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## Multiple parasitoses in an Indian peafowl (*Pavo cristatus*): A report on *Haemoproteus* Sp., Coccidiosis and lice infestation

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### Abstract

The present study reports the mixed infection of blood protozoan *Haemoproteus* sp., intestinal protozoan *Eimeria* sp., and ectoparasite *Colpocephalum tausi* lice based on standard morphological keys in an Indian peafowl from Cauvery delta region of Tamil Nadu, India. Multiple parasitic infections need to be addressed in captive and free-ranging peafowls to maintain the ecological sustainability.

**Keywords:** *Colpocephalum tausi*, *Eimeria* sp., *Haemoproteus* sp., Indian peacock, *Pavo cristatus*

### Introduction

The Indian peacock, *Pavo cristatus*, the national bird of our country comes under the family Phasianidae. There are 3 recognized species of peafowls namely *Pavo cristatus* (Indian peafowl), *Pavo muticus* (Green peafowl) and *Afropavo congensis* (Congo Peafowl). In addition to poaching and habitat destruction, various microbial organisms affect the survivability of these elegant birds. Both wild and captive peafowls are more prone to different microbes such as bacteria, virus and parasites (Hopkins, 1997) [6]. These parasites include helminths, ecto-parasites, protozoa and haemoparasites causing detrimental effects to the health of peafowls. Though less number of parasites discovered in peafowl, most of the infection resembles turkey (Titilincu *et al.*, 2009) [13]. Among the protozoan diseases, coccidiosis is the most pathogenic infection to poultry, causing great economic problems in commercial poultry rearing (El-Shahawy, 2010) [4].

Wild birds are highly susceptible to parasitic infections, the disease condition remain subclinical due to less number of organisms, whereas high infection load results in clinical manifestation (Soulsby, 1982) [12]. Fleas, lice, ticks, mites and trombiculids constitute the various ectoparasites that reside on peafowls and accounts for the transmission of various pathogens. The most common haemoparasites found in peafowl are *Haemoproteus* as similar to other poultry species closely related with the genera *Plasmodium*. *Haemoproteus* sp., infection is mainly transmitted by variety of ectoparasites characterized by torticollis, respiratory distress, increased body temperature and lateral recumbency (Ponnudurai *et al.*, 2011) [10]. This present study describes the combined infection of protozoans *Eimeria* sp., *Haemoproteus* sp., and the lice *Colpocephalum tausi* in an Indian peafowl.

### Materials and Methods

A rescued adult peacock was presented to the Exotic and Special Species Medicine Referral Clinic, Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu, Tamil Nadu Veterinary and Animal Sciences University by the Forest Department of Pattukottai Range, Tamil Nadu with the history of reluctant to fly, dullness, respiratory distress. Clinical examination revealed lateral recumbency and soiled vent region. Whole blood was collected from medial metatarsal vein in heparinized vial for haematological analysis and screening haemoparasites. Faecal droppings were collected for coprological examination. The lice present over the body surface were collected in 70% ethanol for further morphological identification.

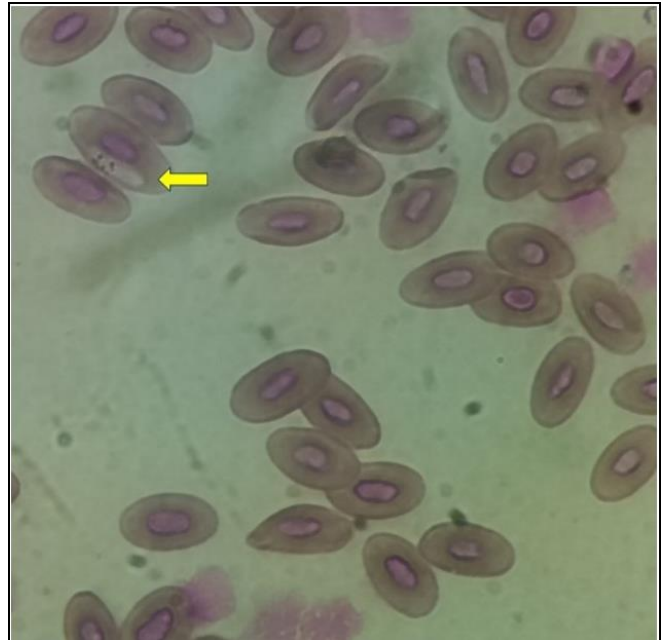
The haematological parameters were analyzed by standard methods (Coles, 1986) [3]. Blood smears were stained with Giemsa’s stain and subjected to microscopical examination under oil immersion. The faecal sample was processed by sedimentation method (Soulsby, 1982) [12], then subjected to light microscopic examination. Faecal sample positive for coccidial oocysts were added with 2.5% potassium dichromate and incubated for sporulation. The collected lice were subjected to potassium hydroxide digestion followed by dehydration in ascending grades of alcohol and cleared in xylene for morphological identification.

