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A new species of *Quadrastichus* Girault, 1913 (Hymenoptera: Eulophidae: Tetrastichinae) from Hatay, Turkey

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Abstract: A new species, *Quadrastichus dasineurae* n. sp. (Hym.: Eulophidae), was reared from galls of *Dasineura oleae* (Loew) (Dipt.: Cecidomyiidae) on leaves and shoots of *Olea europea* L. as a larval parasitoid of the host in Hatay, a province of Turkey. This paper details the new species and some biological data.

Key words: *Quadrastichus dasineurae* n. sp., parasitoid, *Dasineura oleae*, olive trees, Turkey

Hatay (Türkiye)'dan yeni bir *Quadrastichus* Girault, 1913 (Hymenoptera: Eulophidae: Tetrastichinae) türü

Özet: Hatay İli- Türkiye'de zeytin ağacı, *Olea europea* L.,'nın sürgün ve yapraklarında bulunan *Dasineura oleae* (Loew) (Dipt.: Cecidomyiidae) larvalarının oluşturduğu gallerden elde edilen bir yeni tür, *Quadrastichus dasineurae* n. sp. (Hym.: Eulophidae), tanımlanmış ve bu türe ait bazı biyolojik bilgiler verilmiştir.

Anahtar sözcükler: *Quadrastichus dasineurae* n. sp., parazitoit, *Dasineura oleae*, zeytin ağaçları, Türkiye

Introduction

Graham (1991) revised the European species of *Quadrastichus* Girault (Hym.: Eulophidae), and gave their hosts and distributions, and discussed their taxonomic status. LaSalle (1994) gave its diagnostic characters, listed the Nearctic's species, and compared its characters with those of other genera of Tetrastichinae. Doğanlar (1992) gave a new host for *Q. sajoi* (Szelenyi) from Syria *Dasineura oleae* (Loew) on leaves and flowers of *Olea europea* L. Until then, *Q. sajoi* had been recorded as a predatory species of *Eriophyes phloeocoptes* Nalepa (Acari: Eriophyidae) (Vereshchagina, 1961).

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Recently, specimens of *Quadrastichus* were reared from galls of *D. oleae* on leaves and shoots of *Olea europea* L. as a larval parasitoid of *D. oleae* in the Hatay province of Turkey. After examination of the material and the types of *Q. sajoi* in the Australian National Insect Collection, Canberra, together with Dr. John LaSalle, and by following the key in Graham (1991), it was found that in many respects they are distinct from the other species of the genus, especially *Q. sajoi* and *Q. xanthosoma* (Graham). The specimens are described here as a new species of the genus *Quadrastichus*.

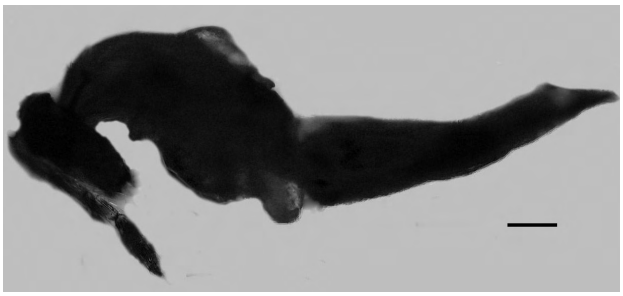


Figure 1. *Quadrastichus dasineurae* n. sp., female, body (excluding appendages), in lateral view. Scale states 0.1 mm.

Materials and Methods

The specimens of the genus *Quadrastichus* were reared from galls of *D. oleae* on leaves and shoots of *Olea europea* L. collected from several parts of Hatay province in Turkey. The galls on the leaves and/or shoots were collected, and placed in glass vials (15 cm length × 1 cm diameter) for rearing. Some parts of one specimen from each sex were slide-mounted in Canada balsam. The adults emerged from the galls were killed in 96% ethyl alcohol for taxonomic study. The host of the parasitoid was obtained by dissecting the plant materials from which the parasites/hosts emerged, and the species was identified by study of its larval and adult morphology.

