



A TAXONOMICAL STUDY OF *APHID PARASITOIDS* (HYMENOPTERA: APHIDIIDAE) AND THEIR HOST APHID ASSOCIATIONS IN DHI QAR PROVINCE

Khalid Jaber AL-Hussainawy¹ Afrah Abdul Zahra Al Jassani² and A. Shamki Jabbar¹

¹College of Agriculture, University of Al-Muthanna, Dhi Qar, Iraq

²Faculty of Agriculture, University of Kufa, Iraq

Abstract

Showed the study of the Aphid parasitoids (Hymenoptera: Aphidiidae) in Dhi Qar province southern of Iraq during the months of March and April 2017 is 5 species belonging to 3 genera of Aphidiidae, *Aphidius matricariae*, *A. funebris*, *A. rosae*, *Lysiphlebus testaceipes* and *Praon exoletum*, The diagnosis was based on important taxonomic characteristics such as, maxillary palpi, labial palpi, wing veins, propodium, petiole and ovary sheath.

Key words: Aphidiidae, aphid parasitoids, Dhi Qar.

Introduction

Aphids (*Homoptera: Aphidiidae*) is a polyphagous insect pest of a wide variety of crops, vegetables, fruits and decoration plants. Aphids cause damage directly (leaves deformation, flower and young fruit droop, underdeveloped shoots), or damage indirectly (honey residue causing sooty mold, virus transmission) (Naeem *et al.*, 2005).

The presence of Aphids in nature is accompanied by the presence of many vital enemies that feed on them and greatly reduce their densities. These enemies return to different families (Stary, 1970).

Aphidiidae is a family of Ichneumonoidea wasps, which are specialized solitary endoparasitoids of aphids (Tobias, Chiriac, 1986; Davidian, 2007). They are among the most important natural enemies of aphids, which can effectively regulate the aphid populations (Hughes, 1989; Hagvar and Hofsvang, 1991).

Among natural enemies of aphids, parasitoids have an important place (Tomanovic and Brajkovic, 2001). Parasitoid is an insect, which larvae feed exclusively on or within the body of the host, which is always killed at the end. Only one host is needed for completion of the life cycle of a parasitoid, but usually more parasitoids are developed in one host. Parasitoids are specialized in

selecting their host and are compared to the hosts relatively big. Usually are parasitoids only in the stage of larva, meanwhile adult specimens are free living and they feed with nectar of the plants and honeydew of the aphids (Minks in Harrewijn, 1988; Godfray, 1994).

Material And Methods

Parts of host plants bearing the aphid colonies were cut with scissors and placed in a small plastic container or tube covered with nylon netting. The samples were transferred from the field to the laboratory, where they were kept under room temperatures (approx. 20–25°C). The emerging parasitoids were captured soon after emergence using a suction collector, and preserved in 70% ethanol. Live aphids were preserved in 90% ethanol (Eastop & van Emden, 1972) for identification at a later stage.

The sampling took place from 1 march till 1 may 2017 in vegetable ecosystems on 3 different locations; namely at the Al-Bathaa, Suk al- Shouokh and Al-Nasiriyah. Aphids, their parasitoids and host plants were collected on cultivated and wild-growing plants (Kos, 2007).

The same time prevented the escape of aphids and later flown out parasitoids. The samples were marked

with the successive number of sample, date of sampling and location (place of collecting).

Additionally, we annotated also species of host plants, on which the samples were collected.

The samples were examined using the Olympus Compound Microscope by magnification lenses under 4x, 10x, 40x magnification and dissecting microscope for identification and composition, and then painted by the Lucida camera.

