

Euderomphale ayeganus sp. nov.: A new species of Eulophidae (Hymenoptera: Chalcidoidea) from Iran

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Abstract. A new species of *Euderomphale* Girault, 1916 (Eulophidae: Entedoninae), *Euderomphale ayeganus* Zeya & Shahbazvar, sp. nov., is described from specimens reared from the whitefly *Aleyrodes* sp. (Hem.: Aleyrodidae) in Iran. The new species is illustrated, and its differences from other species are discussed.

Keywords: Entedoninae, *Euderomphale*, whitefly parasitoid, new species, Iran.

Eulophidae (Westwood, 1829) is a large family of Chalcidoidea with over 5700 described species in 328 genera (Noyes 2019). Species of the genus *Euderomphale* Girault, 1916 (Hymenoptera: Eulophidae) are known as parasitoids of whiteflies (Hemiptera: Aleyrodidae). LaSalle & Schauff (1994) reviewed the tribe Euderomphalini Shafee et al., 1988, placing all eulophid whitefly parasitoids in the tribe Euderomphalini of the subfamily Entedoninae. Thus, they are considered potentially important natural enemies of whiteflies and, hence they may be utilized in the control of the populations of these pest species, which may cause considerable damage to agricultural, horticultural, and forestry crops.

Hansson & LaSalle (2003) revised the Neotropical species and genera of the tribe Euderomphalini and added five more genera (*Cabeza*, *Itahipeus*, *Monterrondo*, *Sifraneurus*, *Xenopomphale*, Hansson & LaSalle, 2003). *Euderomphale* contains 20 known species worldwide (Noyes 2019). The present paper describes a new species of the genus *Euderomphale* from Iran. This is the first species of *Euderomphale* to be described from Iran. Ghahari et al. (2006) reported the presence of two species of *Euderomphale* (*E. chelidonii* Erdős, 1966, and *E. bemisiae* Viggiani, 1977) in Iran, and in 2010 *E. chelidonii* was collected during a taxonomic study of whitefly parasitoids in Guilan province (Shahbazvar et al. 2010). In the recent catalogue of Iranian Eulophidae (Yefremova et al. 2021), only one species, *E. chelidonii*, was catalogued, whereas the other species, *E. bemisiae* was considered a misidentification for *E. chelidonii* (Yefremova et al. 2021). Field-collected material by the first author from Alborz province, Iran, revealed the presence of an undescribed species of *Euderomphale*. This new species, *Euderomphale ayeganus* Zeya & Shahbazvar, sp. nov., is described in the present paper.

Specimens were initially preserved in 80% ethyl alcohol, then dehydrated in ascending grades of alcohol, and mounted on cards. The mounting cards were prepared using a card-punching machine developed by Qamar (2017). The body colour was noted from card-mounted specimens prior to mounting the specimens on slides in Canada balsam. One female specimen was used for SEM micrographs. Only body length is given in millimeters; other measurements are relatively taken from the divisions of a linear scale micrometer placed in the eyepiece of a compound microscope. The

measurements of slide-mounted parts were taken at 100× magnification (one division = 0.01 mm). Photographs of body parts were taken with a digital camera (Nikon Ds-Fi 1c) attached to a compound microscope (Nikon Eclipse Ci).

The following abbreviations are used:

C1, C2, C3 Antennal clavomeres 1, 2, and 3.

Fu1, Fu2 Funiculars 1 and 2.

T1, T2, etc. Gastral tergites 1, 2, etc.

The following acronyms are used for the depositories:

UGNHM Natural History Museum, University of Guilan, Rasht, Iran.

ZDAMU Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, India.

Taxonomy

Genus *Euderomphale* Girault

Euderomphale Girault, 1916: 410. Type species

Euderomphale fuscipennis Girault, by original designation.

Aleurodiphagus Nowicki, 1929: 154. Type species

Pteropterix flavimedia Howard, subsequent designation by

Peck, 1951: 432. Synonymy by Peck, 1951: 432.

Euderomphale ayeganus Zeya & Shahbazvar, sp. nov.

(Figs 1, 2)

Type locality: IRAN: Alborz province, Asara, Ayegan village, 3.viii. 2016, 882 metres, 36°03'38.7"N, 51°08'13.8"E, N. Shahbazvar, leg., ex *Aleyrodes* sp. (Hemiptera: Aleyrodidae).

Material examined: 1 female (holotype) (on slide under 3 coverslips, ZDAMU), paratype: 5 females. The same data as the holotype (UGNHM), 2 females on slides, (1 female antennae without pedicel and flagellum, ZDAMU).

