*Short communication*

# Contribution to Occurrence of the Blackfly (Diptera:Similiidae) in the Palestinian Territories, West Bank




## ABSTRACT

**Aims:** The main aim of the study was to establish evidence regarding the existence of black fly fauna within the Palestinian environment. The research extensively explored the breeding sites, habitats, while also on studying the physiochemical parameters of the water breeding sites. Furthermore, the study assessed the potential impacts of this insect on both humans and animals.
**Study design:** A cross- sectional study.
**Place and Duration of Study:** During the period from January 2023 to August 2023, a cross-sectional survey was carried out in the West Bank-Salfit district to collect larvae and adults of blackflies within the Wadi Qana conservation area.
**Methodology:** In January 2023, a field survey was conducted in Wadi Qana protected area (32.12582, 34.8952) in Salfit district to study the fresh water fauna. All specimens collected from the ruining water that exist in the Valley with a total of 220 individual, by forceps and preserved in 70% ethanol, microscope slide were prepared for the specimens and examined under the light microscope, adults of this groups examined under the dissecting microscope.
**Results:** During the study period, a total 220 larvae were collected from the breeding sites in the freshwater habitats in Wadi Qana.

Two subgenus of Blackflies were found in the study area (*Simulium (wilhelmia)*Enderlein and and *Simulium (Odgamia)* Enderlein. The result shows that the black fly breeding in fast-flowing freshwater and covered by annual water plants with dissolved Oxygen 10.1 (mg/L) and PH 21.6 (°C). No significant health effects were recorded or documented in the study area, except for nuisance to humans and animals caused by the biting of blackflies.
**Conclusion:** blackfly was recorded for the first time in the Palestinian environment, more study research are needed to discussed the fauna, biology, ecology, habitats and the medically important.


*Keywords: Blackfly, Similiidae, West Bank, distribution, Palestine.*

## 1. INTRODUCTION

Blackflies (Diptera: Simuliidae) consider a small, black ,and blood- feeding insect flies that inhabit running fresh water such as spring, river and stream [1,2]. They are known to be a

nuisance to human, animals and birds, in the other hand the female flies consider a transmitter for many diseases, particularly onchocerciasis (river blindness), which is caused by the parasite Onchocerca [1,2]. According to the last revision of the world blackflies inventory, there are about 2415 species of blackflies, 2398 of them are living species while 17 are fossils [3].

Crosskey, 1967) documented 16 species belonging to 7 subgenus groups, distributed across five country. (Lebanon, Iran, Jordan, Egypt, and the Historic Palestine) [4]. Earlier, by Austene, 1921 one species of the blackflies recorded from the Historic Palestine [5]. , Puri 1925 recorded a larval syntype locality for *S. equinum* var. mediterraneum [6] Furthermore Bodenheimer1937 documented six species: *Simulium aureum* Fries, *S. hirtipes Fries, S*. latipes Meigen, S*. reptans* var. syriacum Roubaud, *S. varicolum Stguy*, and *S. varium* Meigen [7]. The records of the six species of blackflies from the Historic Palestine listed by Bodenheimer in 1937 could not be verified due to lack of the specimens that used for identification [7].

Based on Crosskey's (1976), it appears that there are five species of blackflies that can be found in the historic Palestine. These species are (*Simulium (Eusimulium) rufcorne Macquart,* 1838, *Simulium (Eusimulium) rubzovianum* (Serban, 1961), *Simulium (Wilhelmia) mediterraneum* Puri, 1925, *Simulium ( Wilhelmia) paraequinum* Puri, 1933 and *Simulium (Ohgmia) sp*). [4].

Since Crosskey (1967) no studies related to the blackflies appears related to The Historic Palestine, and most our knowledge depend on old literature that shows generally details about this group of flies [4].