This study follows the morphological terminology of LaSalle (1994). The examined specimens were deposited in the collection of the Insect Museum of Plant Protection Department, Agriculture Faculty, Mustafa Kemal University, Antakya, Hatay, Turkey.

Photographs of diagnostic characters of the new species were taken using a stereomicroscope with a digital camera attached to it.

Results and discussion

Quadrastichus dasineurae n. sp.

(Figures 1- 11)

Etymology. The name is derived from the genus name of its host, *Dasineura oleae*.

Type Material. Holotype female: Turkey: Hatay prov. 36°07′03′ N, 35°58′39′ E, 96 m, April-May, 2007 (leg. M. Doğanlar and E. Sertkaya), reared from the gall of *Dasineura oleae*, on the leaves of *Olea europea*, Cat. No: 265-30 (Museum of Plant Protection Department, Agriculture Faculty, Mustafa Kemal University, Antakya-Hatay). Paratypes: 1 male, card mounted, wings and antennae in the slide, number. 1001; 1 female, card mounted, wings and antennae in the slide, number. 1002; 2 males, 5 females, card mounted, same data as the holotype.

Diagnosis: Female: The vertex had a weak and superficial line between lateral ocelli and eyes and the antenna had 1 anellus, scape moderately swollen, 2.83 times as long as broad; forewing with 1 dorsal seta, placed before the middle; mid lobe of mesoscutum with 2-3 adnotaular setae on each side; mesonotum anteriorly, and scutellum dorsally convex, sub-median lines of scutellum distinct. The propodeum had a complete median carina, paraspiracular carina slightly indicated, spiracle placed in shallow furrow formed lateral to the paraspiracular carina; propodeum with a deep cavity between spiracle and its anterior margin as figure 51 of LaSalle (1994) and Figure 4. The gaster was distinctly longer than head, plus mesosoma and acute apicaly; ovipositor sheaths slightly projecting beyond the last tergit of gaster.

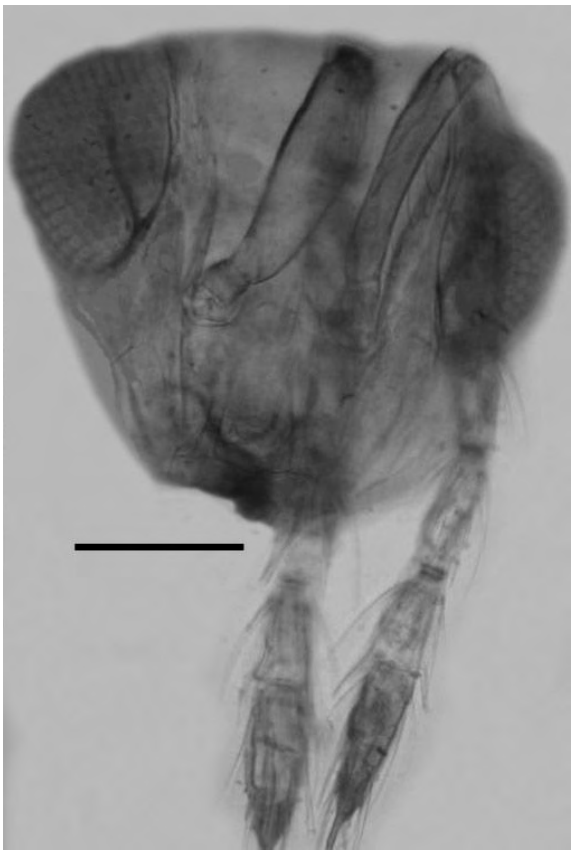
Male: As in the female sample, but the scape was 3 times as long as broad with ventral plaque 0.27-0.29 length of scape, segments of funicle with compact whorls of long setae. Gaster distinctly shorter and narrower than head, plus mesosoma. The genitalia had digitus with a single spine on hind margin.

