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Review of *Ceranisus* (Hymenoptera: Eulophidae) of Turkey, with description of a new species

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Abstract. Three species of *Ceranisus* Walker, 1841 (Hymenoptera: Eulophidae: Entedoninae) were collected recently in Turkey, including *C. menes* (Walker, 1839) and *C. pacuvius* (Walker, 1841) in southeastern Anatolia. A new species, *C. hirsutus* Doğanlar & S. Triapitsyn, is described from Şanliurfa Province. The genus *Urfacus* Doğanlar, 2003 is synonymized under *Ceranisus* and its type species, *U. bozovaensis* Doğanlar, 2003 is transferred to *Ceranisus* as *C. bozovaensis* (Doğanlar, 2003) comb. n., and the species is redescribed from the new material. An identification key to both sexes of *Ceranisus* from Turkey and Europe is provided.

INTRODUCTION

The thrips-attacking genus *Ceranisus* Walker, 1841 (Hymenoptera: Eulophidae: Entedoninae) is a member of a natural, apparently monophyletic group of four genera within the subfamily Entedoninae (Hymenoptera: Eulophidae), all of which are larval parasitoids of thrips (Thysanoptera) (Schauff, 1991; Triapitsyn & Headrick, 1995; Loomans, 2003; Triapitsyn, 2005; Triapitsyn & Morse, 2005). Another genus, *Urfacus* Doğanlar, 2003, was recently described from Turkey (Doğanlar, 2003). Its true identity was not clear (Triapitsyn, 2005) until now when, based on the new material collected in Turkey by the senior author of this communication during 2005, it has become obvious that it should be regarded as a new synonym of *Ceranisus*.

In Europe, the species of *Ceranisus* were first keyed by Graham (1963), who also described a new species, *C. lepidotus*, from Great Britain. Erdös (1966) then described *C. planitianus* from Hungary. More recently, Cameron et al. (2004) described a new species, *C. antalyacus* S. Triapitsyn, 2004, from the Asian part of Turkey (Antalya) and compared it with the related Holarctic species of the genus. Triapitsyn & Headrick (1995) reviewed the Nearctic species of *Ceranisus*; Triapitsyn & Morse (2005) revised the New World fauna of the genus. Triapitsyn (2005) gave a world taxonomic revision of *Ceranisus* and three other related entedonine genera of thrips parasitoids, and listed their known host associations. Earlier, Loomans & van Lenteren (1995) provided a nice overview of the described thrips parasitoids and their importance for biological control of thrips pests. The present study adds an interesting, very unusual new species of *Ceranisus* from Turkey and corrects the descriptions of the female and male of *C. bozovaensis* (Doğanlar, 2003), comb. n. from *Urfacus*. Identification keys to both sexes of *Ceranisus* in Europe and Turkey are also provided.

MATERIAL AND METHODS

Morphological terminology follows Gibson (1997). This study is based upon examination and identification of about 100 specimens collected from the southern and southeastern Anatolia, some of which were slide-mounted in Canada balsam. The examined specimens were deposited in the collections indicated by the following acronyms: ICMKU, Insect Museum of Plant Protection Department, Agriculture Faculty, Mustafa Kemal University, Antakya, Hatay, Turkey, and UCRC, Entomology Research Museum, Department of Entomology, University of California, Riverside, California, USA. Abbreviations used in the key and descriptions are: C = Claval antenomere, and F = Funicular antenomere.

Genus *Ceranisus* Walker, 1841

Figs 1–18

Ceranisus Walker, 1841: vi, pl. N, Fig. 2. Type species: *Cirrospilus pacuvius* Walker, 1841 by monotypy.

Ceranisus: Triapitsyn, 2005: 288–307 (world revision including list of synonyms, diagnosis, key to females).

Urfacus Doğanlar, 2003: 182. Type species: *Urfacus bozovaensis* Doğanlar; 2003 by monotypy and original designation. Syn. n.

