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RESEARCH ARTICLE

REVISION GENERA OF BEE FLIES (BOMBYLIIDAE) IN IRAQ

Razzaq SH. Augul* H. H. Al-Saffar M. S. Abdul – Rassoul

Baghdad University /Iraq Natural History Research and Museum

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ABSTRACT

In this study, there are two genera; *Systoechus* Loew and *Bombylisoma* Rondeni as new recorded in Iraq. Key to genera with figured of them was provided

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INTRODUCTION

The family Bombyliidae with almost 4600 described species is one of the largest families of Brachyceran Diptera throughout the world (Evenhuis & Greathead, 1999 & 2003). Bee flies occur in a variety of habitats and are fairly common insects in the arid and semiarid areas. The family has a high percentage of the fly diversity in the desert regions of the world. The adults of most species are very fast and nimble fliers (Hull, 1973; Evenhuis & Greathead, 1999). With many species possessing colorful patterns of stripes and spots on the wings and bodies, bee flies are often some of the most striking in appearance of all the Diptera. Larvae of all reared species of Bombyliidae are parasitoids (most often ectoparasitoids) or predators of other insects, primarily the immature stages of the large endopterygote orders of Coleoptera, Hymenoptera, Lepidoptera, Orthoptera, and Diptera. Despite their widespread and common occurrence at host aggregation sites, few studies have been carried out on the behavior of females during host searching activities, oviposition, and flower visitation (Yeates & Greathead, 1997). Additionally, some bee fly species are pollinators of various wild and cultivated plant species (Özbek, 2008).

Bombyliidae is orthorrhaphous brachycerous flies of minute to remarkably large size, often bearing bristles usually concealed in the dense fur. Proboscis often long and correct. Wings with the venation very variable and sometimes beautifully spotted. Legs thin and usually almost without bristles but with short or minute spicules; pulvilli two, well developed or atrophied, claws simple but occasionally serrate at the base. Ocelli three, always present (Eflatoun, 1945). Adult Although the morphology of bee flies varies in detail adults of most bee flies are however characterized by some morphological details that make recognition easy. The dimensions of the body vary, depending on the species, from 1 mm to 2.5 cm. The form is often compact and the integument

is covered with dense and abundant hair. The livery usually inconspicuous and colours such as brown, blackish-grey, and light colors like white or yellow predominate. Many species are mimics of Hymenoptera Apoidea. The head is round, with a convex face, often holoptic in males. The antennae are of the type aristate composed of 3-6 segments, with the third segment larger than the others; the stylus is absent (antenna of three segments) or is composed of 1-3 flagellomeres (antenna of 4-6 segments). The mouthparts are modified for sucking and adapted for feeding on flowers. The length varies considerably: for example, the Anthracinae have short mouthparts, with the labium terminating in a large fleshy labellum, in Bombyliinae, in Phthiriinae is the tube is considerably longer, and in Bombyliinae more than four times the length of the head. The legs are long and thin and the front legs are sometimes smaller and more slender than the middle and rear legs. Typically they are provided with bristles at the apex of the tibiae, without empodia and, sometimes, also without pulvilli. The wings are transparent, often hyaline or evenly colored or with bands. The alulae are well developed and in the rest position the wings are kept open and horizontal in a V-shape revealing the sides of the abdomen. The abdomen is generally short and wide, subglobose shaped or cylindrical or conical, in females the abdomen is often ended with spinous processes, used in oviposition. The wing venation although variable within

the family, has some common characteristics that can be summarized basically in the particular morphology of the branches of the radial sector and the reduction of the forking of the media. The costa is spread over the entire margin and the subcosta is long, often ending on the distal half of the costal margin. The radius is almost always divided into four branches, with fusion of the branches R2 and R3, and is characterized by the sinuosity of the end portions of the branches of the radial sector. The venation presents a marked simplification compared to other Asiloidea and, in general, to other lower

* Corresponding author: +
Email: razzaqaugul@yahoo.com

Key to the genera of Bombyliidae of Iraq

1. Wing with three posterior cells (Fig.1a)....
Toxophora Meigen
- Flies with four posterior cells (Fig.1b)
..... 2
2. Proboscis long extending beyond anterior oral margin by more than length of antenna; hind margin of compound eye straight (Fig.2a)
..... 3
3. - Proboscis short to medium length, extending beyond oral margin by less than length of antenna; hind margin of compound eye indented or obviously curved (Fig.2b)
..... 5
4. Cell r5 broadly opened or closed at wing margin (Fig.3a); mediotergite and laterotergite bare (Fig.4a) *Bombylsoma* Rondani
- Cell r5 closed before wing margin (Fig.3b); laterotergite and mediotergite covered by densely hairs (Fig.4b) 4
5. Cross vein r-m situated beyond basal quarter of cell dc; first basal cell bc1 longer than

Brachycera. M1 is always present and converges on the margin or, sometimes, of R 5. M2 is present and reaches the margin, or is absent. M 3 is always absent and merged with M4. The discal cell is usually present. The branch M3+4 is separated from the discal cell at the distal posterior vertex, so the mid-cubital connects directly to the posterior margin of the discal cell. The cubital and anal veins are complete and end separately on the margin or converge joining for a short distance. Consequently the cell cup may be open or closed (Hennig, 1973; Hull, 1973; Zaitzev, 1991).