Description. Female: 1.2-1.3 mm (Holotype 1.2 mm). The body was yellow with some testaceous spots on mesonotum, and eyes dark brown, wings hyaline, venation pale yellow. The gaster had

brownish spot medially on ventral side, base and tip of ovipositor sheaths brown.

The body (Figure 1) had mesonotum anteriorly and scutellum distinctly convex and the head (Figure 2) was slightly narrower than mesoscutum, about 2.13 times as broad as long; POL was about 2.25 OOL. The eyes were about 1.16 times as long as broad and the malar space measured 0.57 length of eye, sulcus slightly curved. The mouth was nearly 1.75 times malar space, the clypeal margin (Figure 2a) bidentate. The antenna (Figure 3) with scape as long as eye, reached slightly above median ocellus; pedicel plus flagellum 1.24 times breadth of mesoscutum; pedicel 1.75 times as long as broad, very slightly stouter than F1; anellus 3 times as broad as long: funicle filiform, F1 and F3 subequal in length, F2 slightly longer than F1 and F2, F1 3 times, F2 3.2 times, F3 2.9 times as long as broad; clava was slightly broader than F3, 4.5 times as long as broad, with C1 1.83 times, C2 and C3 1.25 times, as long as broad, spine as long as C3, with apical seta barely shorter than spine; sensilla had less numerous on funicle, more so on clava, long and slender, with moderately long bases and long projecting blades.

The thorax (Figure 4) was 1.18 times as long as broad; Pronotum 3.5 times as broad as long and the mid lobe of mesoscutum had 2.23 times as broad as long, moderately convex, reticulation fine, with most areoles 4-5 times as long as broad; median line fine, often distinct 2-3 adnotaular setae on each side. Scutellum was 1.7 times as broad as long, strongly convex, sculptured like mesoscutum; submedian lines slightly nearer to each other than to sublateral lines, enclosing a space 2.18 times as long as broad; setae equal in length, close to each other, distance between them as great as distance between posterior pair and hind margin of scutellum. The dorsellum was about twice as broad as long. The propodeum was broadly and deeply emarginated, medially 1.75 times as long as dorsellum; median carina distinct. The propodeum median carina was distinct, but short, reaching about middle and forking; the paraspiracular carina slightly indicated, spiracle placed in a shallow furrow formed lateral to the paraspiracular carina; propodeum with a deep cavity between spiracle and its anterior margin. The callus had 2 setae, one outside spiracle, and the other near hind corner. The legs were moderately long, slender, hind femora 4.6 times as long as broad with spur of mid tibia 0.6 length of basitarsus, fourth tarsomere nearly as long as basitarsus. The forewing (Figure 5) was 2.2 times as long as broad; costal cell



(a)

Figure 2. *Quadrastichus dasineurae* n. sp., female, head with antennae, in frontal view.
Figure 2a. *Quadrastichus dasineurae* n. sp., female, clypeus. Scale states 0.1 mm.

Figure 3. *Quadrastichus dasineurae* n. sp., female, antenna.
Scale states 0.1 mm.

