



# Study on Morphological Stages of *Haematobia exigua* - An Important Pest of Cattle

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## Abstract

*The occurrence of buffalo fly, Haematobia exigua has become more common in cattle farms in Tamil Nadu, India. Hence, this research work was carried out to study the different morphology and life cycle of the fly. The eggs were dark brown, 1.5 mm length and containing two hatching slits. The dung was cultured and developmental stages were monitored. The matured larvae were white, 6 to 7 mm in length and the larval stage lasted for 4 to 5 days. There were two posterior spiracles with irregularly shaped spiracular openings. The pupa was dark brown and lasted for 4 to 5 days. The newly emerged adult flies were examined under microscope and confirmed as H. exigua. The study revealed that the length of life cycle from egg to adult was recorded as 10-11 days.*

**Keywords:** Anterior Spiracles, Buffalo Fly, *Haematobia Exigua*, Life Cycle, Posterior Spiracles.



## Introduction

*Haematobia exigua*, buffalo fly is an economically important pest of cattle and buffaloes in India. They are always found on the animal feeding 24-38 times daily and leaving only to oviposit in fresh dung (Madhav *et al.*, 2020). Both male and female flies have piercing-sucking mouthparts. They feed on cattle blood and cause severe annoyance, irritation, blood loss and wound sore. The infested cattle show behavioural changes such as head throws, tail flicks, leg stamps and skin twitches to get rid of fly menace (Boland *et al.*, 2008 and Anbarasi *et al.*, 2021). This fly also acts as intermediate host for *Stephanofilaria stilesi*, vector for *Trypanosoma*, *Anaplasma* and *Staphylococcus aureus* in animals (Bordoloi *et al.*, 2019).

Recently, this fly infestation is very common in cattle farms in Namakkal, Tamil Nadu, India, and its impact in cattle was recorded (Anbarasi *et al.*, 2021). Understanding the life cycle of the buffalo fly is key for identifying new control options and to suggest better integrated pest management opportunities for farmers. Hence, this work was carried out to study the developmental stages of the fly as the information on biology of *H. exigua* in cattle under this climatic condition is scarce.

## Materials and Methods

### **Collection of Adult Flies for Harvesting Eggs**

The adult *Haematobia* flies were collected from infested cattle using the sweep net and transferred into plastic container half filled with fresh dung for harvesting the eggs. The flies deposited the eggs on the walls of the container which were collected using fine brush. It was examined under microscope and measured using micrometry.

### **Culturing of Faeces for Collecting Developmental Stages Under Laboratory**

The swarming activities of buffalo fly were observed on the freshly voided cattle dung for ovipositing. Then, the dung samples were collected immediately from different dung pats (6 numbers) and brought to the laboratory. Each sample was kept in a circular plastic container (10 cm x 10 cm). The containers were closed with nylon netted lid and kept under room temperature. The dung samples were examined regularly for hatching of eggs, larva to pupa and pupa to adult. The moisture content of the faeces was maintained by adding water with Pasteur pipette. The newly emerged flies after culturing were examined under microscope and the species was confirmed based on the morphological characters (Kano *et al.*, 1972 and Anbarasi *et al.*, 2024). This experiment has been repeated three times.

## Results and Discussion

### **Egg**

The eggs were oval in shape and the size was 1.2-1.5 mm long. Immature eggs were white or yellow in colour and mature eggs were dark reddish brown in colour. The microscopical examination of egg revealed that one side was convex and concave on another side. Two longitudinal hatching slits were observed under the microscope (**Fig 1**).

### **Larva**

The larval stage was observed after 2 days (48 hours) of incubation. The newly hatched larvae were white in colour, 1.3 to 1.5 mm long with a slender pointed head. Whereas, the matured larvae were 6.0 to 7.0 mm long (**Fig 2**) and the larval stage lasted for 4 to 5 days.

