

# Genera of Trichogrammatidae (Hymenoptera Chalcidoidea) of the United Arab Emirates with the description of three new species

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## Abstract

Several samples of Trichogrammatidae have been collected by using Malaise traps in the United Arab Emirates. This material was studied and identified. Ten genera (*Aphelinoidea*, *Chaetostricha*, *Epoligosita*, *Oligosita*, *Paratrichogramma*, *Pseudoligosita*, *Trichogramma*, *Trichogrammatoidea*, *Tumidiclava*, and *Ufens*) and eight species were recognized. A key to the identification of the currently known genera of Trichogrammatidae from the United Arab Emirates (UAE) is provided. Three new species (*Epoligosita arabica*, *Ufens curvipenis*, and *Ufens singularis*) are described and illustrated.

**Key words:** *Epoligosita*, *Paratrichogramma*, *Ufens*, new species, egg parasitoids.

## Introduction

The family Trichogrammatidae includes minute insect egg parasitoids distributed worldwide. They are poorly known in several regions such as in the Arabian Peninsula where, until 2018 only the genus *Chaetostricha* Walker, with the species *C. mahensis* (Kieffer) (Pinto, 1990) and the genus *Ufens* Girault with the species *U. forcipes* Owen and *U. similis* (Krieger), from Oman, were recorded (Owen, 2011). Recently Triapitsyn (2018) recorded *Aphelinoidea gerlingi* Triapitsyn from Oman and Khan *et al.* (2018) recorded the following genera from Saudi Arabia: *Aphelinoidea* Girault, *Oligosita* Walker, *Paracentrobia* Howard, *Pseudoligosita* Girault, *Trichogramma* Westwood, *Ufens* Girault, and *Xiphogramma* Nowicki. Here the genus *Tumidiclava* Girault, with two species, and one species of *Chaetostricha* Walker, are recorded from Oman. New records of ten genera and eight species are added from the United Arab Emirates (UAE). Three new species are described.

## Materials and methods

The specimens were collected by Malaise traps mostly placed in the Al Wathba Wetland Reserve and Houbara Protected Area. Ecological information on the mentioned locations is reported in their home sites. The material was preserved in alcohol. Single specimens were slide-mounted in Canada balsam phenol and studied under a Zeiss Axio-phot with phase contrast illumination. Photos were taken with an AxioCam HRC digital camera. A total of 128 specimens were slide-mounted. Several tens of specimens belonging mostly to the wide genera *Oligosita* and *Pseudoligosita* were not slide-mounted, waiting for a further study.

The identification of the genera was made using the keys in Doult and Viggiani (1968) and Pinto (2006). At species level, comparisons were carried out with the descriptions of known species included in the involved genera and with material preserved in the collection of the present author.

The nomenclature follows Doult and Viggiani (1968) and Pinto (2006). Morphological abbreviations used in the text and plates: A = aedeagus. AA = aedeagal apodemes. ADA = antero-dorsal aperture of phallobase. AS = arched sclerite. C1 = first club segment. C2 = second club segment. C3 = third club segment. DL = dorsal lamina. F1 = first funicular segment. F2 = second funicular segment. IVP = intervolsellar process. LV = left volsella. MV = marginal vein. P = paramere. PM = pre-marginal vein. RS1 = radial sector 1. RV = right volsella. SC = subcostal vein. SV = stigmal vein. V = volsella. VS = volsellar sclerite.

The studied material, including types, will be deposited in the entomological collection of the Dipartimento di Agraria, Università degli Studi di Napoli "Federico II", Laboratorio di Lotta biologica, Portici (NA), Italy. Some paratypes and identified specimens will be deposited in the Terrestrial & Marine Biodiversity, P.O. Box 45553, Al Mamoura Building, Murour Road, Abu Dhabi, United Arab Emirates.

## Systematic accounts

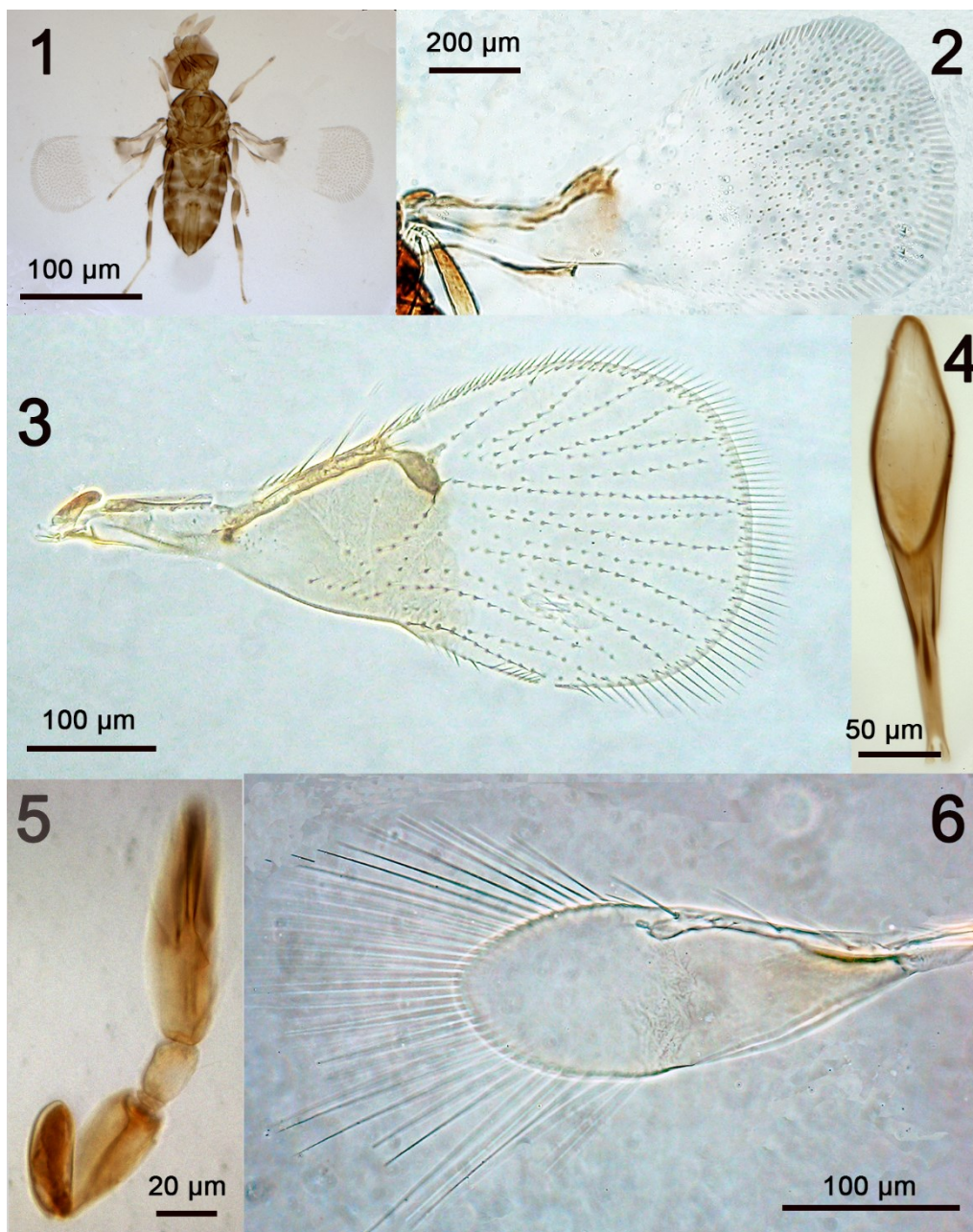
### Genus *Aphelinoidea* Girault 1911

Cosmopolitan genus including 42 species (Noyes, 2020).

