

Analysis the digestive tract of *Brueelia* sp. infesting red avadavat

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INTRODUCTION

Preliminary information on the morphological features of visceral organ systems of few phthirapteran species was provided by earliest workers like Snodgrass (1899), Cummings (1916) and Blagovestchensky, 1931. Anatomical features of three ischnoceran species (e.g. *Lipeurus lawrensis tropicalis*; *Columbicola columbae* and *Philopterus lahorensis*) and two amblyceran species (e.g. *Laemobothrion percnopteri*, *Menacanthus eurysternus*) have also been studied (Srivastava, 1974; Saxena, 1979; Singh, 1999; Beg, 2004).

Few workers have made specific studies on the morphological features of digestive tract of selected louse species. Waterhouse (1953) provided information regarding nature of alimentary canal of three amblyceran (*Eomenacanthus stramineus*, *Heterodoxus* sp. and *Gyropus ovalis*) and two ischnoceran species (*Lipeurus caponis* and *Columbicola columbae*). The histomorphological studies on the digestive tract of an anopluran species (*Haematopinus* sp. and ischnoceran species, *Bovicola caprae*) was made by Haug (1952). Morphological features of the digestive tract of another *Bovicola* sp. were noted by Navio *et al.*, 1986.

Some publications dealing with structure and role of crop teeth of few phthirapterans have also appeared (Blagovestchensky, 1949; Saxena & Agarwal, 1979; Srivastava & Agarwal, 1981).

MATERIALS AND METHODS

Fresh lice, obtained from *in vitro* culture stock were dissected under stereozoom binocular microscope in Insect Ringer's fluid, with the help of fine entomological pins (further sharpened by rubbing on "0" number sand paper). After making an incision in the terga, fat bodies were removed and a drop of aqueous Bouin's fluid was added to get proper differentiation of internal organs. The digestive system were taken out and dehydrated in alcohol series, stained (acid fuchsin), cleared (xylene) and mounted (DPX) to observe morphological features.

OBSERVATIONS

Digestive System

The alimentary canal of *Brueelia* sp. is divisible into three usual regions viz. fore-gut, mid-gut and hind-gut (Fig. 1). The gut contains only feather pieces and no blood; this species therefore, is non-haematophagous, unlike other muna louse, *Myrsides amandava*, which contains host blood in the alimentary canal.

The Fore-gut

The fore-gut comprises Pharynx, oesophagus, crop and proventriculus. The mouth leads into short muscular pharynx, which is followed by a long narrow elastic oesophagus extending into the thorax where it opens at the anterior end of crop.

The crop is a conspicuous structure and can also be seen through the tergal covering of intact insect. It is tadpole shaped with a broader anterior region situated close to right side in the thorax where the oesophagus opens and proventriculus originates (Fig. 1). The crop extends obliquely from the thorax to the fifth abdominal segment occupying a large space and transparent when empty. It undergoes regular peristaltic and anti-peristaltic movements, originating at the anterior end and posterior ends, respectively.

The crop opens into the mid-gut by a short narrow elastic duct, the proventriculus arising from the anterolateral end of the crop. In fact, the opening of oesophagus into the crop and the origin of proventriculus are situated approximately at the same level. The proventriculus opens into the mid-gut. Between two enteric-caeca and does not seem to have any value.

Each salivary gland is an opaque white spherical structure that gives out, from its anterior end, a very fine salivary duct that runs anteriorly parallel to the oesophagus. Salivary reservoirs are also oval structures but transparent in appearance and remain located slightly below the salivary glands. A thin duct arises from the anterior end of each reservoir and runs anteriorly along the salivary duct of its own side. In the head, salivary and reservoir ducts of each side unite into a common duct; the common ducts of the two sides unite to form the salivary duct.

The malpighian tubules

Four long bling Malpighian tubules arise from the junction of mid-gut and hind-gut (two laterally, one dorsally and one laterally) (Fig. 1). The tubules resemble each other in shape and nature. Each Malpighian tubule is differentiated into three distinct parts- a basal, middle and a terminal. The dorsal and ventral tubules run forwards up the level of enteric caeca, form a loop and finally terminate on the lateral sides of ileum.

DISCUSSION

The morphology of alimentary canal of *Brueelia* sp. resembles to other ischnoceran species studied so far (Blagovestchensky, 1949; Haug, 1952; Waterhous, 1953; Navio *et al.*, 1986; Saxena & Agarwal, 1981; Beg, 2004). Any departure from typical ischnoceran pattern (tadpole shaped crop having opening of oesophagus and proventriculus at same end) was not noticed. However, the crop of *Brueelia* sp. appears to be comparatively big sized as it occasionally reaches to seventh abdominal segments (visible even from outer side due to presence of black coloured barbules arranged lengthwise). However, the presence of crop-teeth or spines was not noticed in any part of crop-wall. Generally in most of the ischnoceran species the anterior blunt end of crop is beset with

several cropteeth arranged in small comb like structures. After the ingestion, the feather barbules become arranged lengthwise in crop. The tip of feathers are reportedly rubbed against the group of cropteeth resulting in the so called "triuration".

The mid-gut caecae of *Brueelia* sp. are comparatively feebly developed than *Bovicola caprae*, *Columbicola columbae*, *Lipeurus lawrensis tropicalis* and *Philopterus lahorensis*. Furthermore, the posterior portion of mid-gut and ileum is also comparatively narrower. On the otherhand the nature, number and arrangement of Malpighian tubules and also the structure and arrangement of salivary apparatus of *Brueelia* sp. corresponds to aforesaid ischnocera species, studied so far.

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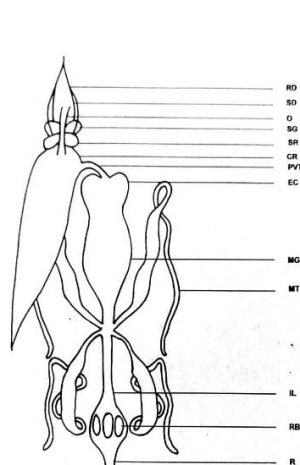


Fig. 1. Digestive System of a Female Brueelia sp.

Abbreviations: SD- Salivary duct; SG- Salivary Gland; SR- Salivary Reservoir; RD- Reservoir Duct; O- Oesophagus; CR- Crop; PVT- Proventriculus; EC- Enteric Caecum; MG- Mid Gut; MT- Malpighian Tubule; IL- Ileum; Rb- Rectal Bulb; R- Rectum