

Intestinal Myiasis by Larvae of *Sarcophaga* Species: A Case Report and Morphological Studies

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ABSTRACT: Intestinal myiasis is a clinical condition when the fly larvae inhabit the gastrointestinal tract and are excreted in feces. A 26-year-old young male visited the outpatient clinic of Manipal Teaching Hospital, Nepal, with symptoms of loose stool, bloating of abdomen, abdominal discomfort, intestinal hurry following meals, and passage of live wriggling maggots in the stool. Macroscopic and microscopic examinations of multiple specimens of stool and the developmental stages of the insect were studied *in vitro* to establish the identity. Maggots obtained from his stool were identified to be *Sarcophaga* species, and the case was diagnosed as intestinal myiasis. Accurate diagnosis is imperative to avoid ineffective treatment.

KEYWORDS: intestinal myiasis, *Sarcophaga* species, maggots in stool

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Introduction

The term “myiasis” was coined and defined by Reverend Fredrick William Hope in 1880 as “Myiasis is the infestation of live human and vertebrate animals with dipterous larvae, which for certain period, feed on the host’s dead or living tissue, liquid body substances or ingested food.”¹ Myiasis is common in animals. In humans, myiasis is seen in rural population where people are in close contact with animals and have low socioeconomic status.² Nosocomial myiasis in an intensive care unit has been reported.³ Clinically, myiasis may be classified as cutaneous, wound, intestinal, urogenital, auricular, etc., depending on the location of fly larvae.² Gastrointestinal myiasis is diagnosed by the presence of larvae in feces or vomitus. It occurs due to consumption of contaminated food or water containing dipterous larvae or eggs. Obligatory gut parasite of animals will not develop in humans, and therefore, species that cause intestinal myiasis are facultative or accidental parasites.⁴ Human myiasis may due to any of the 37 fly species belonging to 10 families, including *Sarcophaga* species.⁵

Intestinal myiasis caused by various species of larvae has been reported from many countries, but most of the cases are from India.^{4,6–9} To the best of our knowledge, no case of intestinal myiasis by genus *Sarcophaga* has been reported from Nepal. This case report also deals with the laboratory diagnosis of intestinal myiasis by macroscopic and microscopic observation of the larvae and their developmental stages.

Case

A 26-year-old young man from rural area of Pokhara, Nepal, presented with complaints of abdominal pain, distention, nausea, and intestinal hurry following meals. He gave history of intermittently passing wriggling “worms” in the stool since one year. There was no history of fever, anorexia, hyperaemia, weight loss, or any other chronic illness. The patient was very anxious and disturbed because of passage of presumed worms in the stool. He had visited various hospitals and was prescribed tablets albendazole, mebendazole, and metronidazole a number of times without any benefit.

He was a thin built, averagely nourished man with clinically no systemic or local abnormality. Perianal area did not reveal any ulcer or abscess. Hematological examination (total and differential leukocyte counts, erythrocyte sedimentation rate, and hemoglobin levels) was within normal limits. Antibodies to HIV-1 and HIV-2 were not detected. The stool was semisolid with the presence of mucous and many small moving maggots, but no blood (Fig. 1A). He was instructed to collect a fresh stool sample in a wide-mouthed clean container without contamination, in the hospital toilet. As maggots were shed intermittently, the second specimen collected at the hospital after a week also revealed few white wriggling maggots. The macroscopic and microscopic observation confirmed first and second instar larvae of dipterous fly based on characteristic patterns of posterior spiracles and anterior hooks. Maggots were nurtured by modified meat and sand media.⁴ Macroscopic and microscopic pictures of both larvae and pupa were taken and sent to Centers

