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BLOOD PARASITES OF SOME BIRDS FROM WEST BENGAL, INDIA

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ABSTRACT

Prevalence of blood parasites in 128 birds (30.8%) of 23 species was observed out of a total of 418 birds belonging to 77 species and subspecies surveyed during the year 1974-1977 from Calcutta, Nadia, Sagar Island and Darjeeling of West Bengal. Infections with *Haemoproteus* (in 116 birds (27.7%) of 17 species), *Plasmodium* (in 15 birds (3.5%) of 8 species), *Trypanosoma* (in 6 birds (1.4%) of 4 species), *Lankesterella* (in 4 birds (0.9%) of 3 species) and microfilaria (in 23 birds (5.5%) of 11 species) were encountered. Double and multiple infections were quite common. Ten species of *Haemoproteus viz., H. bennetti, H. columbae, H. danilewskii, H. dicruri, H. fringillae, H. garnhami, H. oryzivorae, H. pastoris, H. syrnii* and *H. thereicerycis* ; 3 species of *Plasmodium viz., P. relictum, P. circumflexum* and *P. nucleophilum* ; 1 species and 1 subspecies of *Trypanosoma* viz. *T. avium* and *T. avium bakeri* have been recorded. Some protozoan parasites and larval nematodes are yet to be specifically determined. Occurrence of blood parasites was greatest at Nadia. The infections of *Haemoproteus* was predominant. *Ploceus philippinus* sampled exclusively at Nadia was accounted for 51.5% of infected birds. *Haemoproteus syrnii, Plasmodium circumflexum* and *P. nucleophilum* are reported herein for the first time from India. New host-parasite records are indicated by asterisks(*).

INTRODUCTION

In the early part of this century, the blood parasites of Indian birds received considerable attention and many species of haematozoa were described (*vide* Bhatia, 1938). From such published accounts, little is known regarding the abundance and distribution of blood parasites in Indian avifauna. In recent years extensive surveys on avian haematozoa have been carried out in the Zoological Survey of India from different parts of the country in an effort to gather informations on the level of blood parasitism in wild birds of this sub-continent. The present survey represents the analysis of blood parasites from four avian populations of West Bengal.

Materials and Methods

A total of 418 wild birds belonging to 77 species and subspecies were examined for the blood parasites. The birds were either trapped or shot during the year 1974-1977. Some of the trapped birds were brought to the laboratory and kept alive for parasitological study. Blood was examined thrice in a week from these birds, at different intervals, before declaring them negative for blood parasites. Bone-marrow and varicus other organs of some birds were examined at autopsy.

Blood smears and organ-imprints were stained with Leishman, Wright or Giemsa's stain. The smears were first scanned under low power of a microscope (400x) for 5 min. and then searched under oil immersion (1000x) for 10 min. or until satisfaction.

Birds were obtained from four ecologically distinct locations as follows :

Calcutta—22°5′ N ; 88°4′ E. From urban and suburban environs ; collected usually by shooting in the vicinity of Budge Budge, Barasat and Barrackpore *ca.* 25 km around south and north of Calcutta. Mean annual rainfall of 200 cm and mean maximum daily humidity of 87%. Mosquitoes present in great numbers all year round.

Nadia—23°6′ N ; 88°8′ E. From rural environs around Balia and Chakdah *ca.* 80 km north of Calcutta ; collected usually by netting. Mean annual rainfall of 180 cm and mean maximum daily humidity of 86%. Mosquitoes always present in large numbers.

Sagar Island—21°6′ N ; 88°3′ E. From the coastal environs of deltaic sunderbans around mangrove swamps ; collected by netting as well as shooting. Mean annual rainfall of 250 cm and mean maximum daily humidity of 86%. Mosquitoes are fairly common.

Darjeeling—27°4′ N ; 88°5′ N. From the Himalayan range at Sandakphu ca. alt. of 3630 m, collected by shooting. Mean annual rainfall 34 cm and mean maximum daily humidity 90%. Biting flies are common in occurrence.