Results

Key taxonomy of Species

- 1- Antennae more than 13 segmented, maxillary palpi 4 segmented 2-Antennae 13 segmented, maxillary palpi 3 segmented, labial palpi 2 segmented *Lysiphlebus testaceipes*
- 2- maxillary palpi more than one segmented, vein R1 longer than R 2- about 2,5 time, cross vein m-cu and r-m present 3- maxillary palpi one segmented, vein R1 equal to R2, cross vein m-cu and r-m not present..... *Praon exsoletum*
- 3- Antennae 17 segmented, maxillary palpi 4 segmented, labial palpi 3 segmented 4 - Antennae 14-16 segmented, maxillary palpi 3 segmented, labial palpi 2 segmented *Aphidius matricariae*.
- 4- vein R1 longer than R2 about 2.5 time, lateral side of petiole with has parallel lines and 10-8 bristles..... *Aphidius funebris* - vein R1 longer than R2 about 1.5 time, lateral side of petiole with has slanted lines and 16-18 bristles..... *Aphidius rosae*

***Lysiphlebus testaceipes* (Cresson, 1880)**

Synonym

Lysiphlebus basilaris (Provancher, 1888)

Lysiphlebus baccharaphidis Ashmead, 1889

Lysiphlebus abutilaphidis Ashmead, 1889

Description of female : body length 1.8-1.5 mm.

head : oval in dark brown color, the distance between

the wide compound eyes oval shaped large-sized eyes, the dark- brown colored Antennae with 13 segmented, first segmented longer than second segmented, Maxillary palpi with 3 segmented, labial palpi with two segmented (Fig. 1-a), mouth parts are light brown. **Thorax**: oval dark brown, forewing pterostigma triangular light brown, R1 longer than R2 more than 0.5 time, wing cells are 3, vein M absent but short, vein m-cu absent, vein r-m present (Fig. 1- b), dark-colored Propodeum docking area on its dorsal surface is a distinctive aura, long legs dark brown with little yellow color.

Abdomen: Its color is brown and yellow, the petiole is half a yellow is the color and the back half is dark brown (Fig. 1- c), there are two parallel lines on its dorsal surface, its end is six-branched, the sheath is ovipositor sheath (Fig. 1- d), its color is dark brown, wide, and six Bristles.

Host : *Aphis nerii*, *Aphis cragcivora*, *Aphis.fabae*, *Myzus persicae*. *Aphis punicae*, *Aphis gosypii*.

***Praon exsoletum* (Nees, 1811)**

Synonym

Praon palitans Muesebeck, 1956

Description of the female: body length 2-3 mm, length of Antennae 2-1.5 mm. **head** : oval in dark brown color, the distance between the eyes is wide and many fluff, the large oval composite eyes, the number of segmented Antennae is 17 segmented, the segmented 1-3 yellowish, another segmented dark brown, Maxillary palpi 4 segmented (Fig. 2- a), labial palpi One segmented, mouth parts are yellow. **Thorax**: oval dark brown, forewing pterostigma triangular (Fig. 2-b), R1 approximately length equal to R2, M is present but incomplete and no other extremities are connected, sweat m-cu and transient sweat rm are not present, The number of wing cells 3 cells, the area of docking Propodeum has no halo but there is a side layout with short thick hair, long legs dark yellow color.

Abdomen : dark brown, petiole has a pair of prominent lateral protrusions (Fig. 2- c), with long lateral

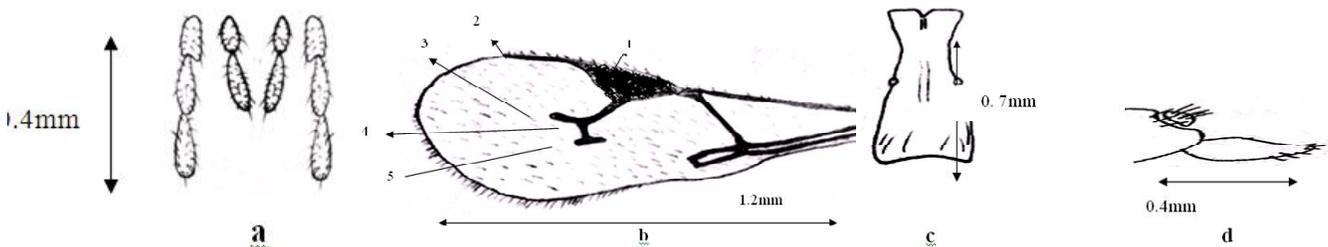


Fig. 1: *Lysiphlebus testaceipes* - a- Maxillary palpi, labial palpi, b- forewing :1- ptero stigma,2-R1,3-R2,4-r-m, 5- M, c- petiole, d- ovipositor sheath

