STUDIES ON SOME ASPECTS OF AVIAN COCCIDIA (PROTOZOA, SPOROZOA). PART IV OCCURRENCE AND DISTRIBUTION OF COCCIDIAN PARASITES IN INDIAN BIRDS

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(With 2 tables)

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I—INTRODUCTION

The coccidian parasites are not uncommon in vertebrates and their presence is also common in birds. India has a large and varied avifauna, and their coccidian parasites are also equally varied. I have described (1963, 1964, 1965) some of them in my earlier papers. In this paper, only the exogenous states of the coccidian parasites are considered. Besides, details regarding their pathogenicity on the birds parasitized, birds examined for the parasites, their number, locality, etc., are also dealt with.

Earlier workers like Levine and Becker (1933), Becker (1934, 1956), Boughton and Volk (1938), Hardcastle (1943), Chakravarty and Kar (1944, 1947) and Levine (1953) have contributed much in this field. A critical review of the literature was necessary in order to determine the correct taxonomic position of the coccidian parasites. Here an attempt has been made in this direction with particular reference to the coccidian parasites of Indian birds.

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II—Material and Methods

The large majority of birds studied were collected near the vicinity of Calcutta; a few were purchased in the local market and the others shot in the Sundarbans (West Bengal). The purchased birds were stated to have been either caught from different parts of Bengal or imported from other parts of India. For coccidial infections, the faecal matter was examined microscopically. Wherever possible, the birds were directly brought to the laboratory and the faecal matter taken either from the droppings or directly from the rectum. Where it was not possible to bring the birds to the laboratory, small glass vials, with rubber stoppers, containing 2·5 per cent $K_2 Cr_2 O_7$ solution, were used to bring the faecal samples to the laboratory.

III—Observations

Only the oocysts were observed for the purpose of the present study. No noticeable variations were found in them from their original descriptions. The infection was judged by the presence of oocysts in the faeces. The birds examined in summer showed greater infection than those in winter, the degree of infection being estimated in terms of the number of oocysts discharged with the faeces and the amount of lesions in the intestinal wall. The sites of lesions were mainly in the lower intestine, and the caeca and their junction with the intestine. In no case, the blood was seen either in the lumen of the intestine or mixed with faeces. The cause of seasonal variation in infection remains undetermined.

IV—Discussion

In discussing the relative diagnostic value of sporocysts and sporozoites on the one hand, and of the unsporulated oocysts on the other, Christensen (1938, p. 455) observed, "Measurements of sporocysts and sporozoites have no specific value, since their size depends upon the size of the original sporont and oocyst. In unsporulated oocyst the protoplasmic mass, or a sporont is spherical in shape. At this stage the oocyst is most typical in size, shape, colour and morphology" The writer, after studying the different species of Coccidia in the Indian birds mentioned in the paper, has been led to regard Christensen's view as substantially correct. Thus, it becomes evident that the validity of some of the species, which have been described in the past, based mainly on measurement, is open to question.

The birds examined for coccidian parasites and found to contain the latter belong to the orders Anseriformes, Pelicaniformes, Galliformes, Ciconiiformes, Charadriiformes, Falconiformes, Gruiformes, Columbiformes, Apodiformes, Psittaciformes, Coraciiformes, Piciformes and Passeriformes. The parasites obtained belong to the genera *Tyzzeria* Allen (1936), *Isospora* Schneider (1881), *Dorisiella* Ray (1930), *Eimeria* Schneider (1875) and *Wenyonella* Hoare (1933).

Only one species of *Tyzzeria* (*T alleni* Chakravarty & Basu, 1947) was found in one species of bird, *Nettapus coromandelianus* (Gmelin) (Anseriformes). A number of species of *Isospora* Schneider, 1881 were obtained from several species of birds (Piciformes, Psittaciformes, Coraciiformes and Passeriformes). Only two species of *Dorisiella* Ray were reported from Indian birds so far and all the hosts, belong to the Passeriformes. Several species of *Eimeria* Schneider, 1875 were obtained from different birds belonging to the orders Charadriiformes, Galliformes, Columbiformes, Piciformes and Passeriformes. Only one species (*Wenyonella mackinnoni* Misra, 1947) was reported from *Motacilla alba* L. (Passeriformes).

