

Coccidian Parasites OF The Green Peacock (*Pavo muticus* L.) In Saudi Arabia

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Abstract. Three species of *Eimeria* and one species of *Isospora* were described from the feces of 25/30 (83.3%) green peacocks *Pavo muticus* in Saudi Arabia. This study represent new geographic record for these parasites. Identification of the parasites was determined by oocysts and sporocysts morphology and measurements and by oocysts sporulation time.

Key Words: Coccidia, Peacock, *Pavo muticus*, Saudi Arabia.

Introduction

With the exception of *Eimeria mayurai* all the previous studies of the coccidian parasites of peacocks were described from the Indian peacock, *Pavo cristatus*.

To our knowledge there is no published reports of any coccidian infections in the green peacocks *Pavo muticus* except for *E. mayurai* which was recovered by (Bhatia *et al.*, 1972 and Chauhan *et al.*, 1973 but no description were provided. In this study a survey was made to determine the prevalence of coccidia in the green peacocks *P. muticus* and to provide detailed morphological descriptions of oocysts and sporocysts of coccidian parasites from the

green peacock (*Pavo muticus* L.) which have not been reported before in Saudi Arabia.

Materials and Methods

Between March and April 1998, thirty green peacocks were randomly chosen as samples for this study at a farm in Al-Kharj area, central region of Saudi Arabia. These birds were caged separately, and fresh fecal samples from each were collected in separate vials and subjected to routine fecal examination using sheather's sugar flotation method (Levine, 1973). The positive samples for coccidian infection were strained and then incubated in a shallow

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Table 1. Comparison of coccidian species reported from peacocks.

<i>Eimeria</i> Species	Shape	Oocyst Size μm	Micropyle	Polar granule	Shape	Sporocyst Size μm	Locality
<i>E. mayurai</i> From <i>P. cristatus</i>	ellipsoid	23-27x13-16 (23x14)	+	+	long ovoid	10-13x5-7 (12x6)	India
<i>E. mayurai</i> from <i>P. muticus</i>	ellipsoid	21.3-30.5x14.5-19 (25.5x17.3)	+	+	long ovoid	10.5-13.8x5.1-7.3 (11.6x5.7)	Saudi Arabia
<i>E. pavonina</i> from <i>P. cristatus</i>	ovoid	20-28x16-20	+	+	boat-shaped	6-16x4-8	India
<i>E. pavonina</i> from <i>P. muticus</i>	ovoid	19-27.5x15.1-20.4 (22.5x6.6)	+	+	boat-shaped	11.2-13.5x5-7.1 (12x5.6)	Saudi Arabia
<i>E. pavonis</i> from <i>P. cristatus</i>	ovoid	20-25x18	+	+	ellipsoid	12.1-15.6x6.6	India
<i>E. pavonis</i> from <i>P. muticus</i>	ovoid	20.2-28.5x15.8-18.9 (26.3x18.1)	+	+	ellipsoid	10.6-13.2x5.1-7.8 (11.8x6.0)	Saudi Arabia
<i>I. Pellerdyi</i> from <i>P. cristatus</i>	Spherical to subspherical	20-27x18-24 (23.3x21.3)	-	-	pear-shaped	14.5-16.1x9.6-11.2 (15.9x10.1)	India
<i>I. pellerdyi</i> from <i>P. muticus</i>	Spherical to subspherical	22.4-31.2x18.8-30 (26.3x22.5)	-	+	pear-shaped	14.3-16.5x9.8-11.5 (15.4x10.7)	Saudi Arabia

layer of 2.5% (w/v) aqueous potassium dichromate solution and kept at 25-28 °C to allow sporulation of the oocysts. Oocysts were then checked every 8 hrs to determine the sporulation time. Unsporulated and sporulated oocysts were photographed with a Leitz universal photomicroscope equipped with a 100x objective and 10x ocular micrometer. All measurements are in micrometers (μm) with means \pm SD in parentheses following the ranges.