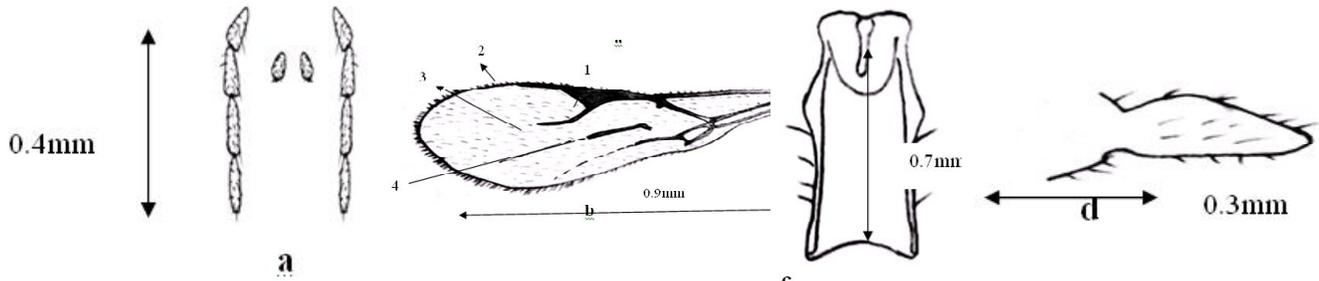


Fig. 2: *Praon exsoletum* - a- Maxillary palpi, labial palpi, b- forewing : 1- pterostigma, 2-R1, 3-R2, 4- M, c- petiole, d- ovipositor sheath

hairs, the dorsal surface with U shaped, ovipositor sheath, dark brown, thick and short hairs (Fig. 2- d). *Sitobion avenae*, *Acyrtosiphon pisum.*, *Myzus persicae*,

Host : *Aphidius matricariae* Haliday, 1834

Synonym

Aphidius (*Aphidius*) *matricariae* Haliday, 1834, Ent. Mag., 2: 103

Aphidius (*Aphidius*) *arundinis* Haliday, 1834, Ent. Mag., 2: 104

Aphidius phorodonitis Ashmead, 1889, Proc. U. S. Nat. Mus., 11:662

Female Description : Body length 2-3 mm, length Antennae 2.3-2 mm. **head :** oval with a dark brown color, the distance between the eyes is close, the oval eyes are large, Antennae filiform with 16- 14 segmented, the first segmented is brown longer than second segmented, fourth segmented is long and yellow, another segmentes are brown, Maxillary palpi with 3 segmented (Fig. 3-a), labial palpi with two segmented of light yellow, the mouth parts are light yellow. **Thorax:** Oval in dark brown color, Forewing Transparent wing Color of brow yellowing (Fig 3- b), pterostigma almost triangular, R1 Longer than R2 by 2.5 time, the veins M, m-cu exist, and r-m exists and clear, the number of wing cells 4, Propodeum is dark brown, its dorsal plate is curly, the legs are long, coxa, femur and tibia are brown, trochanter and tarsus are light yellow. Abdomen: dark brown, petiole yellow (Fig 3- c), with thick fluff, lateral side rough, wrinkled with slanted lines, Ovipositor sheath wide elongated with thick fluff on top (Fig 3- d).

Host : *Aphis punicae*, *Aphis nerii*, *Rhopalosiphum*

padi, *Aphis fabae*, *Myzus persicae*, *Aphis gossypii*, *Aphidius funebris* Mackauer, 1961

Synonym

Aphidius funebris Mackauer, Boll. Lab. Ent. Agr. "F. Silvestri", Portici 19: 279, 1961.

Aphidius funebris: Star., Bull. Ent. Pologne 32: 119, 1962.

