Research Article

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

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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 *Sphaerophoria 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 Azerbaijan, Iran. Khaghaninia [4] also reported it from West Azerbaijan, 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 philanthus 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 rueppellii* 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 Shakh 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 rueppellii* 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 rueppellii* Wiedemann and *Sphaerophoria interrupta* Fabricius from Balochistan, Pakistan.

Checklist of the genus *Sphaerophoria* St. Farg. et Serv reported from Pakistan

Sphaerophoria bengalensis (Macquart 1842)
Sphaerophoria Indiana (Bigot 1884)
Sphaerophoria interrupta (Fabricius 1805)
Sphaerophoria philanthus (Meigen 1822)
Sphaerophoria scripta (Linnaeus 1758)
Sphaerophoria viridaenea (Brunetti 1945)
Sphaerophoria rueppellii (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; arista 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, arista 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 menthrasti* Vockeroth, 1963, Bankowsk, 1964: 339. Violovitsh, 1976b: 331; 1982: 193; 1983: 52; Peck, 1988: 43; Zimina, 1979: 48. *Sphaerophoria picta* Lambek 1968; *Sphaerophoria pictus* Meigen 1822.

Coloration: Eyes reddish brown; vertex black; occiput grey; frons yellow; antennae yellow, arista 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; arista long; face yellow with dull black stripe in middle; no black margin around mouth.

Thorax: Thoracic dorsum dusty black with white hairs; pleural thorax yellow stripe, yellow hairs; scutellum raised yellow with yellow hairs.

Table-1. Measurements characterization of *Sphaerophoria rueppellii* for its body parts.

Male				Female		
Body parts	Mean mm	Range Mm	Stdev mm	Mean mm	Range mm	Stdev mm
Head Length	0.68	0.6- 0.8	0.083	0.7	0.6- 0.8	0.070
Antenna Length	0.58	0.5- 0.7	0.083	0.44	0.4- 0.5	0.054
Arista Length	0.36	0.4- 0.3	0.054	0.4	0.3- 0.5	0.070
Thorax Length	1.44	1.2- 1.8	0.230	1.44	1.3- 1.7	0.167
Scutellum Length	0.44	0.4- 0.5	0.054	0.42	0.4- 0.5	0.044
Wing Length	4.7	3.8- 5.5	0.628	4.88	4.7- 5	0.130
Abdomen Length	3.6	3.1- 4.5	0.552	3.36	3- 3.6	0.250
Hind leg Length	4.62	4.2- 4.9	0.277	4.36	3.7-5	0.585
Body Length	6.32	5.5- 7.4	0.785	6.1	6- 6.2	0.1

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

Male				Female		
Body parts	Mean mm	Range mm	Stdev mm	Mean Mm	Range mm	Stdev mm
Head Length	0.82	0.9- 0.8	0.083	0.76	0.7- 0.9	0.089
Antenna Length	0.46	0.5- 0.4	0.054	0.48	0.4- 0.6	0.083
Arista Length	0.42	0.3- 0.5	0.083	0.54	0.5- 0.6	0.054
Thorax Length	1.8	1.6- 2	0.187	1.72	1.6- 1.9	0.109
Scutellum Length	0.46	0.4- 0.5	0.054	0.52	0.5- 0.6	0.044
Wing Length	5.46	5- 6	0.421	5.26	5- 6	0.421
Abdomen Length	4.36	4- 4.7	0.328	4.02	3.7- 4.3	0.238
Hind leg Length	4.94	4.5- 5.1	0.250	5.54	5- 6	0.384
Body Length	7.46	7- 8.2	0.466	7.2	6.7- 7.8	0.418

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

<i>Sphaerophoria rueppellii</i>			<i>Sphaerophoria interrupta</i>		
Localities	Male	Female	Male	Female	Host plants
Quetta	20	13	18	12	Wheat, Cabbage
Kuchlak	12	05	09	05	Wheat/ barley
Pishin	05	04	07	04	Wheat/ barley
Mastung	07	06	12	08	Vegetables, Weeds
Dusht	07	04	08	06	Weeds, Brassica
Sibi	09	05	09	07	Flowers, pea plants
Dhadar	14	06	04	05	Brassica, onions
Bhag	12	10	10	05	Flowers, Gramm plants
Dera Murad Jamali	13	09	11	10	Cabbage, tomatoes
Dera Allah Yar	11	08	09	06	Brassica, lay finger
Roopa Shak	06	03	10	06	Brassica, weeds
Lasbela	10	07	04	03	Wheat, flowers
Total	126	80	111	77	394

Figure 1: (1A) Female *Sphaerophoria rueppellii* (1B) male *Sphaerophoria rueppellii* (1C) male genitalia ventral view (1D) syrtilus lateral view (1E) aedeagus dorsal view (1F) female genitalia dorsal view (1G) female genitalia ventral view.

2C 1.2mm

2D 0.8mm

2E 0.5mm

2F 0.3mm

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, syrtilus (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.

Distribution: *Sphaerophoria interrupta* wide speared throughout Britain and Ireland (Stubb & Falk), [19] Western Europe (Bankowska) [25], Pakistan; Khyber Pakhtunkhwa, Peshawar, Parachinar [13].

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 rueppellii* 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.

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