

***Orijinal araştırma (Original article)***

**Four new species of *Zeytinus* Doğanlar, 2011 (Hymenoptera: Eulophidae: Tetrastichinae) from Turkey and a redescription of the type species, *Zeytinus hatayensis* Doğanlar, 2011**

Mikdat DOĞANLAR<sup>1</sup>, Gonca VATANSEVER SAKİN<sup>2\*</sup>, Bülent LAZ<sup>3</sup>

**Türkiye’den *Zeytinus* Doğanlar, 2011 (Hymenoptera: Eulophidae: Tetrastichinae) Cinsine giren dört yeni türün tanımlanmaları ve cinsin tip türü, *Zeytinus hatayensis* Doğanlar, 2011’in yeniden tanımlanması**

**Öz:** Bu makale *Zeytinus hatayensis* Doğanlar, 2011’in yeniden tanımlanması ile 4 yeni türün ve bu türlerin bazı biyolojik özelliklerinin açıklamasını içermektedir. Türkiye için, *Zeytinus* Doğanlar cinsine bağlı 4 yeni tür olan; *Z. edremitensis* Doğanlar and Sakin, n.sp., *Z. balikesirensis* Doğanlar and Sakin, n. sp., *Z. marmarae* Doğanlar and Sakin, n. sp. ve *Z. alyssumus* Doğanlar and Laz (Hym.: Eulophidae) tanımlanması yapılmıştır. Bu türlerden ilk üçü Samandağ (Hatay) ve Edremit (Balıkesir) ilçelerinde, zeytin ağacı (*Olea europea* L.) yapraklarında zararlı olan Zeytin Gal sineği, *Dasineura oleae* (Loew) (Dipt.: Cecidomyiidae)’nin larva/pupa parazitoidleri olarak elde edilmiştir. Sonuncu tür ise Kahramanmaraş ilinde bulunan *Alyssum pateri* ssp. *pateri* Nyár (Brassicaceae) bitkisinin çiçekleri üzerinde beslenen bir *Dasineura* türünün gallerinden üretilmiştir.

**Anahtar Sözcükler:** *Zeytinus* spp., parazitoid, cecidomyiid spp., zeytin ağaçları, *Alyssum pateri*, Türkiye

**Abstract:** This paper redescibes *Zeytinus hatayensis* Doğanlar, 2011, describes four new species of the genus *Zeytinus* Doğanlar, and presents some biological data for the species. The new species are *Z. edremitensis* Doğanlar and Sakin, n. sp., *Z. balikesirensis* Doğanlar and Sakin, n. sp., *Z. marmarae* Doğanlar and Sakin, n. sp. and *Z. alyssumus* Doğanlar and Laz (Hym.: Eulophidae). The first three new species were reared as larval/pupal parasitoids from galls of the host, *Dasineura oleae* (Angelini 1831) (Diptera: Cecidomyiidae), on leaves and shoots of *Olea europea* L. collected in Samandağ (Hatay) and Edremit (Balıkesir) Provinces, and the last species was reared from galls of a *Dasineura* sp. in the flower heads of *Alyssum pateri* ssp. *pateri* Nyár (Brassicaceae) from Kahramanmaraş Province, Turkey.

**Key words:** *Zeytinus* spp., parasitoid, cecidomyiid species, olive trees, *Alyssum pateri*, Turkey

<sup>1</sup> Honorary Professor, Biological Control Research Institute, Adana, Turkey, ORCID ID: [0000-0002-1715-3818](https://orcid.org/0000-0002-1715-3818)

<sup>2</sup> Balıkesir University, Edremit Vocational School, Edremit, Balıkesir

<sup>3</sup> Kahramanmaraş Sütçü İmam University, Faculty of Forestry, Department of Forest Botany, Kahramanmaraş, ORCID ID: [0000-0001-9237-1092](https://orcid.org/0000-0001-9237-1092)

Sorumlu yazar (Corresponding author) e-mail: [gonca.sakin@gmail.com](mailto:gonca.sakin@gmail.com), ORCID ID: [0000-0003-1046-2455](https://orcid.org/0000-0003-1046-2455)

Alınış (Received):06.01.2020

Kabul edilmiş (Accepted): 04.02.2020

## Introduction

*Dacineura oleae* (Angelini 1831) (Diptera: Cecidomyiidae), one of the four gall midges associated with the olive tree, is known from many regions of Turkey, and is recognized as a secondary pest (Anonymous, 2008; Doğanlar et al, 2011). Many parasitoid species have been reported to attack the pest in Hatay Province, Turkey (Doğanlar et al, 2011). New studies on *D. oleae* have started in other regions of the country.

Doğanlar (2011) described the monotypic genus *Zeytinus* and *Z. hatayensis*, a larva/pupal parasitoid of some cecidomyiid species in Samandağ, Hatay Province, Turkey, and gave its hosts and distribution, and discussed its taxonomic status.

Recently, from Turkey some specimens of *Zeytinus* spp., including some from the paratype series of *Z. hatayensis*, and others reared as larval parasitoids of *D. oleae* from galls on the leaves and shoots of *Olea europea* L. in Edremit, Balıkesir Province, and the species in Kahramanmaraş Province, was reared from the galls of a *Dacineura* sp. in the flower heads of *Alyssum pateri* Nyár ssp. *pateri* Nyár (Brassicaceae) were examined. Following the key given in Doğanlar (2011), the species were determined to be distinct from *Z. hatayensis* in many respects, and are described here as new species of the genus *Zeytinus*.

## Materials and Methods

Specimens of the genus *Zeytinus* were reared from galls of *D. oleae* on leaves and shoots of *Olea europea* L. collected from Samandağ (Hatay Province) and Edremit (Balıkesir Province), and also from the galls of *Dacineura* sp. in flower heads of *Alyssum pateri* ssp. *pateri* in Kahramanmaraş Province, Turkey. The galls on the leaves and/or shoots were collected, and placed in labelled plastic bags for the rearing of the insects. The adults that emerged from the galls were preserved in 96% ethyl alcohol for taxonomic study. Some of the specimens from each sex were slide-mounted in Canada balsam.