Results

The study revealed the presence of three species of *Eimeria* and one species of *Isospora* from the examined faecal samples of green peacocks, *Pavo muticus*. These were *Eimeria mayurai*, *E. pavonina*; *E. pavonis* and *Isospora pellerdyi*. Of 30 peacocks examined for coccidial infection, 25 (83.3%) birds were positive. *Eimeria mayurai* was the most prevalent species (76.7%) followed by *E. pavonis* (66.7%), *E. pavonina* (50%) and *Isospora pellerdyi* (36.7%).

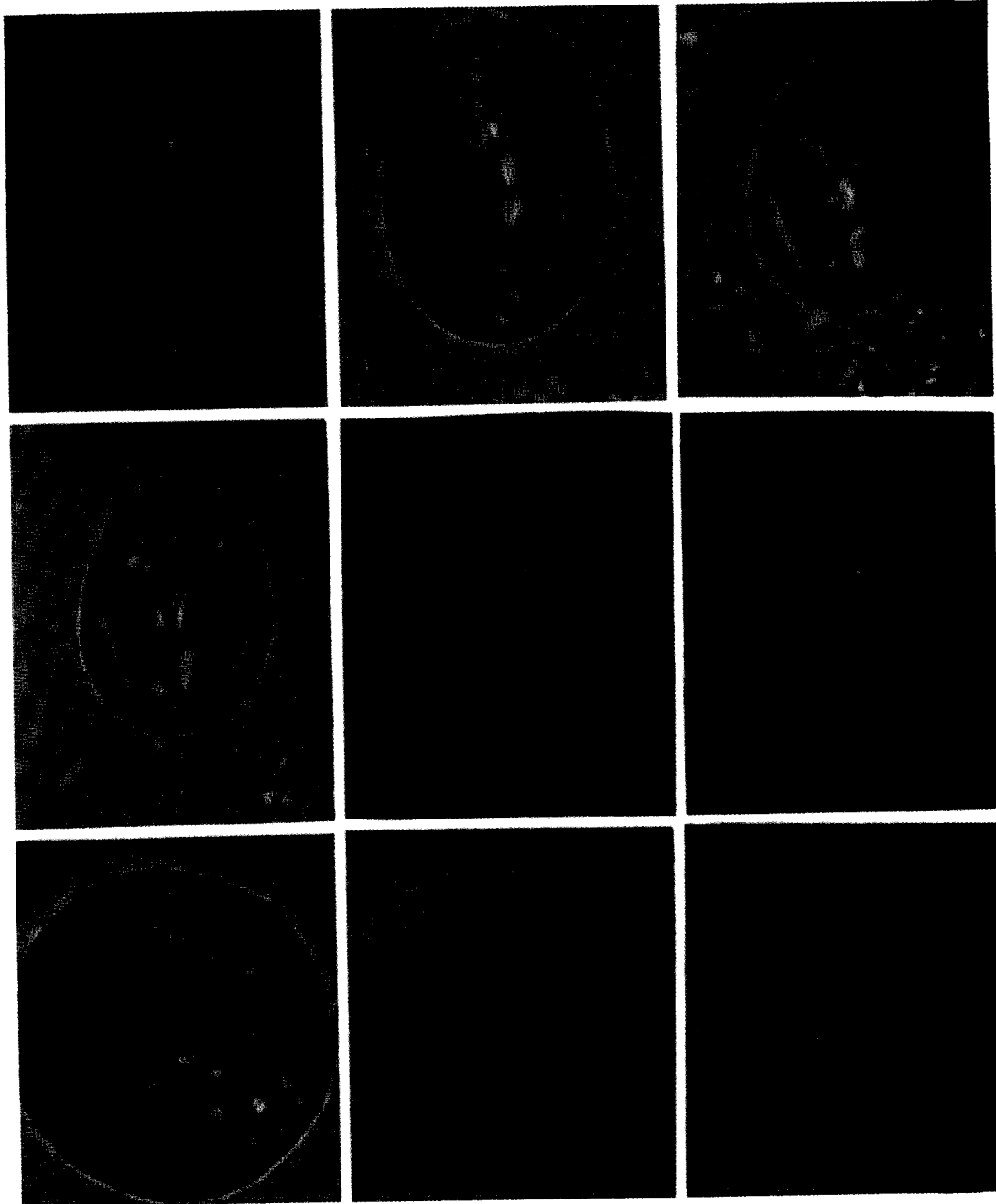
E. mayurai Bhatia and Pande 1966 (Figs. 1-2):