Diagnosis

Body and appendages yellow to dark brown or black; occipital suture present and conspicuous (can be straight, sinuate, or angulate); frontal grooves reaching eye at level of anterior (median) ocellus; malar sulcus present and straight in most species, very rarely split (Y-shaped); mandible reduced (without teeth); female flagellum with 2 funicle segments and a distinct 2-or 3-segmented clava (usually 2-segmented but 3-segmented in *C. russelli* (Crawford, 1911) and *C. hirsutus* Doğanlar & Triapitsyn sp. n.), apical claval segment with an apical spicula in both sexes; male antenna often with a swollen scape, male flagellum with 2-segmented funicle and 3-segmented clava; mesosoma usually smooth or at most lightly sculptured but distinctly reticulate in *C. lepidotus* Graham,

1963 and *C. bozovaensis* (Doğanlar, 2003) comb. n.; notauli indistinct, sometimes distinct but faint; midlobe of mesoscutum with 2 pairs of setae (except with 1 such pair in most *C. russelli* and with 4 pairs in *C. hirsutus*); anterior margin of scutellum straight; scutellum with 1 pair of setae except in *C. hirsutus* with more than 4 pairs; forewing broadened beyond submarginal vein; marginal vein of forewing not expanded except in males of *C. bozovaensis* notably expanded, especially basally, in some of the specimens; petiole at most as long as wide, notably wider than long.

Keys to species in Europe and Turkey

1 Females. 2
– Males. 8
2 Clava 3-segmented (Fig. 1); midlobe of mesoscutum with 4 pairs of setae, scutellum with at least 4 pairs of setae, and axilla with 2 setae (Fig. 3); stigmal vein of forewing distinctly petiolate (Fig. 4) . . . . . C. *hirsutus* sp. n.
– Clava 2-segmented (Figs 11, 16); midlobe of mesoscutum with 2 pairs of setae, scutellum with 1 pair of setae, and axilla with 1 seta (Fig. 14); stigmal vein of forewing short, wide, and sessile 3
3 Head and mesosoma distinctly reticulate 4
– Head and mesosoma smooth or lightly sculptured 5
4 Head and mesosoma dark brown to bluish-black. . . . . .*C. bozovaensis* (Doğanlar) comb. n.
– Head and mesosoma with obvious dark green metallic luster dorsally . . . . . *C. lepidotus* Graham
5 Forewing blade with a distinct semi-oval bare area at posterior margin behind base of marginal vein, demarcated anteriorly by a sinuate line of setae. 6
– Forewing blade either without such bare area or, if a narrow bare area present along posterior margin behind base of marginal vein, it is demarcated anteriorly by a more or less straight cubital setal line (Figs 12, 18) 7
6 Malar groove entire and straight; at least base of gaster yellow or light brown . . . . . *C. menes* (Walker)
– Malar groove split (Y-shaped); gaster completely dark brown or black . . . . . *C. planitianus* Erdös
7 Basal claval segment at most 1.1x distal segment (Fig. 16). . . . . *C. pacuvius* (Walker)
– Basal claval segment at least 1.3x as long as distal segment . . . . . *C. antalyacus* S. Triapitsyn
8 F1 very small, less than 1/2 size of F2 (Fig. 2); midlobe of mesoscutum with 4 pairs of setae, scutellum with at least 4 pairs of setae, and axilla with 2 setae (as in Fig. 3); stigmal vein of forewing distinctly petiolate (as in Fig. 4) . . . . . *C. hirsutus* sp. n.
– F1 at most a little smaller than F2 (Figs 7, 17); midlobe of mesoscutum with 2 pairs of setae, scutellum with 1 pair of setae, and axilla with 1 or 2 setae (Fig. 9); stigmal vein of forewing short, wide, and sessile 9
9 Head and mesosoma distinctly reticulate 10
– Head and mesosoma smooth or lightly sculptured 11
10 Head and mesosoma dark brown to bluish-black; marginal vein of forewing usually notably expanded, especially basally (Fig. 8). . . . . *C. bozovaensis* (Doğanlar) comb. n.
– Head and mesosoma with obvious dark green metallic luster dorsally; marginal vein slightly thickened in whole length . . . . . *C. lepidotus* Graham
11 Scape slender, not swollen, or slightly dilated, at least 3× as long as wide (Fig. 7); forewing blade with a distinct semi-oval bare area at posterior margin behind base of marginal vein, demarcated anteriorly by a sinuate line of setae . . . 12
– Scape strongly swollen (Fig. 17); forewing blade either without such bare area or, if a narrow bare area present along posterior margin behind base of marginal vein, it is demarcated anteriorly by a more or less straight cubital setal line. 13
12 Malar groove entire and straight; at least base of gaster yellow or light brown; antenna with very long setae . . . . . *C. menes* (Walker)
– Malar groove split (Y-shaped); body entirely black; antenna with relatively short setae . . . . . *C. planitianus* Erdös
13 Scape 1.4–1.7× as long as wide (Fig. 17) . . . . . *C. pacuvius* (Walker)
– Scape 1.8–2.2× as long as wide . *C. antalyacus* S. Triapitsyn