The hosts of the parasitoids were obtained by dissecting the plant materials from which the parasites/hosts emerged, and the species were identified by studying their larval and adult morphology.

This study follows the morphological terminology of Graham (1987). The type specimens were deposited in the Insect Museum of the Biological Control Station, Yüreğir, Adana, Turkey (IMBC). Photographs of the diagnostic characters of the new species were taken with a Leica DM 500 microscope with an attached digital Leica ICC 50 camera.

## Results and Discussion

### *Zeytinus* Doğanlar, 2011

Diagnosis: Second segment of tarsi much longer than other segments of tarsi. Ocelli enclosed in an area marked off by impressed lines; shallow subtriangular fovea just outside of each lateral ocellus. Antenna of female with 3 anelli, 3 funicular and 3 claval segments. Antenna of male with ventral plaque of scape, placed in upper half; having 2 anelli, 4 funicular segments and 3 claval segments, flagellar segments with compact subbasal whorls of long dark setae. Malar sulcus straight without fovea below eye. Body having raised pentagonal reticulation on pronotum and side lobes of mesonotum and longitudinal engraved reticulations on mid lobe of mesonotum or with a short stalk; hind coxa without dorsolateral carina, longitudinally reticulated; body colour variable: mostly pale yellow, not metallic, and some species having black and pale brown colour with bluish and greenish reflections.

Biology: Larval/pupal parasitoids of gall midges.

### Identification key for the species of *Zeytinus* Doğanlar in Turkey

- 1-Female.....2  
 -Male.....6
- 2- Ovipositor as long as metasoma; head 0.84x as wide as mesasoma; malar space 0.72x as long as length of eye; F1 2.1x as long as width; F2-F3 almost equal in size, 1.4-1.5 x as long as width; C1 and C2 equal in length; 2nd segment of hind tarsi 1.5x as long as metatarsi; coxae mostly black, except for pale yellow in the specimens hatched in summer.....*Z. alyssumus* Doğanlar and Laz, n.sp.
- Ovipositor distinctly shorter than length of metasoma; head at least as wide as mesasoma; malar space at most 0.56x as long as length of eye; C1 at least 1.5x as long as C2; ratios of 2nd segment and metatarsi of hind tarsi and colors of coxae variable.....3
- 3- Legs with coxae, basal half of femora and last two segments of tarsi black; head 1.1x as wide as mesosoma; F1-F3 almost equal in size, 1.7-1.8x as long as width; C1 1.8-2.2x as long as C2; 2nd segment of hind tarsi 1.8-2.1x as long as metatarsi; malar space 0.56x as long as length of eye.....*Z. edremitis* Doğanlar and Sakin, n.sp.
- Legs pale yellow, except coxae black and pretarsi testaceous; metasoma with some black spots laterally; malar space 0.56x as long as length of eye; other characters variable.....4
- 4- Body pale yellow, ovipositor long, about  $\frac{3}{4}$  of length of metasoma; F1-F3 almost equal in size, 1.5x as long as width; club twice as long as width; C1 1.5x as long as C2; 2nd segment of hind tarsi 1.4x as long as metatarsi.....*Z. hatayensis* Doğanlar (2011)

- Body mostly pale brown to black, some parts with metallic reflection; coxae black; 2nd segment of hind tarsi 1.6x as long as metatarsi; C1 twice as long as C2; other characters variable.....5
- 5-Body with some metallic green in colour on ocellar area, antennae, anterior half of pronotum, mesonotum with front half of mid lobe of mesoscutum, scapulae, propodeum and pleurae, and with black spots on metasoma laterally; malar space 0.53x as long as length of eye; F1 1.55x, F2-F3 1.67x, club 2.75x as long as width; ovipositor 0.7x as long as metasoma.....  
.....*Z. balikesirensis* Doğanlar and Sakin, n.sp.
- Body bluish-black, with metallic reflection, except around notauli, on base of mesoscutum testaceous; malar space 0.44x as long as length of eye; funicular segments equal in size, F1 - F3 almost 1.4x as long as width; club twice as long as width; ovipositor 0.84x as long as metasoma .....  
..... *Z. marmarae* Doğanlar and Sakin, n. sp.
- 6- Legs with basal 2/3 of femora black; antennae with ventral plaque 2.14x as long as broad, 0.8x as long as width of scape, 0.27 length of scape; mid tibia almost 12x as long as width; apical seta of mid tibia 1.5x as long as width of mid tibia; hind tibiae almost 8x as long as width; hind metatarsi 3.3x as long as width; second segment of hind tarsi 7.5x as long as width, and 1.5x as long as metatarsi; genitalia 3.75x as long as wide.....  
.....*Z. edremitisensis* Doğanlar and Sakin, n. sp.
- Legs pale yellow, except coxae black, at most, pretarsi testaceous; mid tibia at most 10x as long as width; hind tibiae almost 8x as long as width; other characters variable.....7
- 7- Body with some dark spots on pronotum and front half of mesonotum; antennae with ventral plaque 3x as long as broad, 0.6x as long as width of scape, 0.25 length of scape; pretarsi pale, mid tibia at most 7.25x as long as width; apical seta of mid tibia 1.25x as long as width of mid tibia; hind tibiae almost 6.7x as long as width; hind metatarsi 2.4x as long as width; second segment of hind tarsi 4.5x as long as width, and 1.5x as long as metatarsi; genitalia 3.62 x as long as wide.....*Z. hatayensis* Doğanlar (2011)
- Body mostly brown, except apical part of mesonotum, scutellum testaceous and metasoma pale brown with some brownish spots on both sides; antennae with ventral plaque 2.75x as long as broad, 0.7x as long as width of scape, 0.3 length of scape; pretarsi testaceous; mid tibia almost 10x as long as width; apical seta of mid tibia 1.7x as long as width of mid tibia; hind tibiae 9.3x as long as width; hind metatarsi 4.1x as long as width; second segment of hind tarsi 9.5x as long as width and 1.73x as long as metatarsi: genitalia 2.64x as long as wide..... *Z. alyssumus* Doğanlar and Laz, n.sp.

