التسجيل الأولي لمتطفل جديد من فصيلة Ichneumonidae (Hymenoptera) على حشرة دودة ثمار التفاح *Cydia pomonella* L. في سورية

First Recorder of New Parasitoid on Codling Moth, *Cydia pomonella* l. Belong to Ichneumonidae Family (Hymenoptera) in Syria

Eng. Shadi Ibrahim Alhaj[1] Prof. Abed Alnabi Basheer[1] Prof. Louai Aslan[1]

(1) Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria.

shadialhaj@live.com

الملخّص

أجريت الدراسة في منطقتي بشراغي وعرامو في محافظة اللاذقية (سورية) خلال الفترة من عام 2011 إلى 2013 في عدة بساتين تفاح، تم جمع عينات مصابة بدودة ثمار التفاح، بهدف تحديد المتطفلات الحشرية على الحشرة. تم تسجيل المتطفل *Mastrus ridibundus* Gravenhorst (Hymenoptera: Ichneumonidae) كمتطفل داخلي على اليرقات المكتملة للحشرة وهي في مرحلة الشرنقة، وتم تصنيف المتطفل باستخدام المراجع التصنيفية المختصة، وهو يسجل لأول مرة في سورية.

الكلمات المفتاحية : متطفل، *Cydia pomomnella*، *Mastrus*، اللاذقية، سورية.

Abstract

This study was conducted during the period 2011/2013 in Bushraghi and Eramo in Lattakia Governorate (Syria) in apples orchards. Samples of infected apple fruits were collected to determine the parasitoids from the pest. The parasitoid *Mastrus ridibundus* Gravehorst (Hymenoptera: Ichneumonidae) was recorded as an internal parasitoid on fully grown larvae at cocoon stage. The parasitoid was classified according to specific references, and it was recorded for the first time in Syria.

Key words: Parasitoids, *Cydia pomonella*, *Mastrus*, Lattakia, Syria.

Introduction

The Codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae) is the most serious pest of apple and pear worldwide. When apple orchards are not protected, up to 95 percent fruit damage can occur only due to infestation by the Codling moth. The Codling moth occurs in all continents where apple and pear are grown, with a distribution from Europe, Asia, North and South Africa to Australia. Also, *C. pomonella* is found as key pest in other fruit crops such as peach, plum, quince and walnut (Barnes, 1991; Hoyt *et al*., 1983; Quarles, 2000; Van Frankenhuyzen and Stigter, 2002). In Syria it's consider the key pest on apple (Talhouk,

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1954). Usually this pest controlled by using insecticides from pyrethroids or organophosphate chemical groups such as cypermethirn, alphacypermethrin, esfenvalerate or chloropyrifos. However, codling moth populations become resistant to these insecticides (Alhaj *et al*., 2009), so according to previous studies were done in Syria focused on biological control of codling moth by studying its parasitoids. Many parasitoids were recorded belong to Ichneumonidae and Braconidae families and also superfamily Chacidoidea on *C. pomonella* in Syria like *Ascogaster quadridentata, Pristomerus vulnerator, Trichogramma cacoeciae* and others (Almatni, 2003; Alhaj *et al*., 2009; Basheer *et al*., 2010).

The Ichneumonidae is one of the most species richest families of organisms with an estimated 60000 species in the world (Townes, 1969; Coruh and Özbek, 2005), Ichneumonids wasps have been used successfully as biocontrol agents in managed biocontrol programs (Gupta, 1991). *M. ridibundus* is a synovigenic parasitoid that attacks the codling moth, *Cydia pomonella* L. during the prepupal stage of development, *M. ridibundus* is a gregarious ectoparasitoid (several eggs are deposited and the larvae feed from the surface of the host). The primary object of this paper is to describe a new species of Ichneumonidae parasitoid on *Cydia pomonella* L. in apple orchards in Syria.

Material and Methods

This study was conducted during the period 2011-2013 in two locations in Lattakia Governorate (Syria) (Eramo 35' 33" N, 36' 20" W, altitude 950m and Bushraghi 35' 17" N, 36' 6" W, altitude 760m) on apple orchards as a plant host.

In the present study, *C. pomonella* larvae were collected using cardboard strips that were placed around the trunks of the plant hosts in two times, in June and removed in 10-15th July and at the beginning of August and removed in full winter.

In the laboratory, the live larvae were placed in corrugated cardboard cylinders inside PVC jars with a mesh cloth on the lid. Glass jars were put over the mesh to collect the newly emerged moths and parasitoids.

A number of parasitoids emerged in the laboratory from the field-collected larvae, that determined by specialized identification references. (Ferriere and Kerrich, 1958; Gauld and Mitchell, 1977; Askew and Shaw, 1986; Shaw and Huddleston, 1991; Goulet and Huber, 1993; Hamon *et al*., 1995; Broad, 2006)

Six individuals of adults (3 females and 3 males) were taken and autopsied, then measured all members by scale lens on microscope, after that calculated average and standard division of all measurements.