Observing the scattered distribution of Coccidian parasites in Indian birds, both from my observations and those of others (Table 2), it is clear that one species of parasite was found in more than one species of birds, so the host-specificity of the parasites may not be fully established. It might be that carefully conducted cross infection tests alone would satisfactorily solve the question of the precise identity of the different forms of coccidia described, as well as the prevalence of host-specificity amongst them.

V—SUMMARY

For coccidian parasites, a large number of birds were examined, and their pathogenicity on the birds noted. A statement giving complete list of coccidian parasites described so far from Indian birds is also given.

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TABLE 1—*Showing the number of birds examined and infection by parasites*

Serial No.	Name of the Host	Locality	No. Examined	No. Infected	Name of the Parasite
(1)	(2)	(3)	(4)	(5)	(6)
	Order—PELECANIFORMES				
	Family—PHALACROCONIDAE				
1.	*Phalacrocoraus niger* (Vieillot)	Suburb of Calcutta	10	Nil	
	Order—CICONIIFORMES				
	Family—ARDEIDAE				
2.	*Ardea cinerea* Linnaeus	Ditto	6	,,	
3.	*Egretta garzetta* (Linnaeus)	Ditto	12	,	
4.	*Bubulcus ibis* (Linnaeus)	Ditto	1		
5.	*Ardeola grayii* (Sykes)	Ditto	5	,	
6.	*Nycticorax nycticorax* (Linnaeus)	Ditto	6	,,	
7.	*Ixobrychus cinnamomeus* (Gmelin)	Ditto	1	,,	
	Family—CICONIIDAE				
8.	*Leptoptiles dubius* (Gmelin)	Sundarbans	4	,,	
9.	*Anastomus oreitans* (Boddaert)	Ditto	3	,,	
10.	*Xenorhynchus asiaticus* (Latham)	Ditto	5	,,	

	Order—ANSERIFORMES				
	Family—ANATIDAE				
11.	*Sarkidiornis melanotos* (Pennant)	Suburb of Calcutta	3	,,	
12.	*Nettapus coromandelianus* (Gmelin)	Ditto	8	3	*Tyzzeria alleni* Chakravarti & Basu (1947)
13.	*Anas crocca* Linnaeus	Ditto	5	Nil	
	Order—FALCONIFORMES				
	Family—ACCIPITTRIDAE				
14.	*Torgos calves* (Scopoli)	Ditto	4	,,	
15.	*Gyps bengalensis* (Gmelin)	Ditto	8	,,	
16.	*Haliastur indus* (Boddaert)	Ditto	5	,,	
17.	*Milvus migrans* (Boddaert)	Ditto	6	,,	
	Order—GALLIFORMES				
	Family—PHASIANIDAE				
18.	*Pavo cristatus* Linnaeus	Uttar Pradesh	4	2	*Eimeria pavonis* Mandal (1964)
	Order—GRUIFORMES				
	Family—RALLIDAE				
19.	*Amaurornis phoenicurus* (Pennant)	Suburb of Calcutta	4	Nil	
20.	*Gallinula chloropus* (Linnaeus)	Ditto	5	,,	
21.	*Fulica atra* Linnaeus	Ditto	5	,,	

