Research Article

New record and description of two species of genus *Sphaerophoria* St. Farg. et Serv (Diptera: Syrphidae) from Balochistan, Pakistan


Department of Zoology, University of Sindh, Jamshoro, Sindh, Pakistan.

*Corresponding author's email: jkturk21@gmail.com

Citation


Received: 09/11/2014 Revised: 20/01/2015 Accepted: 23/01/2015

Abstract

The present study was carried out from March 2012 to April 2013. The specimens of genus *Sphaerophoria* St. Farg. et Serv were collected from different localities of Balochistan. Two species namely *Sphaerophoria rueppellii* Wiedemann, 1830 and *Sphaerophoria interrupta* Fabricius, 1805 were recorded. These species are described here on the bases of morphological characters, coloration and male and female genitalia. The first time record of these species is a new addition in literature of the insect fauna of Balochistan, Pakistan.

Key words: Balochistan, New record, Pakistan, *Sphaerophoria* St. Farg. et Serv

Introduction

The genus *Sphaerophoria* St. Farg. et Serv belongs to family Syrphidae, subfamily Syrphinae and tribe Syrphini St. Farg. et Serv. This genus was first time separated from other genera of hover flies. Fabricius [1] was the first scholar who reported the *Sphaerophoria rueppellii* and Wiedeman [2] first time identified *Sphaephoria interrupta*. Both *Sphaerophoria rueppellii* and *Sphaerophoria interrupta* are economically important in two ways; adults are excellent pollinator and their larvae are predaceous on crops pests (aphids) and other soft-bodied insects. Therefore, they perform precious function in biological control to reduce the population of aphids on various crops, vegetables and other plants. Various researchers added the distributional records of *Sphaerophoria rueppellii*, *Sphaerophoria interrupta* and other species of hover flies [1, 2]. Ehteshamnia et al., [3] reported the *Sphaerophoria rueppellii* from East Azerbayjan, Iran. Khaghaninia [4] also reported it from West Azerbayjan, Iran. Barkalov [5] reported *Sphaerophoria rueppellii* Wiedemann and *Sphaerophoria interrupta* Fabricius from Siberia and adjacent territories. Bankowska [6] recorded from Afghanistan. Ghorpade [7, 8], Bigot [9] and Bruentti [10] from India. Speight [11] reported from different regions of Europe. Arif et al., [12] first time reported the three species from Pakistan. Only one species
Sphaerophoria philanthaus Meigen was reported from province Balochistan and two Sphaerophoria scripta Linnaeus and Sphaerophoria indiana Bigot from KPK province. Alam et al. [13] described and reported the Sphaerophoria interrupta Fabricius from Peshawar Pakistan. Rojo et al. [14] briefly explained and provided the key for identification of some species of genus Sphaerophoria St. Farg. et Serv but not described the male and female genitalia. Goeldlin [15], Van der Goot [16] and Verlinden [17] focused the male terminalia but not explained the female genitalia and male aedeagus. Coe [18], described the diagnostic characters of genus Sphaerophoria and provided key of some species. Sphaerophoria interrupta Fabricius was formerly used Sphaerophoria menthastri Linnaeus, in literatures. This paper will provide us the information about the distribution of two species Sphaerophoria rupellii Wiedemann and Sphaerophoria interrupta Fabricius from Balochistan, Pakistan. The re-description of these species are also given here based on external body features with illustrations, male & female genitalia and measurement of different body parts.

Materials and Methods
The specimens were collected with the help of insect net from different localities of Balochistan Such as Quetta, Pishin, Mastung, Dusht, Kuchlak, Sibi, Bhag, Dhadar, Dera Murad Jamali, Roopa Shak and Dera Allah Yar from various crops, vegetables, flowers as well as weeds during March 2012 to April 2013. A total of 394 specimens were collected, out of these 206 were Sphaerophoria St. Farg. et Serv Sphaerophoria rupellii Wiedemann and 188 were Sphaerophoria interrupta Fabricius. The collected flies were killed by putting them in cyanide bottles then different body parts were stretched on wooden stretching board and left them for 24 hours. The specimens were observed under the binocular dissecting microscope on low and high power. Both the species were identified through standard keys of Stubb and Falk [19] and Coe [18]. For study of male and female genitalia, the tip of abdomen was removed and boiled in 10% potassium hydroxide solution for 6-7 minutes. Genital capsule were dissected with the help of needles and forceps. Genital materials were put into the micro vial with a drop of glycerin solution and then observed under the binocular dissecting microscope. Diagrams of male and female genitalia were drawn by using ocular graph and the measurement of different body parts were taken with the help of micro millimeter scale. Terminology, techniques of exposing of female genitalia and drawing of female genitalia were followed by Hippa [20] and for illustration of male genitalia adopted from Skufjin [21] and terms followed Sinclair [22] and Knutson [23]. Ghorpade and Shehzad [24] studied new distributional record from Pakistan and they published their checklists recently but they did not mention Sphaerophoria rupellii Wiedemann and Sphaerophoria interrupta Fabricius from Balochistan, Pakistan.

