

Systematics and Population of Sarcophagid Flies in Faisalabad (Pakistan)

SHAZIA, MUHAMMAD TAYYIB¹, ANJUM SUHAIL AND M. JAWWAD YOUSUF

Department of Agricultural Entomology, University of Agriculture, Faisalabad–38040, Pakistan

¹Corresponding author's e-mail: muhammادتayyib@yahoo.com

ABSTRACT

The present research has resulted in the collection and identification of 11 species and one genus of Sarcophagid flies. Key for the identification of these species has been prepared. The characters, which differ from the published descriptions of these species have only been given. On an overall basis, a very meagre population of these flies was attracted to the baited traps in winter. However, the maximum population of *Sarcophaga walshi* followed by *S. ruficornis* was attracted to different baited traps.

Abbreviations used in the text are as follows:

H. W. = Head width, F. W. = Frontal width, L. S. A. S. = Length of second antennal segment, L. T. A. S. = Length of third antennal segment, W. T. A. S. = Width of third antennal segment, E. L. = Eye length, E. W. = Eye width, W. P. = Width of parafrontalia, W. F. S. = Width of frontal stripe, L. T. C. S. = Length of third costal segment, L. F. C. S. = Length of fifth costal segment, B. L. = Body length.

Key Words: Systematics; Sarcophagid flies; Baited traps; Faisalabad; Pakistan

INTRODUCTION

The members of many dipterous families including the Sarcophagidae visit flowers of different plants for pollen and nectar and thus play an important role in the pollination of crops (Kevan & Baker, 1984; Kearns & Inouye, 1993). A number of species of this family are serious pests of animals, such as cattle, horses and elephants. Their maggots bore into the body tissues of these animals and cause oral, ocular, rhinal, cutaneous and gastric myiasis, which may prove even fatal, when they are present in large numbers (Liebisch *et al.*, 1983; Hall & Wall, 1994). Some of them are parasites of birds, insects and other animals (Aldrich, 1915).

Many species of sarcophagid flies clean our environment and thus render great service to human beings. Larvae of many flesh flies occur in decaying animal or vegetable matter and clean the earth of these bad-smelling and un-wanted materials. These flies also play an important role in forensic investigations, i.e. any situation in which insects or their actions, become evidence within the legal system. The decomposing bodies provide a temporary microhabitat offering a progressively changing food source to a variety of organisms, ranging from bacteria and fungi to vertebrate scavengers. Insects are a major element of this fauna. Its primary application was to determine the postmortem interval of decomposed bodies in criminal investigations. Now, it is recognized that insects can provide an insight into the movement of a corpse following death and assessment of wounds (antemortem *versus* postmortem).

In view of the great importance of these flies, the present research was designed to see the number of species and their population attracted to different types of decaying flesh in the human habitation in winter months.

MATERIALS AND METHODS

The present research was conducted in the residential area of Ghulam Muhammad Abad in Faisalabad (Pakistan). For this purpose, three traps were set in this area from December to February. These traps were baited with fish, chicken and rabbit carcasses separately. These baits were replaced by new ones during each month of winter (Shah & Sakhawat, 2003).

The flies, which visited these carrions were collected daily, killed and preserved in 70% alcohol in vials. The collected flies were identified up to the species level with the help of a stereo-microscope having the magnification of 10X x 40X. The measurements of various body parts were taken with a very fine divider. Key for the identified species has been constructed to make the future identifications easier. Only differences of the identified species from their published descriptions are given in this paper.

The classification and terminology of Senior-White (1940) was followed in the present work. All the specimens of identified species have been deposited in the Insect Museum, Department of Agricultural Entomology, University of Agriculture, Faisalabad (Pakistan).

RESULTS

A: Systematics of Sarcophagid flies. The family Sarcophagidae is represented by 11 species and one genus in Faisalabad.

Genus *Sarcophaga* Meigen

1826. *Sarcophaga* Mg., Syst. Besch., 5: 14.

1861. *Blaesoxipha* Loew, Wien. Ent. Monat., 5: 384.

1863. *Ravinia* R.-D., Dipt. Env. Paris, 2: 434.

1895. *Helicobia* Coq., Proc. Acad. Nat. Sci. Phil., p. 317.

1914. *Botcheria* Parker, Proc. Bost. N. H. S., 35: 65.

1917. *Glaucosarcophaga* Tnsd., Proc. Biol. Soc. Wash., 30: 191.