Results and Discussion

Of the 418 birds of 77 species and subspecies (Table 1) examined, 128 birds (30.8%) comprising 23 species were found to harbour one or more parasites (Tables 1, 2). The most frequently encountered genus was *Haemoproteus*, occurring in 116 birds (27·7%) of 17 species i.e. in about 80% of the infected birds. *Plasmodium* infection was found in 15 birds (3·5%) of 8 species, *Trypanosoma* in 6 birds (1·4%) of 4 species, *Lankesterella* in 4 birds (0·9%) of 3 species and microfilariae in 23 birds (5·5%) of 11 species. Infection with *Leucocytozoon*, a cosmopolitan avian Haemosporidia, was not encountered. Double and multiple infections with parasites of one genus or of different genera were quite common.

Ten species of *Haemoproteus viz.*, *H. bennetti*, *H. columbae*, *H. danilewskii*, *H. dicruri*, *H. fringillae*, *H. garnhami*, *H. oryzivorae*, *H. pastoris*, *H. syrinii*, and *H. thereicerycis* were recorded in the present venue of investigation along with two other species yet to be specifically determined. *H. columbae* was noted in 100 percent of pigeons examined from West Bengal. Singh *et al.* (1951) obtained a rate of 22% of 214 *Columba livia* from Delhi. *Haemoproteus bennetti* was recently described by Greiner, Mandal and Nandi (1977) from *Picus*

TABLE 1. Blood parasites in birds from Calcutta, Nadia, Sagar Island and Darjeeling of West Bengal. Data is expressed as total number examined/number infected.

ALCEDINIDAE. *Alcedo atthis* (Linnaeus) : Calcutta-3/0. *Halcyon smyrnensis* (Linnaeus) : Calcutta-4/0. *Pelargopsis capensis* (Linnaeus) : Calcutta-1/0. Total : 8/0.

ACCIPITRIDAE. *Accipiter nisus melaschistos* Hume : Darjeeling-1/0. Total : 1/0.

ARTAMIDAE. *Artamus fuscus* Vieillot : Calcutta-1/0. Total : 1/0.

ARDEIDAE. *Ardeola grayii* (Sykes) : Sagar Island-6/0. Total : 6/0.

APODIDAE. *Apus affinis* (J. E. Gray) : Calcutta-2/0. Total : 2/0.

ALAUDIDAE. *Ammomanes phoenicurus* (Pennant) : Sagar Island-1/0. *Mirafra assamica* Horsfield : Calcutta-1/0. *Mirafra erythroptera* Blyth : Calcutta-2/0. Total : 4/0.

CAPITONIDAE. *Megalaima asiatica asiatica* (Latham) : Darjeeling-1/1 ; *Haemoproteus thereicerycis.** *Megalaima haemacephala* (P.L.S. Muller) : Nadia-2/1 ; *Haemoproteus thereicerycis*, *Plasmodium* sp.*, microfilaria. *Megalaima zeylanica* (Gmelin) : Calcutta-2/0. Total : 5/2.

CAPRIMULGIDAE. *Caprimulgus macrurus albonotus* Tickell : Calcutta-1/0. Total : 1/0.

CHARADRIIDAE. *Capella gallinago* (Linnaeus) : Calcutta-5/0. *Capella stenura* (Bonaparte) : Calcutta-3/0. *Tringa hypoleucus Linnaeus* : Calcutta-1/0. *Vanellus indicus* (Boddaert) : Calcutta-6/0. Total : 15/0.

COLUMBIDAE. *Columba hodgsonii* Vigors : Darjeeling-1/0. *Columba livia intermedia* Strickland : Total : 12/12. Calcutta-8/8 ; eight with *Haemoproteus columbae*, one *Plasmodium relictum.** Nadia-4/4 ; four with *Haemoproteus columbae. Streptopelia chinensis* (Scopoli) : Sagar Island-9/0. Total : 22/12.

CORACIIDAE. *Coracias benghalensis* (Linnaeus) : Nadia-6/0. Total : 6/0.