**Result**

A complete blood profile of the investigated peacock indicated a reduction in haemoglobin (Hb) and Packed Cell Volume (PCV) (Table. 1). Examination of stained blood smear revealed the presence of erythrocytes containing *Haemoproteus* sp., The macro-gametocytes with pigmented granules inside the cytoplasm of erythrocytes laterally pushing the host cell nucleus (Fig. 1). The micro-gametocytes were observed with pigmented granules collected in a mass in the RBCs (Fig. 2). The faecal sample examination showed numerous unsporulated oocysts of *Eimeria* sp., measuring 18-27 x 13-20µm without micropyle (Fig. 3). Potassium dichromate (2.5 %) treated faecal sample showed sporulation on the 3<sup>rd</sup> day with sporulated oocysts of *Eimeria* sp., containing 4 sporocysts each with 2 sporozoites (Fig. 4). The lice subjected to clearing were morphologically identified as *Colpocephalum tausi* characterized by circumfasciate head, rounded anterior margin with large distinguished antennae, stout setae at lateral margin of the head, abdominal segments with numerous irregular bristles. The female has a broad V-shaped posterior end (Fig. 5), while the male typically has an anus margin that is convex or U-shaped (Fig. 6). The male genitalia were with characteristic features such as a long, thin basal apodeme, large lateral plates and a wide terminal end of the copulatory organ (Fig. 7).

**Table 1:** Hematological values

RBC	(x10 <sup>6</sup> /µL)	1.65
Haemoglobin	(g/dL)	9.5
PCV	(%)	32
WBC	(x10 <sup>3</sup> /µL)	5.17



**Fig 2:** Micro -gametocyte of *Haemoproteus* sp. (x1000)



**Fig 3:** Unsporulated oocyst of *Eimeria* sp. (x400)



**Fig 1:** Macro -gametocyte of *Haemoproteus* sp. (x1000)



**Fig 4:** Sporulated oocyst of *Eimeria* sp. with four sporocysts (x400)



**Fig 5:** *Colpocephalum tausi* with V – shaped posterior end – Female (x40)



**Fig 6:** *Colpocephalum tausi* with U – shaped posterior end – Male (x40)



**Fig 7:** *Colpocephalum tausi* with long, thin basal apodeme (arrow) - Male (x40)

### Discussion

A rescued Indian peacock was diagnosed with blood protozoan *Haemoproteus* sp. based on standard morphological characteristics. Numerous findings have

previously identified similar haemoproteoan infections in Indian peafowls (Malkani, 1936; Ponnudurai *et al.*, 2011)<sup>[7, 10]</sup>. The clinical findings in this case included lateral recumbency, respiratory distress and difficulty in flying which was in accordance with Malkani (1936)<sup>[7]</sup> who reported that *Haemoproteus* infection is lethal to Indian peafowls. The infection of genera *Haemoproteus* may be of *Haemoproteus rileyi* which was species-specific to peafowls as described early by Ponnudurai *et al.* (2011)<sup>[10]</sup> and Sharma *et al.* (2020)<sup>[9]</sup>. The transmission of *Haemoproteus columabe* in pigeons accounts by the *Pseudolynchia* sp., (Soulsby, 1982)<sup>[12]</sup> whereas wild birds may acquire the blood parasites by biting vectors.

Contrary to the literature, there are only a few cases of *Eimeria* parasites in Indian peafowl, notably *Eimeria pavonina* (Banik and Ray, 1964)<sup>[11]</sup>, *Eimeria mandali* (Banik and Ray, 1964)<sup>[11]</sup>, *Eimeria pavonis* (Mandal, 1965) and *Eimeria mayurai* (Bhatia and Pande, 1966)<sup>[2]</sup>. These are obligatory parasites that are characterized by the presence of apical complex in the free stages of cycle (sporozoites and merozoites) which invade the epithelial cells with symptoms like unthriftiness, loss of appetite, greenish or reddish diarrhea, huddling together and ruffled feathers (Soomro *et al.*, 2001)<sup>[11]</sup>, in which our case displays the signs like dullness and diarrhea. Further molecular identification is warranted in the identification of the species-specific coccidian oocysts. More than 135 species of the genus *Colpocephalum* Nitzsch, 1818 have been documented from various host birds in the Orders Ciconiiformes, Galliformes, Columbiformes, Strigiformes, Passeriformes, Piciformes and Falconiformes. The chewing lice, *Colpocephalum tausi* (Ansari, 1951), are not common lice. It is present in large galliform birds, particularly common peafowl as reported by Farheen *et al.* (2023)<sup>[5]</sup> which is in accordance with our study.

### Conclusion

The peacock was treated with chloroquine and advised with oral sulphadimidine for three days. The present paper reports the combined occurrence of *Haemoproteus* infection with coccidiosis and first report of *Colpocephalum tausi* in an Indian peafowl from Tamil Nadu, India.

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