

First Report of Three Root-Maggot Fly Genera (Diptera: Anthomyiidae) in the Fauna of Iraq

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ABSTRACT

This study reports the first record of three root-maggot fly genera (*Fucellia* Robineau-Desvoidy, 1842; *Pegoplata* Schnabl & Dziedzicki, 1911; and *Engyneura* Stein, 1907) belonging to the family Anthomyiidae (Diptera) in the fauna of Iraq. Detailed descriptions and synonyms for each genus are provided to enhance taxonomic understanding. Furthermore, a comprehensive taxonomic key was developed to facilitate the identification and classification of these genera. This research contributes significantly to the knowledge of Dipteran biodiversity in Iraq and serves as a foundational reference for future studies on Anthomyiidae in the region.

Keywords: Anthomyiidae, New Genus, *Fucellia*, *Engyneura*, *Pegoplata*, Iraq Fauna

INTRODUCTION

Anthomyiidae is one of the large and wide diptera families, consists of more than 1,900 species that fall under approximately 53 genera in the world, most of those species from Europe and regions of North America. More than half have been described [1-3]. It is also called (root maggot –flies) because their larvae live on the stems and roots of various plants, and depend for their food on the decaying parts of the plants on which they live, some species (larvae) are leaf-mining insects, and others are parasites [4, 5]. Anthomyiid flies are very similar to house flies and differ from them in certain characteristics that distinguish them from Muscidae [6, 7], this family is taxonomically difficult, as well as changing nomenclature and division. Where it was previously listed as belonging to the family of Muscidae, but has now been separated from the latter as an independent family [8-10]. Anthomyiidae has been divided into two subfamilies: Anthomyiinae and Fucelliinae according to [1]. In general, species of Anthomyiidae are found in fields and vegetable farms, including radishes, cabbage, carrots, turnips and onions in particular. They feed and attack the roots by making tunnels inside them, which leads to severe infection to the plant, causing yellowing and wilting of the plant. In some cases, the infection develops and leads to the death of plants [8, 11, 12]. Anthomyiidae adults are medium size, approximately (2-12) mm long, mouth parts are well formed, in general; male can be distinguished from the female by the eyes, as they are close in males and far apart in female (mostly). Thorax with transverse suture, mesonotum does not contain setae, and if it is found, it will be as fine hairs. Wing is mostly fully formed and venation, sixth vein (anal vein) A1 reaching almost to tip of wing edge, scutellum contains soft hairs on the ventral surface (Anthomyiinae), or hairs absent in (Fucelliinae) [13-15]. Taxonomic studies related to this family are very few in Iraq. Mekhlif [16] recorded two species belonging to the genus *Pegomya* as leaf miners, Hermize and Al-Karbolli [17] recorded *Delia alliarum* as a new record of Iraq. Al-Saffar and Augul [18] found *Delia antiqua* (Meigen, 1826) collected from the province of Baghdad. Al-Saffar et al [3] also recorded two species of *Pegomya* as leaf miners. Anthomyiidae, which are commonly called root maggot flies; until recently it is classified as a subfamily belonging to the family of Muscidae, according to Hockett [4], due to the similarity of the characteristics of

its members with Muscidae, especially the house fly. With the development of classification over the years, Anthomyiidae were adopted as an independent family in their own right, according to Hockett [4]. They have approximately more than 2000 classified species around the world, and there are still many of their species. It has not been classified yet, so the studies devoted to the classification of this family were few compared to its wide spread, diversity of distribution, and economic importance. In addition, as mentioned above, studies about it are very rare in Iraq, maybe because the small size of its members and the difficulty of dealing with them in the morphological and anatomical classification; therefore this work and the upcoming studies have also focused on some of Anthomyiidae genera and species as well, trying hard, despite the difficulties, to establish a reference base for this topic that will contribute to helping researchers in the future to complete this type of taxonomic work related to the Anthomyiidae family in Iraq, the Arab region, and the world. In the current study, three new genera of the Anthomyiidae were described morphologically and recorded for the first time in Iraq, which are: *fucellia* Robineau-Desvoidy, 1842, *Engyneura* Stein, 1907 and *Pegoplata* Schnabl et Dziedzicki, 1911 [19].