#### *Aphelinoidea* (*Aphelinoidea*) *anatolica* Nowicki (figure 1)

Specimen examined. 1♀, Houbara Protected Area, N24.043755 E52.955936, 01-29.ii.2016, leg. A. Saji and A. van Harten.

Remarks. This species belongs to the group *anatolica*, having the fore wing with a hyaline track running across the wing between apex of venation and middle of discal ciliation (figure 2) (Trjapitzin, 1994). From the yellow brown coloration of the body and antennal characters, it is identified as *A. anatolica* Nowicki. The species has a wide distribution (Middle East, North Africa, China and USA).



**Figures 1-6.** 1. *Aphelinoidea (Aphelinoidea) anatolica* Nowicki, female, habitus; 2. Female, fore wing; 3. *Chaetostricha* sp., male, fore wing; 4. Male, genitalia; 5. *Epoligosita arabica* sp. nov., female, antenna; 6. Female, fore wing.

#### Genus *Chaetostricha* Walker 1851

The genus includes 24 species mostly egg parasitoids of Hemiptera (Noyes, 2020).

##### *Chaetostricha* sp.

Specimen examined. 1♂, Oman, nr. Seeb Airport, 23°34'11"N 58°17'51"E, 17.i.1997, coll. M. D. Galloger.

Remarks. This species shows the antenna with scape about as long as club, pedicel longer than funicle (9:5), and club a little twice as long as wide. Fore wing (figure 3) and male genitalia (figure 4) with typical characteristics of the genus *Chaetostricha* (Doutt and Viggiani, 1968; Viggiani, 1971a). For the mentioned traits the species appears near *C. miridiphaga* Viggiani from South Africa (Viggiani, 1971b).

#### Genus *Epoligosita* Girault 1916

The genus includes 25 described species from Australian, Ethiopian, Oriental, and Palearctic Regions, egg parasitoids of Tingidae, and Cicadellidae (Noyes, 2020). This is the first record from the Middle East.

##### *Epoligosita arabica* sp. nov.

Female. Length: 0.5 mm. Body pale yellow, eyes black-red. Head slightly wider than high (5:4). Antenna (figure 5) with a short scape, as long as pedicel, small anellus, funicular segment one-third longer than wide, about half as long as pedicel, club 3-3.5× as long as wide, with C1 shorter than C2 (15:20), with 1-2 placoid sensilla and some marginal long setae; C2 with 3-4 placoid sensilla, slightly extruded distally, and a terminal rod-like

sensillum. Mid lobe of mesoscutum and scutellum each with one pair of setae and sculpture inconspicuous; metanotum short; propodeum in the middle with a shield-like projection, 3× the length of metanotum. Fore wing (figure 6) almond-shaped, 3× as long as wide, costal cell 1.3× as long as marginal vein, the latter distally enlarged as the sessile stigmal vein and with 3 main marginal setae, blade bare, longest fringe setae one-fifth longer than discal width. Hind wing without rows of setae on the blade. Legs with femora rather stout, hind femur 0.6 as long as tibia. Gaster obconic, longer than mesosoma (50:40); ovipositor inserted at one-third of the gaster, slightly exerted, twice as long as hind tibia.

Male. Unknown.

Specimens examined. Holotype: ♀, Houbara Protected Area, N24.092353 E52.939406, 01.xi-10.xii.2015, Malaise trap, leg. A. Saji and A. van Harten. Paratypes: 4♀, same data as holotype. Additional material: 7♀, same data as holotype. 1♀ paratype will be deposited in the Terrestrial & Marine Biodiversity, P.O. Box 45553, Al Mamoura Building, Murour Road, Abu Dhabi, United Arab Emirates.

Etymology. The name derives from the Arabian Peninsula.

Remarks. Among the described species of *Epoligosita* the new species is very near the Indian species *E. ardeiana* Begum et Anis (Begum and Anis, 2015), but differs in having antenna with scape shorter, as long as pedicel, funicular segment half as long as pedicel and ovipositor twice as long as hind tibia.

### Genus *Oligosita* Walker 1851

Genus distributed worldwide including, as redefined by Pinto and Viggiani (2004), about 100 species (Noyes, 2020).

#### *Oligosita* sp. group *collina*

Specimens examined. 2♀, Al Wathba Wetland Reserve, N24.26329 E54.60422, 01-30.iv.2013, Malaise trap, leg. A. Saji and A. van Harten; 1♀, Al Wathba Wetland Reserve, N24.264479 E54.59423, 01-30.vi.2015, Malaise trap, leg. A. Saji and A. van Harten; 1♀, Mangroves National Park, N24.445464 E54.427642, 01.ii.02.iii.2016, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. The species of the *collina* group, as defined by Nowicki (1936) and Viggiani (1976), are recognized by the long and clavate apical placoid sensillum on the antennal club of the female (figure 7). In this group about 40 species are described, but most remain uncertain. The species here recorded is characterized as follows: body completely yellow or marked with red on the pleural parts of propodeum and the middle of the gaster; antennae infusate; fore wing hyaline with veins without red, a large brown stigmal spot and beyond a faint infuscation; antenna with the funicular segment slightly shorter than pedicel (8:10), club conical, around 4 times as long as broad; fore wing (figure 8) with disc mostly bare, a subcostal row of setae reaching the distal wing margin and a row of 4-6 microsetae from stigma to the same margin; three microsetae are present also on the faint infuscation

beneath the stigmal vein; fringe as long as the maximum width of the disc or slightly shorter; ovipositor about one fifth longer than hind tibia. Within the group *collina*, this species shares antenna and fore wing characters with *O. novisanguinea* Girault, *O. vergilii* Girault, and *O. haematoxantha* Novicki.

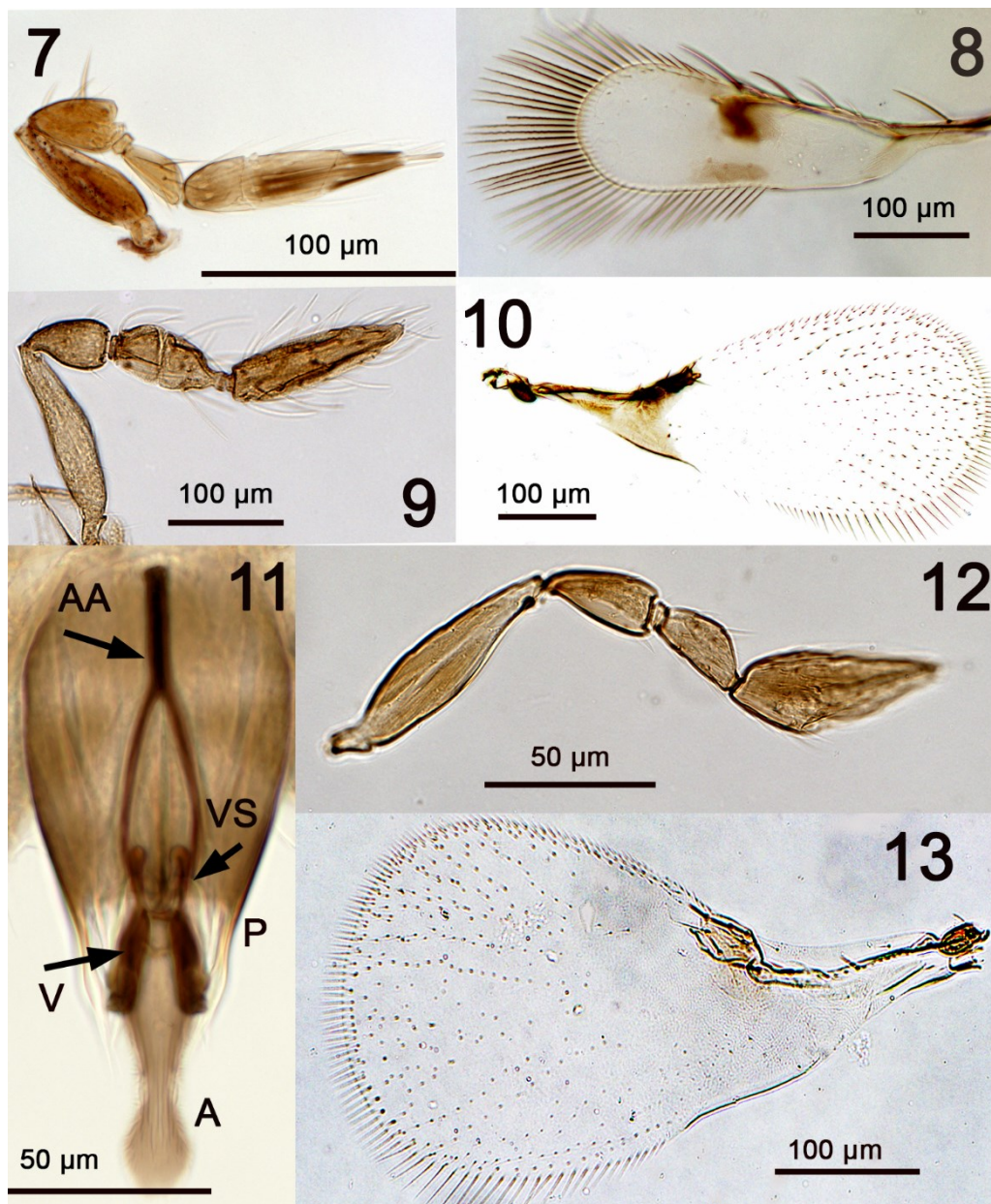
### Genus *Paratrichogramma* Girault 1912

