

REPORT ON DIGENEAN FLUKES AND LICE *ANATICOLA* *CRASSICORNIS* FROM NATIVE DUCKS IN CAUVERY DELTA REGION

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Abstract: Post mortem examination of two duck carcasses brought to the Department of Veterinary Pathology by a nomadic farmer, revealed the presence of flukes in the trachea and intestines. The flukes were identified as *Tracheophilus cymbius* and *Echinostoma* sp. based on the standard morphological features. In addition, lice were collected from the feather region and identified as *Anaticola crassicornis*. This study reports the concurrent infection of *Tracheophilus cymbius*, *Echinostoma* sp. and *Anaticola crassicornis* in native ducks from Cauvery delta region of Tamil Nadu, India.

Keywords: *Anaticola*, Ducks, *Tracheophilus cymbius*, *Echinostoma*, Tracheal fluke, Trematode

INTRODUCTION

Asian countries exclusively produce 82.6% of the world's duck meat and eggs, rendering duck farming a significant contributor to the continent's agricultural economy (Adzitey and Adzitey, 2011). There are enormous areas of paddy fields in the Cauvery delta region which play vital role in the income of marginal farmers. Although India's tropical climate and geographical location provide a desirable habitat for ducks to reside, the low-lying, water-logged areas including harvested paddy field acts as an ideal area for raising ducks. Nevertheless, the identical environment also fosters the growth, survival and spread of parasites. In light of this, almost all ducks in India have parasite diseases, which have an impact on their growth and poor production (Farjana *et al.*, 2008). Due to the foraging behaviour of ducks, they enormously feed on aquatic weeds, algae, green legumes, fungi, earthworms, maggots, snails and various types of insects creating a transmission dynamics in parasites life cycle.

The duck flocks are infected with numerous types of helminth parasites. According to Gauthier *et al.* (2013), flukes develop the dwelling in the caecum, windpipe, intestine, gizzard, and even the eyelids. Diseases caused by parasites, particularly trematodes transmitted by snails, are widespread in ducks. *Tracheophilus* (*Typhlocoelium*) and *Echinostoma* are relatively uncommon trematodes that occur in domestic and wild ducks (Soulsby, 1982; Jeyathilakan *et al.*, 2019). Lice from several species impact the growth and production of ducks, both domesticated and wild. Chewing lice (Phthiraptera: Ishnocera, Amblycera) are obligate ectoparasites that primarily feed on bird hair, feathers and skin detritus. Seven chewing lice species have been documented in domestic ducks (*Anas platyrhynchos domesticus*) worldwide (Naz *et al.*, 2016; Jeyathilakan *et al.*, 2024). The present study reports the occurrence of *Tracheophilus cymbius*, *Echinostoma* sp., and *Anaticola crassicornis* in nomadic ducks of Cauvery delta region of Tamil Nadu, India.

MATERIALS AND METHODS

A nomadic duck farmer with 950 ducks reported the death of 25 ducks within a month of introducing them into a newly harvested paddy fields for foraging. The owner brought two adult dead ducks to the Department of Veterinary Pathology, Veterinary College and Research Institute, Orathanadu, TANUVAS for postmortem examination. Systematic necropsy of duck carcasses revealed bright red live worms in the mouth cavity and tracheal mucosa (Fig. 1, 2). In addition, flukes were also collected from the small intestine of a duck. For identification, these worms were collected in 10% formalin. Tracheal mucosal scrapings and intestinal contents were collected for screening of parasitic ova/oocysts. The permanent staining procedure of borax carmine was employed to prepare the collected parasites (Soulsby, 1982). The snail shells present inside the proventriculus and gizzard regions of ducks were also collected for species identification. In addition, lice present in the feather (Fig. 8) were also collected in 70 % alcohol for morphological identification. The lice were processed as per standard procedures (Soulsby, 1982).

RESULTS

Mucosal scrapings collected from the trachea of dead ducks showed the presence of several operculated eggs with miracidium inside that were approximately 110 by 60 µm in size (Fig. 4). Fresh flukes were reddish, thick, and oval-shaped, with rounded ends reminiscent of cymbals. Adult parasites stained with borax carmine revealed a sub-terminal mouth in place without oral or ventral suckers. The intestinal caeca of the parasite had basic diverticula across its inner wall and its pharynx was completely developed. The testes were positioned

diagonally in the posterior region of the body, without lobed. The anterior testis was situated in front of the round-shaped ovary. The vitellaria were extra caecal and extended longitudinally towards the posterior end of the parasite, and the uterine coils were packed with many eggs and intercaecal in position. The genital pore appeared pre-pharyngeal. Based on the morphological characters, the collected flukes were identified as *Tracheophilus cymbius* belonging to Family Cyclocoelidae. In a similar way, the characteristics of the flukes found in intestine possessed tandem testes and vitelline glands at the lateral sides, a head collar with 37 spines (Fig. 5,6), including five corner spines on either side and identified as *Echinostoma* sp. Microscopical examination of the intestinal contents revealed slight yellowish oval shaped eggs with compact yolk mass (Fig. 7), measuring 115 µm x 60 µm size identified as the ova of *Echinostoma* sp. In the present study, the snails collected were identified as *Stenothyra blanfordiana* a freshwater snail with a slender, elongated shell, typically light-coloured with subtle spiral ridges. It has a well-developed operculum and inhabits in freshwater streams and rivers and *Planorbis* sp. characterized by round shaped with three to four spirals without operculum.