This research documentation comes to increase our knowledge to the blackflies in Palestine, including highlights the futures needs of studies related to this group of insects, to gain a better understanding of the blackfly fauna, ecology, biology, habitats, distribution and medical importance in the Palestinian territories (West Bank).

## 2. MATERIAL AND METHODS

**2.1 Study area:** In January2023, a field survey was conducted in Wadi Qana protected area (32.12582, 34.8952) in Salfit district to study the fresh water fauna. All specimens collected from the ruining water that exist in the Valley with a total of 220 individual, by forceps and preserved in 70% ethanol, microscope slide were prepared for the specimens and examined under the light microscope, adults of this groups examined under the dissecting microscope.

Wadi Qana, is located in the Salfit district and geographically by its coordinates 32.12582, 34.8952 (map 1). The total area of the study site is approximately 15.22 square kilometers, with a length of 20km.The region experiences a Mediterranean climate, with average temperatures 8-12 degree Celsius during winter and 22- 28 degree Celsius during summer [8].

Wadi Qana characterized by the presence of 5 natural fresh water springs that discharge in to the Wadi throughout the year. The elevation ranges from 240- 700 m above the sea level providing a diverse range of habitats for freshwater organisms [8].

### 2.2 Collecting Samples and identification

The larvae were collected from January 2023 until June 2023 from fresh water habitats. Forceps were used to pick up the larvae which were attached to rocks and water plants. All characteristics of the breeding site habitat were recorded, and the physiochemical parameters of the water (pH, temperature, electrical conductivity and dissolved oxygen) were also measure.

The collected larvae were deposited in 75% alcohol in small plastic cups (50 ml) and sent to Palestinian Institute for Biodiversity and Sustainability for identification. Adult Blakflies were also collected by hand net for species identification.

Morphological features of the larvae and adults were examined using compound and dissection microscopes. Different identification keys were used to identify the collected larvae, were identified to the subgenus. [4, 9, 10, 11, 12].adult Blckflies were collected to prove the species

## 3. RESULTS AND DISCUSSION

**3.1 during the study period, a total 220 larvae were collected from the breeding sites in the freshwater habitats in Wadi Qana**.

Two subgenus of Blackflies were found in the study area (*Simulium (wilhelmia)* Enderlein and and *Simulium (Odgamia)* Enderlein figures (1,2).

*3.1.1* *Simulium (wilhelmia)* Enderlein,spp

Morphology: The widest part of the cephalic apotome is at its base; width of the postgental cleft does not exceed its depth. Cervical sclerites separated from the head capsul, hypostomium with single center tooth. Lobes of the gill spot are thick and running parallel to one another. Circle of hooks on the last abdominal segment bearing more hooks on the dorsal side than on the ventral side, ventral papillae absent. Figure (1).

*3.1.2* *Simulium (Odgamia) Enderlein1921,spp.*

Morphology: The widest part of the cephalic apotome is at its base; width of the postgental cleft does not exceed its depth. Cervical sclerites separated from the head capsul, hypostomium with single center tooth. Lobes of the gill spot are thin and coiled or not yet visible (earlier instar) and ventral papillae blunt rounded and inconspicuous. Figure (2).

*3.1.3* Remarks: according to comprehensive revision of the taxonomic and geographical inventory 2022 the two subgenus were known a worldwide distribution (Adler 2022). No significant health effects were recorded or documented in the study area, except for nuisance to humans and animals caused by the biting of blackflies.

