

## A STUDY ON THE MORPHOLOGY AND MORPHOMETRY OF *ASCARIDIA GALLI* (NEMATODA)

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### ABSTRACT

The present paper describes the morphology and morphometry of *Ascaridia galli*, a roundworm parasitizing domestic fowls. External morphology of male and female worms and morphometry of important body parts were studied. Caudal papillae, cuticular striations, cuticular alae, lips, nerve ring, spicules, genital openings of male and female worms, excretory pore and size of the eggs was analyzed for morphometric characteristics.

**KEYWORDS:** *Ascaridia galli*, nematoda, morphology, morphometry, helminthes.



## INTRODUCTION

*Ascaridia galli* is an intestinal parasite belonging to phylum: Nematoda, class: Secernentia, order: Ascaridida, family: Ascaridiidae. It is the most prevalent and pathogenic species and is the most significant nematode of poultry in India in terms of intensity and impact. It causes damage to intestinal mucosa leading to blood loss, partial or complete obstruction of intestine and increased morbidity due to secondary infections.

The present paper deals with the light microscopic study on the basic morphology and morphometrics of this pathogenic nematode. This study will be helpful to solve the confusions regarding identification of this parasite.

## MATERIALS AND METHODS

### Collection of parasites:

Naturally infected intestines of Domestic fowls (*Gallus gallus domesticus*) were collected from the abattoirs from different parts of Punjab, India. These were taken to the laboratory, cut open and searched for adult male and females of *Ascaridia galli*. Motile active worms were collected in petri dishes containing normal saline.

### Preservation of parasites:

The male and female worms were preserved in 70% alcohol. Higher concentration of alcohol was avoided which may result in structural artifacts due to shrinkage. The morphological and morphometric study requires minimum body surface distortions and shrinkage. Some samples were also preserved in glycerin and 70% alcohol in the ratio of 1:3.

### Microscopic studies:

After preservation, the worms were cleared in lactophenol. For studying some of the external and internal characters of the parasites the fresh specimens were

stained in 1% methylene blue at 60 degree centigrade for 18 hours. The specimens were differentiated in 80% alcohol and cleared in lactophenol. The parasites were finally mounted in lactophenol. The male and female worms as well as eggs were thoroughly examined for morphological and morphometric characteristics. Faecal samples of infected fowl were collected in collection tubes containing 10% formalin. The eggs were studied by direct smears, flotation and sedimentation techniques (Urguhart *et al*, 1996).

## RESULTS AND DISCUSSION

Adult *Ascaridia galli* are elongated, cylindrical, semitransparent and yellowish white in colour. The body of *Ascaridia galli* is slender tapering towards anterior end in both the sexes. The body was found to be enclosed in a tough covering called cuticle. The anterior end of the body has a mouth, surrounded by three lips, one dorsal lip and two subventral lips. Each subventral lip has two papillae and dorsal lip has two such papillae. The edges of the lips bear teeth-like denticles.

The cuticle is transversely striated throughout the whole length of the body. The cuticular alae are poorly developed. Distinct sexual dimorphism is present in *Ascaridia galli* which is characterized by ventrally coiled tail with precloacal sucker in males and a blunt and rounded end in female. Males are smaller than the females and have a distinct pointed and curved tail. Females are relatively longer with separate vulvar and anal openings. The vulvar aperture is near the middle of the body and anal aperture is near the posterior end.

**Male:** The male is easily distinguished from the female by its size being smaller than the female and also by the presence of an ellipsoidal or circular preanal or precloacal sucker. The male is 35 to 70 mm long and 0.58 to 0.90 mm broad. Nerve ring lies at a distance of 0.46

to 0.90 mm from the anterior end of the body. Oesophagus measure 2.40 to 4.80 mm in length and 0.26 to 0.52 mm in breadth. Excretory pore lies 0.84 to 1.24 mm from the anterior end of the body. Cloacal aperture is transverse slit like and is present at a distance of 0.34 to 0.64 mm from the precloacal sucker. One pair of well-developed spicules are present. Each spicule is about 1.2 to 2.8 mm long. Ten pairs of caudal papillae are present near the caudal end of the body. The caudal papillae are lie on the ventral surface of the caudal end and are arranged in a definite pattern i.e., three pairs of pre-cloacal papillae, one pair of cloacal papillae, three pair of post-cloacal papillae and three pairs of subterminal papillae.