TABLE 1—*contd.*

Serial No.	Name of the Host	Locality	No. Examined	No. Infected	Name of the Parasite
(1)	(2)	(3)	(4)	(5)	(6)
	Order—CHARADRIIFORMES				
	Family—JACANIDAE				
22.	*Metopedius indicus* (Latham)	Suburb of Calcutta	4	Nil	
23.	*Hydrophasianus chirrurgus* (Scopoli)	Ditto	6	,,	
	Family CHARADRIIDAE				
24.	*Vanellus malabaricus* (Boddaert)	Sundarbans	10	4	*Eimeria vanelli* Mandal (1964)
25.	*Pluvialis apricaria* Linnaeus .	Ditto	8	4	*Eimeria roscoviensis* Mandal (1964)
26.	*Numenius arquata* (Linnaeus) . .	Ditto	7	4	*Eimeria numanii* Mandal (1964)
27.	*Gallinago gallinago* (Linnaeus)	Ditto	10	6	*Eimeria gallinagoi* Mandal (1964)
28.	*Charadrius asiaticus* Pallas . . .	Ditto	9	4	*Eimeria charadrii* Mandal (1964)
	Family—ROSTRATULIDAE				
29.	*Rostratula benghalensis* (Linnaeus) .	Ditto	6	Nil	
	Order—COLUMBIFORMES				
	Family—COLUMBIDAE				
30.	*Streptopelia chinensis* (Scopoli)	Suburb of Calcutta	15	,,	
31.	*Treron phoenicoptera* (Latham) .	(Purchased)	7	,,	

	Order—PSITTACIFORMES			
	Family—PSITTACIDAE			
32.	*Psittacula cyanocephala* (Linnaeus) .	Suburb of Calcutta	9	,,
33.	*Psittacula eupatria* (Linnaeus) . .	(Purchased)	6	,,
34.	*Psittacula krameri* (Scopoli) . .	Ditto	5	,,
	Order—CUCULIFORMES			
	Family—CUCULIDAE			
35.	*Clamator jacobinus* (Boddaert) . .	Suburb of Calcutta	7	,,
36.	*Centropus sinensis* (Stephens)	(Purchased) .	5	,,
37.	*Eudynamys scolopacea* (Linnaeus) .	Suburb of Calcutta	8	,,
	Order—CORACIIFORMES			
	Family—CORACIIDAE			
38.	*Coracias benghalensis* (Linnaeus)	(Purchased) .	6	,,
	Family—ALCITINIDAE			
39.	*Ceryle rudis* (Linnaeus) . . .	Suburb of Calcutta .	8	,,
40.	*Halcyon smyrnensis* (Linnaeus) . .	Ditto .	10	,,
	Order—APODIFORMES			
	Family—APODIDAE			
41	*Apus affinis* (J. E. Gray) .	Ditto	15	,,
42.	*Cypsiurus parvus* (Lichtenstein) . .	Ditto .	5	,,

TABLE 1—*contd.*

Serial No.	Name of the Host	Locality	No. Examined	No. Infected	Name of the Parasite
(1)	(2)	(3)	(4)	(5)	(6)
	Order—PICIFORMES				
	Family—PICIDAE				
43.	*Dendrocopos mahrattensis* (Latham)	Suburb of Calcutta	4	Nil	
44.	*Dinopium benghalensis* (Linnaeus)	Ditto	6	,,	
	Family—CAPITONIDAE				
45.	*Megalaima haemacephala* (P. L. S. Müller)	Ditto	10	5	*Isospora megalaimae* Mandal & Chakravarty (1964)
	Order—PASSERIFORMES				
	Family—HIRUNDINIDAE				
46.	*Hirundo rustica* Linnaeus	Ditto	25	Nil	
	Family—LANIIDAE				
47.	*Lanius excubitor* Linnaeus	Ditto	7	,,	
48.	*Lanius vittatus* Valenciennes	Ditto	5	,,	