Ceranisus hirsutus Doğanlar & S. Triapitsyn, sp. n.

Figs 1–5

Types. Holotype ♀ (on slide, ICMKU), labeled: "TURKEY, Şanliurfa, Bozova, Kangörmez, 37°26′N, 38°12′E, 430 m, 7.v.2005, M. Doganlar. Mounted at UCR/ERM by V.V. Berezovskiy 2005 in Canada balsam". Paratypes (same collection data as the holotype): 1♂ (on slide, in entellelan, ICMKU); 1♀ (on point, UCRC), 2♀, 1♂ (on points, ICMKU); 1♀ (in alcohol, ICMKU).

Description

Female (holotype). Body dark brown; antenna light brown, legs light to dark brown, venation brown.

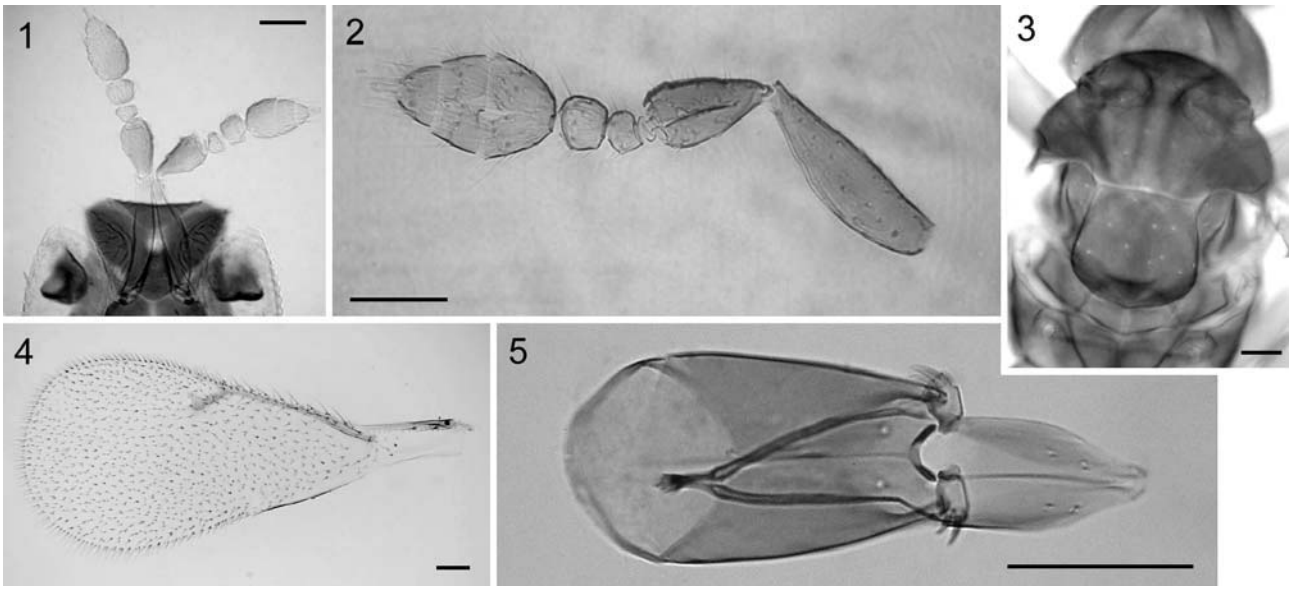
Head. Vertexal suture broadly V-shaped (Fig. 1). Antenna (Fig. 1) with scape slender, about 4.8× as long as wide; pedicel 1.8× longer than wide; F1 notably shorter and narrower than F2, 0.75× as long as and 0.66× as wide as F2, without sensilla; F2 with 1 sensillum; clava including spicula 2.0× as long as wide, C1 slightly shorter than combined length of C2 and C3, distal claval segments subequal in length, C1 and C2 with one sensillum each and C3 with two sensilla.