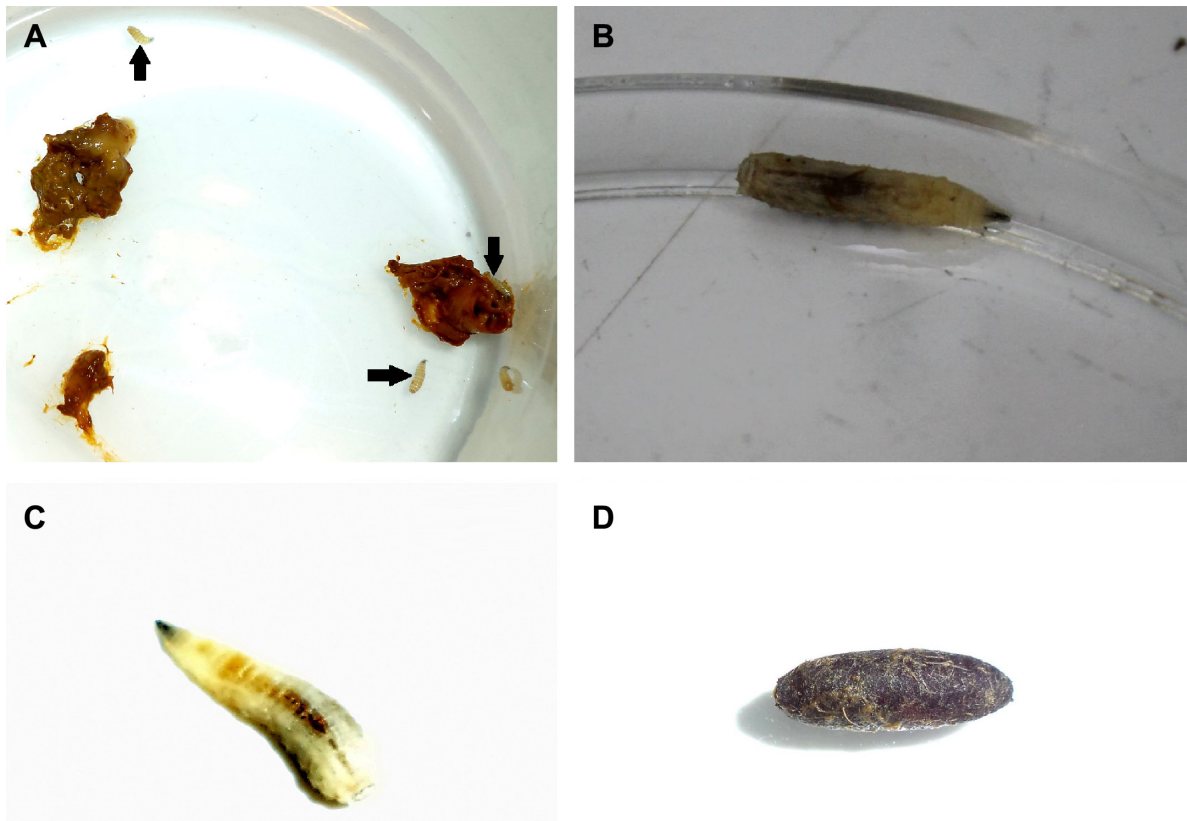


Figure 1. Macrophotograph of the larvae and pupa of *Sarcophaga* species (flesh fly). (A) Semisolid stool mixed with mucous and second instar larva (arrow head). (B and C) Third instar larva. (D) Pupa (head is to the right).

for Disease Control and Prevention, Atlanta, for further identification. These were confirmed as larvae of genus *Sarcophaga*. Colonoscopy examination did not reveal any abnormality. The case was diagnosed as intestinal myiasis and treated with ivermectin and purgatives. He was reviewed after a month and had no gastrointestinal symptoms or passing worms/maggots on subsequent follow-up. A repeat third specimen of the stool was collected in the hospital. This specimen did not reveal maggots.

Methods

The maggots were picked up from the stool specimen, washed in normal saline (0.9%), and preserved in 10% formalin. Few maggots were studied for their development. The larvae were reared in a modified artificial culture medium containing meat and sand and observed daily for 25 days for the development of larvae and for the emergence of flies. The maggots isolated from the patient were identified to be second instar larvae (Fig. 1A) based on macroscopic examination (small, white, segmented structures about 4–5 mm long and 0.5–1 mm wide). Third instar larvae (slightly bigger than second instar larvae) were picked from rearing media after four to five days of incubation (Fig. 1B and C).