Results and Discussion

Many Ichneumonids parasitoids had emerged from *C. pomonella* like *Pristomerus vulnerator, Liotryphon caudatus, Ephialtes caudatus, Trichomma enecator* and *Mastrus ridibundus*. Last one is about we investigated in this paper, it is record for the first time in Syria on *C. pomonella*.

Adult (Fig.1):

The Parasitoid is belongs to Ichneumonidae family, to subfamily Cryptinae and tribe Phygadeuontini, and it's a larval parasitoid on Codling moth, distinguish by black color on most parts of adult, with dark orange color on legs and the second and third rings of abdomen.

Average of length of the female is 3.34±0.03 mm without ovipositor and 4.37±0.02 mm with ovipositor, while the average length of the male is 3.86±0.02 mm.

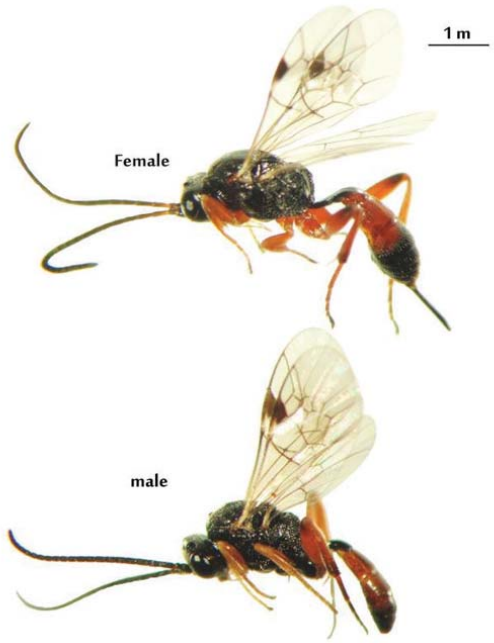

Fig.1. Adult of parasitoid *M. ridibundus*.

Color:

The head is black color. Antennae are distinguished with brownish- black color, and its more darkness in male than female. Thorax in whole is in black color, and the T2 and the piece of T3 of abdomen are in dark-orange color . Legs in orange color in whole except small pieces in dark color.

Wing venation:

Front wing (Fig .2):

- Length of front wing for the female is 3.3±0.1 mm, and width is 1.25±0.02 mm, while it's in the male 3.5±0.2 mm for length and 1.3±0.05 mm for width.
- Wing venation for front and hind wings is the same in both female and male.
- Stigma exists with large size and length shape, with light brown color.
- Prestigma is clear and separated from stigma.
- Veins R+Sc+C are exist and clear.
- Veins M+Cu are exist and clear.
- Vein A1 exists and clear with slight curve in the beginning.
- Vein M distinguish with clear bulla in the first part of its.
- Veins Rs & Cu are strong and extended to the end of wing while vein M extend.
- Vein Cu exists and clear, cu-a1 & cu-a2 are clear and the size of cu-a1 is twice of cu-a2 approximately.
- Vein 3rs-m isn't clear, so Areolet cell not clear enough.
- Vein 2rs-m exists, but there is a bulla in the upper part.
- Vein 2m-cu have two clear bulla in female but there is just one bulla in this vein at male.

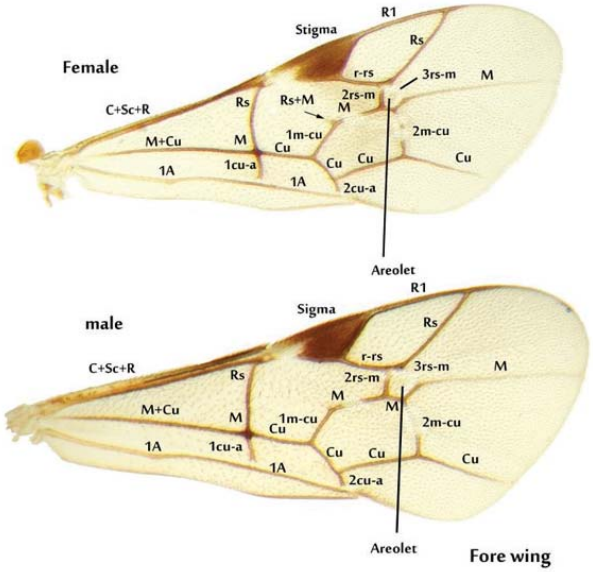

Fig.2. Front wings of the female and the male of parasitoid *M. ridibundus*.

Hind wing (Fig. 3):

Length of hind wing of the female is 2.6±0.2 mm, and width is 0.86±0.01 mm, while it's in male 2.65±0.05 mm length and width is 1.3±0.05 mm.