1921. *Parasarcophaga* Johnston and Tiegs, Proc. Roy. Soc. Queensland, 23: 78.

All the collected specimens of this genus completely agree with the published description of Senior-White *et al.* (1940).

Key to the species of *Sarcophaga*

1. Postsutural dorso-central bristles 3.....2
 - Postsutural dorso-central bristles 4.....3
 - Postsutural dorso-central bristles 5 - 6.....6
2. Frons two-thirds of an eye-width; genital segment 2 black; wing with its costal segment 3 equal to 5; hind femora without fringe. *josephi* Bottcher
 - Frons three-quarters of an eye-width; genital segment 2 red; wing with its costal segment 3 longer than 5; hind femora with fringe..... *barbata* Thomson.
3. Presutural acrostichal bristles present; frontal bristles almost straight; face with yellow tinge.....*albiceps* Meigen
 - Presutural acrostichal bristles absent; frontal bristles diverging; face silvery.....4.
4. Third antennal segment two and a half times the second; frons three-fifths of an eye-width; two rows of black postocular cilia.....*crinita* Parker
 - Third antennal segment not more than twice the second; frons about half an eye-width; one row of black postocular cilia.....5.
5. Mid and hind femora and tibiae fringed; parafrontalia silvery with yellow tinge; wing with its costal segment 3 longer than 5.....*brevicornis* Ho
 - Mid and hind femora and tibiae not fringed; parafrontalia silvery without yellow tinge; wing with its costal segment 3 equal to 5.....*hainanensis* Ho
6. Third antennal segment thrice the second; genae with short bristles.....*khasiensis* Senior-White
 - Third antennal segment not longer than two and a half times the second; genae without short bristles.....7.
7. Mid tibiae fringed; parafrontalia and face golden.....*orientaloides* Senior-White
 - Mid tibiae bare; parafrontalia and face not golden.....8.
8. Hind tibiae fringed; frontal bristles almost straight.....*kempi* Senior-White
 -Hind tibiae not fringed; frontal bristles strongly diverging.....9.
9. Antennae and palpi orange-red; genital segments 1 and 2 red.....*ruficornis* (Fabricius)
 - Antennae and palpi black; genital segments 1 and 2 black.....*walshi* Ho

1. *Sarcophaga barbata* Thomson

1869. *Sarcophaga barbata* Thoms., Eugen. Reis., p. 533.

1896. *Sarcophaga falculata* Pand., Rev. Ent., 15: 185.

1924. *Sarcophaga falculata* var. *persicae* Sen.-Wh., Rec. Ind. Mus., 26: 228.

The collected specimens of this species differ from the published description of Senior-White *et al.* (1940) in the following characters:

Palpi yellow; thorax slightly pale whitish-grey.

Measurements (mm). H.W. = 4.0, F.W. = 1.25, L.S.A.S.

= 0.375, L.T.A.S. = 0.75, W.T.A.S. = 0.375, E.L. = 2.50, E.W. = 2.0, W.P. = 0.50, W.F.S. = 0.50, L.T.C.S. = 1.75, L.F.C.S. = 1.50, B.L. = 11.0-11.25.

Material examined: 4 specimens, 1.12.2004 - 27.2.2005.

2. *Sarcophaga josephi* Bottcher

1912. *Sarcophaga josephi* Bott., Ent. Mitteil., 1: 168.

The collected specimens of this species are similar to the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.0, F.W. = 0.80, L.S.A.S. = 0.25, L.T.A.S. = 0.50, W.T.A.S. = 0.25, E.L. = 2.25, E.W. = 1.25, W.P. = 0.25, W.F.S. = 0.25, L.T.C.S. = 1.25, L.F.C.S. = # 9; 1.25, B.L. = 9.0.

Material examined: 1 specimen, 16.2.2005.

3. *Sarcophaga albiceps* Meigen

1826. *Sarcophaga albiceps* Mg., Syst. Besch., 5: 22.

1896. *Sarcophaga cyathisans* Pand., Rev. Ent., 15: 191.

1905. *Sarcophaga pauciseta* Kram., Zeit. Hym. Dipt., 5: 331.

It is exactly similar to the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.75, F.W. = 1.0, L.S.A.S. = 0.375, L.T.A.S. = 0.90, W.T.A.S. = 0.375, E.L. = 2.25, E.W. = 1.75, W.P. = 0.25, W.F.S. = 0.50, L.T.C.S. = 2.0, L.F.C.S. = 1.50, B.L. = 8.50.