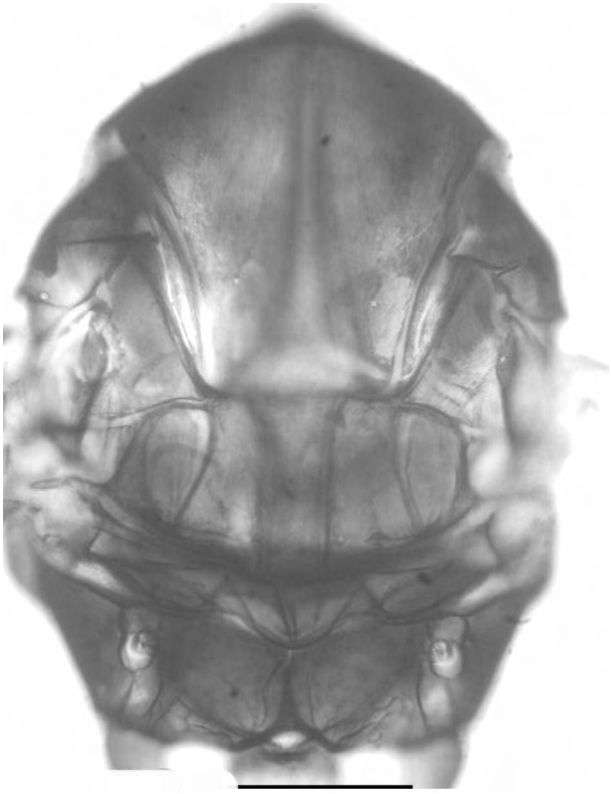


Figure 4. *Quadrastichus dasineurae* n. sp., female, mesosoma.
Scale states 0.1 mm.

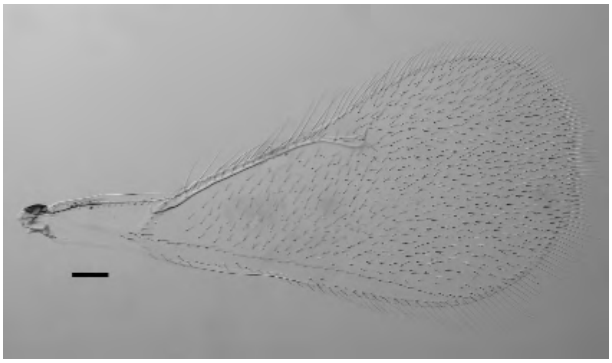


Figure 5. *Quadrastichus dasineurae* n. sp., female, forewing.
Scale states 0.1 mm.

distinctly shorter than M (23:28), 5.75 times as long as broad; the SM with 1 dorsal seta; M was rather thin, 3 times length of ST, its front edge with 10-12 long setae; ST at 35°-40°, had very thin proximally, stigma small

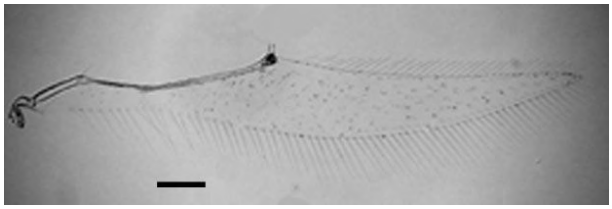


Figure 6. *Quadrastichus dasineurae* n. sp., female, hindwing.
Scale states 0.1 mm.

Figure 7. *Quadrastichus dasineurae* n. sp., female, metasoma (gaster).
Scale states 0.1 mm.

and oblong; speculum closed, narrow, extending a little way below M; wing beyond it thickly pilose, especially distally; cilia 0.33 length of ST. The hind wing (Figure 6) was bluntly to sharply pointed; cilia 0.66 breadth of wing. The gaster (Figure 7) lanceolate was 1.22 times as long as head, plus thorax, as broad as thorax, 1.66 times as long as broad, its sides subparallel in basal half, its apex distinctly acuminate; last tergite (Figure 8) was slightly broader than long; postcercale short, from about half to nearly as long as longest cercal seta; ovipositor sheaths plus postcercale 0.29 length of hind tibia; tip of hypopygium at or slightly beyond half length of gaster.

Male: 0.96-1.00 mm. The male differed from the female specimens as follows: the body was mainly black, head pale brown, to brown; mesosoma scutellum, dorsellum and hind half of mesonotum pale brown; antennae and legs pale yellow; hind half of gaster black, its basal half pale yellow. Antenna (Figures 9, 10) with scape 2.18 times as long as broad, with ventral plaque about 0.33 length of scape; pedicellus plus flagellum about 1.42 times breadth of mesoscutum; pedicel about twice as long as broad, slightly longer than F1; funicle as broad as pedicel, filiform; F1 slightly shorter than F2 (5:6) and was 1.66 times as long as broad, following segments subequal in length, each about twice as long as broad; clava slightly broader than F4, 1.16 times as long as F3 plus F4, about 3.5 times as long as broad, with C1 and C2 subequal, each 1.66 times as long as broad, C3 short and hardly longer than broad; the whorled setae was very long; those of F1 reaching slightly beyond half of F3. Wings with longer marginal ciliae; The gaster (Figure 11) distinctly narrower and slightly shorter than mesosoma.