***Zeytinus hatayensis* Doğanlar (2011)**

(Figures 1 a, 2 a, 3 a, 4 a, b)

**Etiology:** The name is derived from the locality of types, Hatay Province, from where the specimens were collected.

**Type:** Holotype female, Turkey: Hatay, Samandağ, Vakıflı, 36 07 03 N, 35 58 39 E, 96 m, April-May, 2007 (leg. M. Doğanlar and Sertkaya), reared from the galls of *D. oleae* on the leaves of *O. europea* (deposited in the Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC)). Paratypes: 2♀♀, 1♂, 25. IV.2007; Antakya, 13-22.V. 2008, 1♀ 3♂♂, 2.- 17.V. 2009, 1♀ 2♂♂; 13.V. 2010, 2♂♂, (leg. Doğanlar), deposition same as holotype; 13♂♂, 3♀♀, same data as the holotype.

**Diagnosis:** Female: Body pale yellow, or at most with some metallic green spots on pronotum and front half of mesonotum; legs pale yellow, except coxae black and pretarsi testaceous; F1-F3 almost equal in size, 1.4-1.5x as long as width; malar space 0.5x as long as length of eye.

**Male:** Body with some dark spots on pronotum and front half of mesonotum, legs pale yellow, except coxae black, at most pretarsi testaceous; antennae with ventral plaque 3x as long as broad, 0.6x as long as width of scape, 0.25 length of scape; hind tibiae almost 8x as long as width; mid tibia at most 7.25x as long as width; apical seta of mid tibia 1.25x as long as width of mid tibia; hind tibiae almost 6.7x as long as width; hind metatarsi 2.4x as long as width; second segment of hind tarsi 4.5x as long as width and 1.5x as long as metatarsi. Genitalia 4.62 x as long as wide.

**Redescription:** Female: 1.2-1.3 mm. Some characters additional to the diagnostic ones were given as follows: eyes dark brown. Wings hyaline, venation pale yellow, dorsellum and legs pale yellow; antennae pale brown.

Body with mesonotum and scutellum distinctly convex. Head about as wide as mesoscutum, about 1.03-1.16x wider than height; POL about 1.7-2.0x OOL. Eyes about 1.4-2.4x as long as broad. Mouth nearly 1.5 x malar space. Antenna (Figure 2 a) with scape 0.7 x as long as eye, not reaching median ocellus, 3.25-3.5x as long as wide; pedicellus 1.6-1.7 x as long as broad; clava 1.44-1.5 x broader than F3, 1.9-2.0x as long as wide, with C1 quadrate, 1.5 x as long as C2, the latter 0.33 x as long as wide; C3 0.6-0.8 x as long as C2, spine 0.2-0.33 x as long as C3, with apical seta distinctly shorter than spine; sensilla less numerous on funicle, more so on clava, long and slender, with moderately long bases and short projecting blades.

Mesosoma (Figure 1 a) 1.5-1.8 x as long as broad; pronotum about 1.6x as wide as long, midlobe of mesoscutum 1.2-1.5x wider than long, with raised reticulation, with long 4 adnotular setae on each side. Scutellum 1.4-1.5x as broad as long, sculptured like mesoscutum; submedian lines not nearer to each other than sublateral lines, enclosing a space 2.26 x as long as broad; setae equal in length, close to each other, distance between anterior pair and fore margin of scutellum 1.6-2.3 x distance between setae. Dorsellum about 0.4x as long as wide. Propodeum medially 1.1-1.3x as long as dorsellum; median carina distinct, propodeal spiracle very large. Callus with two setae, one outside spiracle, the other near the hind corner. Forewing (Figure 3 a) 2.2-2.33x as long as broad; costal cell 0.82-1.0x as long as marginal vein, 9x as

long as broad; submarginal with 4-5 dorsal setae; marginal vein rather thin, 3.5-3.7x length of stigmal vein; stigma small and oblong; speculum closed, narrow; cilia 0.33 length of ST. Hind wing bluntly pointed; cilia 0.28 breadth of a wing. Legs moderately long, slender shaped, mid coxae 1.25x, mid femora 4x, mid tibiae 9.4x as long as width; apical seta of mid tibia 1.4x as long as width of mid tibia; hind coxae 2.1x, hind femora 4x, hind tibiae almost 11.5x; hind metatarsi 4x as long as width; second segment of hind tarsi 4.7-5.2x as long as width and 1.6x as long as metatarsi; third segment of hind tarsi 3.2-3.3x, hind pretarsi 3.0-3.7x, as long as width.

Metasoma lanceolate, almost as long as head plus mesosoma, 0.8 x as broad as mesosoma, 2.5-2.7x as long as broad, last tergite twice as broad as long; postcercal short, almost half as long as longest cercal seta; ovipositor sheaths plus postcercal 0.26-0.5 length of hind tibia; tip of hypopygium at half length of metasoma.

Male: Differs from female as follows. Some characters added to the diagnostic ones are as follows: Colour: body mainly yellow, head, pronotum brown, mesoscutum dorsally with a broad, brown spot anteriorly; mesopleuron on upper corner, metapleuron, propodeum and hind half of metasoma brown; dorsellum and legs pale yellow; antennae pale brown.

Antenna (Figure 4 a) with scape 3 x as long as broad, antennae with ventral plaque 3x as long as broad, 0.6x as long as width of scape, 0.25 length of scape; pedicellus plus flagellum 1.44 x breadth of mesoscutum; pedicellus 1.5 x as long as broad, as long as F1; funicle as broad as pedicellus, filiform; F1 0.66 x as long as F2 and 1.2 x as long as broad, following segments equal in width, F2 1.8 x, F3 twice, F4 2.2 x as long as broad; clava as wide as F4, 1.1 x longer than F3 plus F4, about 4.3 x as long as broad, with C1 and C2 subequal, each 1.6 x as long as broad, C3 short, as long as basal width; whorled setae very long, those of F1 reaching slightly beyond tip of F3.

Legs moderately long, slender, mid coxae 2.2x, mid femora 4x, mid tibia 7.25x, as long as width; apical seta of mid tibia 2.3x as long as width of mid tibia; mid metatarsi 2.8x as long as width; second segment of mid tarsi 5.83x as long as width and 1.4x as long as metatarsi; third segment of mid tarsi 4.2x, mid pretarsi 3.75x as long as width; hind coxae 1.5x, hind femora 3.2x, hind tibiae almost 6.7x; hind metatarsi 2.4x as long as width; second segment of hind tarsi 4.5x as long as width and 1.5x as long as metatarsi; third segment of hind tarsi 3.3x, hind pretarsi 2.7x as long as width.