Checklist of the genus Sphaerophoria St. Farg. et Serv reported from Pakistan
Sphaerophoria bengalensia (Macquart 1842)
Sphaerophoria Indiana (Bigot 1884)
Sphaerophoria interrupta (Fabricius 1805)
Sphaerophoria philanthus (Meigen 1822)
Sphaerophoria scripta (Linnaeus 1758)
Sphaerophoria viridaenea (Brunetti 1945)
Sphaerophoria rupellii (Wiedemann 1830).

Results
Genus Sphaerophoria St. Farg. et Serv.
Head: Head broader than thorax; eyes bare; antennae short, aristae bare.
Thorax: Distinctly broadest behind the middle, color blackish; thoracic pleura yellow stripe complete or partly.
**Wings:** Anterior cross vein before middle of distal cell, 3rd vein almost straight; squamae moderate sized.

**Abdomen:** Relatively narrower than thorax, black bands and yellow bars or spots.

**Legs:** Simple, pubescent.

*Sphaerophoria rueppellii* Wiedemann, 1830  
(Fig: 1A-B)  
*Sphaerophoria rueppellii* Wiedemann; Barkereyer 1999.

**coloration:** Eyes dark brown; vertex black; occiput grey; frons yellow; antennae orange color; aristae brown; face yellow; thoracic dorsum black; pleura yellow stripe; scutellum yellow; abdomen band and yellow; legs yellow.

**Head:** Head about same width as thorax; eyes large, dark brown; frons smooth yellow; antennae orange color, antennae 3rd segment, aristae thin and longer than 3rd segment of antennae; face yellow with white hairs; occiput grey with pale hairs.

**Thorax:** Dorsum dusty black, pale hairs; thoracic pleura have incomplete yellow stripes with yellow hairs; haltere yellow thumb like structure; scutellum raised yellow with yellow hairs.

**Abdomen:** Abdomen short, cylindrical, slight twisted on middle, tergite 1 black band, tergite two 1/4 black; sternite without black marking.

**Wings:** Vein R4+5 not dipped toward cell r5, second basal cell 70% microtrichia; allula completely covered with microtrichia; squama margin small yellow hairs; sub-costal cell yellow; stigma yellow with small dots.

**Legs:** Legs yellow, fore legs white hairs; hind coxa have long white hairs, hind femur black hairs, tibia brown with white hairs, middle femur slightly swollen.

**Male genitalia** (Fig. 1C) Epandrium skull shape, a pair of small circus located on circular groove, cerci hairy, yellow; surstylus (Fig. 1D) lobe thumb like structure, base slender, inner curve hairy; aedeagus (Fig. 1E) long, tubular, anterior end slender than posterior part; hypandrium narrow.

**Female genitalia** (Fig. 1 F, G). Genitalia covered by small black bristles; a pair of cerci finger like shape; post genital or sub anal narrow and raised in middle.

**Distribution:** This is widely distributed in England, Scotland, South Norway, Sweden, North Africa, Ireland, Greece, Turkey, Mediterranean, Island, Russia, China, Korea, Afghanistan, India and Iran [3, 6, 7, 25-27].

*Sphaerophoria interrupta* Fabricius, 1805  
(Fig: 2A-B)  
*Scaeva interrupta* Fabricius, 1805.  
*Melithreptus menthrasti* Strobl, 1893,  
*Sphaerophoria menthasti* Vockeroth, 1963,  

**Coloration:** Eyes reddish brown; vertex black; occiput yellow; frons yellow; antennae yellow, antennae 3rd segment, aristae orange brown; dorsum thorax dark, pleural thorax yellow stripe; scutellum yellow; abdomen yellow with black bands; legs yellow.

**Head:** Head about same width as thorax; eyes bare, reddish brown; three ocelli shiny brown; occiput ground grey, hairs grey color; frons smooth yellow; third segment of antenna longer than 1 and 2; aristae long; face yellow with dull black stripe in middle; no black margin around mouth.