This small genus includes nine described species (Noyes, 2020). They are recorded from Australia (3), Africa (1), China (1), India (3), and USA (1). According to Pinto (2006), the genus is distributed also in Argentina, Costa Rica, Mexico, and Israel. Several species remain poorly known and of uncertain identification, based mostly on discal ciliation of fore wing. According to the shape and the size of the funicular segment the described species can be grouped as follows: a) group *cinderella* Girault (funicular segment less than twice as long as wide, subtrapezoidal in profile; included species: *cinderella* Girault, *fusca* Girault, *heliothidis* Viggiani, *nigricorpa* Yousuf et Shafee, *pretoriensis* Doutt, *quilonensis* Yousuf et Shafee); b) group *californica* Doutt (funicular segment at least twice as long as wide, subcylindrical in profile; included species: *californica* Doutt, *giraulti* Hayat et Shuja-Uddin, *tarimica* Hu, Huang et Lin. The specimens collected in UAE are identified as *P. giraulti* Hayat and *P. tarimica* Hu, Huang et Lin.

#### *Paratrichogramma giraulti* Hayat et Shuja-Uddin

Specimens examined. 4♂, Houbara Protected Area, N24.043755 E52.955936, 01.xi-10.xii.2015, Malaise trap, leg. A. Saji and A. van Harten; 1♂, Houbara Protected Area, N24.043755 E52.955936, 10-31.i.2016, Malaise trap, leg. A. Saji and A. van Harten; 1♂, Houbara Protected Area, N24.074963 E52.953977, 01-29.ii.2016, Malaise trap, leg. A. Saji and A. van Harten; 1♂, Baqa Al Sohour, N23.99244094 E52.678005816, 29.iii.2018, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. This species, until now known only from India, was described from 4 females and 1 male, emerged from eggs of *Acrocercops orthostacta* Meyrick (Lepidoptera Gracillariidae) (Hayat and Shuja-Uddin, 1980). An additional male specimen was subsequently recorded by Yousuf and Shafee (1987), of which they illustrated, but did not describe the genitalia. The specimens examined in the present paper show antenna (figure 9), fore wing (figure 10), and genitalia (figure 11) very similar to those of *P. giraulti*. The discrimination between *P. giraulti* and *P. tarimica* based on the female characters is not easy; on the contrary, the differences between the two species concerning the genitalia appear clearer and more significant. The male genitalia of *P. giraulti*, 0.17 mm in length, show typically the aedeagal apodemes fused in the apical one-third; the volsellae are rectangular, 4× as long as wide, with a small terminal digital spine and, at their base, each connected with a straight volsellar sclerite about half as long as a volsella, the latter basally connected with a narrow transverse bridge; parameres present, reaching the distal level of volsellae, with a terminal spine; aedeagus body distally spatulate and ridged, shorter than the aedeagal apodemes (35:40).



**Figures 7-13.** 7. *Oligosita* sp. group *collina*, female, antenna; 8. Female, fore wing; 9. *Paratrichogramma giraulti* Hayat et Shuja-Uddin, male, antenna; 10. Male, fore wing; 11. Male, genitalia (A = aedeagus; AA = aedeagal apodemes; P = paramere; V = volsella; VS = volsellar sclerite); 12. *Paratrichogramma tarimica* Hu, Huang et Lin, female, antenna; 13. Female, fore wing.

*Paratrichogramma tarimica* Hu, Huang et Lin

Specimens examined. 5♀, 2♂, Al Wathba Wetland Reserve, N24.26166 E54.60455, 01-30.xi.2014, Malaise trap, leg. A. Saji and A. van Harten; 6♀, 9♂, Al Wathba Wetland Reserve, N24.26166 E54.60455, 01-31.xii.2014, Malaise trap, leg. A. Saji and A. van Harten; 4♀, 9♂, Al Wathba Wetland Reserve, N24.26389 E54.59439, 01-31.i.2015, Malaise trap, leg. A. Saji and A. van Harten; 1♀, 2♂, Al Wathba Wetland Reserve, N24.26389 E54.59439, 01-28.ii.2015, Malaise trap, leg. A. Saji and A. van Harten; 2♀, Al Wathba Wetland Reserve, N24.264479 E54.59423, 01-30.iv.2015, Malaise trap, leg. A. Saji and A. van Harten; 3♀, Houbara Protected Area, N24.092353 E52.939406, 01.xi-10.xii.2015, Malaise trap, leg. A. Saji and A. van Harten; 3♂, Houbara

Protected Area, N24.074963 E52.953977, 10-31.i.2016, Malaise trap, leg. A. Saji and A. van Harten; 1♀, Houbara Protected Area, N24.074963 E52.953977, 01-29.ii.2016, Malaise trap, leg. A. Saji and A. van Harten; 1♀, Jebel Hafeet National Park, N24.077407 E55.778863, 25.ii.2018, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. In the original description this species was compared with *P. giraulti* and differentiated from the latter by the sparser discal cilia on the fore wing, the shorter marginal fringe, and ovipositor much longer than middle tibia; male's 1<sup>st</sup> funicle much shorter than the 2<sup>nd</sup> funicle. The discrimination is rather weak for the females of *P. giraulti* and *P. tarimica*, mostly about the ovipositor, middle tibia, and hind tibia ratios. On 14 females of the examined material the average ratios (mm) were the

following: ovipositor 0.14 (SD, 0.029; min. 0.1; max. 0.2); middle tibia 0.15 (SD, 0.018; min. 0.12, max. 0.19); hind tibia 0.16 (SD, 0.015; min. 0.15, max. 0.21). The antenna (figure 12) is very similar to that of *P. giraulti*, but the discrimination with the latter species, based on fore wing (figure 13) discal ciliation appears more reliable, although some variation concerning the density of the discal ciliation and the fringe length. In the examined material several specimens have a short fringe only on the posterior apical margin and others show no fringe. More marked is the discrimination between the males of the mentioned species, based on the shape of the second funicular of the antenna, which has a longer neck in *P. tarimica* (figure 14) and some structures of the genitalia. The latter (figures 15 and 16), in particular, show two