Metasoma distinctly shorter and narrower than mesosoma. Genitalia 4.67 x as long as wide (Figure 4 b).

Biology: The species is an endoparasite of *D. oleae* and *Lasioptera oleicola* Skuhřavá, 2011 in galls on the leaf and/or shoots of *O. europea*.

### ***Zeytinus edremitensis* Doğanlar and Sakin, n.sp.**

(Figures 1 b, 2 b, 3 b, 4 c, d)

Etymology: The name is derived from the locality (Edremit) where the type specimens were found.

Type: Holotype female, Turkey: Marmara Region, Balıkesir, Edremit, Avcılar, 39°35'13"N, 26°48'31"E, 155m, 12.05.2019 (leg. Gonca Sakin), reared from the galls of *D. oleae* on the leaves of *O. europea* (Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC)). Paratypes: Balıkesir, Edremit, 1♀, Kadıköy, 39°36'22" N , 26°59'41"E, 40m, 6.05.2019; 1♀, Hacıaslanlar, 39°38'54.71"N, 27°04'19.17"E, 197m, 20.04.2019; 2♀, Arıtışı, 39°35'56"N, 26°49'08"E, 309m, 12.05.2019; 2♀, 39°35'41.18" N, 27°01'16.69" E, 29m, April, 2019; 1♀, same data as the holotype, slide mounted in Canada balsam; 2♂, Hatay, Samandağ, Vakıflı, 36 07 03 N, 35 58 39 E, 96 m, May 2007 (leg. M. Doğanlar), reared from the galls of *D. oleae* on the leaves of *O. europea*.

Diagnosis: Female: Body mostly brown to black, some parts with metallic reflection; legs with basal half of femora and last two segments of tarsi black; F1-F3 almost equal in size, 1.7-1.8x as long as the width; malar space 0.56x as long as length of eye.

Male: Legs with coxae and basal 2/3 of femora black, tibiae and tarsi grey; antennae with ventral plaque 2.14x as long as broad, 0.8x as long as width of scape and 0.27x length of scape; mid tibiae almost 12x as long as width; apical seta of mid tibia 1.5x as long as width of mid tibia; hind tibiae almost 8x as long as width; hind metatarsi 3.3x as long as width; second segment of hind tarsi 7.5x as long as width, and 1.5x as long as metatarsi; genitalia 3.75x as long as wide.

Description: Female: 1.0-1.2 mm (Holotype 1.0 mm). Some characters added to the diagnostic ones given, are as follows: eyes dark brown. Wings hyaline, venation pale yellow; antennae pale brown.

Body with mesonotum and scutellum slightly convex. Head about as wide as mesoscutum, and as wide as height; POL about 2.2x OOL. Eyes about 1.3 x as long as broad. Mouth nearly 1.3 x malar space. Antenna (Figure 2 b) with scape 0.75-0.83x as long as eye, not reaching median ocellus, 3.8x as long as wide; pedicellus twice as long as breadth; lava 1.3x broader than F3, 2.63x as long as wide, with C1 almost 1.5x as long as wide, 1.8-2.2x as long as C2, the latter 0.53x as long as wide; C3 0.8x as long as C2, spine 0.2 x as long as C3, with apical seta distinctly shorter than spine; sensilla less numerous on funicle, each segment having one sensilla on each side.

Mesosoma (Figure 2 b) 1.4 x as long as broad; pronotum about twice as wide as long, midlobe of mesoscutum 1.1 x wider than long, with raised reticulation on pronotum, on midlobe of mesoscutum and scapulae with pentagonal or quadrangular engraved reticulations on 1/3 of anterior part, with finer, longitudinal engraved reticulations on other parts; with long 5 adnotaular setae on each side. Scutellum 1.1-1.3x as broad as long, sculptured like the median lobe of mesoscutum; submedian lines medially nearer to each other than sublateral lines, enclosing a space 3.0x as long as broad; setae equal in length; distance between anterior pair and fore margin of scutellum 1.2x distance between setae. Dorsellum about 0.3-0.5x as long as wide. Propodeum medially 1.7x as long as dorsellum; median carina weakly indicated,

propodeal spiracle very large. Callus with two setae. Forewing (Figure 3 b) 2.0-2.2 x as long as broad; costal cell 0.84x marginal vein, 8.8x as long as broad; submarginal with 5-6 dorsal setae; marginal vein rather thin, 3.5x length of stigmal vein; stigma small and oblong; speculum closed, broad; hind wing bluntly pointed. Legs moderately long, slender shaped, mid coxae 1.83x, mid femora 5.0x, mid tibiae 10.6x as long as width; apical seta of mid tibia as long as width of mid tibia; mid metatarsi 5x as long as width; second segment of mid tarsi 7.0x as long as width and 1.4x as long as metatarsi; 3<sup>rd</sup> segment 4.2x and pretarsi 3x as long as width; hind coxae 1.7-2.0x, hind femora 3.14-4.6x, hind tibiae almost 10x; hind metatarsi 3.3-3.5x as long as width; second segment of hind tarsi 6.8-7.5x as long as width and 1.8-2.1x as long as metatarsi; third segment of hind tarsi 3.3-4.2x, hind pretarsi 2.5-3.0x as long as width.

Metasoma lanceolate, almost as long as head plus mesosoma, and as broad as mesosoma, 1.3 x as long as broad, last tergite 1.25x broader than long; postcercal short, 0.83x as long as longest cercal seta; ovipositor sheath plus postcercal 0.3-0.4x length of hind tibia; tip of hypopygium 0.43x length of metasoma.

Male: Differs from female as follows. 1.1 mm. Body mainly black, Legs with coxae and basal 2/3 of femora black, apical 1/5 of femora, tibiae and tarsi grey; antennae brown, apically paler.