Description: Sporulated oocysts were ellipsoid with smooth surface, 50 oocysts from 9 infected birds were $25.5 \pm 1.6 \times 17.3 \pm 1.1$ (21.3-30.5 \times 14.2-19.0) with shape index (length/width ratio) 1.47 ± 0.15 (1.38-1.78). Oocysts wall 1.3 ± 0.12 (1.1-1.4) is composed of two layers, an outer light blue layer and an inner brownish one. Micropyle is present, a

spherical polar body is present, but without oocyst residuum. Sporocyst is elongate-ovoid $11.6 \pm 0.6 \times 5.7 \pm 0.5$ (10.5-13.8 \times 5.1-7.3), with length/width ratio 2.04 ± 0.22 (1.96-2.34), with prominent Stieda body but without substiedal body. Sporocyst residuum is present as many scattered small granules. Sporozoites are elongate, club-shaped, lying head to tail with large refractile body mostly at the broad end. Sporulation time is 48 hrs at 26 ± 2 °C.

Eimeria pavonina Banik and Ray, 1961 (Figs. 3-4).

Description: Sporulated oocysts are ovoid with smooth surface, 50 oocysts from 6 infected peacocks were $22.5 \pm 1.1 \times 16.6 \pm 0.9$ (19.0-27.5 \times 15.1-20.4), with shape index (Length/width ratio) 1.36 ± 0.09 (1.17-1.42). Oocyst wall 1.1 ± 0.1 (1.0-1.3) is composed of two layers, an outer light brown layer and an inner brownish blue one. A small micropyle and a spherical polar body are present 1.7 ± 0.1 (1.5-1.9) μm in diameter. The oocyst residuum is present at the narrower end of the oocyst and is composed of 1 to 3 brownish globules. Sporocysts are boat-shaped $12 \pm 0.68 \times 5.6 \pm 0.45$ (11.2-13.5 \times 5.0-7.1). length/width ratio is 2.14 ± 0.15 (1.98-2.33). Stieda body is present whereas substiedal body is absent. Sporocyst residuum is present, it consisted of a few scattered granules. Sporozoites are elongate and pointed at one end and lying head to tail in the sporocysts, each with a large



Figs. 1-9. Photomicrographs of living oocysts of coccidia from naturally infected *Pavo muticus*. Fig. 1-2. *Eimeria mayurai*, 1. Shows stieda body and micropyle. 2. Shows polar body. Figs. 3-4. *E. pavonina*, 3. Shows oocysts residium and large refractile globules. 4. Shows two layers wall of the oocysts. Figs. 5-6. *E. pavonis*, 5. Shows a spherical polar body. 6. Shows sporocyst residium. Figs. 7-9. *Isospora pellerdyi*, 7. Shows unsporulated oocyst. 8. Shows sporulated oocyst with stieda and subtiedal bodies. 9. Shows a polar body. (Bar=10 μ m).

refractile globule at the broad end. Sporulation time is 72 hrs at 26 ± 2 °C.

***E. pavonis* Mandal 1965 (Figs. 5-6).**

Description: Sporulated oocysts are elongate-ovoid with smooth surface; 50 oocysts from 5 infected hosts were $26.3\pm 1.8\times 18.1\pm 1.3$ (20.2-28.5 \times 15.8-18.9), with shape index (length/width ratio) 1.45 ± 0.14 (1.33-1.65). Oocyst wall 1.2 ± 0.08 (1.1-1.4) is composed of two layers an outer light brown layer and an inner greenish brown one. Micropyle is present, a spherical polar body is lying underneath the narrow end of the oocyst and without oocyst residuum. Sporocysts are ellipsoid, $11.8\pm 0.9\times 6.0\pm 0.65$ (10.6-13.2 \times 5.1-7.3), with length/width ratio 1.97 ± 0.24 (1.85-2.28), pointed stieda body is present, but without substiedal body. Sporocyst residuum is present as several small scattered granules within the sporocysts. Sporozoites are elongate-club shaped, lying head to tail, and each with a large refractile globule at the sporozoite. Sporulation time is 72 hrs at 26 ± 2 °C.