Results

Microscopic observation revealed that each larva had 12 segments, with short spines at its posterior margin. It had a

broader posterior end, tapering anterior end with two oral hooks (Fig. 2A and B), and mouth brushes. The posterior segment had a fossa within which was located a pair of spiracles (Fig. 2C and D). Posterior spiracles were incompletely surrounded by lightly sclerotized peritreme ventrally. Spiracle slits were present inside spiracles surrounded by peritreme. Incomplete peritreme and spiracle slits pointed away from the opening in the peritreme, which is the characteristic feature of *Sarcophaga* species. The posterior spiracles had two parallel slits indicating it to be second instar larvae and three parallel slits indicating it to be third instar larvae. The developmental stages were identified by nurture method. Pupation started approximately one week after incubation at 25°C. The pupa ranged in size from 5 to 10 mm, darker in color with advanced stage (Fig. 1D). The adult flies emerged after 10–15 days. The length of the adult fly ranged from 9 to 13 mm. The fly was typically light grayish color with three black stripes on the thorax (Fig. 3).

Discussion

Flesh flies (Diptera: Sarcophagidae) are commonly found in warm tropical areas. These are closely associated with humans (synanthropic) and have been known to enter houses. The larval stages of many species of Sarcophagidae are necrophagous, and for this reason, these species are termed