Antenna (Figure 4 c) with scape 3.6 x as long as broad, with ventral plaque 0.26 length of scape; pedicellus 1.7 x as long as broad, as long as F1; funicle 1.33x as broad as pedicellus, filiform; F1 0.66 x as long as F2 and 0.8x as long as broad, following segments almost equal in width, F2 1.25 x, F3 1.3x, F4 1.5x as long as broad; clava as wide as F4, 1.15x as long as F3 plus F4, about 3.8x as long as broad, with C1 and C2 subequal, each 1.3 x as long as broad, C3 short, as long as basal width; whorled setae very long, those of F1 reaching slightly beyond tip of F3. Metasoma is distinctly shorter and narrower than mesosoma. Genitalia (Figure 4 d) 3.75x as long as wide.

Biology: The species is an endoparasite of *D. oleae* in the galls of the host on the leaves and/or shoots of *O. europea*.

### ***Zeytinus balikesirensis* Doğanlar and Sakin, n.sp.**

(Figures 1 c, 2 c, 3 c)

Etymology: The name is derived from the locality of types, Balıkesir, from where the specimens were collected.

Type: Holotype female, Turkey: Marmara region, Balıkesir, Edremit, April 2019, 39°35'41" N 27°01'16" E, 29m (leg. Gonca Sakin), reared from the galls of *D. oleae* on the leaves of *O. europea* (Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC)).

Diagnosis: Female: Body with some metallic green spots on ocellar area, antenna, anterior half of pronotum and mesonotum with front half of midlobe of mesoscutum, scapulae, propodeum and pleurae, and with black spots on metasoma laterally; ovipositor long, about 2/3 length of metasoma; F1 1.55x, F2-F3 1.67x, club 2.75x, as long as wide.



Description: Female: 1.5 mm. Some characters in addition to the diagnostic ones are as follows: eyes dark brown. Wings hyaline, venation pale yellow; antennae with scape yellow, pedicellus and flagellum black.

Body with mesonotum and scutellum distinctly convex. Head 1.12x as wide as mesoscutum, and as wide as high; POL about 2.0 OOL. Eyes about 1.35 x as long as broad. Mouth nearly 1.4 x malar space. Antenna (Figure 2 c) with scape 0.75x as long as eye, not reaching median ocellus, 5.4 x as long as wide; pedicellus 1.8x as long as broad; clava 1.3 x broader than F3, 2.74x as long as wide, with C1 almost 1.4x as long as wide, 2.0x as long as C2, the latter 0.9x as long as wide; C3 0.8 x as long as C2, spine 0.2 x as long as C3, with apical seta distinctly shorter than spine; F1 and F2 with one sensilla on each side, F3 with 1+3 sensillae, club with 3-4 sensillae on each segment.

Mesosoma (Figure 1 c) 1.8 x as long as broad; pronotum about 1.6x as wide as long, midlobe of mesoscutum 1.2 x wider than long, with fine engraved reticulations on pronotum, on midlobe of mesoscutum and 1/3 of anterior part and scapulae with broader reticulations, with finer, longitudinal engraved reticulations on other parts; with 5 long adnotaular setae on each side. Scutellum 1.4x as broad as long, sculptured like the median lobe of mesoscutum; submedian lines parallel to each other, enclosing a space 2.26x as long as broad; setae slightly close to each other, the distance between anterior pair and fore margin of scutellum 1.6x distance between setae. Dorsellum about 0.4x as long as wide. Propodeum medially 1.1x as long as dorsellum; median carina weakly indicated, propodeal spiracle very large. Callus with two setae. Forewing (Figure 3 c) 2.33x as long as broad; costal cell as long as a marginal vein, 9.0x as long as broad; submarginal with 4 dorsal setae; marginal vein rather thin, 3.46x length of stigmal vein; stigma small and oblong; speculum closed, broad; hind wing bluntly pointed. Legs moderately long, slender, mid coxae 1.25x, mid femora 4.0x, mid tibia 9.4x, as long as width; apical seta of mid tibia 1.4x as long as width of mid tibia; mid metatarsi 3.2x as long as width; second segment of mid tarsi 5.5x as long as width and 1.4x as long as metatarsi; third segment 3.5x and pretarsi 3.2x as long as width; hind coxae 2.1x, hind femora 4.0x, hind tibiae almost 11.5x; hind metatarsi 3.2x as long as width; second segment of hind tarsi 5.2x as long as width and 1.6x as long as metatarsi; third segment of hind tarsi 3.2x, hind pretarsi 3.7x, as long as wide.

Metasoma lanceolate, 1.15x as long as head plus mesosoma, 1.25x as broad as mesosoma, 2.7 x as long as broad, last tergite 1.33x broader than long; postcercal short, almost as long as longest cercal seta; ovipositor sheaths plus postcercal 0.4x length of hind tibia; tip of hypopygium 0.64x length of metasoma.

Biology: The species is an endoparasite of in the galls of the host, *D. oleae*, on the leaves and/or shoots of *O. europea*.

***Zeytinus marmarae* Doğanlar and Sakin, n. sp.**

(Figures 1 d, 2 d, 3 d) Etymology: The name is derived from the Marmara Region from where the type specimen was collected.

Type: Holotype female, Turkey: Marmara Region, Balıkesir, Edremit, Hacıaslanlar, 39°38'55" N, 27°04'19" E, 197 m; 20 April, 2019 (leg. Gonca Sakin), reared from the galls of *D. oleae* on the leaves of *O. europea* (Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC)).

Diagnosis: Female: Body bluish-black, with metallic green reflection, around notauli on base of mesoscutum and dorsellum testaceous; Legs pale yellow, except coxae black and pretarsi testaceous; funicular segments equal in size, F1 - F3 almost 1.4x as long as width; malar space 0.44x as long as length of eye; C1 almost twice the length of C2.

Female: 0.95 mm. Some characters additional to the diagnostic ones are provided as follows: eyes reddish, metasoma with pale spots laterally. Wings hyaline, venation pale yellow. Antenna black, except radicle, anelli and tip of clava grey.