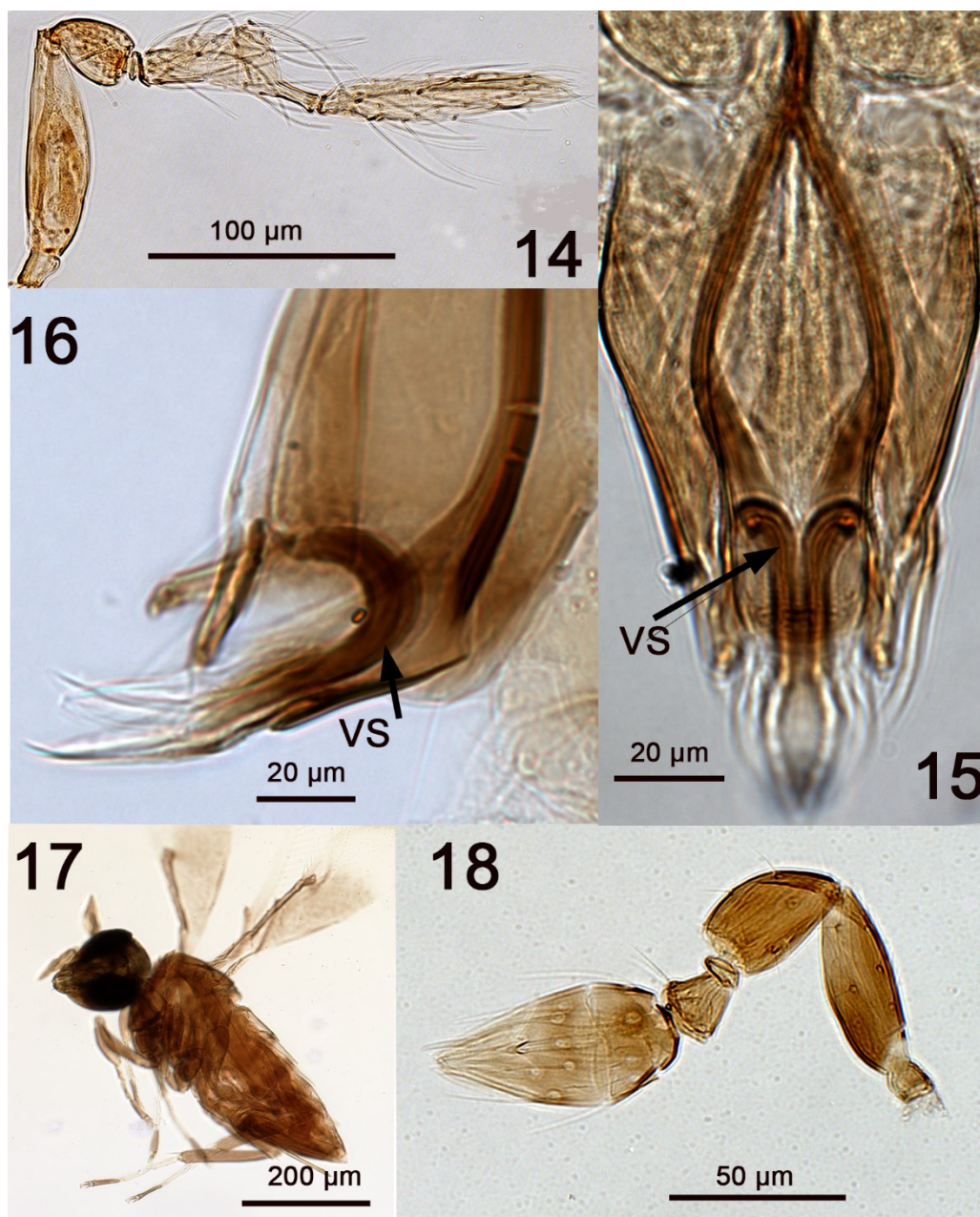
arched volsellar sclerites (VS) starting from the base of the aedeagal apodemes and directed along the sides of the aedeagus. They are not present in the other known genitalia of *Paratrichogramma*, *P. californica* (Pinto, 2006), and *P. giraulti* (Yousuf and Shafee, 1987). *P. tarimica* was recorded only from China (Hu *et al.*, 2007).

#### Genus *Pseudoligosita* Girault 1913

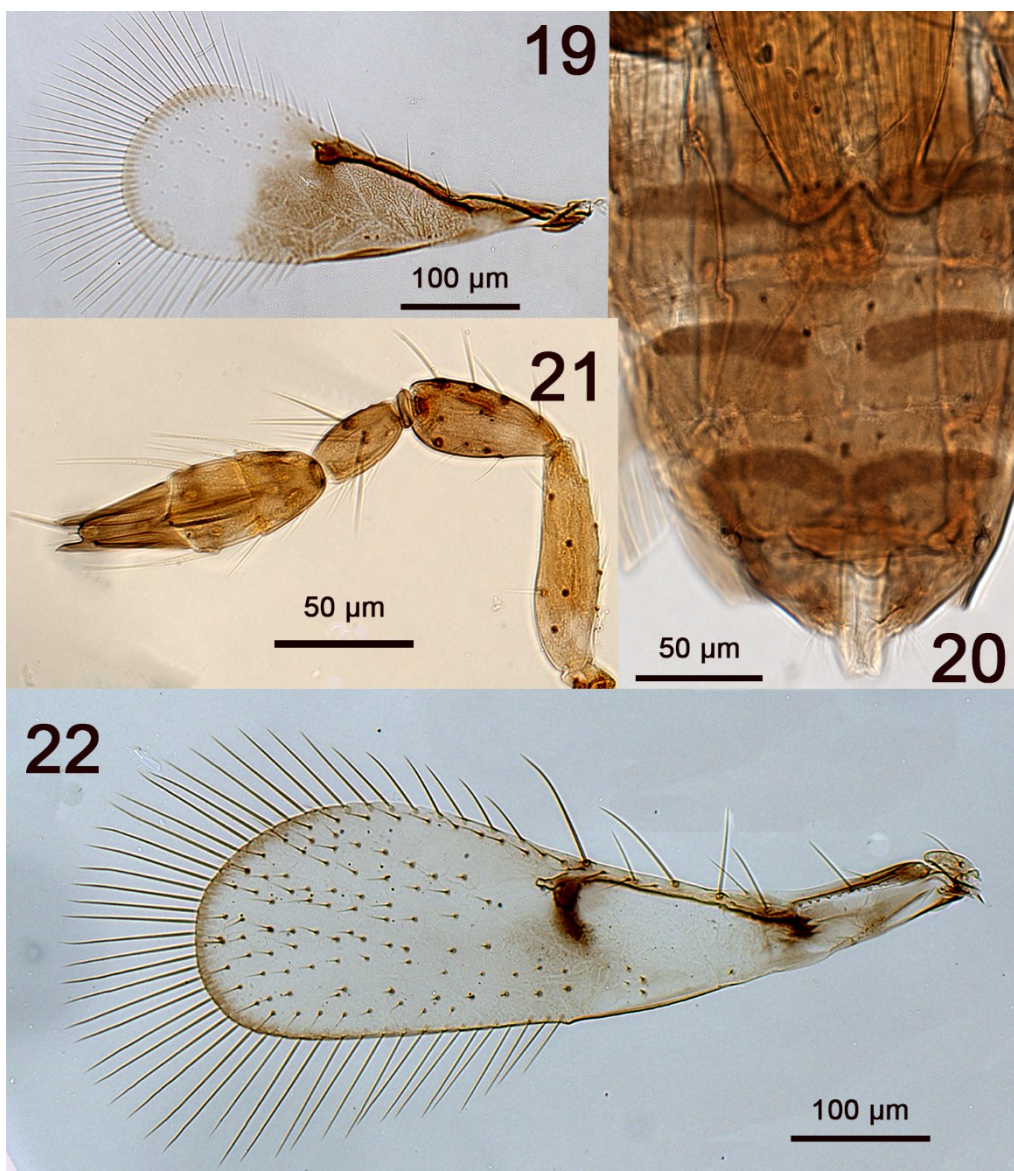
A genus with worldwide distribution including 55 species (Noyes, 2020).