3.14 Larval and adult habitat:

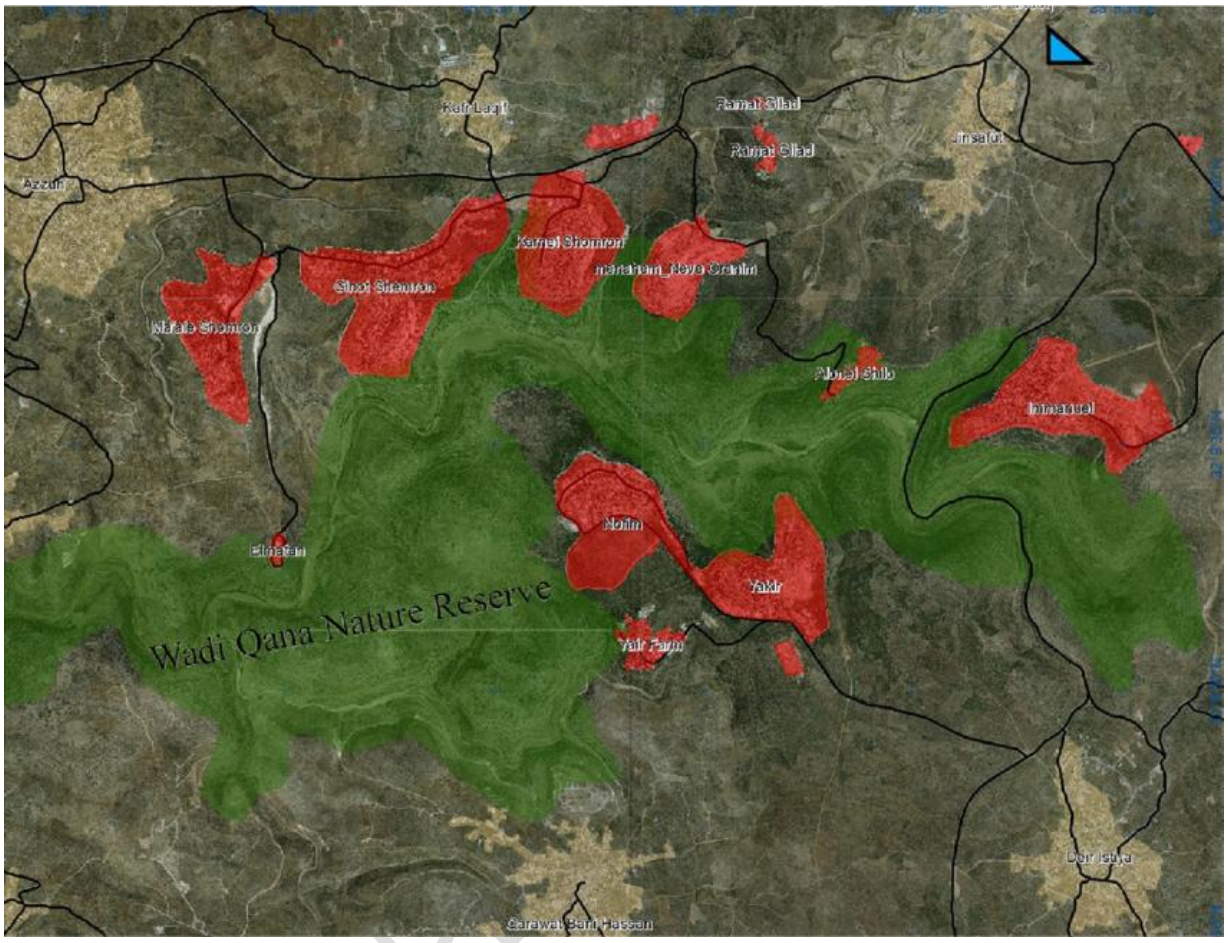
The larvae and adults were collected from the three breeding sites in the study area, characterized by fast-flowing freshwater and covered by annual water plants (figures 3, 4). The study also found that the blackflies adults bred in specific physiochemical parameter characterized by high level of dissolved oxygen and alkalinity water, table (1).

It is worth noting that there is limited information and scientific research discussing the Blackfly fauna and it is medical importance in the study area (West Bank). Therefore, our finding will contribute to helping other researcher in building a comprehensive understanding of the species fauna in the future.

Several previous studies have explored the fauna, ecology, biology, distribution, habitats, and medical importance of Blackfly. [13,14,15,16,17].