Body with mesonotum and scutellum slightly, but distinctly convex. Head 1.2x as wide as mesoscutum, about 1.13 x wider than height; POL about 1.6x OOL. Eyes about 1.6 x as long as broad. Mouth nearly 1.3 x malar space. Antenna (Figure 2 d) with scape 0.8 x as long as eye, not reaching median ocellus, 4.4 x as long as wide; pedicellus 1.9x as long as broad; clava 1.5 x broader than F3, twice as long as wide, with C1 1.2x as long as wide, 2.15 x as long as C2, the latter 0.6 x as long as wide; C3 0.8 x as long as C2, spine 0.1 x as long as C3, with apical seta distinctly shorter than spine; sensillae in two rows (1+2) on funicles, and on clava with 2 rows on C1, one row on C2 and C3.

Mesosoma (Figure 1 d) 1.72 x as long as broad; pronotum about 2.2 x as wide as long, midlobe of mesoscutum as wide as long, with raised reticulation on pronotum, on midlobe of mesoscutum and scapulae with pentagonal or quadrangular engraved reticulations on 1/3 of anterior part, with finer, longitudinal engraved reticulations on other parts; with 5 adnotaular setae on each side. Scutellum 1.3 x as broad as long, with finer, longitudinal engraved reticulations; submedian lines medially nearer to each other than sublateral lines, enclosing a space 2.3 x as long as broad; setae almost equal in length, close to each other, distance between anterior pair and fore margin of scutellum 1.1 x distance between setae. Dorsellum about 0.4x as long as wide. Propodeum medially 1.3x as long as dorsellum; median carina very fine, propodeal spiracle very large, almost touching anterior margin. Callus with two setae. Forewing (Figure 3 d) 2.1 x as long as broad; costal cell slightly shorter than marginal vein (25:28), 9.3 x as long as broad; submarginal with 5 dorsal setae; marginal vein rather thin, 3.5 x length of stigmal vein; stigma small and oblong; speculum closed, narrow. Hind wing bluntly pointed. Legs moderately long, slender *shaped*, mid coxae 1.6x, mid femora 5.7x, mid tibia 12.5x as long as width; apical seta of mid tibia 1.5x as long as width of mid tibia; hind coxae 1.8x, hind femora 5.2x, hind tibiae almost 12.7x, hind metatarsi 6x as long as wide; second segment of hind tarsi 6.7x as long

as width and 1.7x as long as metatarsi; third segment of hind tarsi 4x, hind pretarsi 2.8x, as long as wide.

Metasoma lanceolate, almost as long as head plus mesosoma and as broad as mesosoma, 2.32 x as long as wide, last tergite twice as wide as long; postcercal short, almost half as long as longest cercal seta; ovipositor sheaths plus postcercal 0.24 length of hind tibia; tip of hypopygium at half-length of metasoma.

Biology: The species is an endoparasite of *D. oleae* in galls which forms on the leaves and/or shoots of *O. europea*.

### ***Zeytinus alyssumus* Doğanlar and Laz, n.sp.**

(Figures 1 e, 2 e, 3 e, 4 e, f) Etymology: The name is derived from the genus name of *Alyssum pateri* Nyár; the specimens of the new species were reared from galls on the flower head.

Type: Holotype female, Turkey: Kahramanmaraş, Dulkadiroğlu, Denizli, 37°25'32" N, 37°04'25" E, 684m, 14. VII. 2018, (leg. B. Laz) reared from the galls of *Dasineura* sp. on the flower head of *A. pateri* (in the Insect Museum of the Biological Control Station, Yüreğir, Adana, Turkey (IMBC)). Paratypes: 23♀ 19♂, 13-22.VII. 2019, same locality as the holotype.

Diagnosis: Female: Ovipositor as long as metasoma; head 0.84x as wide as mesosoma; malar space 0.72x as long as length of eye; F1 2.1x, F2-F3 almost equal in size, 1.4-1.5x as long as width; C1 and C2 equal in length; 2nd segment of hind tarsi 1.5x as long as metatarsi; coxae mostly black, except pale yellow in the specimens hatched in summer.

Male: Legs pale yellow, except coxae black, at most pretarsi testaceous; antennae with ventral plaque 2.75x as long as broad, 0.7x as long as width of scape, 0.3 length of scape; mid tibiae at most 10x as long as width; hind tibiae almost 8x as long as width; body mostly brown, except for the apical part of mesonotum, scutellum testaceous and metasoma pale brown with some brownish spots on both sides, pretarsi testaceous; mid tibiae almost 10x as long as width; apical seta of midtibia 1.7x as long as width of mid tibia; hind tibiae 9.3x as long as width; hind metatarsi 4.1x as long as width; second segment of hind tarsi 9.5x as long as width and 1.73x as long as metatarsi.

Female: 1.5-2.25+0.12 mm (Holotype 1.25+0.12 mm). Some characters in addition to the diagnostic ones are as follows: eyes dark brown. Wings hyaline, venation pale yellow; antennae brown.

Body with mesonotum and scutellum slightly convex. Head 0.84x as wide as mesoscutum, and 1.16x as wide as height; POL about 1.6 OOL. Eyes about 1.25 x as long as broad. Mouth nearly 0.72x malar space. Antenna (Figure 2 e) with scape 0.74x as long as eye, almost reaching median ocellus, 5.43x as long as wide; pedicellus 1.62x as long as broad; clava 1.25x broader than F3, 2.5x as long as wide, with C1 almost as long as wide, and as long as C2, the latter almost as long as wide; C3 0.4 x as long as C2, spine 0.25 x as long as C3, with apical seta distinctly shorter than spine; each segment having one sensilla on each side.