#### *Pseudoligosita gerlingi* (Viggiani) (figure 17)

Specimens examined. 6♀, 3♂, Al Wathba Wetland Reserve, N24.26166 E54.60455, 01-31.xii.2014, Malaise trap, leg. A. Saji and A. van Harten; 5♀, 1♂, Al Wathba



**Figures 14-18.** 14. *Paratrichogramma tarimica* Hu, Huang et Lin, male antenna; 15. Male, genitalia (VS = volsellar sclerites); 16. Male, genitalia, lateral view (VS = volsellar sclerite); 17. *Pseudoligosita gerlingi* (Viggiani), female, habitus; 18. Female, antenna.



**Figures 19-22.** 19. *Pseudoligosita gerlingi* (Viggiani), female, fore wing; 20. Male, gaster; 21. *Pseudoligosita* sp., female, antenna; 22. Female, fore wing.

Wetland Reserve, N24.264479 E54.59423, 01-30.vi.2015, Malaise trap, leg. A. Saji and A. van Harten; 5♀, Houbara Protected Area, N24.074963 E52.953977, 01-29.ii.2016, Malaise trap, leg. A. Saji and A. van Harten; 5♀, 2♂, Houbara Protected Area, N24.043755 E52.955936, 10-31.i.2016, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. The original description was based on a male, but later on the female was also described (Viggiani, 1972; 1981). This species is unique for the combination of the antennae and fore wing characters (figures 18 and 19). It is added here that basally on each of the male gaster tergites (figure 20) VI-VII-VIII a pair of dark multiporous stripes are present.

Distribution: France, Israel (Viggiani, 1981), and from UAE recorded for the first time.

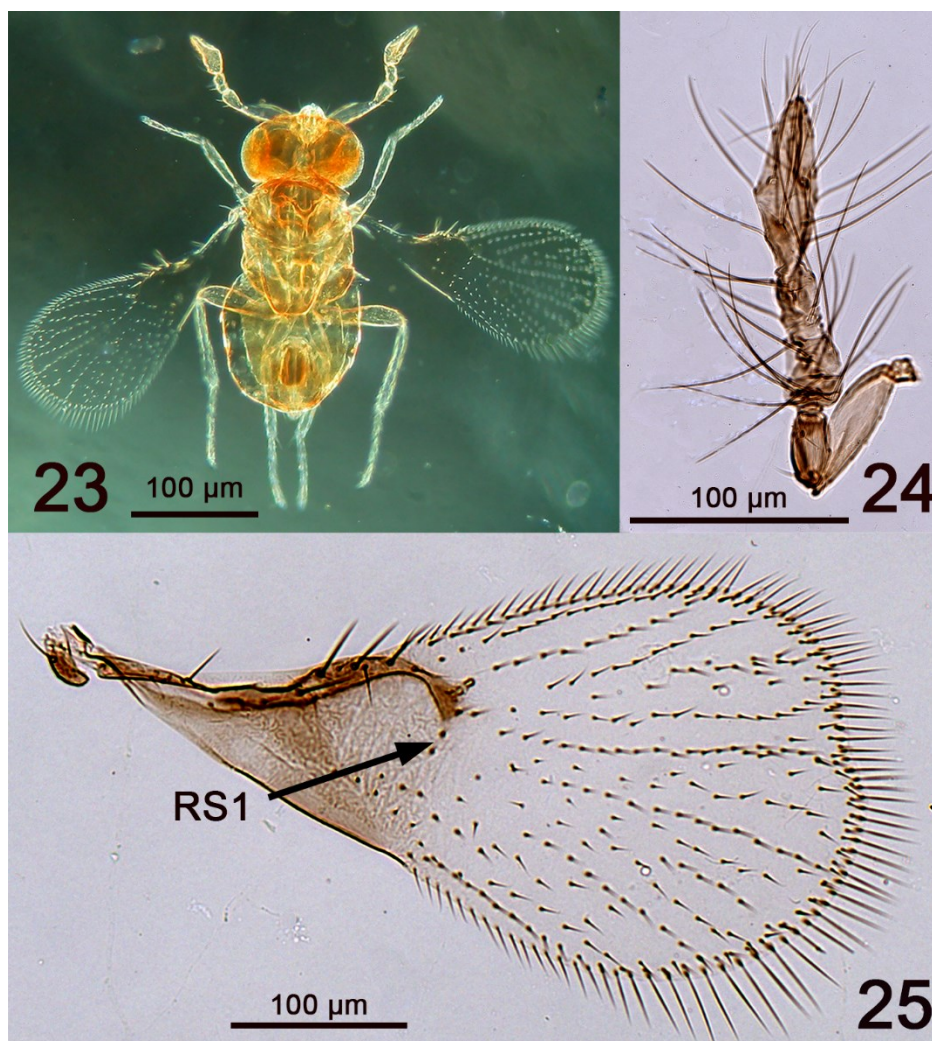
#### *Pseudoligosita* sp.

Specimens examined. 2♀, Al Wathba Wetland Reserve, N24.261086 E54.55973, 01-30.vi.2015; 4♀, Houbara Protected Area, N24.045495 E52.965830, 01-30.iv.2016, Malaise trap, leg. A. Saji and A. van Harten; 1♀, Houbara Protected Area, N24.090173 E52.940211, 28.ii.2017, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. The species, belonging to the *acestes* group, is near *P. numiciae* (Viggiani) for the shape of antenna and fore wing, but the funicular segment is slightly longer and the fore wing fringe longer than half discal width (figures 21 and 22).

#### Genus *Trichogramma* Westwood 1833

A worldwide distributed genus of the Trichogrammatidae, including 241 species (Noyes, 2020), mostly egg parasitoids of Lepidoptera. The genus was recorded



Figures 23-25. 23. *Trichogramma* sp., female, habitus; 24. Male, antenna; 25. Male, fore wing.

from Saudi Arabia (Khan *et al.*, 2018). The first record from the UAE.

*Trichogramma* sp. (figure 23)

Specimens examined. 1♀, Al Wathba Wetland Reserve, N24.26341 E54.60683, 01-31.i.2015, Malaise trap, leg. A. Saji and A. van Harten; 2♂, Houbara Protected Area, N24.265033 E54.600552, 28.ii.2017, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. The species shows male club (figure 24) 4.6× as long as wide, with longest setae 2.6× as long as maximum club width; fore wing (figure 25) with fringe as long as one-fourth of discal width; genitalia (figure 26) with the dorsal laminar subtriangular (DL), rather narrow, as long as half of the antero-dorsal aperture, reaching the distal level of volsellae, parameres about twice as long as volsellae, intervolsellar process about as long as volsellae. For the mentioned characters the species can be included in the *minutum* group (Nagarkatti and Nagaraja, 1977).