Diagnosis: Fu2 subquadrate to transverse; clava broad, including specula 2.6× as long as broad; forewing adjacent to the marginal vein in proximal third or so widely bare, with speculum broadly open at the level of parastigma.

Etymology: The species name is derived from the type locality 'Ayegan village' of Alborz Province, Iran, from where the holotype was collected.

Description: Female. Holotype. Length, 0.58 mm. Body black with metallic reflection. Head dark brown to black. Antenna dark brown to black. Mesosoma metallic black. Wings hyaline, except forewing with brownish infuscation below submarginal + parastigmal veins (Fig. 2a). Legs, including coxae, dark brown to black, except bases of all tibiae white. Gaster dark brown to black, but dark brown

bands appear on the slide with intersegmental white areas (Fig. 2c).

Head. (Fig. 1a), frons smooth, $1.52\times$ as broad as high, $2.28\times$ as broad as frontovertex; occiput dorsally sparsely setose; eye height $1.87\times$ as long as malar space; antennal toruli situated at the level of the ventral margin of eyes. Mandible with two teeth. Antenna (Fig. 1c) with scape $6.5\times$

as long as broad, $2.16\times$ as long as pedicel; pedicel $2\times$ as long as broad, distinctly longer than anellus and funicle combined; funiculars dilated apically; Fu1 transverse; Fu2 quadrate, distinctly larger than Fu1, with one mps; clava (including spicula) $2.6\times$ as long as broad; both C1 and C2 transverse, C3 conical with a thick specula; each claval segment with mps.

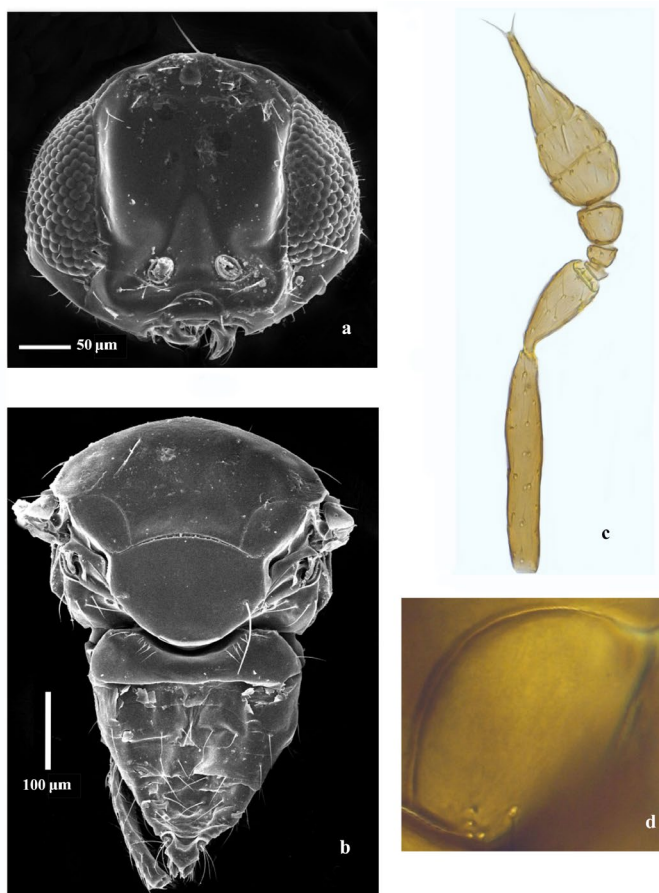


Figure 1. *Euderomphale ayeganus*, sp. nov.

Female:

a, head, frontal view (SEM, micrograph);

b, mesosoma and metasoma (SEM, micrograph);

c, antenna (holotype, female);

d, (holotype, female) axilla showing small setae near posterior margin.

Mesosoma. (Fig. 1b). Pronotum smooth, appearing narrowly attached to mesoscutum dorsally; mesoscutum $1.5\times$ as long as scutellum, with a pair of long setae anteriorly and a pair of setae on each lateral margin; mesoscutum largely smooth but with faintly thick rugose sculpture laterally just above the axilla; axillae elongate and advanced in sides of mesoscutum, smoothly rounded anteriorly; each axilla with one thick seta posteriorly on lateral margin and 4 small setae near posterior margin and one small seta present postero-laterally (Fig. 1d); scutellum smooth and transverse, $2\times$ as broad as long, posterolaterally with a pair of long setae and, a pair of moderate setae on subapical margin; metanotum narrow, with one seta on each side; propodeum medially narrow, each propodeal callus with 4 setae. Forewing (Figs 2a, b) $2.39\times$ as long as broad; longest marginal seta $0.27\times$ maximum wing width; submarginal vein + parastigma $0.66\times$ marginal vein; marginal vein $8.33\times$ as long as post marginal vein; $5.5\times$ as long as stigmal vein; post marginal vein about as long as stigmal vein; disc almost bare below submarginal vein + parastigma; setae bare

adjoining to proximal third or so of the marginal vein. Hindwing $5\times$ as long as broad with longest marginal seta $0.69\times$ maximum wing width; disc setose with hyaline setae.