CORVIDAE. *Corvus macrorhynchos* Wagler : Nadia-7/0. *Corvus splendens* Vieillot : Total : 8/1. Calcutta-6/1 ; *Plasmodium relictum,** *Haemoproteus danilewskii.** Sagar Island-2/0. *Dendrocitta vagabunda* (Latham) : Total : 17/3. Nadia-14/3 ; two with *Trypanosoma avium bakari,** three with *Haemoproteus danilewskii,** one with *Plasmodium circumflexum**, two with *Plasmodium* sp., one with microfilaria. Calcutta-3/0. Total : 32/4.

CUCULIDAE. *Cacomantis merulinus querulus* Heine : Calcutta-1/0. *Eudynamys scolopacea* (Linnaeus) : Nadia-2/0. Total : 3/0.

DICRURIDAE. *Dicrurus adsimilis* (Bechstein) : Total : 6/4. Nadia-5/4 ; four with *Haemoproteus dicruri*, one with *Trypanosoma auium** and two with microfilaria. Sagar Island : 1/0. *Dicrurus hottentottus* (Linnaeus) : Calcutta-1/0. Total : 7/4.

FRINGILLIDAE. *Carpodacus pulcherrimus* (Moore) : Darjeeling-1/0. *Leucosticte nemoricola nemoricola* (Hodgson) : Darjeeling-1/0. Total : 2/0.

LANIIDAE. *Lanius schach* Linnaeus : Nadia-5/1 ; microfilaria. Total : 5/1.

MOTACILLIDAE. *Anthus hodgsoni* Richmond : Calcutta-1/0 ; *Anthus novaeseelandiae* Gmelin : Calcutta-1/0. *Anthus novaeseelandiae richardi* Vieillot : Calcutta-6/0. Total : 8/0.

TABLE 1. (*Concluded*)

MUSCICAPIDAE. *Acrocephalus agericola* (Jerdon) : Total : 5/0. Calcutta-2/0 ; Sagar Island-3/0 ; *Acrocephalus dumetorum* Blyth : Total : 9/3. Calcutta-5/2 ; two with *Trypanosoma avium** and *Haemoproteus* sp.* Sagar Island-4/1 ; one with *Haemoproteus* sp.* *Acrocephalus stentorius* Hemprich & Ehrenberg : Calcutta-8/0 ; *Chrysoma sinensis* (Gmelin) : Calcutta-1/0 ; *Copsychus saularis* (Linnaeus) : Total : 7/3. Calcutta-2/1 ; *Haemoproteus fringillae* and *Haemoproteus oryzivorae.* Nadia-4/2 ; two with *Haemoproteus fringillae* and *Haemoproteus oryzivorae.* Sagar Island-1/0. *Erithacus calliope* (Pallas) : Calcutta-8/0. *Erithacus svecicus* (Linnaeus) : Total : 14/0. Calcutta-9/0 ; Sagar Island-5/0. *Monarcha azurea* (Boddaert) : Sagar Island-5/0. *Monticola solitorius* (Linnaeus) : Nadia-1/0. *Muscicapa parva* Bechstein : Total : 14/1. Calcutta-10/1. *Haemoproteus* sp.* Sagar Island-4/0. *Orthotomus sutorius* (Pennant) : Calcutta-1/0. *Phoenicurus ochruros rufiventris* (Vieillot) : Calcutta-1/0. *Phylloscopus collybita tristis* Blyth : Sagar Island-6/0. *Phylloscopus fuscatus fuscatus* (Blyth) : Sagar Island-8/1 ; microfilaria.* *Saxicola torquata* (Linnaeus) : Calcutta-1/0. *Saxicoloides fulicata* (Linnaeus) : Nadia-1/1 ; microfilaria. *Turdoides striatus* (Dumont) : Sagar Island-4/1 ; *Haemoproteus oryzivorae.** Total : 94/10.

NECTARINIIDAE. *Nectarina asiatica* (Latham) : Nadia-1/0. Total : 1/0.

ORIOLIDAE. *Oriolus xanthornus* (Linnaeus) : Sagar Island-2/0. Total : 2/0.

PHASIANIDAE. *Arborophila atrogularis* (Blyth) : Darjeeling-1/0. Total : 1/0.