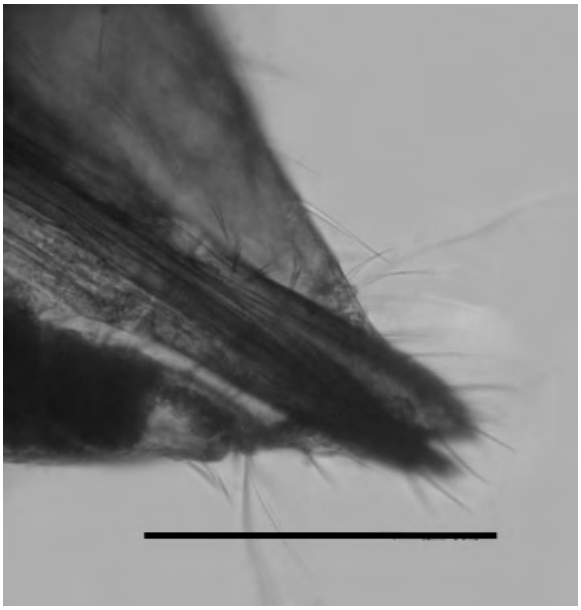


Figure 8. *Quadrastichus dasineurae* n. sp., female, tip of ovipositor and post cercale.
Scale states 0.1 mm.

Figure 9. *Quadrastichus dasineurae* n. sp., male, antenna.
Scale states 0.1 mm.

Biology: The species is an endoparasite of *Dasineura oleae* in galls of the host on the leaf and/or stalk of *Olea europea*.

Following the key of Graham (1991), the new species runs to the *sajoi* and *anysis* groups of *Quadrastichus* in having the pronotum anteriorly with reticulate areas and with a pale colored body. In those groups, the new species is similar to *Q. sajoi* and *Q. xanthosoma* (Graham) in having the mesonotum with 2-3 adnotaular setae and with a pale colored body. It

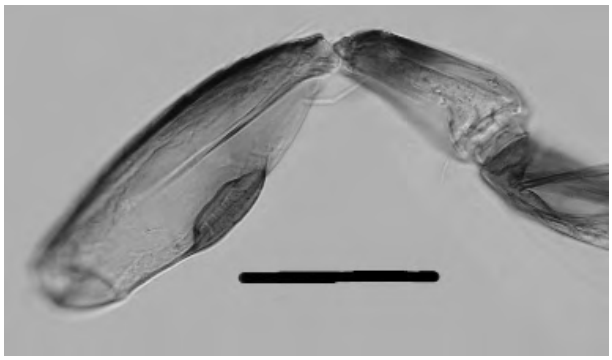


Figure 10. *Quadrastichus dasineurae* n. sp., male, scapus and pedicellus
Scale states 0.1 mm.

Figure 11. *Quadrastichus dasineurae* n. sp., male, mesosoma and metasoma.
Scale states 0.1 mm.

differs from both of them in having spiracle on the propodeum with a distinct cavity between spiracle and the hind margin of metanotum, and having the clypeal margin bidentate; and from *sajoi* in having pronotum with reticulate sculpture on the whole surface, and malar sulcus not foveate (in *sajoi* pronotum with 4 coarsely reticulate yellowish areas, the rest of the surface more finely reticulate and dark, and malar sulcus with a large sub-triangular fovea just below the eye). The new species differs from *xanthosoma* in having the scutellum with scutellar setae closely placed each other, and funicular segments subequal in length (in *xanthosoma* having the scutellum with scutellar setae placed far from each other, and the first funicular segments distinctly longer than others).

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