



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2015; 3(5): 483-486

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Received: 21-07-2015

Accepted: 22-08-2015

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Useful morphological characters of 3rd larval stages of three species of Sarcophagidae family (Diptera, Insecta)

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Abstract

Sarcophagidae family is important in medical and forensic entomology. Their morphological identification is difficult but it is possible by male genitalia.

The object of this study was to find some useful characters to distinguish larval stage III of some of Sarcophagidae flies.

Flies sample were collected from central parts of Tehran. Female sample was placed in separated cup and transported to the laboratory for temporary rearing. Few of the 3rd instar larvae were preserved and the remained were continued to the end of cycle.

All adults were pinned after emerging. Male adults were used for species identification. The obtained larvae were compared with the other species of Sarcophagidae family.

Results showed that there are some morphological differences among *Sarcophaga argyrostoma*, *S. aegyptica* and *S. variegata*. Results showed that the exact morphological variations between these species to compare them with collected samples. Therefore, it is suggested that such studies should be done for other species to provide applicable identification keys.

Keywords: Sarcophagidae, Morphological Identification, 3rd larval stage, Iran

Introduction

One of the most diverse families in Diptera is Sarcophagidae, with more than 400 genera and 2,600 species that are found throughout the world [9]. Flies of this family have a checkerboard abdomen, flies are large in size and greyish in colour that commonly known as flesh-fly.

Some members of this family have substantial medical, veterinary and forensic importance. Sarcophagidae cause infestation of a live mammal from an infected sore called myiasis [1, 3] and mechanically transmitted the diseases [4]. Larvae of sarcophagidae used in forensic entomology to determine post mortem interval (PMI) [6].

It difficult to recognize the species of family Sarcophagidae which is only possible to identify the male genitalia, but at family level, adults and larvae easily identified [5].

There are some works on identifications of adult Sarcophagidae in Iran [1, 10, 11] but there are little works on identifications of Sarcophagidae larvae except of some of the main myiasis agents [10-11].

Most species of the family Sarcophagidae have been reported from various parts of Iran. Some species such as *S. africa*, *S. argyrostoma*, *S. aegyptica* and *S. variegata* are common in various parts of Iran [7, 10, 11, 8].

Identification of larvae of medical and forensically important flies such as members of Sarcophagidae family is very necessary because in most cases the temporary rearing of the larvae is not possible. There are no more studies about the identification in larval stage of these flies, therefore it seems difficult. This study has been conducted to find some useful characters which can help the morphological identifications of larvae of the genus *Sarcophaga*.

Materials and Methods

The adult flies of the genus *Sarcophaga* sp. flies were collected from several points of Tehran. The samples were collected by means of entomological net from various places, near the rubbish, butchers, public catering, animal corpses occasionally using of attractive baits such as decaying fish material. Collected samples were kept individually in cups with net in above and transported to the entomology laboratory of Department of Medical Entomology and Vector

Control of Tehran University of Medical Sciences. A piece of fresh meat was placed in cups as a substrate for larval deposit of female and kept in the insectary room with $24 \pm 1^\circ\text{C}$ temperature, 16:8 light/ dark period and $60 \pm 5\%$ of relative humidity for temporary rearing. Some of the 3rd instar larvae were killed in hot water for 2 minutes to prevent shrinkage, and the remained larvae continued their growth to the end of life cycle.

All adults were mounted immediately after emerging. Male adults were used for species exact identification by pulling out the genital organs. The obtained larvae were observed carefully and compared with the other species. The shape of posterior spiracle, excretory pore and spinouse strip of larvae of each species have been observed carefully.

Results

A total of 226 flies of family Sarcophagidae were collected and identified in central part of Tehran including *S. africa*, *S. variegata*, *S. argyrostoma*, *S. aegyptica* and *S. melanura*.

Three of these species including *S. variegata*, *S. argyrostoma* and *S. aegyptica* selected for this study due to successful temporary rearing.

Larvae of *S. variegata*

Some characters of larvae of posterior spiracle of larvae of *S. variegata* (Fig. 1) are:

- The shape is round.
- The size of appendices on spiracle from out to central are big, small, small.
- The peritreme wall at first is colored and completely opened.
- The peritreme at the inner wall is colored.
- Peritreme wall on the outside, smooth and gather the internal wall.
- Two peritreme look near.
- The breath pore with minimum of bent.
- The aerial pores from out to inner cite be smaller.
- Aerial pore in base with equal distance and they seem near at top end.