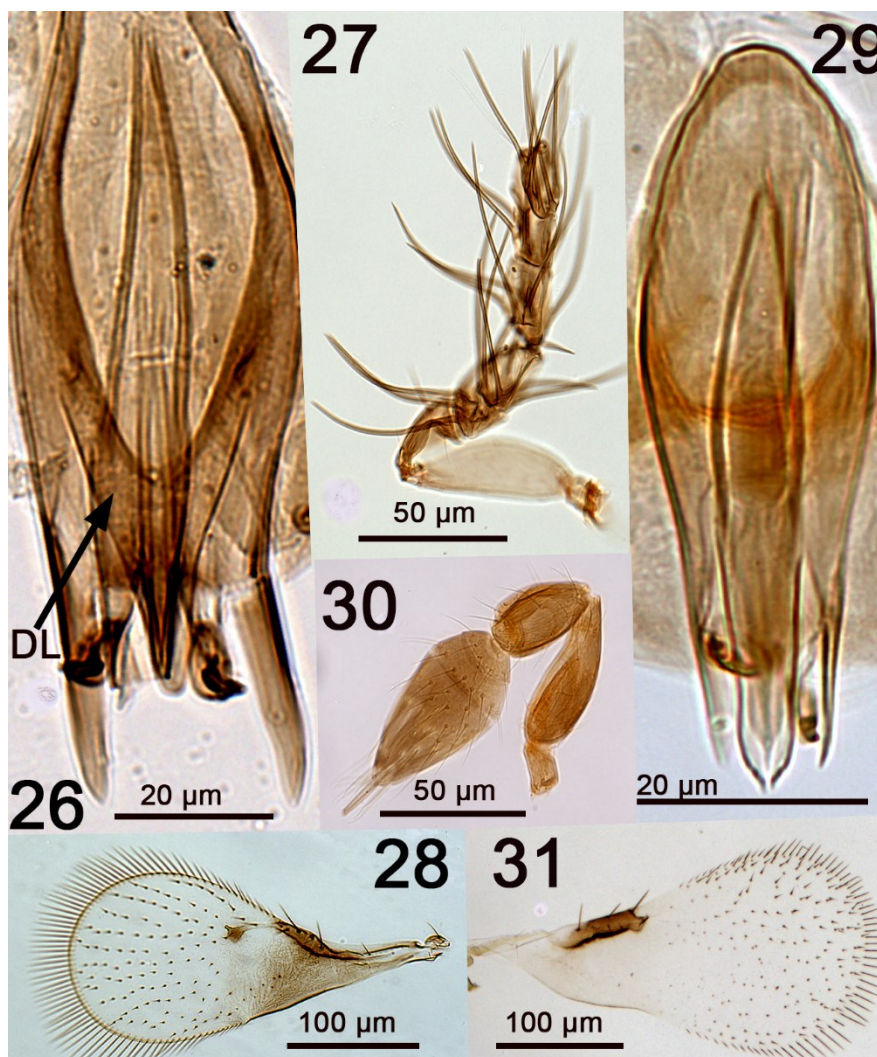
#### Genus *Trichogrammatoidea* Girault 1911

The genus, distributed worldwide, includes 31 species (Noyes, 2020), mostly egg parasitoids of Lepidoptera.

*Trichogrammatoidea* sp.

Specimens examined. 1♀, 1♂, Houbara Protected Area, N24.090173 E52.940211, 28.ii.2017, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. The species shows a yellowish body, female fore wing 2.2× as long as wide, with longest fringe setae 0.4× as long as discal width, and ovipositor as long as hind tibia; male antenna (figure 27) with 5-segmented club, each segment with robust setae, the longest as long as scape, fore wing (figure 28) 2× as long as wide, with fringe longest setae one-third of the discal width; genitalia (figure 29) length 0.1 mm with a rather narrow phallobase, 4× as long as wide, parameres slightly longer than volsellae, intervolsellar process very small, aedeagus with body one-fourth shorter than apodemes. For the mentioned characters this species runs near *T. lutea* group (Nagaraja, 1978; Nagarkatti and Nagaraja, 1977).



**Figures 26-31.** 26. *Trichogramma* sp., male, genitalia (DL = dorsal lamina); 27. *Trichogrammatoidea* sp., male, antenna; 28. Male, fore wing; 29. Male, genitalia; 30. *Tumidiclava* sp., female, antenna; 31. Female, fore wing.

#### Genus *Tumidiclava* Girault 1911

The genus *Tumidiclava* includes 20 species (Noyes, 2020).

##### *Tumidiclava nowickii* Viggiani

Specimen examined. 1♀, Oman nr. Old Muscat, 11.vii.1989, coll. Huber and Reacher. Until now this species was recorded only from Cape Verde Islands (Viggiani, 1996).

##### *Tumidiclava* sp.

Specimens examined: 1♀, Oman, Salalah, South Dehariz, 22.ii.1968, coll. J. T. Huber; 1♀, same data, but 21-23.ii.1968.

Female. Length: 0.6 mm. Body rather stout, chestnut dark, with vertex of head, scutellum, metanotum, propodeum and base of gaster yellow; legs concolorous with the body, but tibiae, at least distally, and tarsi lighter; fore wing hyaline with marginal vein brown. Antenna (figure 30) short, with scape a little shorter than club (15:18), pedicel one-third shorter than scape; club 3-segmented

twice as long as wide. Mesosoma shorter than metasoma (7:9). Mid lobe of mesoscutum with reticulate sculpture and 2 pairs of setae, as scutellum. Fore wing (figure 31) 2.2× as long as wide, rather normally setose, with a short fringe, one-sixth of the discal width; marginal vein one half of the costal cell and with 3 marginal setae. Legs with basitarsomere slightly shorter than the following segments. Ovipositor not exerted, 1.2 longer than hind tibia.

Remarks. This species shares some characters (antenna and fore wing) with the type of the genus *T. pulchrinotum* Girault (Aishan *et al.*, 2015), but the body colour is different.

#### Genus *Ufens* Girault 1911

This genus, which includes 54 species, was revised by Owen (2011). The females show small morphological variations, in many cases, their specific discrimination is very difficult or impossible. On the contrary, the male sex provides remarkable variations, mostly concerning genitalia, which are unique in the Trichogrammatidae.





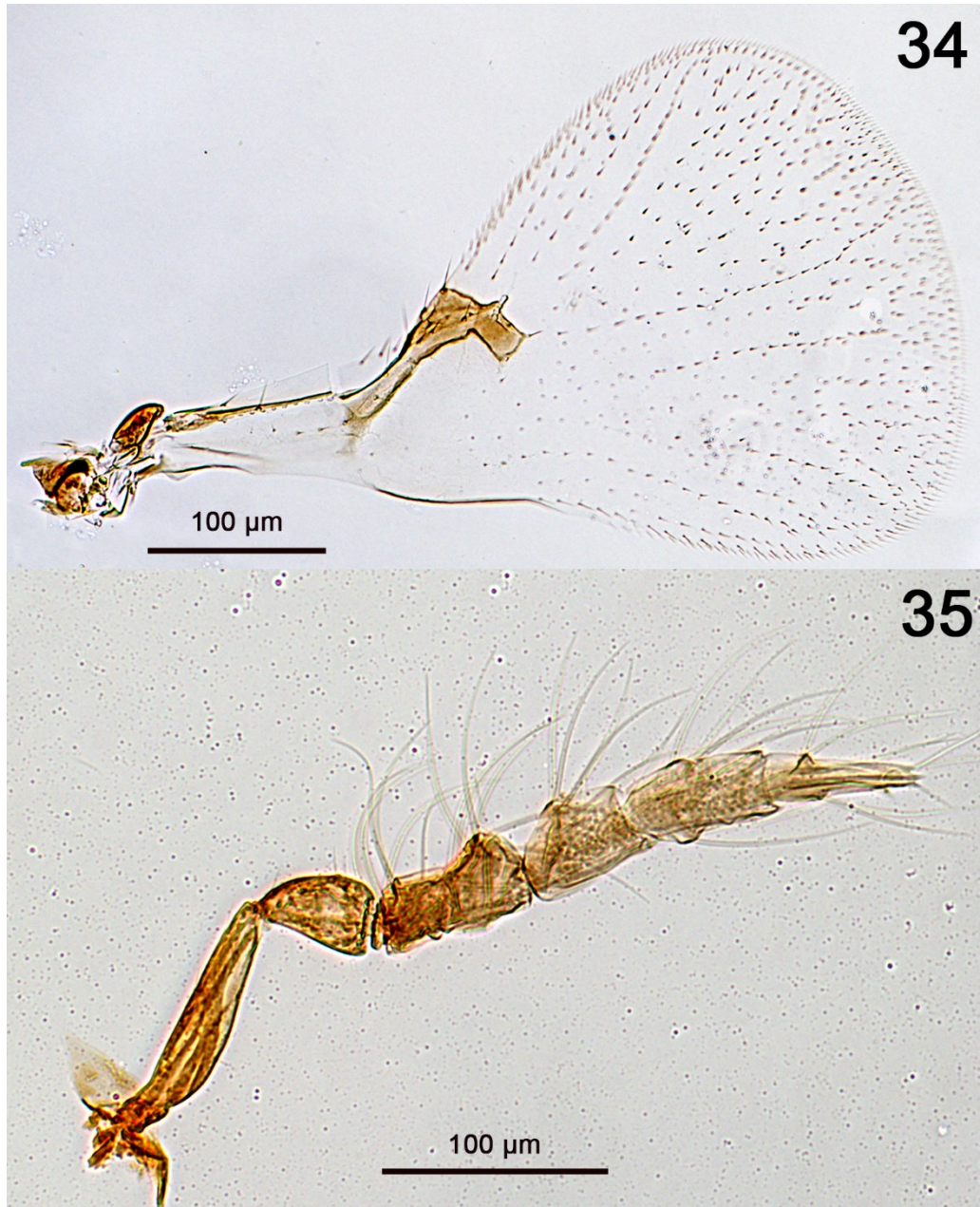
Figures 32-33. 32. *Ufens curvipenis* sp. nov, female, habitus; 33. Female, antenna.

