NEW RECORD OF THE Genus Pullimosina Roháček, 1983 (DIPTERA, Sphaeroceridae) FROM KERBALA CITY, IRAQ, Study in Forensic Entomology

Haider Naeem Al-Ashbal*, Rafid Abbas Al-Essa**, Hanaa H. Al-Saffar**
1,2 College of Education for Pure Sciences/ University of Kerbala, Kerbala, Iraq.
3 Iraq Natural History Research Center and Museum, University of Baghdad, Baghdad, Iraq.
Haideralashbal77@gmail.com

ABSTRACT
This study aims to know the types of insects belonging to the Sphaeroceridae family. During this study, one species registered for this family for the first time to Iraq (New genus and species). It is using two methods of killing are injurious machine (knife) and toxic substance (strychnine). Four areas within Karbala governorate studied and identified to know their spread and time of presence on the body during the stages of decomposition. During this experiment, the bodies of dogs used to identify types of insects attracted to the body during four seasons. The results indicated the presence of the species Pullimosina heteroneura (Haliday, 1836) in the first three stages of decomposing the bodies, but in different proportions and the highest was in the wet decomposition of the body for the spring and autumn seasons.

Key words: Diptera, Forensic Entomology, Pullimosina, Iraq, Sphaeroceridae.

INTRODUCTION

Forensic entomology is the study of insects and arthropods who visit corpses and this behavior was used to uncover the circumstances of criminal cases [1]. The study of Diptera are flies important in the forensic entomology field. This can be beneficial in determining post-mortem interval (PMI) and obtain additional information to locate the crime [2]. The pattern of insects on the body differs, but in most cases, there are often two main groups: flies and beetles, as Diptera are present during the early stages of decomposing the body, so we give important information for forensic evidence [2], [3].

The Sphaeroceridae family is one of the largest families within the two-winged insects, as it contains more than 2000 species [4]. Previous
studies in Iraq to determine the species belonging to it are very few, as six species belonging to four genera within this family have registered, such as *Copromyza* Sp. [5], *Leptocera* Sp. [6], *Opacifrons maculifrons* (Becker, 1907), *Rachispoda fuscipennis* (Haliday, 1833), *Rachispoda modesta* (Duda, 1924) and *Rachispoda varicornis* (Strobl, 1900) [4].

The genus *Pullimosina* includes 28 species. *P. heteroneura* has recorded on animal carcasses in several studies[7], [8]. During this study, this species registered for the first time in Iraq and added to the Iraqi Entomofauna.

**MATERIALS AND METHODS**

In this study the specimens were collected from dog carcasses during the period from 1/3/2018 to 28/2/2019, which killed by two methods the first using a sharp knife and the second by a toxic substance (Strychnine sulfate tablet). Use three duplicates in each of the above-mentioned transactions. The flies collected by air net and fly roll trap during the bloating and decaying stages of carcasses. The specimens were taken to the laboratory and killed by freezing (24h) and so as they mounted by insect pins, the locality and date of collection were recorded[9], [10].

For identification of genus and species were used taxonomical keys such as [7], [8], [11]–[15] The habitat and morphological features taken photos by the aid of the digital microscope dino-light with scales of measurements.

**RESULTS AND DISCUSSION**

This study conducted in four areas in the holy city of Karbala (agricultural, residential, desert and industrial). The results indicated the species *Pullimosina heteroneura* (Haliday, 1836) presents in the agricultural region only (characterized by the presence of thick vegetation as well as pets) and recorded on the bodies of dogs with both methods of killing. The presence rate for this species was 8.3% for dogs killed by an injurious machine. As for the killing of toxic substance, it was 2.7% Diagram (1)

This fly was recorded during the spring and autumn seasons due to the convergence of temperatures and humidity during these two seasons. with
the average maximum temperature in spring and autumn 20-25 °C respectively, while the relative humidity was 65, 62%, respectively, and this type was not recorded during the summer and winter seasons this result equal with [16].

The highest occurrence rate during the spring and autumn seasons of carcasses of dead and poisoned bale dogs was 3.7 and 4.3 %, while the lowest occurrences were 0.7 and 1.0 %, respectively.

During the early stages of fresh decomposition, bloating, and wet decomposition on the bodies of killed dogs, a wounded bale recorded. The numbers were as follows 1.0, 3.3 and 4.0%, respectively. As for those killed in the toxic substance, they reached 0.7, 1.3 and 0.7%, respectively, for the spring and autumn seasons.

This is consistent with previous studies, as this species spreads in agricultural areas and at moderate temperatures [7], [8], [11], [14].

Diagram (1) level of appearance that abut *P. heteroneura* (Haliday, 1836).

**Diagnostic character of the Sphaeroceridae Macquart family, 1835**

Small flies with a body length of 0.7-5.5 mm, pale brown to black, sometimes their head is yellow, orange or red, the Thorax and legs are marked. The sides of face are concave between the antenna end the edge of the mouth. The linule frontal crescent clearly defined. The Maxillary palp texture consists of one piece. Vibrissae is present Plate (1). Arista is
long and bare. The second part of the pedicle does not contain the longitudinal fissure. Thorax with no suture separator, costal vine with two refractors, reduced or absent Calypters. The first piece of the wrist for the hind leg is swollen and shorter than the second Plate (1).

**Subfamily: Limosininae Frey, 1921**

**Genus: Pullimosina Roháček, 1983**

*Pullimosina heteroneura (Haliday, 1836)*

**Synonym:** *Limosina heteroneura Haliday, 1836.*

*Limosina jeanneli Bezzi, 1911.*

*Leptocera rara Spuler, 1925.*

*Leptocera opaca Aldrich, 1932.*

*Leptocera opacella Richards, 1961.*

**Diagnostic character of Pullimosina heteroneura (Haliday, 1836)**

The body length ranges from 1 - 1.5 mm, the body is dark in color. Interfrontal bristles in 3 or 4 equal pairs Plate (3), dorsocentral bristles in 2 pairs and the scutellum contains a couple of side bristles Plate (4). The wing contains a small disc cell, wing vine R_{4+5} connects with the costal vine, transit vine r-m is smaller than transient vine dm-cu Plate (2). Middle tibia consist of 2 bristles in ventral surface Plate (1). Tarsus spin between ther segments Plate (1). The hind leg does not contain spur. Sternite 5 of male concave and lightly pigmented posteromedially, with 2 clusters of short bristles. Tergite 8 of female lightly pigmented posterodorsally. This is in accordance with several studies [4], [11], [17].

**Materials examined** (67 specimens), at Fresh stage (2♂; 4♀) 18-20.III.2018, (2♂; 2♀) 1-3.XI.2018; at blotting stage (3♂; 6♀) 20-23.III.2018, (3♂; 6♀) 2-5.XI.2018; at decaying stage (12♀; 10♂) 21-28.III.2018, (8♂; 9♀) 5-20.XI. 2018.

**Distribution:** Austria, Belgium, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Japan, Latvia, Montenegro, Nepal, Netherlands, North Korea, Norway, Poland,
Portugal, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland [11]. Iran, Egypt, Afghanistan, Lebanon, Palestine, UAE and Tunisia [4].

**Plate (1):** *Pullimosina heteroneura* (Haliday, 1836) Male, lateral view, B= Bristles, Dcs= Dorsocentral setulae, V= Vibrissa, T1= Tarsus1

**Plate (2):** *P. heteroneura* Male, Wing dorsal view.
**Plate (3):** *P. heteroneura* Male, I fb = Interfrontal bristles.

**Plate (4):** *P. heteroneura* Male, Sb = scutellum bristles
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