The finding of our study proved that the existence of blackfly in West Bank region. and the finding of our study align with the pervious study which indicate that these species breeding in fast-flowing freshwater habitats furthermore, the study found that the species breeding in water exhibit high oxygen level, alkaline water and elevated temperatures, consistent with pervious research.[13,14,15,16,17].

Indeed, further studies are necessary to provide a comprehensive understanding of the fauna of Blackfly and it is medical importance, while the current study contributes valuable information about the Blackfly fauna found in the study area and their breeding habitats, additional research is needed to fill in the gaps and expand our knowledge in this field.




**Map1. showing the Wadi Qana location at West Bank area (Palestine Central Bureau of statistic, 2017)**

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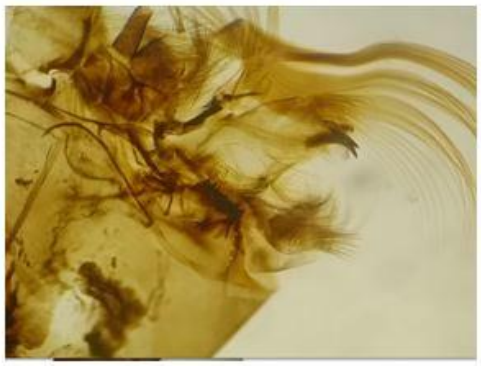
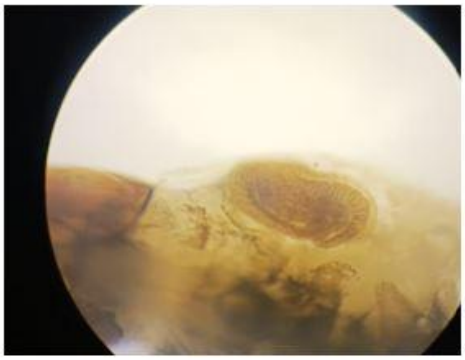


Hypostomium of *Simulium*( Wilhelmia) Enderlin



Lobs of gill spots of Simulium(Wilhelmia) Enderlin

hooks on the dorsal side on Simulium( Wilhelmia) Enderlin

**Fig.1*Simulium*(Wilhelmia) Enderlin larva**

Lobs of gill spots of *Simulium* (Odgamia) Enderlein.

Hypostomium of *Simulium* (Odgamia) Enderlein

**Fig.2 *Simulium (Odgamia) Enderlein***

**Table 1. Shows the average of physiochemical parameters for the fresh water habitats during the study period 2023**

| physiochemical parameters | |
|---|---|
| PH | 8.2 |
| Temp | 21.6 (°C) |
| DO | 10.1 (mg/L) |
| EC | 810 (µS/cm), |

**Fig. 3 shows the breeding sites habitats for blackflies in the study area**

**Fig. 4 shows the breeding sites habitats for blackflies in the study area**

## 4. CONCLUSION

blackfly was recorded for the first time in the Palestinian environment, more study research are needed to discussed the fauna and biology, ecology, habitats and the medically important.

## CONSENT (WHERE EVER APPLICABLE)

No manuscripts will be peer-reviewed if a statement of patient consent is not presented during submission (wherever applicable).
This section is compulsory for medical journals. Other journals may require this section if found suitable. It should provide a statement to confirm that the patient has given their informed consent for the case report to be published. Journal editorial office may ask the copies of the consent documentation at any time.

Authors may use a form from their own institution or SDI Patient Consent Form 1.0. It is preferable that authors should send this form along with the submission. But if already not sent during submission, we may request to see a copy at any stages of pre and post publication.

If the person described in the case report has died, then consent for publication must be collected from their next of kin. If the individual described in the case report is a minor, or unable to provide consent, then consent must be sought from their parents or legal guardians.

Authors may use the following wordings for this section: "All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal."

## ETHICAL APPROVAL (WHERE EVER APPLICABLE)

NO ethical approval needed to this research

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