*Ufens curvipenis* sp. nov. (figure 32)

Female. Body yellow, with some dusky areas on pronotum and sides of mesosoma; gaster with brown small patches on each side of the tergites, more evident on the VIII and last tergites; ovipositor at base dark brown and valvifers rusty; eyes dark red. Length. 0.5-0.8 mm. Antenna (figure 33) with short radicula, scape narrow, 4× as long as wide, pedicel as long or slightly longer than the two funicular segments combined, F1 transverse, F2 about 2× as long as F1, club 2× as long as funicle, C2 slightly longer than C2 and C3. Mesosoma shorter than gaster (6:8). Mid lobe of mesoscutum as long as wide, with 2 pairs of setae and a striate sculpture, as scutellum; metanotum short, one-sixth of scutellum length; propodeum in the middle about as long as propodeum. Fore wing (figure 34) around 1.5× as long as wide, venation extended in the basal

half, with SC:PM:MV:SV ratios as follows: 25:10:10:5; MV increasingly wider than PM from base and distally as wide as the length of SV; the latter without neck, broad base and distally with a trunked stigma. Discal ciliation rather sparse, with 13-15 rows of setae; fringe very short, shorter than the length of SV and present only on the posterior apical margin of the wing. Hind wing with blade not immediately narrower beyond hamulus and with 3 rows of setae. Legs normal with basitarsus slightly shorter than the subsequent tarsomeres. Gaster conic-ovate, ovipositor inserted at basal one-third of the gaster, slightly exerted, around 2× as long as hind tibia.

Male. As the female, but antenna (figure 35) with pedicel one-third shorter than F1 and F2 combined; F1 subquadrate, F2 slightly longer and wider than F2; club 2× as long as scape, C1 shorter than C2 (25:30), C3 narrower, conic,



Figures 34-35. 34. *Ufens curvipenis* sp. nov., female, fore wing; 35. Male, antenna.

as long as C2; funicular and club segments each with a whorl of setae; club segment with 2-4 placoid sensilla. Genitalia (figures 36, 37 and 38) 0.15 mm in length, with phallobase twice as long as wide, basally trunked and concave in the middle, with antero-dorsal aperture subtriangular; volsellae asymmetrical, sickle-shaped, directed ventrally, the left (LV) twice longer than the right (RV) one, as long as the ventrally curved, short, but robust aedeagus; the latter has a trunked end and no apodemes; parameres absent.

Specimens examined. Holotype: ♂, Al Wathba Wetland Reserve, N24.26247 E54.61181, 01-31.vii.2015, Malaise trap, leg. A. Saji and A. van Harten. Paratypes:

4♀, 2♂, Al Wathba Wetland Reserve, N24.262610 E54.59427, 01-30.vi.2015, Malaise trap, leg. A. Saji and A. van Harten; 1♀, 4♂, same data as holotype. 1♀ and 1♂ paratypes will be deposited in the Terrestrial & Marine Biodiversity, P.O. Box 45553, Al Mamoura Building, Murour Road, Abu Dhabi, United Arab Emirates.

**Etymology.** Named for the shape of the genitalia.

**Remarks.** The new species shows a unique combination of very distinctive characters: the fore wing venation with MV short, sessile SV, and genitalia with asymmetrical and sickle-shaped volsellae, short and curved ventrally, aedeagus without apodemes. The first character is shared only with *U. pallidus* Owen (Owen, 2011), which shows



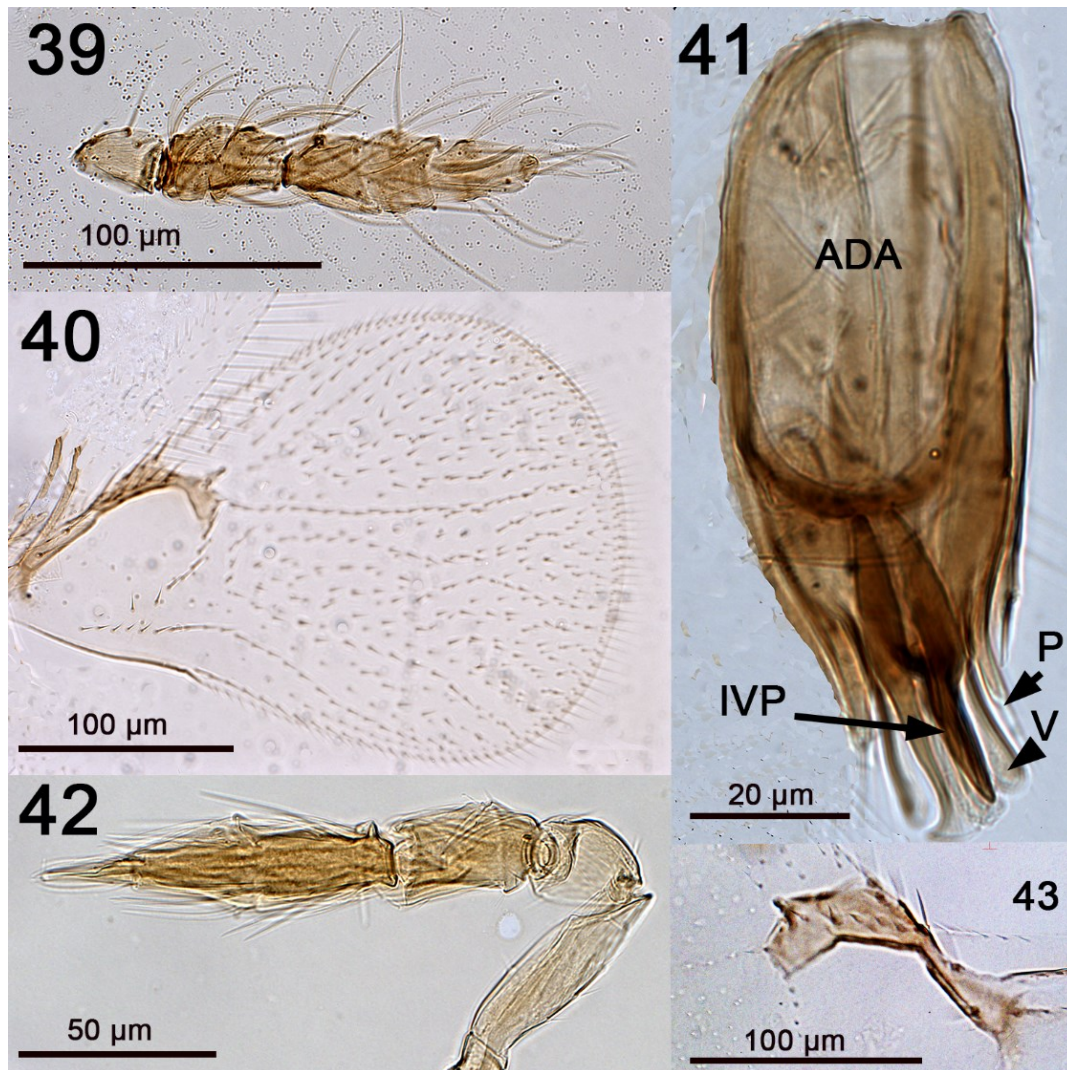
**Figures 36-38.** 36. *Ufens curvipenis* sp. nov., male, genitalia, dorsal (LV = left volsella; RV = right volsella); 37. Male, genitalia, lateral view of aedeagus (A = aedeagus; LV = left volsella); 38. Male, genitalia, lateral view of volsellae (LV = left volsella; RV = right volsella).