Mesosoma. (Fig. 3). Almost as long as metasoma; mesoscutum, scutellum, and axillae with light engraved sculpturing, without metallic luster; midlobe of mesoscutum with 8 setae; scutellum with 9 setae. Forewing (Fig. 4) 2.2× as long as wide; longest marginal cilia about 1/8 maximal forewing width; blade hyaline, uniformly covered with numerous microtrichia; submarginal vein with 2 long macrochaetae and 2 hypochaetae opposite to basal macrochaeta; postmarginal vein 0.7× as long as stigmal vein, marginal vein + parastigma 4× as long as stigmal vein, the latter distincly petiolate. Hind wing about 5.5× as long as wide; blade uniformly setose, hyaline; longest marginal cilia about 1/3 wing's maximal width. Coxae lightly sculptured (with long cells).

Metasoma. Petiole about 2× as wide as long. Ovipositor occupying about 2/3 length of gaster, slightly exserted; ovipositor length/metatibia length ratio 1.1 : 1.4

Measurements (holotype). Body length: 0.94 mm. Relative measurements, as length or length/width: Antenna: scape: 11.5/2.5; pedicel: 5/2.5; F1: 2/1.5; F2: 1.3/2.3; clava: 5.6+1.5/3.5, C1: 2.8, C2: 2, C3: 1, spicula: 1.5. Forewing: 56/25; longest marginal cilia: 2.5. Hind wing: 50/9; longest marginal cilia: 3. Ovipositor: 22.

Male. Similar to female except for normal sexually dimorphic features, as follows. Antenna (Fig. 2) with scape 3.3× as long as wide; pedicel 1.66× longer than



Figs 1–5: *Ceranisus hirsutus* sp. n. 1 – female head and antennae; 2 – male antenna; 3 – female mesoscutum and scutellum; 4 – female forewing; 5 – male genitalia. Scale bars = 0.05 mm.

wide; flagellum as in female but F1 slightly narrower. Genitalia as in Fig. 5. Body length: 1.00 mm. Relative measurements (paratype on slide, as length or length/width): Antenna: scape: 10/3; pedicel: 5/3; F1: 1.5/2; F2: 2/2.3; clava: 7+1.5/4.5, C1: 3, C2: 2, C3: 2, spicula: 1.5.

Diagnosis. This species is similar to the North American *C. russelli* in having a 3-segmented clava of the female antenna; thus it would key together with *C. russelli* in the world key to females of *Ceranisus* by Triapitsyn (2005). It differs from *C. russelli* and all other described species of *Ceranisus* in having mesoscutum and scutellum with 8 and 9 setae, respectively (in *C. russelli* mesoscutum and scutellum with 4 and 2 setae, respectively). At present, it cannot be assigned to any species group defined for *Ceranisus* by Triapitsyn (2005).

Hosts. Unknown.

Etymology. This species is named for its unusually large number of setae on the mesoscutum and scutellum (hirsutus stands for hairy or bristly in Latin).

Ceranisus bozovaensis (Doğanlar, 2003), comb. n.

Figs 6–15

Urfacus bozovaensis Doğanlar, 2003: 182.

Type locality. Bozova, Şanliurfa, Turkey.

