**Eristalis tenax** intestinal myiasis: An electron microscope study

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**Abstract**

Myiasis is the infestation of live vertebrates (humans or animals) with dipterous larvae. *Eristalis tenax*, belonging to order Diptera and family Syrphidae, seldom causes accidental myiasis, usually due to ingestion of contaminated food or water by humans. Here, we report a case of intestinal myiasis in a male from Alexandria, Egypt, complaining of frequent passage of small worms in his stool. A larva and a pupa were presented to the laboratory and examined macroscopically, and then studied by a scanning electron microscope. *E. tenax* (rat-tailed maggots) were diagnosed. Rarely diagnosed worldwide, a case of *E. tenax* accidental intestinal myiasis was found in a middle-aged adult male from Egypt. A larva and a pupa were identified and studied macroscopically and by scanning electron microscope.

**Keywords:** Accidental, electron microscope, *Eristalis tenax*, myiasis

**INTRODUCTION**

Myiasis is defined as the infestation of live vertebrates with dipterous larvae. In mammals, dipterous larvae can feed on the host’s living or dead tissue, liquid body substance, or ingested food and can cause a broad range of infestations, depending on the body location and the relationship of the larvae with the host.[1] The distribution of human myiasis is worldwide, with more species and greater abundance in poor socioeconomic regions of tropical and subtropical countries. In countries where it is not endemic, myiasis is an important condition, where it can represent the fourth most common travel-associated skin disease.[2]

Intestinal myiasis due to the larvae of the drone fly, *Eristalis tenax*, is reported sporadically from various countries, and about forty cases have been documented in literature.[3] Two worms were presented and studied macroscopically by the naked eye and microscopically by scanning electron microscopy.

**CASE REPORT**

Here, we report a case of intestinal myiasis in a 43-year-old male living in an urban area in the city of Alexandria, Egypt. The patient complained of gastrointestinal discomfort and frequent passing of living worms in his stool. He owned a store of imported wood in the suburbs of the city in a place where clean water is not guaranteed.

Two worms (one alive and one dead) in a sterile container having 0.9% saline were delivered for identification. A larva and a pupa were identified and studied macroscopically and by scanning electron microscopy.

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The two worms were identified by their distinctive morphology as larva and pupa of the drone fly, *E. tenax*. The patient was treated with ivermectin tablets 200 µg/kg body weight. The symptoms were relieved, and dead dark worms were passed afterward.

**Macroscopical examination**

**Larva**
The studied larva was a third-stage larva of *E. tenax* drone fly, which was cylindrical, was creamy white in color, and was measuring about 1.7 cm without the posterior retractile respiratory tube. Its body consisted of 11 hairy body segments, each having a pair of prolegs ventrally. The last segments had an elongated posterior breathing tube (rat tailed) consisting of three parts [Figures 1 and 2].

**Pupa**
The studied pupa was shorter (about 1.5 cm in length) and darker in color with a smoother plump body, especially from the anterior aspect with prominent two anterior spiracles. The respiratory tube was fixed and directed upward [Figures 1 and 2].

**Scanning electron microscope study**

**Larva**
On microscopy, the body of the larva is cylindrical with a flattened ventral side, covered by arranged rows of hairs on each body segment, with the taller in the front and then gets shorter. They are very abundant and arranged haphazardly in the last segment near the posterior elongated breathing tube [Figure 3].

The head bears two antennae with a rounded mouth and long tufts of hairs on the dorsal lip [Figure 4]. The prothorax bares 6–8 longitudinal grooves covered with hairs on the dorsal side. Two anterior spiracles are found on both sides of the prothorax, which are pointed and retractile [Figure 5]. The prolegs on the ventral side are equipped with fairly sturdy crochets, arranged in two distinct semicircular rows [Figure 6].

The last segment of the larva bears the elongated posterior spiracle (rat tail) divided into three parts: the first part is thicker with transverse segmentations and longitudinal grooves, covered with numerous hairs [Figure 7]; the second part is retractile and thinner with longitudinal arranged hairs [Figure 8]; and the third part is smooth with no spicules except for few setae at the tip. There are four rounded spiracular openings and a central scar [Figure 9].

**Pupa**
On microscopy, the body of the pupa is rounded, stout anteriorly and tapered posteriorly with a flat ventral aspect. It is smoother than the larva with scarce spicules. The head and prothorax are fused with rudimentary mouthparts and prominent anterior spiracles [Figures 10 and 11].