### **Anterior and Posterior Spiracles**

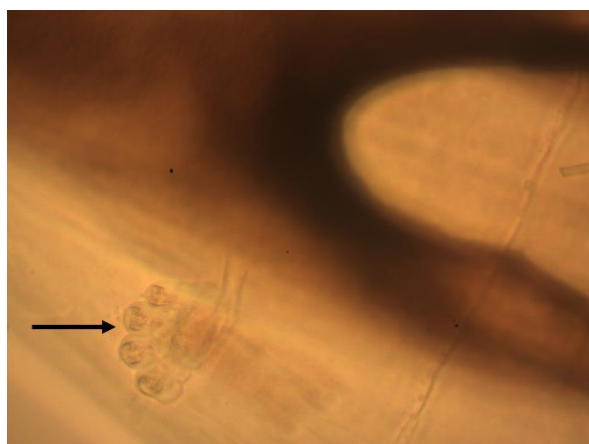
In third instar larva, the prothoracic region revealed the presence of characteristic fan shaped anterior spiracles with 4 bulbous apex containing 8 digits inside (**Fig 3**). The posterior spiracles were found dark brown in colour on the last abdominal segment of the larva. They appeared as nearly bean / kidney shaped under the light microscope. The margin of the peritreme was complete, thick, dark with irregularly shaped spiracular slits (**Fig 4**).



**Fig 1:** Egg of *H. exigua* having two hatching slits (40x)



**Fig 2:** Larvae of *H. exigua* collected from cultured faeces



**Fig 3:** Anterior spiracles of *H. exigua* (40X)



**Fig 4:** Posterior spiracles of *H. exigua* (40X)



**Fig 5.** Pupa of *H.exigua*



**Fig 6.** Adult *H.exigua* (Male)

### **Pupa**

Pupation was noticed on 6<sup>th</sup> day of incubation, the pupae were white in colour initially, but it turned into dark brown later (**Fig 5**). The duration of pupal stage was 4 to 5 days.

### **Adult**

The emergence of adult flies was recorded from 10 to 11<sup>th</sup> day. The time taken from egg to adult was 10 to 11 days under laboratory condition. The flies collected from cultured faeces were confirmed as *H.exigua* by microscopical examination. Male *H.exigua* fly had 6 long hairs with curled tip on the second segment of the hind tarsus (**Fig 6**) which were absent in the female fly.

In this study, the developmental stages of *H. exigua* was observed under laboratory condition of temperature 26-28°C and relative humidity of 50-70 per cent. Since literature on biology of *H. exigua* is found to be scanty, the findings of the present study are discussed with biology of closely related species *H. irritans*.

The larvae hatched out in 2 days, larval stage lasted for 4-5 days and a similar period was required for pupal stage. The whole life cycle from egg to adult was completed in 10-13 days. The observations of the present study are in accordance with findings of Butler *et al.*, (1981) although a slight difference was observed in the time taken for hatching of eggs, which usually occurs in 24 hours in most of the muscid flies. But, the observation of the present study concurs with the findings of Foil and Hogsette (1994) who also stated that the time taken for hatching of *Haematobia* eggs was 1-2 days, however, this time variation could be due to microenvironment condition of the laboratory.

The time taken for egg to adult emergence was 10-13 days in this study, which is in corroboration with Campbell (2006) who reported that the time required to complete the life cycle of a horn fly was between 10 and 20 days depending on the temperature and time of year. It could be understood from the results of the present study that the biology of both *H. exigua* and *H. irritans* is almost similar; however, climatic factor influenced variations are likely to occur.

The morphological characters of egg, larva and pupa of *H.exigua* observed in the present study are similar to that of *H.irritans* reported by Fitzpatrick and Kaufman (2011).

The structure of anterior and posterior spiracles in the third instar larva of *H.exigua* resemble the morphological character of *H. irritans* with minor difference in the anterior spiracle (Baker, 1987).

The morphological characters of adult *H. exigua* are in consonance with the findings of Kano *et al.*, (1972); Iwasa & Ishiguro, (2010), and Anbarasi *et al.*, (2024) who reported that the presence of 6 long hairs on the second segment of the hind tarsi of male is a differentiating character between *H. exigua* and *H. irritans*.

## Conclusion

The total length of lifecycle from egg to emergence of adult fly was found to be 10-11 days.

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## Contribution by Authors

Each co-author contributes equally.

## Conflict of Interests

There is no conflict of interest.

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