MATERIALS AND METHODS

Flies Collection

In this work, specimens of flies were collected from different regions of Iraq for the period between (1/3/2022 and 1/3/2023), 17 specimens were collected from some places of Iraq (Baghdad, Saladin and Wasit), aerial and sweeping nets were used to collect adult Anthomyiidae from grassy areas and jungles, as well as agricultural fields for the various field plants on which this family resides such as fields of cucumbers, eggplants, peppers, fennel, peas, tomatoes and onions. The obtained specimens were placed in plastic bags, killed by placing them in the freezer for 24 hours, after which they were fixed with special insect pins and kept in boxes to be diagnosed.

Examination

Specimens were examined by a dissecting microscope. Samples were photographed by Dino Lite, Digital Microscope. Identification:

keys were used for diagnosis them: Suwa [20], in addition to compare with identified specimens which kept at Iraq Natural History Museum, Baghdad –Iraq. Flies Taxonomic:Insects were classified using some

taxonomic keys, which were adopted in this study [21-23]. Synonyms for each genus have been added depending on the GBIF Secretariat [24].

Table 1: Abbreviations

Abbreviation	Descriptive Character
Ts	Transverse Suture
Mr	Meron
A1	Anal Vein
Sc	Scutellum
Fr	Frontal Seta
If	Interfrontal Seta
Ar.	Arista
Orb S.	Orbital Seta
Vi	Vibrissa
Plp	Palpus
Premnt	Premmentum
Anepm	Anepimeron
Anepst	Anepisternum
Mr	Meron
Prepst	Proepisternum
C Spl	Costal Spinules
Av	Anteroventral Seta
Pv	Posteroventral Seta
Ps	Posterior Seta
Vs	Ventral Seta

Results and Discussion

The results showed three genera, were collected from different regions of Iraq fucellia Robineau-Desvoidy, 1842, Pegoplata schnabl et Dziedzicki, 1911 and Engyneura Stein, 1907.

Subfamily: Fucelliinae

Genus: Fucellia Robineau-Desvoidy, 1842

Synonyms Halithea Haliday, 1838

Parachaetophila Bigot, 1882

Parachortophila Bigot, 1882

Fucellia Robineau-Desvoidy, 1842

Diagnosis: Known as kelp flies because it is found or feeds on plants near seashores and rivers. Lay their eggs on decaying algae found on the shores of rivers, seas and wet places, the larvae feed on bacteria, which in turn live on plants and aquatic grasses near the water. This genus belongs to the sub family of Fucelliinae and includes about 20 described species; eyes are usually far apart in both sexes, and this contradicts what is known in the Anthomyiidae genera, where the eyes converge in males and diverge in females [1, 25, 26]. Costa consists of widely spaced coarse series setae on inner surface beyond subcostal break, anal vein (A1) of the wing reaches the end of the wing (Fig. 1;a,b), anepimeron (anep.) and proepisternal (proep.) are bare, scutellum without hair ventrally, frons is wider than a third of the width of the head in male and female, presence of pair of distinct interfrontal setae (if), arista pubescent [21, 23]. Materials examined (2 ♂♂) and (6 ♀♀) the specimens collected from Baghdad- Bab Al-Moadham 33.3548019 N 44.3910226 E and Saladin Province- Tikrit 34.6187204 N 43.6567219 E and Distribution:Iraq Korea, Japan, China, Russia Suh [23].

Subfamily Pegomyiinae

Trib Myopini

Genus Pegoplata schnabl et Dziedzicki, 1911

Synonyms Nudaria Karl, 1928

Nupedia Karl, 1930

Pegoplata schnabl et Dziedzicki, 1911

Diagnosis of Female: Frons as wide as or wider than third of head width ,presence of interfrontal (if) setae, palpus(plp) blade-like(Fig.2;a,b), anal vein(A1) reaches the end of the wing, no setae on inner surface of (C) Costa, Anepimeron and proepisternal bare, lower calypter not enlarged approximately equal in size to the upper, absent of apical posteroventral seta on hind tibia [21, 23]. Materials examined (3 ♀♀) the specimens collected from Wasit Province- Al-Suwaira 32.925267°N 44.770958°E. Distribution: Iraq Mekhlif [16], China [27], Korea [23], Japan [1], Nearctic and Palaearctic region [28].