	Family—DICRURIDAE				
49.	*Dicrurus adsimilis* (Bechstein)	(Purchased)	5	1	*Isospora upupae* Chakravarty & Kar (1947)
	Family—STURNIDAE				
50.	*Sturnus malabaricus* (Gmelin)	Suburb of Calcutta	6	3	*Isospora sturniae* Chakravarty & Kar (1947)
51.	*Sturnus pagodarum* (Gmelin)	Ditto	5	Nil	
52.	*Sturnus contra* Linnaeus	Ditto	8	5	*Isospora lonchurae* Mandal & Chakravarty (1964)
53.	*Acridotheres ginginianus* (Latham)	Ditto	10	4	*Isospora ginginiana* Chakravarty & Kar (1944)
54.	*Acridotheres tristis* (Linnaeus)	Ditto	8	1	*Isospora ginginiana tristis* Chakravarty & Kar (1944)
	Family—CORVIDAE				
55.	*Crypsirina vagabunda* (Latham)	Ditto	17	8	*Dorisiella vagabundae* Mandal & Chakravarty (1963)
56.	*Corvus splendens* Vieillot	Ditto	15	9	*Isospora bengalensis* Mandal & Chakravarty (1964)
57.	*Corvus macrorhynchos* Wagler	Ditto	5	Nil	
	Family—PYCNONOTIDAE				
58.	*Pycnonotus jocosus* (Linnaeus)	Ditto	10	4	*Isospora pycnonotae* Mandal & Chakravarty (1964)
59.	*Pycnonotus cafer* (Linnaeus)	Ditto	12	Nil	

TABLE 1—*concld.*

Serial No.	Name of the Host	Locality	No. Examined	No. Infected	Name of the Parasite
(1)	(2)	(3)	(4)	(5)	(6)
	Family—MUSCICAPIDAE				
60.	*Turdoides caudatus* (Dumont)	Suburb of Calcutta	8	Nil	
61.	*Turdoides striatus* (Dumont)	Ditto	10	6	*Isospora pycnonotae* Mandal & Chakravarty (1964)
62.	*Copsychus saularis* (Linnaeus)	Ditto	6	1	*Isospora lacazei* (Labbe, 1893)
63.	*Copsychus malabaricus* (Soopoli)	Ditto	4	Nil	
64.	*Orthotomus suterius* (Pennant)	Ditto	3	,,	
65.	*Erithacus syccicus* (Linnaeus)	Ditto	5	,,	
	Family—MOTACILLIDAE				
66.	*Motacilla alba* Linnaeus	Ditto	10	3	*Wenyonella mackinnoni* Misra (1947)
67.	*Motacilla citreola* Pallas	Ditto	5	Nil	
	Family—NECTARINIDAE				
68.	*Nectarinia asiatica* (Latham)	Ditto	6	,,	

Family—**PLOCIDAE**					
69. *Passer domesticus* (Linnaeus)	Ditto	10	4	*Isospora lacazei* (Labbé, 1893)	
70. *Ploceus philippinus* (Linnaeus)	Ditto	10	Nil		
71. *Lonchura punctulata* (Linnaeus)	Ditto	8	3	*Isospora lonchurae* Mandal & Chakravarty (1964)	
72. *Lonchura malacca* (Linnaeus)	Ditto	4	1	*Isospora muniae* Chakravarty & Kar (1944)	
73. *Estrilda amandava* (Linnaeus)	Ditto	5	2	*Dorisiella hareni* Chakravarty & Kar (1944)	
Family—EMBERIZIDAE					
74. *Emberiza bruniceps* Brandt.	Sundarbans	10	4	*Isospora emberizae* Mandal & Chakravarty (1964)	

TABLE 2.—*Statement giving the full list of Coccidian parasites so far obtained from Indian birds indicating the diagnostic characters etc.*

