Consider to low information, more investigation about biology, hosts range and their role in biological control should be done.

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Conflict of Interests

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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اورلین گزارش جنس اولین (Ichneumonidae: Campopleginae) Cymodusa از ایران

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چکیده: این تحقیق به منظور شناسایی زنبورهای پارازیتیپید زیرخانواده (Hym.: Ichneumonidae) Campopleginae مهرماه ۱۳۹۲ در استان فارس (جنوب ایران) انجام شد. نمونه‌ها با استفاده از نور حشره‌گیری و تله مالیز جمع‌آوری شدند. در بین نمونه‌ها دو گونه زنبور پارازیتیپید از C. australis (Smits van Burgst, 1913) جنس Cymodusa گزارش شدند. C. longiterebra Dbar, 1985 شناسایی شد که برازون ایران جدید هستند. کلید شناسایی، ویژگی‌های مورفولوژیک افتراقی و براکنش چگونگی‌ای این دو گونه اراپه شده است.

واژگان کلیدی: استان فارس، گزارش Campopleginae Ichneumonidae