Female Description : Body length 2.5 -2 mm, Antennae length 2-1.7 mm. **head :** oval with a brown color, the distance between the eyes is close, the composite eyes are oval large, the Antennae with 18-17 segmented, the first segmented is the base part of which is black and the outer color is yellow, the length is equal to the last segmented by 2.5 time, the second and third segmented are brown, The fourth segmented is long and yellowish, another segmented are brown. Maxillary palpi with 4 segmented, labial palpi with 3 segmented (Fig. 4-a), The mouth parts are light yellow. **Thorax :** oval in dark brown, forewing is transparent (Fig. 4- b), the color of the veins is dark yellow, the pterostigma is almost triangular, R1 longer than the R2 by 2.5 time, veins M, m-cu and r-m is present and clear, cell wing are 4, Propodeum dark brown, its dorsal plate wrinkled, legs long, coxa, femur and tibia are brown, trochanter and tarsus are yellow. **Abdomen :** Dark brown in color, petiole yellow with 10-8 long bristles (Fig. 4- c), its lateral side rough on it parallel straight lines, Ovipositor sheath dark brown elongated with a thick fluff on top (Fig 4- d).

Host: *Acyrtosiphon pisum*, *Aphis gossypii*, *Aulacorthum solani*

Macrosiphum euphorbiae

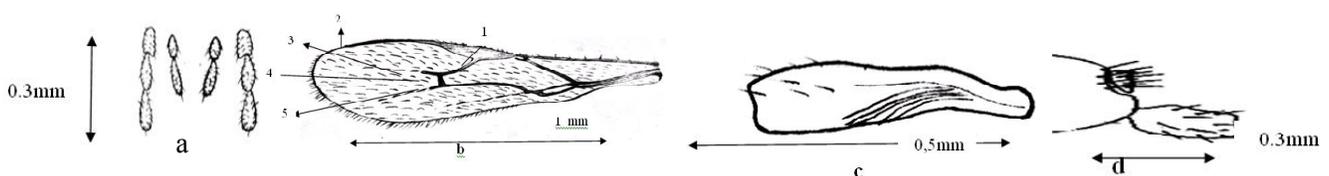


Fig. 3: *Aphidius matricariae* - a- Maxillary palpi, labial palpi, b- forewing : 1- pterostigma, 2-R1, 3-R2, 4-r-m, 5- M, c- petiole d- ovipositor sheath

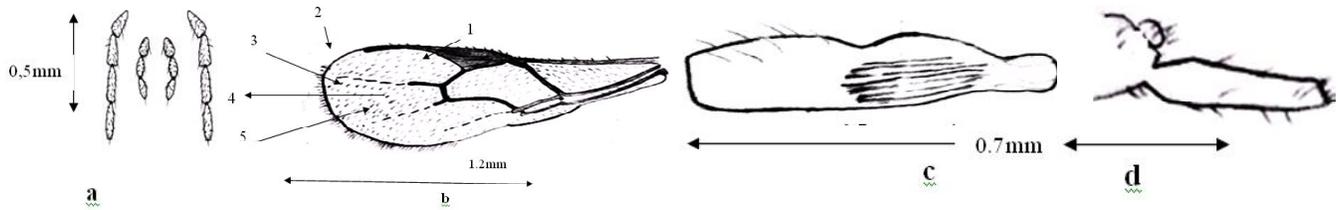


Fig. 4: *Aphidius funebris* - a- Maxillary palpi, labial palpi, b- forewing : 1- pterostigma,2-R1,3-R2,4-r-m, 5- M, c- petiole d- ovipositor sheath

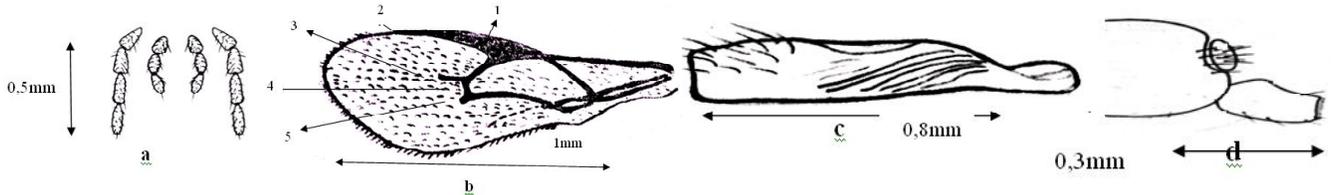


Fig. 5: *Aphidius rosae* - a- Maxillary palpi, labial palpi, b- forewing : 1- pterostigma,2-R1,3-R2,4-r-m, 5- M, c- petiole, d- ovipositor sheath