Type material examined. Holotype: ♂ (wrongly indicated as female in the original description), on card (ICMKU), labeled: "TURKEY: Şanliurfa, Bozova, 37°22′N, 38°33′E, 570 m, 15.vi.2002, M. Doganlar, *Urfacus bozovaensis* Doğanlar. Mounted by M. Doğanlar". Paratypes (same data as the holotype, ICMKU): 1♂ (wrongly indicated as female in the original description) and 1♀ (wrongly indicated as male in the original description) on cards; 1♂ (wrongly indicated as female in the original description) on slide, mounted in Canada balsam at UCRC by V.V. Berezovskiy in 2005; 1♂ on card (correctly indicated as male in the original description).

Additional material examined. TURKEY: Şanliurfa, Birecik, İnnapli Village, 37°04′N, 37°55′E, 430 m, 6.v.2005, M. Doganlar, 32♀, 20♂ on cards and points; 4♀, 4♂ on slides (ICMKU, UCRC); 17♀, 8♂ in alcohol (ICMKU).

Redescription

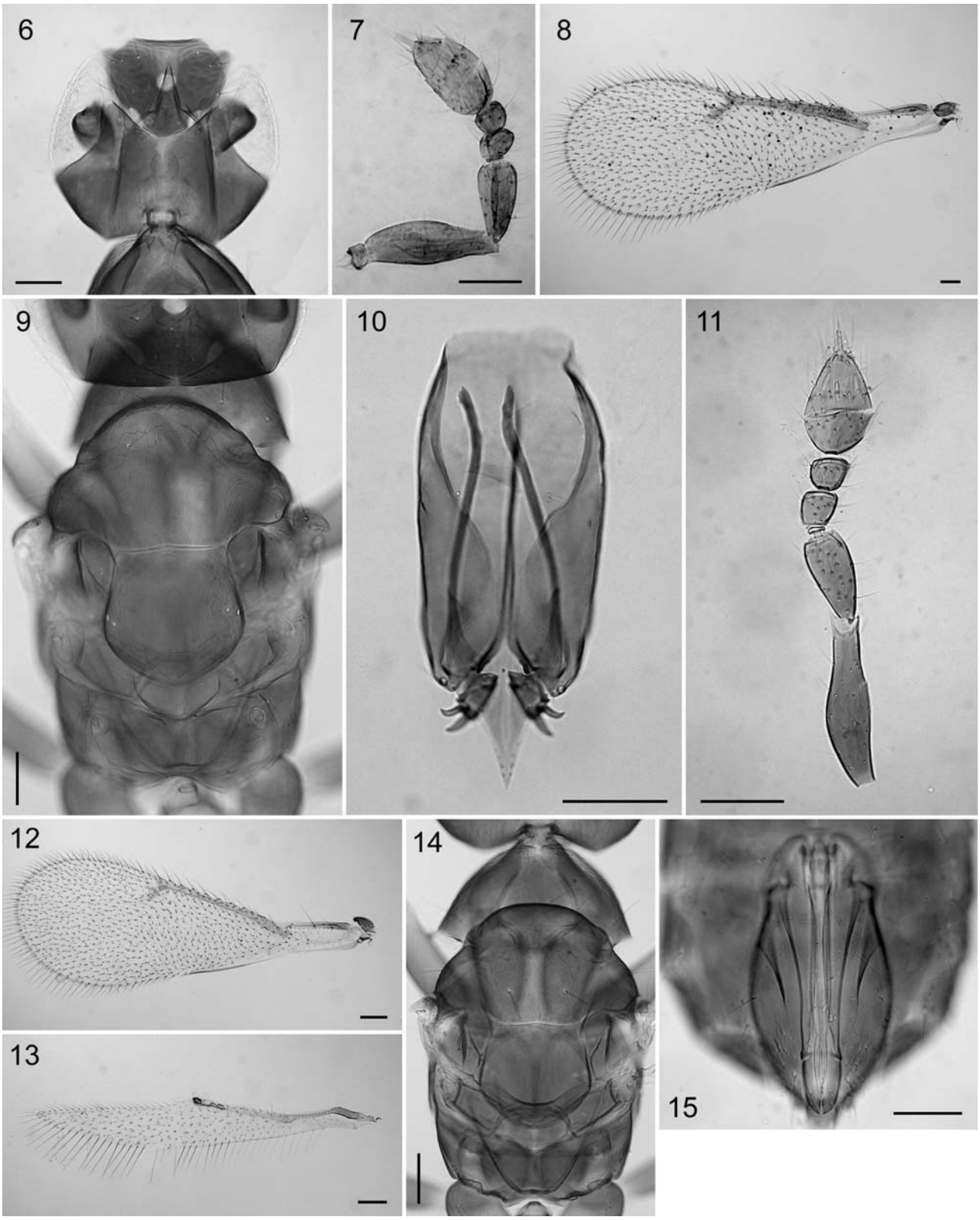
Female. Body dark brown to bluish-black, non-metallic; mouthparts, antenna and tarsi yellow, venation brown.