Material examined: 1 specimen, 8.2.2005.

4. *Sarcophaga crinita* Parker

1917. *Sarcophaga crinita* Parker, Proc. U.S. Nat. Mus., 4: 92.

The specimens of this species are exactly similar to the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.50, F.W. = 1.25, L.S.A.S. = 0.375, L.T.A.S. = 1.0, W.T.A.S. = 0.375, E.L. = 2.25, E.W. = 1.50, W.P. = 0.50, W.F.S. = 0.375, L.T.C.S. = 1.50, L.F.C.S. = 1.50, B.L. = 9.0.

Material examined: 3 specimens, 1.12.2004 - 27.2.2005.

5. *Sarcophaga orientaloides* Senior-White

1924. *Sarcophaga orientaloides* Sen.-Wh., Rec. Ind. Mus., 26: 244.

It completely tallies with the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.0-3.75, F.W. = 0.90-1.25, L.S.A.S. = 0.375, L.T.A.S. = 0.75, W.T.A.S. = 0.375, E.L. = 2.25-2.50, E.W. = 1.50 - 1.75, W.P. = 0.166-0.375, W.F.S. = 0.25-0.50, L.T.C.S. = 1.75, L.F.C.S. = 1.50, B.L. = 9.50-12.0.

Material examined: 3 specimens, 1.12.2004 - 27.2.2005.

6. *Sarcophaga brevicornis* Ho

1934. *Sarcophaga brevicornis* Ho, Bull. Fan Inst. Biol., 6: 210.

It exactly tallies with the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.0, F.W. = 1.0, L.S.A.S. = 0.375, L.T.A.S. = 0.75, W.T.A.S. = 0.375, E.L. = 2.0, E.W. = 1.50, W.P. = 0.20, W.F.S. = 0.332, L.T.C.S. = 1.50, L.F.C.S. = 1.0, B.L. = 10.0.

Material examined: 1 specimen, 1.2.2005.

7. *Sarcophaga kempii* Senior-White

1924. *Sarcophaga kempii* Sen.-Wh., Rec. Ind. Mus., 26: 247.
1931. *Sarcophaga kempioides* Baran., Konowia, (2)10: 114-115.

It completely conforms to the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.0, F.W. = 0.75, L.S.A.S. = 0.375, L.T.A.S. = 0.50, W.T.A.S. = 0.375, E.L. = 2.0, E.W. = 1.50, W.P. = 0.25, W.F.S. = 0.40, L.T.C.S. = 1.50, L.F.C.S. = 1.25, B.L. = 11.25.

Material examined: 1 specimen, 16.2.2005.

8. *Sarcophaga ruficornis* (Fabricius)

1794. *Musca ruficornis* Fab., Ent. Syst., 4: 314-16.
1940. *Sarcophaga ruficornis* Senior-White, Aubertin and Smart, Fauna Brit. - India, Diptera, Vol. VI. Calliphoridae, p. 269.

The collected specimens of this species completely agree with the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.0 - 4.25, F.W. = 1.0 - 1.33, L.S.A.S. = 0.25 - 0.50, L.T.A.S. = 0.50 - 1.50, W.T.A.S. = 0.25 - 0.50, E.L. = 2.0 - 2.50, E.W. = 1.50 - 2.0, W.P. = 0.33 - 0.50, W.F.S. = 0.375 - 0.625, L.T.C.S. = 1.25 - 2.0, L.F.C.S. = 1.0 - 1.75, B.L. = 7.0 - 12.0.

Material examined: 13 specimens, 1.12.2004 - 27.2.2005.

9. *Sarcophaga khasiensis* Senior-White

1924. *Sarcophaga khasiensis* Sen.-Wh., Rec. Ind. Mus., 26: 246.

It completely tallies to the published description of Senior-White *et al.* (1940) except one row of black postocular cilia.

Measurements (mm). H.W. = 3.50, F.W. = 1.0, L.S.A.S. = 0.375, L.T.A.S. = 1.125, W.T.A.S. = 0.375, E.L. = 2.25, E.W. = 1.50, W.P. = 0.25, W.F.S. = 0.50, L.T.C.S. = 1.50, L.F.C.S. = 1.25, B.L. = 9.0.

Material examined: 1 specimen, 27.1.2005.