PICIDAE. *Dinopium benghalense* (Linnaeus) : Nadia-1/0. *Picoides mahrattensis* (Latham) : Nadia-1/0. *Picus flavinucha* Gould : Darjeeling-1/1 ; *Haemoproteus bennetti.* Total : 3/1.

PLOCEIDAE. *Lonchura malabarica* (Linnaeus) : Total : 20/3. Calcutta-5/1 ; *Haemoproteus garnhami* and *Trypanosoma avium.* Nadia-15/2 ; two with *Haemoproteus garnhami. Lonchura punctulata* (Linnaeus) : Calcutta-4/3 ; three with *Haemoproteus garnhami.** *Passer domesticus* (Linnaeus) : Nadia-18/3 ; two with *Lankesterella* sp., two with microfilaria. *Ploceus benghalensis* (Linnaeus) : Nadia-2/0. *Ploceus megarhynchus* Hume : Nadia-3/0. *Ploceus philippinus* (Linnaeus) : Nadia-75/66 with *Haemoproteus oryzivorae,** five with *Plasmodium relictum,* two with *Plasmodium* sp. one with *Lankesterella* sp.*, nine with microfilaria. Total : 122/75.

PSITTACIDAE. *Psittacula krameri* (Scopoli) : Sagar Island-5/0. Total : 5/0.

PYCNONOTIDAE. *Pycnonotus cafer* (Linnaeus) : Nadia-4/1 ; microfilaria Total : 4/1.

RALLIDAE. *Amaurornis phoenicurus* (Pennant) : Sagar Island-6/0. *Gallinula chloropus* (Linnaeus) : Calcutta-1/0. Total : 7/0.

ROSTRATULIDAE. *Rostratula benghalensis* (Linnaeus) : Calcutta-1/0. Total : 1/0.

STRIGIDAE. *Asio flammeus* (Pontoppidan) : Darjeeling-1/0. *Athene brama* (Temminck) : Sagar Island-2/0. *Otus scops* (Linnaeus) : Nadia-1/1 ; *Haemoproteus syrnii** and *Plasmodium* sp.* *Strix aluco nivicola* (Blyth) : Darjeeling-1/0. Total : 5/1.

STURNIDAE. *Acridotheres tristis tristis* (Linnaeus) : Nadia-7/1 ; microfilaria. *Sturnus contra* Linnaeus : Nadia-22/12 ; Eight with *Haemoproteus pastoris,** two with *Plasmodium* sp.* three with microfilaria.* *Sturnus malabaricus* (Gmelin) : Total : 8/4. Nadia-5/3 ; three with *Haemoproteus pastoris,* one with *Plasmodium nucleophilum,** one *Lankesterella* sp.* Sagar Island-3/1 ; *Haemoproteus pastoris.* Total : 37/17.

TRUNICIDAE. *Turnix suscitator* (Gmelin) : Nadia-8/0. Total : 8/0.

* New host-parasite records.

TABLE 2. Prevalence of haematozoa from four different localities of West Bengal.

	Total examined	Total infected	Number of bird infected with				
			Haemo.	*Plasm.*	*Tryp.*	Micro	*Lank.*
Calcutta	118	17	17	2	3	—	—
percent :		14.4	14.4	1.7	2.5	—	—
Nadia	214	105	94	13	3	22	4
percent :		49.0	43.9	6.0	1.4	10.2	1.8
Sagar Island	77	4	3	—	—	1	—
percent :		5.1	3.8	—	—	1.3	—
Darjeeling	9	2	2	—	—	—	—
percent :		22.2	22.2	—	—	—	—
Total	418	128	116	15	6	23	4
percent :		30.8	27.7	3.5	1.4	5.5	0.9

Haemo.=*Haemoproteus* ; *Plasm.*=*Plasmodium* ; *Tryp.*=*Trypanosoma* ; Micro.=microfilaria ; *Lank.*=*Lankesterella*.

flavinucha from Darjeeling. *Haemoproteus syrnii* in *Otus scops* is reported herein for the first time from India. Other haemoproteid species *viz.*, *H. danilewskii*, *H. dicruri*, *H. fringillae*, *H. garnhami*, *H. oryzivorae*, *H. pastoris* and *H. thereicerycis* were previously recorded from this subcontinent by a number of investigators (de Mello, 1937a ; Bhatia, 1938 ; Grewal, 1964 ; Nandi, 1976 ; Nandi and Mandal, 1977a).