Metasoma. (Fig. 2c). Petiole $4\times$ as broad as long; gaster subequal to slightly longer than mesosoma; T6 with a pair of spiracles touching lateral margins; T7 small with button-like cerci projected near posterior margin; ovipositor, as seen through the illustration, extends from the base of T1 (Fig. 2c); ovipositor slightly exerted beyond the apex of gaster, $1.37\times$ as long as the mid tibia, $1.34\times$ as long as hind tibia; the second valvifer $3.66\times$ as long as the third valvula.

Relative measurement. Head length (width), 32 (21); frontovertex width, 14; eye height, 15; malar space, 8. Scape length (width), 13 (2); pedicel length (width), 6(3); clava length (width) 13 (5); C1, 3; C2, 3; C3+ specula, 4+2. Mesosoma length, 30; mesoscutum length (width), 15(30); scutellum length (width), 10 (20); forewing length (width), 79 (33); marginal vein, 25; submarginal vein + parastigma, 16.5; stigmal vein, 4.5; post marginal vein, 3; longest

marginal seta length, 9; hindwing length (width), 65 (13); longest marginal seta length, 9; mid tibia length, 25.5; hind tibia, 27. Metasoma. Petiole length (width), 1(4). Gaster length, 36; ovipositor length, 35; second valvifer 25.5; third valvula length, 7.5.

Variation. The newly described species exhibits variation in the following characters: head, in frontal view, varies

from 1.29–1.5× as broad as high, 2.07–2.28× as broad as frontovertex width; eye height varies in the range of 1.8–1.87× as long as malar space; forewing recorded variation in the range of 2.39–2.42× as long as broad, with longest marginal seta 0.24–0.27× maximum wing width and hindwing vary from 5–5.3× as long as broad.

Male. Unknown.

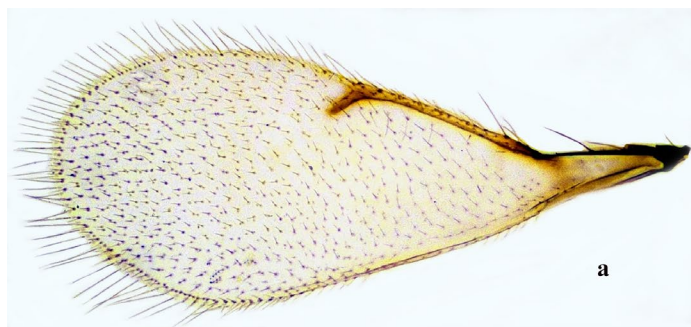


Figure 2. *Euderomphale ayeganus*, sp. nov.
Holotype female:
a, forewing;
b, forewing, basal part enlarged;
c. Metasoma, showing ovipositor.

Euderomphale ayeganus Zeya & Shahbazvar, sp. nov., belongs to the *flavimedia* group of *Euderomphale* as characterized by having the axilla smoothly rounded anteriorly; vertex smoothly rounded posteriorly with lateral ocellus placed on the top of the head, and the prepectus partially fused to mesopleuron anteriorly (LaSalle 1999).

The new species *E. ayeganus*, sp. nov., apparently comes close to *E. chelidonii* Erdős (1966) in having the antennal scape slender, clava slightly shorter than scape, forewing with similar disc dimensions and a well-developed post marginal vein, but it differs from the latter as follows (characters of *E. chelidonii* noted from Huldén 1986, figs 71 a, 71b; LaSalle & Schauff 1994, figs: 46, 54): Fu2 subquadrate to transverse; clava broad, including specula 2.6× as long as broad; forewing adjacent to the marginal vein in proximal

third or so widely bare, with speculum broadly open at the level of parastigma.

In *E. chelidonii*, Fu2 is relatively more transverse; the clava is relatively slender, including specula more than 3× as long as broad (Huldén 1986). However, LaSalle & Schauff (1994) illustrated that Fu2 is distinctly longer than broad; clava (including specula) more than 3× as long as broad; forewing behind the marginal vein in the proximal third narrowly bare, with speculum more or less closed at the level of parastigma.

It is to note that the antenna with Fu2 varies from transverse to distinctly longer than broad; clava (including specula) more than 3× as long broad in *E. chelidonii* while in the new species Fu2 quadrate to transverse; clava (including specula) 2.6× as long as broad.

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