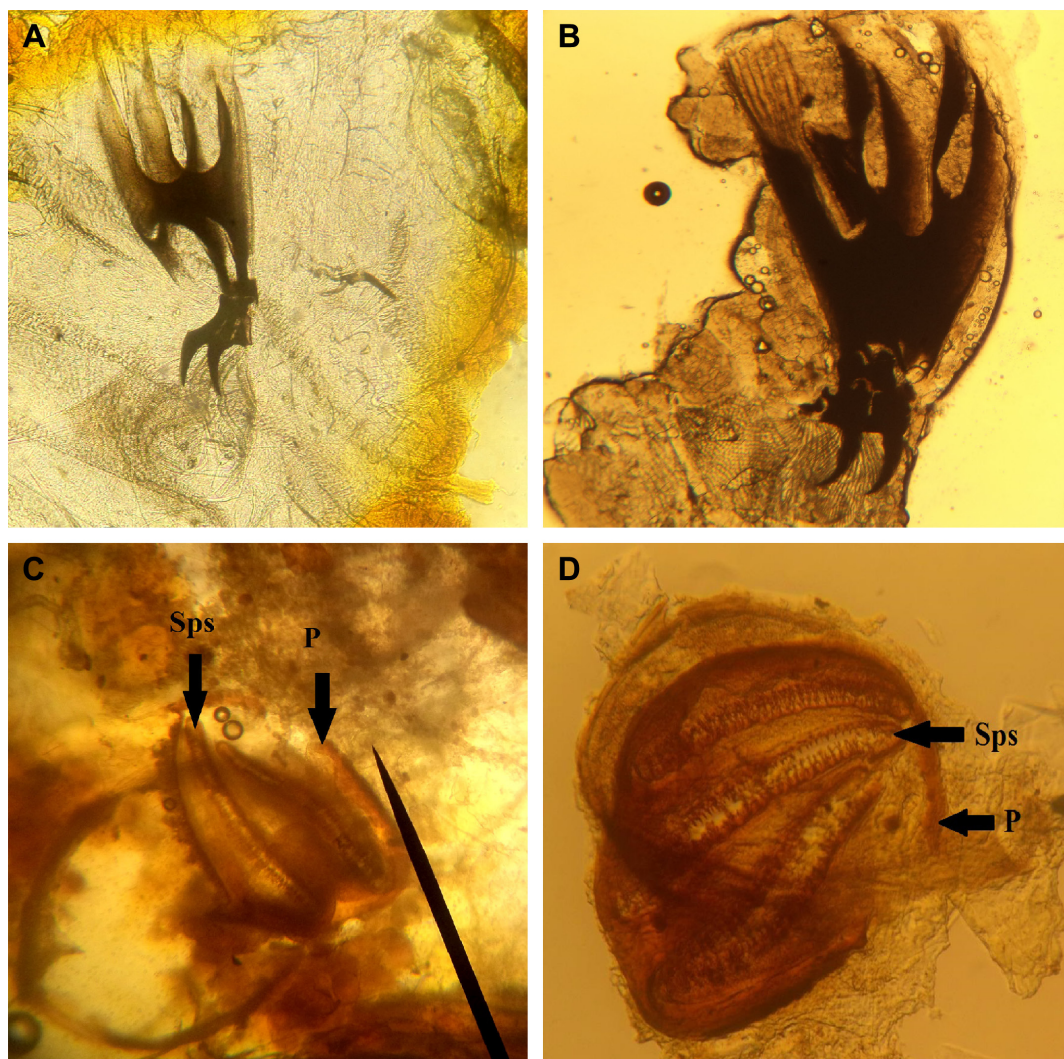


Figure 2. Microphotograph of cephalopharyngeal armatures and posterior respiratory spiracles of the larva of *Sarcophaga* species. Cephalopharyngeal armatures contain a pair of black-colored hooks on anterior end: (A) second-stage larvae and (B) third-stage larvae. Posterior respiratory spiracles: (C) second-stage larvae and (D) third-stage larvae.

Abbreviations: Sps, spiracle slit; P, peritreme.

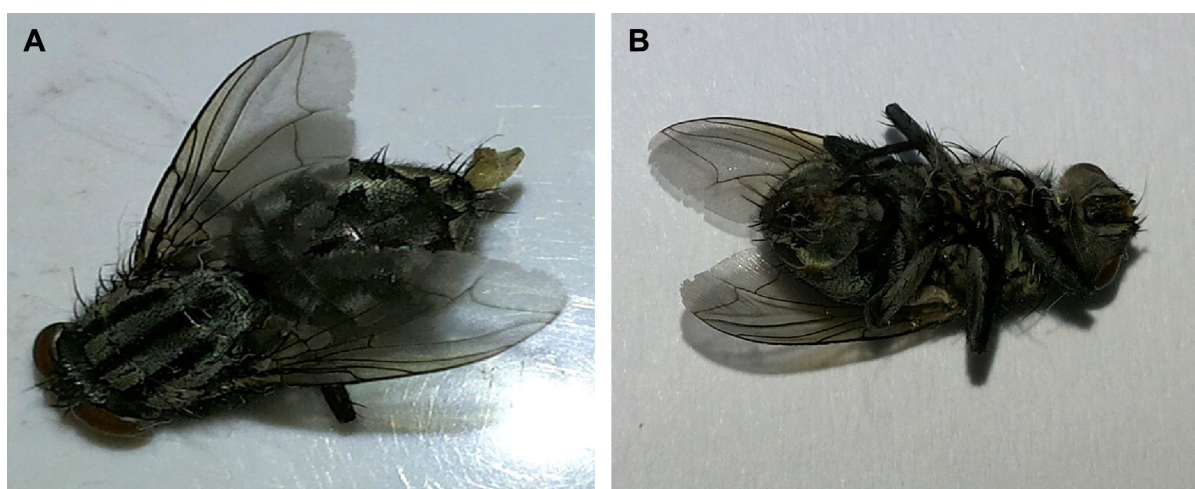


Figure 3. Macrophotograph of the adult fly of *Sarcophaga* species: (A) dorsal view of the adult female fly with first instar larvae and (B) ventral view of the adult fly.