Three species of *Plasmodium viz. P. relictum*, *P. circumflexum* and *P. nucleophilum* and a few undetermined species were encountered in this survey. Previously *P. relictum* was reported on several occasions from Indian birds by Chakravarty and Kar (1945), Singh *et al.* (1952) and Nandi and Mandal (1977a). However, it appears from Garnham (1966) that *P. circumflexum* and *P. nucleophilum* in *Dendrocitta vagabunda* and *Sturnus malabaricus* respectively, are reported herein for the first time from India and constitute new host-parasite records.

Trypanosoma avium and *T. avium bakeri* were known from India (Grewal, 1963 ; Chatterjee and Ray, 1971). But *T. avium* in *Dicrurus adsimilis* and *Acrocephalus dumetorum*, and *T avium bakeri* in *Dendrocitta vagaunda* seem to be new records.

Lankesterella infection was noted in *Passer domesticus*, *Ploceus philippinus* and *Sturnus malabaricus*. These parasites are yet to be diagnosed as to species. However, these organisms are reported for the first time from the latter two hosts.

Infections with microfilariae, the larval nematodes, were observed in 11 avian species. De Mello (1937b) and Choudhury *et al.* 1972, however, reported earlier the occurrence of microfilariae from *Acridotheres tristis*, *Dendrocitta vagabunda*, *Dicrurus adsimilis*, *Lanius schach*, *Pycnonotus cafer* and *Saxicoloides fulicata*. Microfilariae from five other avian hosts are reported in the present communication for the first time from India.

A wide variety of haematozoa was found

in birds from West Bengal, whereas parasites belonging to the genera *Haemoproteus* and *Plasmodium* were only recorded from Godavari River Basin (Nandi, 1976) and Orissa (Nandi and Mandal, 1977a). But, the birds from Kashmir (Nandi and Mandal, 1978) showed rich and varied haematozoa including a number of species of *Leucocytozoon* which was not recorded in wild birds from West Bengal. However, infection with *Leucocytozoon sabrazesi* was noted in a domestic fowl from Darjeeling (Nandi and Mandal, 1977b). Absence of *Leucocytozoon* infection may be due to small size of the sample from Darjeeling and for possible absence of simuliid vectors from the vast plains of West Bengal as they require running water (hill streams) for the development of immature stages.

In Calcutta, a total of 118 birds of 35 species were examined ; 17 birds (14.41) harboured blood parasite, primarily species of *Haemoproteus*. In Nadia, a total of 214 birds of 24 species were examined ; 105 birds (49%) were infected of which a weaver bird, *Ploceus philippinus* shared more than 60% of all the infected birds sampled from Nadia. In Sagar Island, 77 birds of 19, species were examined ; only 4 birds were infected, three with *Haemoproteus* and one with microfilaria. In Darjeeling, a small sample of 9 birds of 9 species was examined ; only two birds showed infections with *Haemoproteus*.

The prevalence of blood parasites in birds of West Bengal other than Nadia was found not to vary significantly from region to region and in regard to parasite genera involved. The occurrence of more varied types of haematozoa and their higher prevalence (49%) at Nadia can be attributed partly to examination of blood smears as well as organ-imprints from a number birds and partly due to one species of bird, *Ploceus philippinus*, taken exclusively at Nadia, accounted for 51.5% (66 of 75 birds, Table 1) of all the infected birds recorded in this paper. The same is true with the overall higher prevalence of *Haemoproteus* centred around Nadia in West Bengal. This particular bird, *Ploceus philippinus*, was infected with a number of parasite too (Table 1) which suggests that this avian species proves to be susceptible for blood parasites. If the Nadia data is substracted from the overall results, the remaining infections may not be very dissimilar to that recorded for the Godavari River Basin (Nandi, 1976) and Orissa (Nandi and Mandal, 1977a), considering the variations in the general ecology and topography of the areas sampled.

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