10. *Sarcophaga hainanensis* Ho

1934. *Sarcophaga hainanensis* Ho, Bull. Fan. Inst. Biol., 6: 210.

This species exactly tallies with the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.50, F.W. = 0.75, L.S.A.S. = 0.375, L.T.A.S. = 1.0, W.T.A.S. = 0.375, E.L. = 2.20,

E.W. = 1.50, W.P. = 0.375, W.F.S. = 0.75, L.T.C.S. = 1.50, L.F.C.S. = 1.50, B.L. = 9.0.

Material examined: 1 specimen, 8.2.2005.

11. *Sarcophaga walshi* Ho

1938. *Sarcophaga walshi* Ho, Ann. Trop. Med. Paras., 32: 125.

It completely agrees with the published description of Senior-White *et al.* (1940).

Measurements (mm). H.W. = 3.50, F.W. = 1.25, L.S.A.S. = 0.375, L.T.A.S. = 0.75, W.T.A.S. = 0.375, E.L. = 2.25, E.W. = 1.50, W.P. = 0.50, W.F.S. = 0.25, L.T.C.S. = 2.0, L.F.C.S. = 1.25, B.L. = 9.50.

Material examined: 36 specimens, 1.12.2004 - 27.2.2005.

B: Population of Sarcophagid Flies. Table I reveals that on an overall basis a very meagre population of different sarcophagid species was attracted to different types of baited traps, which were set in the residential area in winter. However, the maximum population of 20 specimens of *Sarcophaga walshi* was recorded in the fish-baited trap, followed by 14 specimens of this species in the rabbit-bait. Its least population was noted in the chicken bait. The next in order was the population of 10 specimens of *S. ruficornis* in the fish- and only 2 specimens in the rabbit-baited trap. The remaining species were represented by only few specimens in the traps.

REFERENCES

Aldrich, J.M., 1915. A catalogue of N. American Diptera. *Smithson. Misc. Coll.*, 46: 680
Hall, M.J.R. and R. Wall, 1994. Myiasis in human and domestic animals. *In: Advances in Parasitology*. Academic Press, London
Kearns, C.A. and D.W. Inouye, 1993. *Techniques for Pollination Biologists*, P: 583. University of Colorado Press, USA
Kevan, P.Q. and H.G. Baker, 1984. Insects on flowers. *In Huffaker, C.B. (ed.), Ecological Entomology*, P: 844. John Wiley and Sons, New York
Leibisch, A., H. Froehner and D. Elger, 1983. Myiasis in sheep caused by *L. sericata*- an approaching problem. *Tierarztliche Umschau*, 38: 747
Senior-White, R., D. Aubertin and J. Smart, 1940. *The Fauna of British-India Including the Remainder of the Oriental Region-diptera*. Fam. Calliphoridae, Vi. Taylor and Francis, London
Shah, Z.A. and T. Sakhawat, 2003. Calliphorid and sarcophagid flies visiting rabbit flesh during fall season from Faisalabad, Pakistan. *Pakistan Entomol.*, 25: 177-81

(Received 04 May 2006; Accepted 15 August 2006)

Table I. Number of sarcophagid species attracted to traps baited with different carcasses in residential area of Faisalabad (Pakistan) in winter, 2004

	Rabbit				Fish				Chicken			
	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
<i>Sarcophaga barbata</i>	3	-	-	3	1	-	-	1	-	-	-	-
<i>Sarcophaga walshi</i>	5	-	9	14	2	2	16	20	-	1	1	2
<i>Sarcophaga ruficornis</i>	2	-	-	2	8	1	1	10	1	-	-	1
<i>Sarcophaga orientaloidea</i>	-	-	-	-	-	-	2	2	1	-	-	1
<i>Sarcophaga crinita</i>	-	-	2	2	-	-	-	-	1	-	-	1
<i>Sarcophaga khasiensis</i>	-	-	-	-	-	1	-	1	-	-	-	-
<i>Sarcophaga albiceps</i>	-	-	-	-	-	-	1	1	-	-	-	-
<i>Sarcophaga brevicornis</i>	-	-	-	-	-	-	1	1	-	-	-	-
<i>Sarcophaga kempii</i>	-	-	-	-	-	-	1	1	-	-	-	-
<i>Sarcophaga josephi</i>	-	-	-	-	-	-	1	1	-	-	-	-
<i>Sarcophaga hainanensis</i>	-	-	-	-	-	-	-	-	-	-	1	-