MATERIAL AND METHODS

We used the material (51 specimens) deposited in the non identification collection of Iraq Natural History Museum at Baghdad University. Morphological observation were made with a dissecting microscope and figured by a Sony, Cyper-shot, EXMOR R 10.2 Megapixels digital camera.

The publications of Efflatoun (1945), Hull (1973) , El-Hawagry & Evenhuis (2008) and Yao *et al.* (2011) are used for recognizing the specimens. Second basal cell bc2(Fig.3b)....*Bombylius* Linnaeus

- 3 - Cross vein r-m situated before basal quarter of cell dc , first basal cell bc1 and second basal cell bc2 equal in length (Fig.5)
.....*Systoechus* Loew
- 4 - Origin of R2+3 basal to r-m cross vein by at least twice its length, often three times its length (Fig.6a); alula reduced and narrow (Fig.7a)
..... *Petrorossia* Bezzi
- Origin of R2+3 opposite r-m cross vein or less than twice its length from r-m cross vein (Fig.6b); alula large and lobe-like (Fig.7b)..... 6
- 5 - Basicosta sharply pointed and narrow (Fig.8a); flagellomere without terminal tuft of hairs (Fig.9a) ; latero -tergite and mediotergite with hairs
..... *Villia* Lioy
- 6 -Basicosta broad and projecting (Fig.8b); flagellomere with terminal tuft of hairs (Fig.9b); laterotergite and mediotergite bare
..... *Anthrax* Scopoli



Figure 1. wings : a- *Toxophora* sp.
b- *Bombylsoma* sp.



Figure 5. Wing of *Systoechus* sp.



Figure 2. Head: a- *Bombylsoma* sp.
b- *Anthrax* sp.



Figure 6. Wing: a- *Petrorossia* sp.
sp. b- *Villia* sp.



Figure 3. Wing: a- *Bombylsoma* sp.
b- *Bombylius* sp.

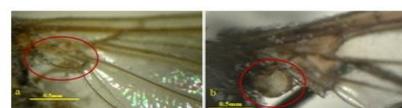


Figure 7. Alula: a- *Petrorossia* sp.
b- *Villia* sp.



Figure 4. Lateral thorax: a- *Bombylsoma* sp.
b- *Bombylius* sp.



Figure 8. wing: a- *Villia* sp.
b- *Anthrax* sp. (from El-Hawagry & Evenhuis, 2008)

Genus *Systoechus* Loew, 1855

Systoechus Loew, 1855, Neuc., III, 34,30

Densely furry (Fig. 10) , *Bombylius* -like flies in general appearance but readily distinguished from the representative of this genus by antennae and wing venation (the position of r-m cross vein , being closed to the base of first dc cell) . (Efflatoun ,1945). Face and oragenal cup with long, but loose, scattered pile. Upper anterior intercalary vein much reduced, shorter than the anterior crossvein. Abdominal pile dense, fine, long, erect, plushlike. Anterior branch of third vein without spur. Pulvilli well developed. Head narrower than mesonotum. Female front often with transverse depression. (Hull , 1973).

Materials:, 10 specimens 4♀ + 6♂: from Sulimania, 2 , Ser'senk, Hassarost in 8. VII . 1971 , 10.VII . 1971

Distribution

World wide distributed , major genus of palearctic region

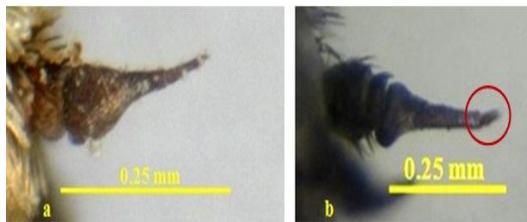


Figure 9. Antenna: a-*Villia* sp. b- *Anthrax* sp.



Figure 10. *Systoechus* sp. a- habitus b- antenna c- lateral side of the abdomen ending

Genus Bombylisoma Rondani 1865

Bombylisoma Rondani, Dipterol. Ital. Prodr., vol. 1, p. 164, 1856. Length: 7 to 13 mm ; of wing, 6.5 to 13 mm. Small flies with short, obtuse abdomen ; whole thorax and abdomen with dense, long, erect pile. Whole sides of face and gena continuously covered with fine, very long pile. Males widely holoptic. Female front without a transverse depression. First antennal segment slender and long; third long, slender, attenuate. Anterior crossvein at the middle of the discal cell (Hull, 1973).

Materials

10 specimens 4♀ + 6♂ from Sulimania , Ser'senk, Hassarost in 8. VII.1971,10.VII.1971, 8.VII. 1971. Chwarta , Sulaymania

Distribution

World wide distributed.

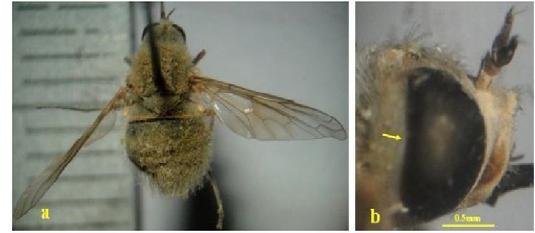


Figure 11. *Bombylisoma* sp. : a- habitus b- lateral side of head

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