Parasite	Oocysts			Sporocysts				Habitat, Host & Locality
	Shape	Measurements (in μ)	Residue	Sporulation time	Shape	Measurements (in μ)	Residue	
1. *Isospora munias* Chakravarty & Kar (1944)	Elongate oval	24·7—30·9 × 14·4—18·5	Absent	48 hrs.	Pyriform	14·4—16·5 × 10·5	Present	From small intestine of *Munia malacca malacca* Linn.—Calcutta
2. *Isospora ginginiana* Chakravarty & Kar (1944)	Rounded	22·0—24·2	,,	Not known	,,	15·4—17·6 × 11·0	,,	From intestine of *Acridotheres ginginianus* (Latham)—Calcutta.
3. *Isospora temenuchii* Chakravarty & Kar (1944)	Subspherical	22·0—24·2 × 19·8—22·0	,,	,,	Elongate oval	15·4—17·6 × 11·0	,,	From intestine of *Temenuchus pagodarum* (Gmelin) —Calcutta.
4. *Isospora psittaculae* Chakravarty & Kar (1947)	Oval	28·6—33·0 × 24·2—28·6	,,	48 hrs.	Oval	22·0—26·4 × 13·2	,,	From intestine of (i) *Psittacula eupatria nipalensis* (Hodge.) (ii) *Elathea jocosa emeria*—Calcutta.
5. *Isospora sturniae* Chakravarty & Kar (1947)	Spherical or Subspherical.	22·0—28·6	,,	Not known	Pyriform	17·6—19·8 × 11·0—13·2	,,	From intestine of *Sturnia malabarica malabarica* (Gmelin)—Gaya.
6. *Isospora upupae* Chakravarty & Kar (1947)	Spherical	24·2—28·6	,,	,,	Oval	15·4—19·8 × 13·3	,,	From intestine of (i) *Upupa epops orientalis* Baker (ii) *Dicrurus macrocercus* Vieillot—Gaya (Bihar).
7. *Isaspora zosteropis* Chakravarty & Kar (1947)	Oval	17·6—22·2 × 13·2—19·8	,,	,,	,,	15·4—17·6 × 11·0	,,	From intestine of (i) *Zosterops palpebrosa palpebrosa* (Temin. and Schlegel) (ii) *Therticryx Zeylanicus caniceps* (Frawnl)—Calcutta.
Isospora ginginiana martristis Chakravarty & Kar (1947)	Subspherica slightly or oval	24·2—28·0 × 19·8—24·2	,,	,,	Pyriform	15·0—17·6 × 8·8—11·0	,,	From intestine of *Acridotheres tristis tristis* (Linn.)—Calcutta.
9. *Isospora lacazei* (Labbe), (1893)	Spherical or ovoid	22·6—24·7	,,	4 or 5 days	,,	16·5—18·5 × 10·3—12·4	,,	From intestine of (i) *Ploceus philippinus* (Linn.) (ii) *Copsuchus saularis saularis* (Linn.)—Calcutta.

10. *Isospora corviae* Ray *et al* 1952	Spherical or subspherical	17·7×20·0	Present	36—48 hrs.	,,	7·75+10·8	,,	From intestine of *Corvus macrorhynchos intermedius* Adams—Mukteswar (U. P.)
11. *Isospora seicercusae* Ray *et al* (1952)	,,	23·28×24·8	,,	48 hrs.	Pear-shaped	10·31×14·21	,,	From intestine of *Seicercus xanthoschistos* (Gray)—Mukteswar (U. P.).
12. *Isospora garrulae* Ray *et al* (1952)	,,	19·75×20·62	,,	24—36 hrs.	Pyriform	13·40× 8·5	,,	From intestine of *Garrulax lineatus lineatus* (Vigors)—Mukteswar (U. P.).
13. *Isospora garrulae* Ray *et al* (1952)	Oval to subspherical	21·20×25·0	,,	48—72 hrs.	Pear-shaped	16·07× 9·60	,,	From intestine of *Garrulus glandarius bispecularis* Vigors—Mukteswar (U. P.).
14. *Isospora parusae* Ray *et al* (1952)	,,	20·83×24·16	,,	48 hrs.	Pyriform	15·0× 10·0	,,	From intestine of *Parus dichrous* Hodgson—Mukteswar (U. P.).
15. *Isospora bengalensis* Mandal & Chakravarty (1964)	Round	18·7—23·3	Absent	Not known	,,	15·4× 7·7	,,	From intestine of *Corvus splendens* Vieillot—Calcutta.
16. *Isospora pycnonotae* Mandal & Chakravarty (1964)	Oval	24·2×19·8	,,	,,	,,	9·8×8·8	,,	From intestine of (i) *Pycnonotus jocosus* (Linn.) (ii) *Turdoides striatus* (Dumont)—Calcutta.
17. *Isospora lonchurae* Mandal & Chakravarty (1964)	,,	25·3—26·4× 20·9—23·1	Present	,,	,,	18·7—20·8× 11·0—13·2	,,	From intestine of (i) *Lonchura punctulata* (Linn.) (ii) *Sturnus contra* L.—Calcutta.
18. *Isospora megalaimae* Mandal & Chakravarty (1964)	Round	23·2—24·4	Absent	,,	,,	17·6× 9·9	,,	From intestine of *Megalaima haemacephala* (P. L. S. Müller)—Calcutta.
19. *Isospora emberizae* Mandal & Chakravarty (1964)	Oval	21·0×18·7	Present	,,	,,	19·8×15·4	,,	From intestine of *Emberiza bruniceps* Brandt—Calcutta.
20. *Tyzzeria alleni* Chakravarty & Basu (1947)	,,	14·48—17·3× 9·63—11·5	Absent	2 days	,,	,,	,,	From intestine of *Nettapus coromandelianus* (Gmelin)—Bidyadhari spill area (Fisheries)—Calcutta.