***Isospora pellerdyi* Patnaik (1965) (Figs. 7-9).**

Description: Sporulated oocysts are spherical to subspherical with smooth surface, which tends to shrink in potassium dichromate solution during sporulation, 50 oocysts from three infected hosts were $26.3\pm 2.1\times 22.5\pm 1.6$ (22.4-31.2 \times 18.8-30.0) with shape index (length/width ratio) 1.09 ± 0.09 (1.0-1.2). Oocyst wall is double-

layered 1.3 ± 0.1 (1.2-1.4), the outer layer is light yellow and the inner one is brownish. Micropyle and oocyst residuum are absent. A subspherical polar body is present. Sporocysts are pear-shaped $15.4\pm 0.96\times 10.7\pm 0.7$ (14.3-16.5 \times 9.8-11.5) with (length/width ratio) 1.44 ± 0.11 (1.26-1.59), a plug-like stieda and substiedal bodies are present. Sporocyst residuum is present as small granules dispersed around the sporozoites. Sporozoites are elongate with a large refractile globule at the broad end. Sporulation time is 72 hrs at 26 ± 2 °C.

Discussion

In this study three species of *Eimeria* and one species of *Isospora* have been recorded for the first time in the green peacocks, *Pavo muticus*, in Saudi Arabia. These are *Eimeria mayurai* Bhatia and Pande 1966; *E. pavonina* Banik and Ray 1961; *E. pavonis* Mandal 1965 and *Isospora pellerdyi* Patnaik 1965, and Pande *et al.*, 1970. Previously these coccidian species were reported from the Indian peacock, *Pavo cristatus*. However *E. mayurai* was also reported from the green peacock *P. muticus* but without detailed description of the oocyst. The previous authors based on their descriptions of eimerian and isosporan species only on line drawing which is less convincing than photomicrographs of this work.

The present description of these coccidian species is generally in agreement with the original one. However, size variation of oocysts (Table 1) may be due to

the host and geographic distribution differences (Duszynski 1971). We also reported the presence of a polar and substiedal bodies in the oocysts of *I. Pellerdyi* which was not mentioned in the original description. This study recognized *P. muticus* as a new host for *E. pavonina*, *E. pavonis* and *I. Pellerdyi*. However, the green peacock is not indigenous to Saudi Arabia, but our samples were taken from a farm containing hundreds of peacocks which were brought to Saudi Arabia long time ago and housed, hatched and raised in Saudi Arabia, which may eliminate the idea of country of origin infection. The high prevalence of these coccidian species suggest that all these species are common parasites of the green peacocks *Pavo muticus* L. in Saudi Arabia. Heavily infected peacocks were observed to have a low growth rate and show signs of diarrhea, loss of feathers and weakness and upon dissecting the small intestine, it was found to have many inflammatory lesions.

Acknowledgements

We wish to thank the owner and all the workers in the peacocks farm at Al-Kharj area for their cooperation and great help.

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طفيليات الكوكسيديا في الطاووس الأخضر في المملكة العربية السعودية

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ملخص البحث : لقد تم في هذا البحث دراسة تواجد ووصف ثلاثة أنواع من الأيميريا (*Eimeria*) ونوع واحد من الأيزوسبورا (*Isospora*) وذلك لأول مرة في المملكة العربية السعودية من الطاووس الأخضر كعائل جديد لهذه الطفيليات الأولية الجرثومية .

وقد تم تعريف هذه الطفيليات بناءً على شكل وقياسات كل من الحويصلات والأكياس البوغية لجميع هذه الأنواع الطفيلية .