**Female:** The female is 72 to 102 mm long and 2.80 to 5.20 mm broad. The maximum width of the body is near the vulvar region. The posterior end of female is tapering and pointed. Nerve ring lies at a distance of 0.52 to 1.22 mm from the anterior end of the body. Oesophagus measure 2.80 to 5.20 mm in length and 0.36 to 0.48 mm in breadth. Excretory pore lies 0.92 to 1.54 mm from the anterior end of the body. The anal aperture is at a distance of about 0.88 to 1.48 mm from the tip of the tail. Eggs are with smooth shells and measure 72- 92 X 44-54  $\mu\text{m}$  size

All the above morphometric characteristics are summarized in the table 1.

Lalchhandana (2010) described that *Ascaridia galli* possesses all the salient features of ascarid nematodes. Its body is cylindrical, extended, covered with collagenous cuticle, anterior end with distinct lips.

The cuticle of parasitic nematodes is generally smooth and the various structures such as spines, bristles, warts, punctuations, papillae, striations and ridges may be present. The arrangements and positions of such structures are of taxonomic importance and is a reliable tool for species identification (Cheng, 1986). The presence of three labial lips is one of the diagnostic features among the species of *Ascaridia* (Lalchhandana, 2010)

Descriptions of adult examined in this study show similarity with the known taxonomic characters and diagnostic features. The structures of taxonomic importance minutely observed during present investigation. The morphometric characteristics including body length, width, colour, position of cervical papillae, cuticular striations, size of spicules, eggs show similarity with the previous findings of Ackert (1927), Cram (1927), Baylis (1936), Deo (1964), Soulsby (1965) and Soulsby (1982) and Ramadan and Abou-Znanda (1992). Some intraspecific variations are found in the morphometry are of less taxonomic importance.