TABLE 2—*concld.*

Parasite	Oocysts			Sporulation time	Sporocysts			Habitat, Host & Locality
	Shape	Measurements (in μ)	Residue		Shape	Measurements (in μ)	Residue	
21. *Dorisiella hareni* Chakravarty & Kar (1944)	Spherical	18·5—22·6	Absent	24 hrs.	Pyriform	14·4—18·5× 9·3—10·3	Present	From intestine of (i) *Munia malacca malacca* L. (ii) *Amandava amandava* (L.). (iii) *Munia articapilla rubronigra* (Hodgs.) (iv). *Uroloncha malabarica* (L). (v) *Uroloncha punctulata punctulata* (L.)—Calcutta.
22. *Dorisiella aethiopsaris* Chakravarty & Kar (1947)	Oval or subspherical	33·0—38·8× 24·2—26·4 28·6—30·8× 24·2—26·4	,,	Not known	Oval	19·8—22·0× 11·0—13·2	,,	From intestine of *Aethiopsar fuscus fuscus* (Wagler)—Calcutta.
23. *Dorisiella vagabundae* Mandal & Chakravarty (1964)	Oval	24·0—26·4× 22·0	Present	,,	,,	17·6—19·8× 12·1	,,	From intestine of *Crypsirina vagabunda* (Latham)—Calcutta.
24. *Eimeria columbae* Mitra & Das Gupta (1937)	Subspherical	16·4 × 14·35	,,	,,	Ellipsoidal	7·2×4·8	,,	From intestine of *Columba livia intermedia* Strickland—Calcutta.
25. *Eimeria barbeta* Kar (1944)	Oval	22—24 × 19·6—19·8	Absent	,,	Oval	19·8	,,	From intestine of *Cyanops asiatica* (Latham) (Loc. ?).
26. *Eimeria malaccae* Chakravarty & Kar (1944)	Oval or elongate oval	26·8—30·9× 16·4—18·5	,,	,,	,,	12·4× 10·3	,,	From intestine of *Munia malacca malacca* L.—Calcutta.
27. *Eimeria pfeifferi* (Labbe) (1893)	Oval or spherical	19·8—20·9× 16·5—17·6	,,	,,		11·0—13·2× 6·6	,,	From intestine of *Columba livia intermedia* Strickland—Calcutta.
28. *Eimeria coturnicis* Chakravarty & Kar (1947)	Oval	26·4—38·8× 19·8—26·4	,,		Pyriform	13·2—17·2× 8·8—11·0	,,	From intestine of *Coturnix coturnix coturnix* (L.) (Loc. ?).
29. *Eimeria lucknowensis* Misra (1947)	Ovoid	21·4—24·5× 17·4—18·8	,,	3-4 days	Ovoid	8·5× 6·0	,,	From small intestine of *Motacilla alba* L.—Lucknow (U. P.).