“flesh flies.” Genus *Sarcophaga* has three instar larvae stages. As adult female flies are *ovoviviparous*, female flies deposit their first instar larvae directly on the host. The larvae commence feeding immediately and convert into second and third instar larvae.

The presence of fly larvae in the stool specimens does not necessarily denote intestinal myiasis. Many species of fly larvae can be accidentally ingested with food but cannot survive in the gastrointestinal environment. In such cases, the dead larvae may be recognized on stool examinations. Contamination of the stool by fly larvae before specimen collection usually misleads the inspecting physician or nurse in believing that the maggots were passed with the feces. When true host infestation is never established, it is termed pseudomyiasis. As the larvae are of a more or less creamy color, they would, to all intents and purposes, be invisible to a layman to judge as contamination from external source. For correct laboratory diagnosis, careful macroscopic examination of fresh stool specimen, without contamination, is important. Intestinal myiasis is often mistaken and mistreated as pinworm infestation.¹⁰ However, the condition may not respond to antihelminthics. Clinical cases of so-called “intestinal myiasis” recorded from humans are very often wrongly interpreted and present pitfalls to the practitioner.

The flies may deposit larvae in the wound or abscess at the perianal area. These larvae may penetrate and grow in abscesses and pass in stool intermittently. In our case, the patient did not have any perianal lesion.

The female flies of genus *Sarcophaga* frequently larviposit (ovoviviparous) on food or decaying matter and could be ingested. In this reported case and some other reports,^{4,7,9,11} it is assumed that the larvae survived in the gastric juice as live larvae have been recovered from fresh stool samples of the patients, indicating it as true intestinal myiasis. The gastrointestinal symptoms, perhaps, are due to repeated intake of polluted food. How the larvae can cause gastrointestinal disturbances is not well understood. Co-contamination and infection by other pathogens or other agents could have led to gastrointestinal disturbances.⁶

There are very serious reasons for disbelieving any possibility of larvae surviving in the intestine and the clinical term intestinal myiasis by entomologist and medical scientist. It is assumed that most of the swallowed maggots are usually killed by the digestive juices, but their skins, consisting mainly of chitin, are resistant, and therefore, few larvae are able to survive in the intestinal tract and appear apparently undamaged in the feces. The larvae would, however, be quite unsuited to a habitat in a semiliquid material with a moisture content of >90%, as found in the human intestine, and they would very quickly be clogged up and asphyxiated. It is hardly possible that the larvae of dipterous fly should have passed the stomach of the patient. The evidence for an actual passing of the larvae in the stool of the patient does not hold good to scientific scrutiny. In order to obtain conclusive evidence

on this subject, further research is necessary to find out the resistance of fly larvae to the gastrointestinal secretion (saliva, gastric, and intestinal juices) and mechanical effects of gastrointestinal tract. However, reports exist claiming that the swallowed maggots under the new conditions may suddenly have adopted a pedogenetic method of reproduction.¹² That is, the larvae may have produced other larvae without passing through the adult stage. However, this theory is rejected by many entomologists.¹³

There are no effective drugs for the treatment of intestinal myiasis. The empirical treatment with purgatives and albendazole or ivermectin has been found to be effective.¹⁴ Our patient responded to empirical ivermectin treatment.

Conclusion

This case report highlights the need for awareness among the physicians and microbiologists that worm-like objects passed in the stool are not always helminths. These may be the larvae of flies, but the presence of larvae in the stool does not always suggest intestinal myiasis. Each case should be closely evaluated to rule out pseudomyiasis and to avoid incorrect therapeutic approach.

Consent

The authors would like to acknowledge the patient, who gave written, informed consent for the publication of this case report.

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Author Contributions

Observed the incidence and case, collected specimens, performed the morphological studies, followed the cases, and wrote the manuscript: HSS. Contributed toward distilling the material, morphological studies, and manuscript preparation: DRB. Contributed toward providing clinical relevance, case follow-up, and treatment: SS. Contributed toward providing clinical relevance, manuscript drafting, and critically reviewed the manuscript: SG.

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