Head. Vertexal suture broadly V-shaped (as in Fig. 6). Antenna (Fig. 11) with scape slender, about 3.6× as long as wide; pedicel 2× as long as wide; F1 slightly longer than F2 (2.5/2.0), slightly longer than broad, and F2 0.8× as long as broad, F1 without sensilla, F2 with 1 sensillum; clava including spicula 2.0× as long as wide, C1 slightly shorter than C2 (3/4), C1 with one sensillum and C2 with two sensilla.

Mesosoma. Almost as long as metasoma; mesoscutum, scutellum, and axillae with broad meshed reticulate sculpturing; midlobe of mesoscutum with 2 pairs and scutellum with 1 pair setae (Fig. 14). Forewing (Fig. 12) about 2.8× as long as wide; longest marginal cilia about 1/4.4 maximal width of forewing; blade hyaline, uniformly covered with numerous microtrichia; submarginal vein with long macrochaetae and 2–3 hypochaetae opposite to basal macrochaeta; postmarginal vein 0.9× as long as stigmal vein, marginal vein + parastigma about 5× as long as stigmal vein, the latter distinctly sessile. Hind wing (Fig. 13) about 7× as long as wide; blade uniformly setose, hyaline; longest marginal cilia about as long as wing's maximal width. Coxae lightly sculptured.

Metasoma (Fig. 15). Petiole about 2× as wide as long. Ovipositor occupying 1/2–3/5 length of gaster, slightly exserted; ovipositor length/metatibia length ratio 1.1 : 1.0

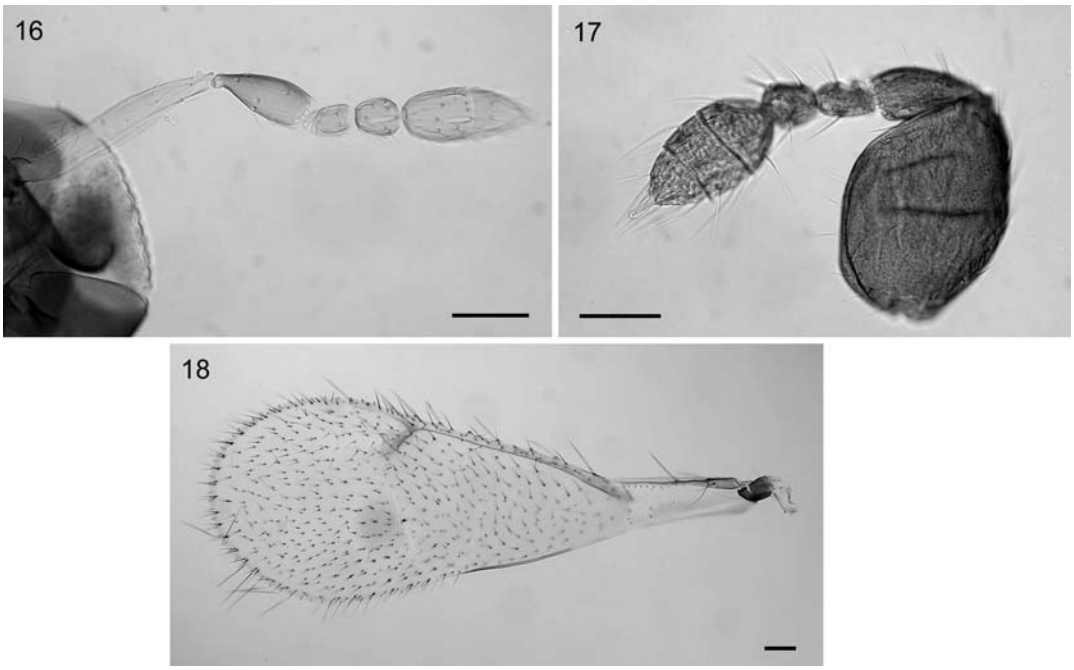
Measurements (holotype). Body length: 1.05 mm. Relative measurements (as length or length/width): Antenna: scape: 11/3; pedicel: 6/3; F1: 2.5/2.3; F2: 2/2.5; clava: 7+2/4.5, C1: 3, C2: 4, spicula: 2. Forewing: 65/23; lon-