Aphidius rosae Haliday, 1834

Synonym

Aphidius (Aphidius) rosae Haliday, 1833, Ent. Mag. I: 261

Aphidius rosarum Nees, 1834, Hym. Ichn. aff. Mon. 1: 19

Aphidius aphidivorus Ratzeburg, 1844, Ichn. d. Forstins. I: 50, 52

Aphidius cancellatus Buckton, 1876. Mon. Brit. Aphid. Vol. I: III

Female Description : Body length 3-2.5 mm, Length Antennae 2.3-2 mm. **head** : oval black, the distance between the eyes is close, the oval eyes are large. The Antennae with 17 segmented, the second and third segmented are brown, the fourth is yellow, another segmented brown, Maxillary palpus with 4 segmented, labial palpi with 3 segmented of light yellow color (Fig. 5- a), the mouth parts are yellow to light brown. **thorax**: oval in dark brown, forewing is transparent (Fig. 5- b), the color of the veins is dark yellow, forewing pterostigma is almost triangular, R1 longer than R2 about 1.5 time, the veins M, m-cu r-m is present and clear, wing cell are 4, the dark brown Propodeum, the dorsal plate curly, legs are long, coxa, femur and tibia are brown color, trochanter and tarsus are light yellow.

Abdomen : dark brown, petiole yellow with 18-16 thick hair (Fig. 5- c), lateral side rough on it, slanted lines, Ovipositor sheath dark brown, broad wide, with a thick fluff (Fig. 5- d). **Host** : *Metopolophium dirhodum*, *Sitobion avenae*, *Rhopalosiphum padi*, *Schizaphis graminum*.

References

- Davidian, E.M. Fam (2007). Aphidiidae / Ed. A. S. Leley// Keys to the insects of Russian Far East. Vol. IV. *Neuropteromorpha, Mecoptera, Hymenoptera*, Pt. 5.- Vladivostok : Dal'nauka, - P. 192-254.
- Eastop, V.F. and H.F. van Emden (1972) Aphid technology. In: van Emden, H. F (ed.), *The insect material*. Academic Press, London, 1-45.
- Godfray, H.C.J. (1994). *Parasitoids: behavioral and evolutionary ecology*. Princeton, New Jersey, Princ.Uni. Press. 192-211.
- Hagvar, E.B. and T. Hofsvang (1991). Aphid parasitoids (Hymenoptera: Aphidiidae): Biology, host selection and use in biological control. *Biocontrol News and Information*, **12**: 13-41
- Hughes, R.D. (1989). *Biological control in the open field*. pp. 167-198.
- Kos, K. (2007). Prave listne uši (Aphidiidae) in njihovi parazitoidi v vrtnarskem ekosistemu. Dipl. naloga, UL, Biotehniška fakulteta, Odd. za agronomijo: 69 p.
- Minks, A.K. and P. Harrewijn (1988). *Aphids, their biology, natural enemies and control*. World Crop Pests 2B. Amsterdam, Elsevier: 364 p
- Naeem, M., F. Shehzad and M.R. Khan (2005). Biosystematics of aphid parasitoids (Hymenoptera: Aphidiidae: Aphelinidae) from Potohar region of the Punjab. *Entomol. Mon. Maga. Humane Press, U. S. A.*, **141**: 219-226.
- Star, P. (1970). *Biology of aphid parasites (Hymenoptera: Aphidiidae)*. Dr. W. Junk, The Hague., 643pp.
- Tobias, V. I. and I.G. Fam Chiriak (1986). *Aphidiidae* / Ed. G. S. Medvedev Leningrad : Nauka, -P. 254. - (Keys to the insects of the European part of the USSR; Vol. 3, part 5).
- Tomanoviæ, Ž. and M. Brajkoviæ (2001). Aphid parasitoids (Hymenoptera: Aphidiidae) of agroecosystems of the south part of the Pannonian area. *Arch. Biol. Sci.*, **53**: 57-64.