male antenna and genitalia markedly different. Socked-shaped volsellae are present also in *U. acacia* Owen, *U. decipiens* Owen, and *U. gloriosus* Owen, but other genitalia characters and wing venation are dissimilar.

*Ufens singularis* sp. nov.

Male. Body yellow brown, legs lighter, fore wing hyaline. Length: 0.5 mm. Antenna (figure 39) with pedicel slightly longer than F2 (8:6), F2 as long as pedicel, C1 as long as C3 and C2 slightly shorter than C1, terminal segment discoidal; funicular and club segments each with a whorl of setae, the longest 1.6× as long as the pedicel; funicular and C1-C3 segments with basiconic peg sensilla near their distal margin and 1-2 placoid sensilla. Mid lobe of mesoscutum with a mesh sculpturing. Fore wing

(figure 40) 1.6× as long as wide, PM as long as MV, the latter slightly enlarged distally, SV half as long as MV with a constricted neck; blade densely setose with RS1 present, confluent to the cubital track 1, discal fringe shorter than SV length. Genitalia (figure 41) with phallobase 1.7× as long as wide, ovoidal antero-dorsal aperture with subparallel lateral margins and distal margin with slight invagination and dorsal ridge, parameres present with a terminal seta as long as the preceding part; volsellae flat and spatulate (V), well distinct from parameres, and reaching the distal level of the robust intervolsellar process (IVP); aedeagus one-third shorter than the antero-dorsal aperture, with two robust apodemes reaching the basal margin of the antero-dorsal aperture.



**Figures 39-43.** 39. *Ufens singularis* sp. nov., male, antenna; 40. Male, fore wing; 41. Male, genitalia, dorsal (ADA = antero-dorsal aperture of phallobase; IVP = intervallosellar process; P = paramere; V = volsella); 42. *Ufens* sp., female antenna; 43. Female, fore wing veins.

Specimen examined. Holotype: ♂, Sharjah, Al Wasit Protected Area, 19.v.-2.vi.2011, water trap, leg. A. van Harten.

Etymology. Named for the combination of unique characters.

Remarks. The new species shares the type of genitalia with *U. apollo* Owen, *U. niger* (Ashmead), *U. principalis* Owen, *U. similis* (Kryger) and *U. taniae* Owen. Among them, *U. singularis* is more similar to *U. niger* and *U. similis*, but the ratio phallobase length/phallobase width is around 1.7 (not 2-2.7), the anterodorsal aperture of the phallobase is not abruptly constricted in posterior half, the ventral process width at base is less than half of width of phallobase and not sinuous. The aedeagus not described in detail and considered without apodemes in *U. niger*

and *U. similis* (Owen, 2011), in fact as illustrated for the latter species by Viggiani (1971a) shows two robust apodemes slight longer than the ventral process (15:12).

*Ufens* sp.

Specimen examined. 1♀, Al Wathba Wetland Reserve, N24.25394 E54.61651, 01-30.ix.2013, Malaise trap, leg. A. Saji and A. van Harten.

Remarks. The specimen shows the female antenna as in figure 42 and a pale fore wing venation, a short MV broadly connected with the base of SV (figure 43). This peculiar character is present in *U. pallidus* Owen (2011) from Turkmenistan. Only the discovery of the male can allow a comparison with the mentioned species.

## Key to the currently known genera of Trichogrammatidae of the United Arab Emirates

1 (2)	- Antenna with funicle 2-segmented (figure 33) . . . . .	2
--	- Antenna with funicle 1-segmented or without funicle (figures 21, 30) . . . . .	5
2 (1)	- Fore wing with arched marginal vein (figures 25, 28) . . . . .	3
--	- Fore wing with straight marginal vein (figures 3, 22) . . . . .	4
3 (2)	- Fore wing with RS1 track present (figure 25); male flagellum normally 1-segmented, with robust and long setae, genitalia with a dorsal lamina (DL) (figure 26) . . . . .	<i>Trichogramma</i>
--	- Fore wing without RS1 track present (figure 28); male flagellum 5-segmented, genitalia without a dorsal lamina (figure 29) . . . . .	<i>Trichogrammatoidea</i>
4 (2)	- Female antenna with 3-segmented club (figure 33) and male antenna with 3 or 4-segmented club (figure 35); complex male genitalia (figures 36, 41) . . . . .	<i>Ufens</i>
--	- Female and male antenna with 3-segmented club; male genitalia simple, tubular, without distinct phallobase and distal appendices (figure 4) . . . . .	<i>Chaetostricha</i>
5 (1)	- Antenna with 1-segmented funicle . . . . .	6
--	- Antenna without a funicle . . . . .	9
6 (5)	- Female antenna with 1-segmented club (figure 12), male antenna with 2-segmented funicle, second funicular segment bottle-shaped (figure 14) . . . . .	<i>Paratrachogramma</i>
--	- Antennal club 2 or 3-segmented . . . . .	7
7 (6)	- Antenna with a 2-segmented club (figure 5); fore wing almond shaped, entirely glabrous or with 1-2 setae, with a long discal fringe (figure 6) . . . . .	<i>Epoligosita</i>
--	- Fore wing not almond shaped, with sparse or dense ciliation; club 3-segmented . . . . .	8
8 (7)	- Gaster with at least some tergites with longitudinal ridges (figure 20) . . . . .	<i>Pseudoligosita</i>
--	- Gaster tergites without longitudinal ridges . . . . .	<i>Oligosita</i>
9 (5)	- Female antennal club without a terminal process (figure 1) . . . . .	<i>Aphelinoidea</i>
--	- Female antennal club with a terminal process at apex (figure 30) . . . . .	<i>Tumidiclava</i>

### Concluding remarks

The Trichogrammatidae collected in UAE from 2011 to 2018, of which 128 specimens have been studied, represent genera distributed worldwide. However, some of them, like *Trichogramma* and *Trichogrammatoidea*, surprisingly appear rather rare. The most common genus collected in the study area has been *Paratrachogramma*, about 43% of the studied specimens, and between the two identified species *P. giraulti* and *P. tarimica*, the latter has been the most represented (87%). Significant has been also the presence of *Pseudoligosita gerlingi* (21%). According to the present knowledge, the Trichogrammatidae fauna of the UAE includes some elements of the Oriental and Palearctic Regions. Further studies are needed to have a wider picture of the UAE biodiversity.

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