Figs 6–15: *Ceranisus bozovaensis* (Doğanlar). 6–10 – male, 6 – head in dorsal view; 7 – antenna; 8 – forewing; 9 – mesosoma; 10 – genitalia; 11–15 – female; 11 – antenna; 12 – forewing; 13 – hind wing; 14 – mesosoma; 15 – genitalia. Scale bars = 0.05 mm.

gest marginal cilia: 5. Hind wing: 57/8; longest marginal cilia: 7. Ovipositor: 17.

Male. Description was given by Doğanlar (2003) (as female). Antenna (Fig. 7) with scape 3.2× as long as wide; pedicel and flagellum as in female but F1 quadrate. Mesosoma as in Fig. 9. Marginal vein of the forewing notably and significantly expanded, particularly basally (Fig. 8). Body length about 1.00 mm. Relative measure-



Figs 16–18: *Ceranisus pacuvius* (Walker). 16 – female antenna; 17 – male antenna; 18 – female forewing. Scale bars = 0.05 mm.

ments, as length or length/width: Antenna: scape: 9.5/3; pedicel: 5.5/3; F1: 2/2.2; F2: 2/2.2; clava: 6.5+1.5/4, C1: 2.5, C2: 2, C3: 2, spicula: 1.5. Genitalia as in Fig. 10.

Diagnosis. This species is similar to *C. lepidotus* in having the head and mesosoma reticulate; their antennae in both sexes are also very similar. It differs from *C. lepidotus* in having the mesoscutum with broad meshed reticulate sculpturing and the dorsum of head and mesosoma with bluish tinge, and also in notably expanded marginal vein (especially basally) of the male forewing in the majority of specimens. In *C. lepidotus*, dorsum of the head and mesosoma have a metallic greenish luster and the marginal vein of the male forewing is only slightly thickened in its whole length.

Hosts. Unknown.

Ceranisus menes (Walker, 1839)

See Triapitsyn & Headrick (2005) for the diagnosis and illustrations of *C. menes* and also Triapitsyn (2005) for the list of its synonyms, distribution, etc. Loomans & van Lenteren (1995) listed the known hosts of this species.

Type locality. Near London, England, UK.

Material examined. (ICMKU). Turkey: Hatay, Antakya, Adiyaman, Gölbaşi, 5.ix.2005, E. Çikman, 5♀ (swept from lentil field). Serinyol, 65 m, 17.iii.2005, M. Doganlar, 34♀, 8♂ (swept from leek field infested by *Thrips tabaci* Lindeman).

Comments. This common cosmopolitan species was also recently recorded from Turkey (Kemer) by Triapitsyn (2005).

Ceranisus pacuvius (Walker, 1841)

Figs 16–18

See Triapitsyn (2005) for the diagnosis, illustrations, list of synonyms, and distribution of *C. pacuvius*. Loomans & van Lenteren (1995) listed the known hosts of this species.

Type locality. Near London, England, UK.

Material examined. (ICMKU). Turkey: Kahramanmaraş, v.2003, A. Yiğit, 2♀ (swept from *Medicago sativa* field). Şanliurfa, Birecik, Arat Mt., 37°03´N, 38°08´E, 800 m, 6.v.2005, M. Doğanlar, 9♀, 2♂ (swept from lentil field).

Comments. This species is recorded for the first time from Turkey.

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