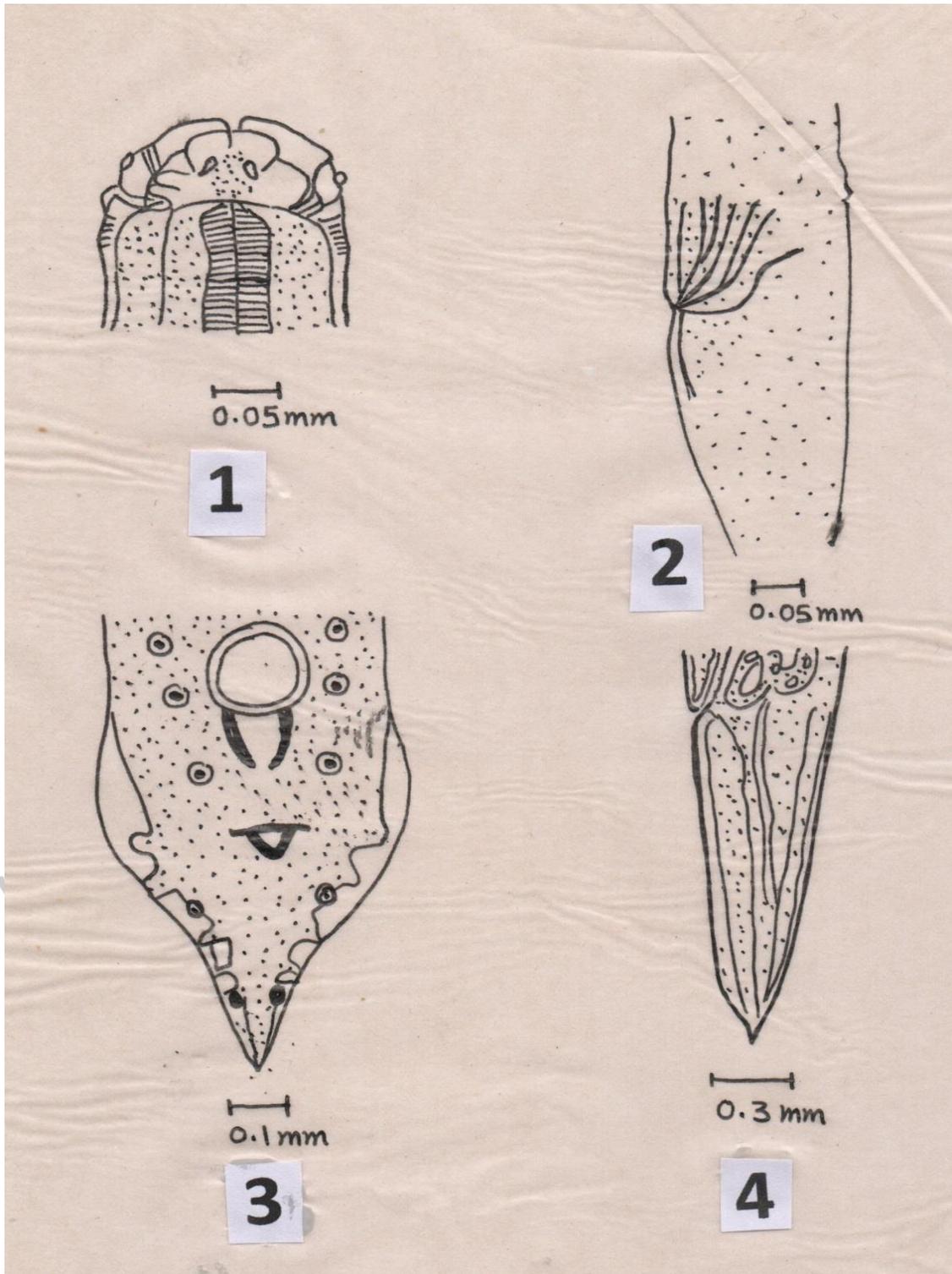
**Table 1: Morphometric characteristics of *Ascaridia galli***

Particulars	Measurements
Body length (male)	35-70 mm
Body length (female)	72-102 mm
Width (male)	0.58 to 0.90 mm
Width (female)	0.9 to 1.6 mm
Length of Oesophagus (in Male)	2.40 to 4.80 mm
Length of Oesophagus (in female)	2.80 to 5.20 mm
Width of Oesophagus (in Male)	0.26 to 0.52 mm
Width of Oesophagus (in female)	0.36 to 0.48 mm
Distance between tip of anterior end and nerve ring (in male)	0.46 to 0.90 mm
Distance between tip of anterior end and nerve ring (in female)	0.52 to 1.22 mm
Distance between tip of anterior end and Excretory pore (in male)	0.84 to 1.24 mm
Distance between tip of anterior end and Excretory pore (in female)	0.92 to 1.54 mm
Distance between tip of anterior end and vulva (in female)	27.50 to 57.50 mm
Distance between tip of posterior end and anal aperture (in female)	0.88 to 1.48 mm
Distance between the precloacal sucker and cloaca (in male)	0.34 to 0.64 mm
Spicules	1.2 to 2.8 mm
Tail length	0.52 to 0.72 mm
Eggs	72-92X44-54 $\mu$ m
Host	Domestic Fowl
Locality	Punjab (India)

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**PLATE I: Fig. 1 to 4: *Ascaridia galli* (Schrank, 1788) Freeborn, 1923.**

**Fig. 1:** Anterior region showing lips and cephalic papillae.

**Fig. 2:** Vulvar region of female.

**Fig. 3:** Posterior end of male showing caudal papillae

**Fig. 4:** Posterior end of female.

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