The lice had flattened, elongated body with a broad cephalic region with lateral hyaline margins (Fig. 9). The head is short with prominent, stout five-segmented antennae (Fig. 10), where the third segment is notably thickened with sensitive structures, sensilla on ventral and distal end. The mandibles are large and adapted for biting. The thorax is wider than the abdomen, with the mesothorax being slightly wider than the prothorax. The abdomen is elongated with distinct lateral expansions and sparse setae, showing a segmented appearance. Both the legs and claws are well-adapted for gripping the feathers. Male genitalia are simple, with a moderately sclerotized basal apodeme, a short paramere fused with the mesosomal plate, and a Y-shaped penis between mesosomal sclerites (Fig. 11). Female genitalia have a bilobed vulval sclerite with small setae on the vulval margin with a ventro-terminal genital opening (Fig.12). The lice were identified as *Anaticola crassicornis* belongs to the family Anatidae.

DISCUSSION

Tracheophilus is a digenetic trematode parasite causing dyspnoea, asphyxia and even death in ducks (Soulsby, 1982; Parikshit *et al.*, 2015). Two species of *Tracheophilus*, *T. cucumerinum* and *T. cymbius* are widespread parasites of the common duck, *Anas platyrhynchos domesticus*. In recent years, reports of *T. cymbius* have been made from various Indian states and regions, including Kashmir (Mohiuddin and Lone, 1967), Kerala

(Sreekumaran and Peter, 1973), Andhra Pradesh (Rao and Rao, 1981), Pondicherry (Sreekrishnan *et al.*, 2004), Assam (Parikshit *et al.*, 2015) and Tamil Nadu (Balasundaram and Raja, 1986; Latchumikanthan *et al.*, 2019; Jeyathilakan *et al.*, 2019). General morphological features of *T. cymbius* were in accordance with earlier descriptions (Soulsby, 1982; Latchumikanthan *et al.*, 2019; Jeyathilakan *et al.*, 2019).

The genus *Echinostoma* sp. (Trematoda: Echinostomatidae) contains approximately 120 species with a global distribution. *Echinostoma* sp. causes enteritis and diarrhoea in domestic poultry and waterbirds. The current study identified *Echinostoma* sp. in duck intestine, which was similar to the study by Yousuf *et al.* (2009), who reported heavy infection of echinostomes, particularly *Echinostoma revolutum*, as a zoonotic important trematode parasite causing emaciation, catarrhal enteritis and death in young ducks. The genus *Echinostoma* has a complex life cycle, with intermediate stages in snails and definitive hosts being vertebrates such as birds, particularly water fowls. They have a head collar with spines that is indicative of echinostomes, which was identical to the observations by Labony *et al.* (2022) in chickens from Bangladesh. The humid climate of Tamil Nadu with high rainfall, humidity and the diverse topography of the land serve a very appropriate microclimatic environment for growth and development of various stages of parasites of animals and birds, and ideal for faster transmission of aquatic snails in flooded paddy field supplemented with perennial water bodies, wet lands, swamps and marshy areas, which act as intermediate hosts of a wide variety of trematodes. Ducks are raised in backyard farms adopting an open range method, feeding on snails and other aquatic vegetations and getting infected with parasites.

Chewing lice are obligatory parasites infesting warm-blooded animals such as birds and mammals; they rely on their hosts throughout their life cycle and are typically host-specific (Soulsby, 1982). Chewing lice typically exhibit vertical transmission during brooding and nursing of chicks (Clayton *et al.*, 2016). Chewing lice have a strong capability to acquire host specificity with their hosts; yet, the species of chewing lice of anatid birds are discovered to be the least particular to their hosts among all avian lice around the world. The genus *Anaticola* was first proposed by Clay (1936), with *Anas platyrhynchos* Linnaeus serving as the typical species. Clay and Hopkins (1954), Eichler and Vasjukova (1980) and Zlotorzyska (1980) all reported the genus *Anaticola* key descriptive characteristics. *Anaticola crassicornis* is a global species found in 26 host species. Price *et al.* (2003) found it on 23 out of 37 *Anas* species in the Anatini family. Reports on *A. crassicornis* were available (Ansari,

1947; Rai, 1977; Lakshminarayana, 1979; Ahmad *et al.*, 2013; Jeyathilakan *et al.*, 2023) which were identical with our study. In this investigation, solely just a few of these lice were collected from ducks indicating pediculosis.

CONCLUSION

The current study appears to be a co-occurrence of the digenean flukes viz., *Tracheophilus cymbius* and *Echinostoma* sp. infection with lice *Anaticola crassicornis* in native ducks from Cauvery delta region of Tamil Nadu, India.

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CONTRIBUTION

Authors have equal contribution for the article. All authors declared that ‘written informed’ consent was obtained from the approved parties for the publication of this article and accompanying images.

CONFLICT OF INTERESTS

There is no conflict of interest for the article by the authors.

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Fig. 1. Adult *Tracheophilus cymbius* fluke in buccal cavity during duck necropsy



Fig. 2. Adult *Tracheophilus cymbius* flukes collected from trachea



Fig. 3. *Tracheophilus cymbius* flukes



Fig. 4. Egg of *Tracheophilus cymbius* and miracidium (arrow) hatched from egg (x400)



Fig. 5. *Echinostoma* sp. collected from the intestine of ducks (x100)



Fig. 6. *Echinostoma* sp. showing the heal collar spines (x400)



Fig. 7. Eggs of *Echinostoma* sp. (x400)



Fig. 8. Presence of lice in the feathers of a duck



Fig. 9. *Anaticola crassicornis* (x40)



Fig. 10. *Anaticola crassicornis*- Short, prominent head with stout five-segmented antennae (x100)



Fig. 11. *Anaticola crassicornis* – Male genitalia (Arrow) (x100)



Fig. 12. *Anaticola crassicornis* – Female genitalia with bilobed vulval sclerite (Arrow) bearing a row of small setae on vulval margin (x100)