Wing venation in hind wing is complete.

Vein C exists and clear.

Veins M+Cu and M exist and clear, with slight curve in the vein M+Cu.

Vein 1rs-m exists and clear with bulla in the middle.

Vein cu-a exists and clear.

Vein Rs strong and clear and extend to the end of wing.

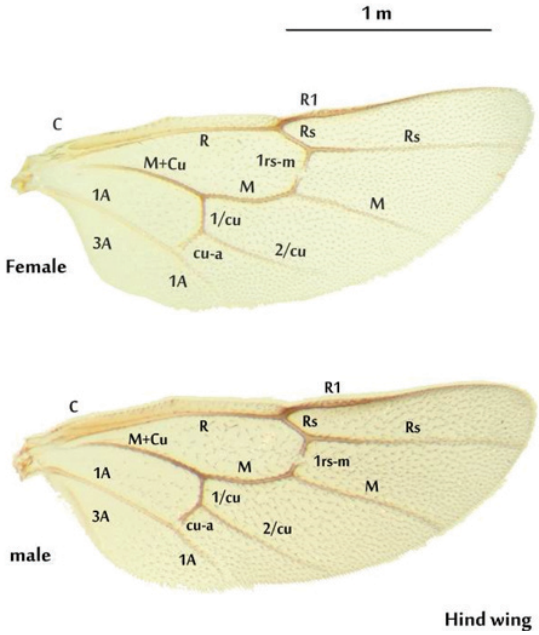

Fig.3. Hind wings of female and male of parasitoid *M. ridibundus*.

Antennae (Fig. 4):

Antenna of *M. ridibundus* has a sting shape, with orange color in the female and brown color in the male. Length of antenna in female is longer than in male, its 3.52±0.08 mm and 3.31±0.04 mm respectively, and there is another difference the number of segments, it's 23 in female and 21 in male.

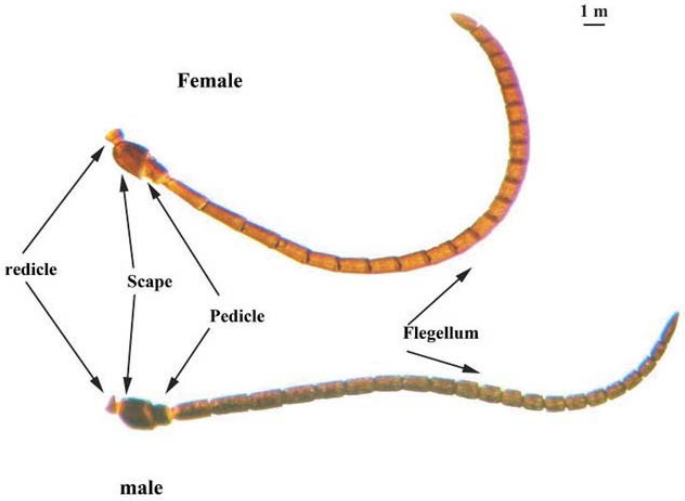

Fig.4. Antennae of female and male of parasitoid *M. ridibundus*.

Legs (Fig. 5):

Legs are similar in both female and male, with orange color for most of the leg with, except the coxa and trochanter for legs of male which distinguish with dark brown color.

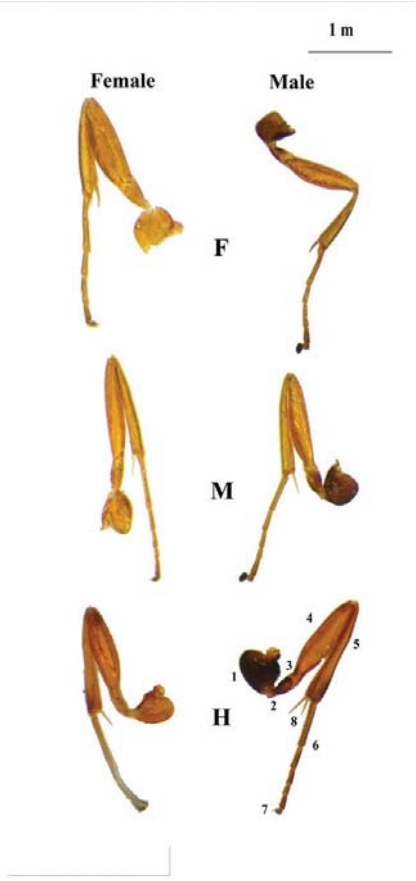

Fig.5. Legs of parasitoid *M. ridibundus*, F: front leg, M: Medium leg, H: Hind leg, 1: coxa, 2: Trochanter, 3: Trochantellus, 4: Femur, 5: Tibia, 6: Tarsus, 7: Pretarsus, 8: Tibial spurs.

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