**Thorax:** Thoracic dorsum dusty black with white hairs; pleural dorsum yellow stripe, yellow hairs; scutellum raised yellow with yellow hairs.
Table-1. Measurements characterization of *Sphaerophoria rueppellii* for its body parts.

<table>
<thead>
<tr>
<th>Body parts</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean mm</td>
<td>Range Mm</td>
<td>Stdev mm</td>
<td>Mean mm</td>
</tr>
<tr>
<td>Head Length</td>
<td>0.68</td>
<td>0.6-0.8</td>
<td>0.083</td>
<td>0.7</td>
</tr>
<tr>
<td>Antenna Length</td>
<td>0.58</td>
<td>0.5-0.7</td>
<td>0.083</td>
<td>0.44</td>
</tr>
<tr>
<td>Arista Length</td>
<td>0.36</td>
<td>0.4-0.3</td>
<td>0.054</td>
<td>0.4</td>
</tr>
<tr>
<td>Thorax Length</td>
<td>1.44</td>
<td>1.2-1.8</td>
<td>0.230</td>
<td>1.44</td>
</tr>
<tr>
<td>Scutellum Length</td>
<td>0.44</td>
<td>0.4-0.5</td>
<td>0.054</td>
<td>0.42</td>
</tr>
<tr>
<td>Wing Length</td>
<td>4.7</td>
<td>3.8-5.5</td>
<td>0.628</td>
<td>4.88</td>
</tr>
<tr>
<td>Abdomen Length</td>
<td>3.6</td>
<td>3.1-4.5</td>
<td>0.552</td>
<td>3.36</td>
</tr>
<tr>
<td>Hind leg Length</td>
<td>4.62</td>
<td>4.2-4.9</td>
<td>0.277</td>
<td>4.36</td>
</tr>
<tr>
<td>Body Length</td>
<td>6.32</td>
<td>5.5-7.4</td>
<td>0.785</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Table-2. Measurements characterization of *Sphaerophoria interrupta* for its body parts.

<table>
<thead>
<tr>
<th>Body parts</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean mm</td>
<td>Range Mm</td>
<td>Stdev mm</td>
<td>Mean Mm</td>
</tr>
<tr>
<td>Head Length</td>
<td>0.82</td>
<td>0.9-0.8</td>
<td>0.083</td>
<td>0.76</td>
</tr>
<tr>
<td>Antenna Length</td>
<td>0.46</td>
<td>0.5-0.4</td>
<td>0.054</td>
<td>0.48</td>
</tr>
<tr>
<td>Arista Length</td>
<td>0.42</td>
<td>0.3-0.5</td>
<td>0.083</td>
<td>0.54</td>
</tr>
<tr>
<td>Thorax Length</td>
<td>1.8</td>
<td>1.6-2</td>
<td>0.187</td>
<td>1.72</td>
</tr>
<tr>
<td>Scutellum Length</td>
<td>0.46</td>
<td>0.4-0.5</td>
<td>0.054</td>
<td>0.52</td>
</tr>
<tr>
<td>Wing Length</td>
<td>5.46</td>
<td>5-6</td>
<td>0.421</td>
<td>5.26</td>
</tr>
<tr>
<td>Abdomen Length</td>
<td>4.36</td>
<td>4-4.7</td>
<td>0.328</td>
<td>4.02</td>
</tr>
<tr>
<td>Hind leg Length</td>
<td>4.94</td>
<td>4.5-5.1</td>
<td>0.250</td>
<td>5.54</td>
</tr>
<tr>
<td>Body Length</td>
<td>7.46</td>
<td>7-8.2</td>
<td>0.466</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Table-3. Showing the distribution of species, number of specimens and host plants from Balochistan, Pakistan