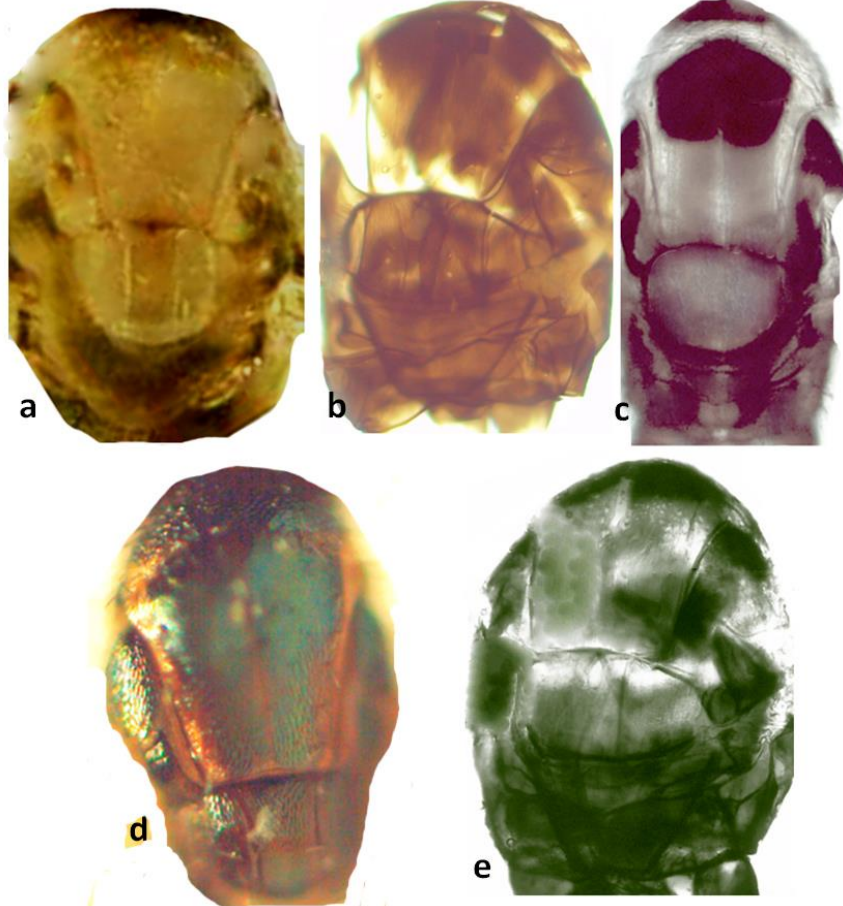
Mesosoma (Figure 1 e) 1.45 x as long as broad; pronotum 4.2x as wide as long, midlobe of mesoscutum 1.1x wider than long, with raised fine reticulation on pronotum, on midlobe of mesoscutum and scapulae with pentagonal or quadrangular engraved reticulations on anterior 1/3, with finer, longitudinal engraved reticulations on other parts; with 5 long adnotaular setae on each side. Scutellum 1.5x as broad as long, sculptured like the median lobe of mesoscutum; submedian lines apically nearer to each other than sublateral lines, enclosing a space 2.13x as long as broad; setae equal in length, slightly close to each other than the distance between anterior pair, fore margin of scutellum equal to the distance between setae. Dorsellum about 0.5x as long as wide. Propodeum medially 1.4x as long as dorsellum; median carina weakly indicated, propodeal spiracle very large. Callus with two setae. Forewing (Figure 3 e) 2.16 x as long as broad; costal cell 0.76x the length of the marginal vein, 10x as long as broad; submarginal with 5-6 dorsal setae; marginal vein rather thin, 3.8x length of stigmal vein; stigma small and oblong; speculum closed, broad; Hind wing bluntly pointed. Legs moderately long, slender, mid coxa 1.5x, mid femora 6.2x, mid tibia 9.3x as long as width; apical seta of mid tibia 1.33x as long as width of mid tibia; hind coxae 2.1x, hind femora 4.3x, hind tibiae almost 7.0x, hind metatarsi 3x as long as width; second segment of hind tarsi 6.0x as long as width and 1.5x as long as metatarsi; third segment of hind tarsi 4x, hind pretarsi 4x as long as width.

Metasoma lanceolate, almost as long as head plus mesosoma, 1.33x as long as mesosoma, 2.2 x as long as broad, last tergite as long as basal breadth; postcercal almost as long as longest cercal seta; ovipositor sheaths plus postcercal 0.53 length of hind tibia; the tip of hypopygium 0.64x length of metasoma.

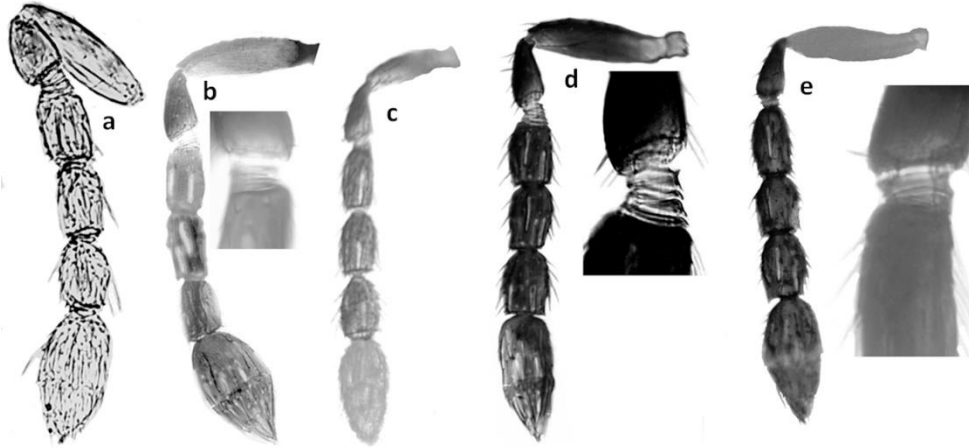
Male: Differs from female as follows. Body 1.3-2.1 mm, mainly black, metasoma in basal half brown. Legs with coxae dorsally black, ventrally apical 1/3 yellow, femorae, tibiae and tarsi yellow; in summer specimens body including legs yellow; antennae with scape and pedicel brown, flagellum yellow.

Antenna (Figure 4 e) with scape 2.38x as long as broad, having ventral plaque 2.75x as long as broad, 0.7x as long as width of scape, 0.3x length of scape; pedicellus 1.8x as long as wide, 1.4x as long as F1; F1 1.64x as broad as pedicellus, 0.48x as long as F2 and 0.86x as long as broad, following segments almost equal to each other, 1.92x as long as broad; clava slightly narrower than F4, 1.05x as long as F3 plus F4, almost 4.44x as long as broad, with C1 and C2 subequal in length, C1 2.4x, C2 2.5x as long as broad, C3 short, 1.75x as long as basal width; whorled setae very long, those of F1 reaching slightly beyond tip of F3. Metasoma distinctly shorter and narrower than mesosoma, 2.17x as long as broad. Genitalia (Figure 4 f) 2.64 x as long as wide.