The prolegs are absorbed with fine crochets [Figure 12]. The elongated posterior spiracle is mostly similar to the larva with some differences. The first part is the same as the larva crowded with spicules [Figure 13]. The second part has longitudinal folds with no spicules [Figure 14]. The third part is transversally striated and thicker [Figure 15], slightly flattened near the end with tuft of setae at the tip [Figure 16].

**DISCUSSION**

Myiasis is the infestation of body tissues by larvae of several fly species of veterinary and medical interests.
Here, we present a rare case of intestinal myiasis caused by *E. tenax* larvae. Intestinal myiasis may be caused by ingestion of contaminated water or food by maggots of dipterous flies. Majority of the ingested fly larvae cannot survive in...
the digestive tract. However, the ingestion of larvae often causes diarrhea, and the larvae are then passed out alive in the feces. Some larvae seem especially able to survive such conditions.\[5\]

True rectal myiasis may occur when flies are attracted to the excreta and lay eggs on or near the anus; the larvae...
may penetrate the posterior part of the rectum and obtain oxygen by placing their posterior spiracles in the anal region, causing irritation. Larvae of *Eristalis* are well adapted to this mode of life.[9]

Few reports mentioned the presence of dipterous fly maggots in human feces in Egypt. Atal and Dubey and Zumpt recorded intestinal myiasis due to *Sarophaga* species,[6,7] and Mazayad and Rifaat reported the first case in Egypt caused by *Megaselia scalaris*. Ahmad *et al.* reported gastric and intestinal myiasis due to *Sarophaga* and *Oestrus* flies.[8,9]

There have been sporadic cases of human myiasis due to *E.* *tenax* worldwide, with about forty cases reported.[3,10,11] Water resources, individual habits, and low socioeconomic standards are factors that may contribute to the development of myiasis. Intestinal myiasis follows the consumption of contaminated raw or uncooked food or water. The ingested larvae may not be destroyed by the digestive enzymes and may produce various unspecific gastrointestinal symptoms.[3]

To our knowledge, this is the first report of intestinal myiasis due to *E.* *tenax* in Egypt.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**
There are no conflicts of interest.

**REFERENCES**

1. Francesconi F, Lupi O. Myiasis. Clin Microbiol Rev 2012;25:79-105.
2. Caumes E, Carrière J, Guermonprez G, Bricaire F, Danis M, Gentilini M. Dermatoses associated with travel to tropical countries: A prospective study of the diagnosis and management of 269 patients presenting to a tropical disease unit. Clin Infect Dis 1995;20:542-8.
3. Hamed RA, Hamid RA, Hamid N. Second report of accidental intestinal myiasis due to *Eristalis tenax* (Diptera: Syrphidae) in Iran, 2015. Case Rep Emerg Med 2017;2017:3754180. doi: 10.1155/2017/3754180. Epub 2017 Jul 11.
4. Hayat MA. Principles and Techniques of Electron Microscopy. New Jersey: University Park Press; 1981.
5. Smith KG. An introduction to the immature stages of British flies. In: Dolling WR, Asker RR editors. Handbooks for the Identification of British Insects. 1st ed. London: British Museum (Natural History); 1989.
6. Atal PR, Dubey DC. Intestinal myiasis with accompanying helminthic infestations. J Indian Med Assoc 1963;41:403-5.
7. Zumpt F. Myiasis in Man and Animals in the Old World. London: Butterworth and Co.; 1965.
8. Mazayad SA, Rifaat MM. Megaselia scalaris causing human intestinal myiasis in Egypt. J Egypt Soc Parasitol 2005;35:331-40.
9. Ahmad AK, Abdel-Hafeez EH, Makhloof M, Abdel-Raheem EM. Gastrointestinal myiasis by larvae of *Sarophaga* sp. and *Oestrus* sp. in Egypt: Report of cases, and endoscopic and morphological studies. Korean J Parasitol 2011;49:51-7.
10. Raffray I, Malvy D. Accidental intestinal myiasis caused by *Eristalis tenax* in France. Travel Med Infect Dis 2014;12:109-10.
11. Desoubeaux G, Gaillard J, Boréé-Moreau D, Bailly É, Andres CR, Chandenier J. Gastrointestinal symptoms resembling ulcerative proctitis caused by larvae of the drone fly *Eristalis tenax*. Pathog Glob Health 2014;108:158-63.