<table>
<thead>
<tr>
<th></th>
<th><em>Sphaerophoria rueppellii</em></th>
<th></th>
<th><em>Sphaerophoria interrupta</em></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Localities</strong></td>
<td><strong>Male</strong></td>
<td><strong>Female</strong></td>
<td><strong>Male</strong></td>
<td><strong>Female</strong></td>
</tr>
<tr>
<td>Quetta</td>
<td>20</td>
<td>13</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Kuchlak</td>
<td>12</td>
<td>05</td>
<td>09</td>
<td>05</td>
</tr>
<tr>
<td>Pishin</td>
<td>05</td>
<td>04</td>
<td>07</td>
<td>04</td>
</tr>
<tr>
<td>Mastung</td>
<td>07</td>
<td>06</td>
<td>12</td>
<td>08</td>
</tr>
<tr>
<td>Dusht</td>
<td>07</td>
<td>04</td>
<td>08</td>
<td>06</td>
</tr>
<tr>
<td>Sibi</td>
<td>09</td>
<td>05</td>
<td>09</td>
<td>07</td>
</tr>
<tr>
<td>Dhadar</td>
<td>14</td>
<td>06</td>
<td>04</td>
<td>05</td>
</tr>
<tr>
<td>Bhag</td>
<td>12</td>
<td>10</td>
<td>10</td>
<td>05</td>
</tr>
<tr>
<td>Dera Murad Jamali</td>
<td>13</td>
<td>09</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Dera Allah Yar</td>
<td>11</td>
<td>08</td>
<td>09</td>
<td>06</td>
</tr>
<tr>
<td>Roopa Shak</td>
<td>06</td>
<td>03</td>
<td>10</td>
<td>06</td>
</tr>
<tr>
<td>Lasbela</td>
<td>10</td>
<td>07</td>
<td>04</td>
<td>03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>126</strong></td>
<td><strong>80</strong></td>
<td><strong>111</strong></td>
<td><strong>77</strong></td>
</tr>
</tbody>
</table>

**Host plants**

- *Sphaerophoria rueppellii*: Wheat, Cabbage

113
Figure 1: (1A) Female *Sphaerophilia rueppellii* (1B) male *Sphaerophilia rueppellii* (1C) male genitalia ventral view (1D) syrstilus lateral view (1E) aedeagus dorsal view (1F) female genitalia dorsal view (1G) female genitalia ventral view.
Figure 2: (2A) Male *Sphaerophoria interrupta* (2B) female *Sphaerophoria interrupta* (2C) male genitalia dorsal view (2D) surstylus lateral view (2E) aedeagus dorsal view (2F) female genitalia ventral view
Wings: 1st and 2nd costal bright yellow, stigma yellow; m. second basal cell complete covered microtrichia; R4+5 straight.

Abdomen: Abdomen cylindrical width thinner than thorax; tergites 1 and 3 have black bands; lateral margin of abdomen yellow hairs.

Legs: Orange color, hind legs dorsally covered with black bristles.

Male genitalia (Fig. 2 C) Epandrium globular shape, a pair of cerci small found in circular groove, rod like shape, yellow, hairy, syr stilus (Fig. 2D) tooth lobe with apical thumb like shape, small hairs on ridge; aedeagus (Fig. 2E) arrow shape, yellow, hairy.

Female genitalia (Fig. 2F) Genitalia densely covered with black hairs; a pair cerci small, cactus shape, post genital or subanal plate triangular shape.


Discussion

The genus Sphaerophoria St. Farg. et Serv is most common syrphids in Balochistan, Pakistan. The Sphaerophoria rueppellii Wiedemann, 1830 and Sphaerophoria interrupta Fabricius, 1805 appear in the months of March to November in winter from different localities of Balochistan such as Quetta, Mastung, Dusht, Pishin and Kuchlak and in summer from Sibi, Dera Murd Jamali, Dera Allah yar, Bhag, Dhadar, Roopa Shakh and Hub Chowki. Peak season of Sphaerophoria St. Farg. et Serv in winter zone was March and April and in summer localities optimum months of appearance were also March and April. The species of Sphaerophoria St. Farg. et Serv commonly found all over the world except Antarctica. Many researchers described the morphological characters of Sphaerophoria ruep nellii Wiedemann, and Sphaerophoria interrupta Fabricius e.g. Coe [18], Knutson, [23] Stubb& Falk [19], and Van [28] were prominent. They described the morphological features and external male and female genitalia but not focused on the female genitalia, male aedeagus and their measurements.

The newly recorded two species Sphaerophoria rueppellii Wiedemann and Sphaerophoria interrupta Fabricius, have been described for the first time from Balochistan on the bases of morphological characters, male and female external genitalia, their diagram and measurements of different parts are also given. No one has reported the Sphaerophoria rueppellii Wiedemann, and Sphaerophoria interrupta Fabricius from Balochistan, Pakistan so it is a new distributional record in the list of Balochistan fauna.

References

1. Fabricius JC (1805). "Systema anti liatorum secundum ordines, genera, species.—373 pp.+ 30 pp." Brunsvigae (= Brunswick)