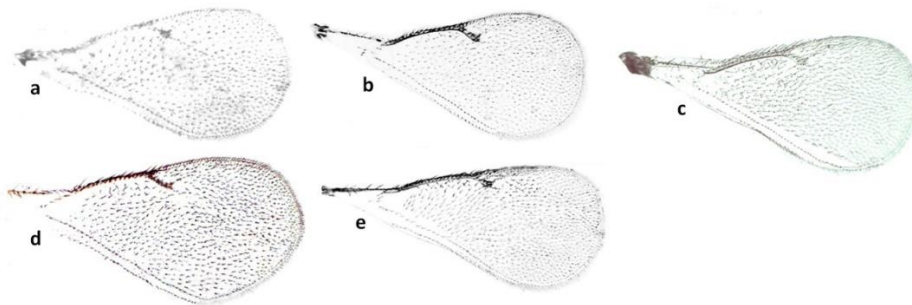
Biology: The species was reared from galls of *Dasineura* sp. in flower heads of *Alyssum pateri* Nyár ssp. *pateri* Nyár (1919).



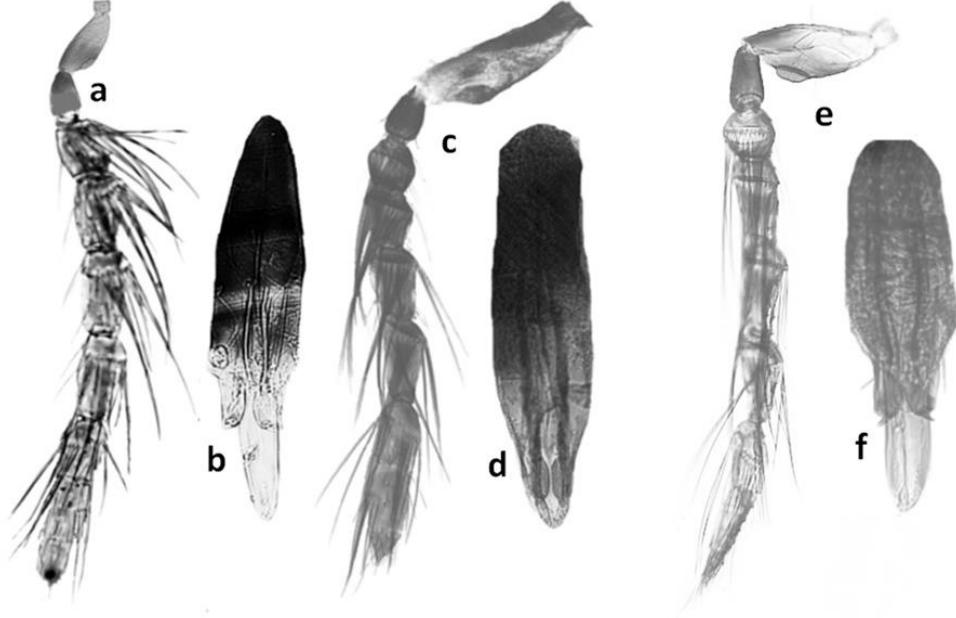
**Figure 1.** Mesosoma. Female. a-e, *Zeytinus* spp. A. *Z. hatayensis* Doğanlar (2011); b. *Z. edremitensis* Doğanlar and Sakin, n.sp.; c. *Z. balikesirensis* Doğanlar and Sakin, n.sp.; d. *Z. marmarae* Doğanlar and Sakin, n. sp.; e. *Z. alyssumus* Doğanlar and Laz, n.sp.



**Figure 2.** Antennae. Female. a-e, *Zeytinus* spp. A. *Z. hatayensis* Doğanlar (2011); b. *Z. edremitensis* Doğanlar and Sakin, n.sp.; c. *Z. balikesirensis* Doğanlar and Sakin, n.sp.; d. *Z. marmarae* Doğanlar and Sakin, n. sp.; e. *Z. alyssumus* Doğanlar and Laz, n.sp.



**Figure 3.** Forewings. Female. a-e, *Zeytinus* spp. A. *Z. hatayensis* Doğanlar (2011); b. *Z. edremitensis* Doğanlar and Sakin, n.sp.; c. *Z. balikesirensis* Doğanlar and Sakin, n.sp.; d. *Z. marmarae* Doğanlar and Sakin, n. sp.; e. *Z. alyssumus* Doğanlar and Laz, n.sp.



**Figure 4.** Antennae and genitalia of males of *Zeytinus* spp. (a-f). a, b. *Z. hatayensis* Doğanlar (2011); c, d. *Z. edremitensis* Doğanlar and Sakin, n.sp.; e, f. *Z. alyssumus* Doğanlar and Laz, n.sp.

## References

- Anonymous, 2008. Zeytincilik Araştırma Enstitüsü, Bitki Sağlığı, 2.derece önemli zeytin zararlıları. (URL: <http://www.zae.gov.tr/bitkisagligi/iz.asp>.) (Data accessed: Mayıs 2008)
- Doğanlar, M., 2011. Parasitoids complex of the olive leaf gall midges, *Dasineura oleae* (Angelini 1831) and *Lasioptera oleicola* Skuhrová, 2011 (Diptera: Cecidomyiidae) in Hatay Turkey, with descriptions of new genus and species from Tetrastichinae (Hymenoptera: Eulophidae). *Turkish Journal of Entomology*, 35 (2): 245-264.
- Doğanlar, M., Sertkaya, E. & M. Skuhrová 2011. Pest status of olive leaf gall midge *Dasineura oleae* (Angelini, 1831), description of *Lasioptera oleicola* Skuhrová sp. new (Diptera: Cecidomyiidae) and effectiveness of parasitoids on their populations in Hatay Turkey. *Turkish Journal of Entomology*, 35 (2): 265-284.
- Graham, M. W. R. de V., 1987. A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. *Bulletin of the British Museum* (Natural History) (Entomology), 55:1-392