Genus Engyneura Stein, 1907

Diagnosis: A1 extending to wing edge, Anepimeron and proepisternal without seta, lower calypter not enlarged approximately equal in size to the upper, presence seta on apical posteroventral of hind tibia and anteroventral seta of mid tibia, costa not fading beyond R4+5 but continues, and M1 not parallel with R4+5 (inclined toward it) (Fig.3;a,b) [21]. Materials examined (3 ♂♂) and (3 ♀♀), the specimens collected from Saladin Province- Ishaqi 34.0475291 N 44.0294362 E. Distribution: Korea Suh [23], Nearctic and Palaearctic region [28].

Key to Genera

1- Costa (c) with widely spaced coarse setae on ventral surface ...Fucellia Robineau-Desvoidy, 1842 (fig. 1) - Costa without widely spaced coarse setae on ventral surface 2.

2- Arista long plumose, Prementum pollinose, female Pulpus blade-like, mid tibia with anteroventral seta absent Pegoplata schnabl et Dziedzicki, 1911 (fig 2).

-Arista only pubescent, Prementum polished, female Pulpus slender, mid tibia with one or more anteroventral(av) setae Engyneura Stein, 1907 (fig. 3).

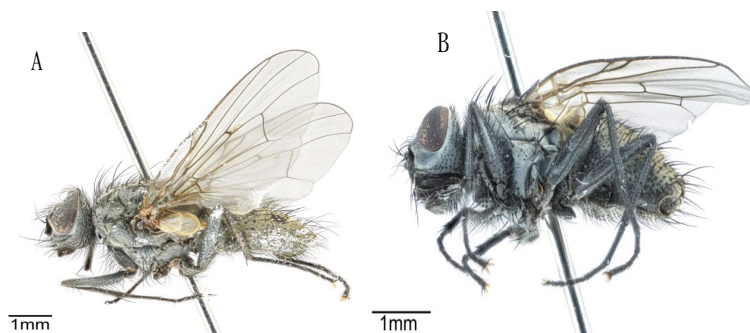


FIGURE 1 (A, b): Fucellia Genus

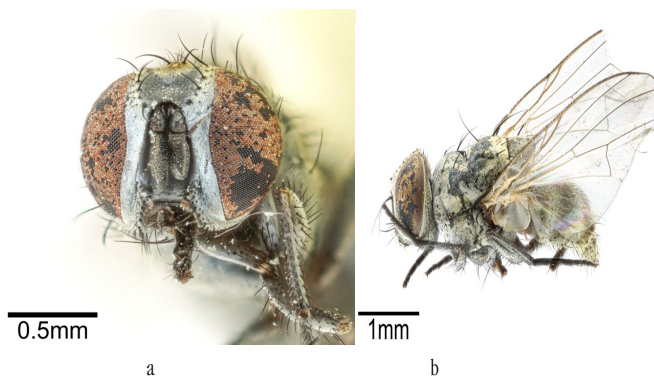


FIGURE 2 (A, b): Pegoplata Genus

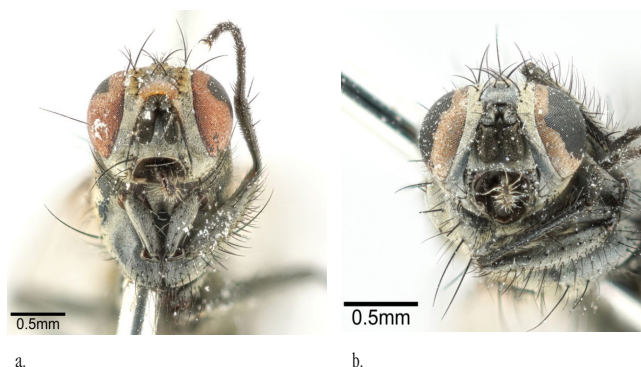


FIGURE 3(A, B): Engyneura Genus

Conclusions

In this study, three genera were identified and recorded for the first time in Iraq. They belong to the (Anthomyiidae- Diptera). It is one of the economic important families, as its genera are very similar to house flies in appearance.

Its larvae feed on plants, and some of its species are dangerous pests. Such as the genus *Delia* Robineau-Desvoidy, 1830, which is considered an important pest of onion and cabbage plants. Taxonomic studies for this family are very few in Iraq. Therefore, we recommend conducting more future taxonomic studies about it.

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