Fig 1: Posterior spiracle of 3rd instar of larvae of *S. variegata*).

Some characters of excretory pore of *S. variegata* larvae (Fig. 2) are:

- Swollen.
- Without appendices.
- 3 to 4 spine.



Fig 2: Excretory pore of 3rd instar larvae of *S. variegata* (Diptera: Sarcophagidae).

The spinouse bands of 3rd instar of *S. variegata* larvae can be seen more or less on whole body segments.

Larvae of *S. aegyptica*

Some characters of posterior spiracle of *S. aegyptica* larvae (Fig. 3) are:

- The size of appendices on the spiracle: two times bigger than the other and two central appendices are small and not in line.
- The peritreme at the base is fragmented.
- The peritreme outer wall is continuance but don't ended top of the inner wall.
- Shape of aerial pores are equal.



Fig 3: Posterior spiracles of 3rd instar larvae of *S. aegyptica* (Diptera: Sarcophagidae).

Appendages of excretory pore of *S. aegyptica* larvae are clearly opposite (Fig. 4).

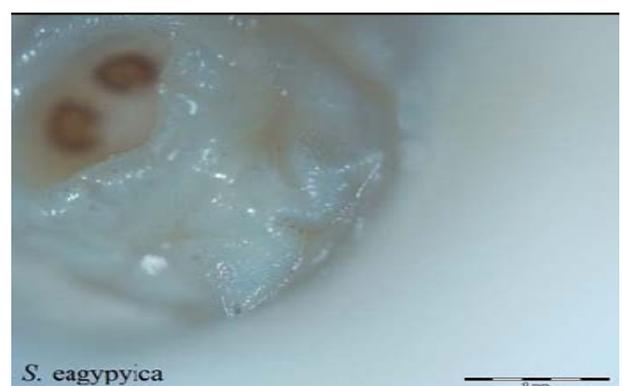


Fig 4: Excretory pore of 3rd instar larvae of *S. aegyptica* (Diptera: Sarcophagidae).

Larvae of *S. argyrostoma*:

Some characters of posterior spiracle of *S. argyrostoma* larvae (Fig. 5) are:

- Spiracle at internal wall is swelled.
- The size of appendices on the spiracle: all of them are equal, have two small appendices.
- The peritreme wall has a triangle hole in base.
- And in outer part it continued to top of the outer wall and just small space of the wall is opened.
- Slits are equal.
- The distance between the slit and the principle of equal and above the heads were bowed.



Fig 5: Posterior spiracles of *S. argyrostoma* larvae (Diptera: Sarcophagidae).

Appendages of excretory pore of *S. aegyptica* larvae are clearly opposite (Fig. 6) with a little changed shape as:

- Thorns formed the pore surface is covered uniform.
- The spins are covered by the surface of the pore
- Two appendices are located at vertical position



Fig 6: Excretory pore of 3rd instar larvae of *S. argyrostoma* (Diptera: Sarcophagidae).

Discussion

There are some differences between peritreme, appendices on the anal segment and shape of excretory pore in three species, *S. argyrostoma*, *S. aegyptica* and *S. variegata*.

The shape of peritreme in *S. variegata* is completely open in ventral and in *S. argyrostoma* is closed but in *S. argyrostoma* not closed completely. Schematic shapes of appendices of *S. aegyptica* and *S. argyrostoma* has little changes but for this issue these two species are completely different with *S. variegata*.

There are some documents on variations and species description for *S. argyrostoma*, *S. variegata* and *S. aegyptica*.

With this study it has been tried to show the exact morphological variations between these species and compare them with collected samples in Tehran. Finding some local changes between species is possible around the world. Therefore it can be recommended that such study should be done for other species and compare to provide applicable identification keys.

The results of this study can be mentioned as one step forward to show some characters which may be useful for distinguishing of the Sarcophagidae fly species in larval stages. The results after completing in the near future can be useful for medical and veterinary entomology as well as forensic entomology. Such studies are defined for local species which is comparable with other species in one place. Similar studies with comparing more species are recommended.

Acknowledgement

The authors wish to thanks all personnel of central lab of School of Public Health, TUMS for their kind help. This study has been financially supported by Tehran University of Medical Sciences (TUMS) with project number 92-01-61-20996.

The authors stated that there is no conflict of interest.

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