30.	*Eimeria shenocercae* Ra 1952	Kidney-shaped	25·0—17·5× 15·0—12·5	,,	5-6 days	Oval	18·75—17·5× 13·75—12·5	,,	From intestine of *Sphenocercus sphecorcerus* (Gray)-Mukteswar (U. P.) alt. 7500.
31.	*Eimeria alectoreae* Ray & Hiregaudar (1959)	Elliptical	23·6—2·4× 15·6—15·0	,,	Not known	Pea-shaped	8-9·5× 4-5·6	,,	From Calcutta zoo *Alectoris gracea* (Meisner)—Calcutta.
32.	*Eimeria gennaeuscusae* Kay & Hiregaudar (1959)	Subspherical	21·2—1·5	,,	24—36 hrs.	,,	7-8 × 4-5	,,	From intestine of *Gennaecus horsfieldii* (L.)—Calcutta.
33.	*Eimeria bhutanensis* Ray & Hiregaudar (1959)	Spherical to subspherical	15·5—16·8× 14·6—16·6	,,	,,	,,	6-7 × 3-4	,,	*Polyplectron bicoloratus bakeri* Lowe—(ex. Zool. Garden, Calcutta).
34.	*Eimeria gallinagoi* Mandal (1965)	Pyriform	19·8—20·9× 13·2—14·3	Absent	Not known	Pyriform	5·5× 7·7	Present	From intestine of *Gallinago gallinago* (L.)—Sundarbans.
35.	*Eimeria pavonis* Mandal (1965)	Ovoidal	19·8—25·4× 17·6		,,	Elliptical	12·1—15·6× 6·6	,,	From intestine of *Pavo cristatus* (L).—Mau (U. P.).
36.	*Eimeria numenii* Mandal (1965)	Round	20·9—23·1	,,	60—70 hrs.	Pyriform	6·6× 5·5	,,	From intestine of *Numenius arquata* (L.)—Sundarbans.
37.	*Eimeria vanelli* Mandal (1965)	Oval or pyriform	20·9 × 14·3	,,	Not known		12·1× 6·6	,,	From intestine of *Vanellus malabaricus* (Boddaert) —Sundarbans.
38.	*Eimeria charadrii* Mandal (1965)	Oval	14·3—17·6× 11·0—12·0	,,	80—90 hrs.	Pyriform	8·8× 4·6	,,	From intestine of *Charadrius asiaticus* Pallas—Sundarbans.
39.	*Eimeria r. roscoviensis* Mandal (1965)	Pyriform	14·3 × 18·7	Present	72—80 hrs.	,,	6·6 × 12·1	,,	From intestin of *Pluvialis apricaria* .—Sundarbans.
40.	*Wenyonella bahli* Misra (1944)	Subspherical or ovoidal	16·0—17·5 × 14·6—15·5	Absent	4—5 days	Egg-shaped	6·6 × 1·2	Absent	From intestine of *Coturnix comomunis* (Gmelin)—Lucknow (U. P.).
41.	*Wenyonella gallinae* Ray (1945)	Oval or egg-shaped	29·48—33·50 × 19·48—22·78	..	4—6 days	Short necked round bottom vials	18·76 × 8·04	Present	From epithelium of terminal part of intestine of *Gallus galus domesticus* (L.)—Mukiwar (U.P.)
42.	*Wenyonella mackinnoni* Misra (1947)	Spherical or ovoid	19·0—26·2 × 18·0—21·5	Absent	4—6 days	Ovoid	10·2 × 7·4	Absent	From epithelium small intestine of *Motacilla alba* L.—Lucknow (U.P.)