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BLOOD PARASITES OF SOME BIRDS FROM SENEGAL

GORDON F. BENNETT¹, JEAN BLANCOU², ELLEN M. WHITE¹ and NORMAN A. WILLIAMS¹

Abstract: A total of 809 birds from Senegal, including 43 species and 21 families, were examined for hematozoans; 93 birds (11.5%) harbored blood parasites, with only 7 (7.5%) harboring mixed infections. Species of *Haemoproteus* occurred in 81.7% of the infected birds while species of *Plasmodium*, *Trypanosoma*, microfilaria and *Leucocytozoon* were encountered less frequently. The majority of the sample was composed of species of ploceids and estrildids and blood parasites were most prevalent in the colonial-nesting ploceids. Prevalence of blood parasites in Senegal was low in comparison to that seen in birds from other parts of Africa.

INTRODUCTION

The blood parasites of birds from the west coast of Africa have been poorly studied. One of us (JB) had the opportunity to collect blood smears from a primarily passeriform population in the suburbs of Dakar, Senegal, over a period of 18 months. This paper reports on the blood parasites found in this study.

MATERIALS AND METHODS

Birds were caught in mist nets in suburban Dakar, Senegal over the period April, 1975 through August, 1976, and February - April, 1977. Blood films, prepared from blood drawn from the femoral or brachial artery, were air-dried, fixed in 100% methanol or ethanol and stained with Giemsa's stain buffered to pH 7.2. The slides were then sent to the International Reference Centre for Avian Haematozoa for diagnosis and identification of the blood parasites encountered.

The climate of Dakar is sub-Saharan, where the mean tem-

perature, moderated by the trade-winds, averages 24 C. The rainy season begins in July and continues through the beginning of October, with a mean annual rainfall of 650 mm. This temperate climate is not typical of the rest of Senegal, where the hot, dry northern portion contrasts with the hot, humid southern regions, regions in which the avifauna were not sampled.

The birds sampled in this study are non-migratory and represent a resident, breeding population. The most commonly captured species nest throughout the year, but breeding activity slows down just prior to the rainy season and resurges at the end of the rains. The greater part of the avifauna of this region is composed of species often found in association with man (Ploceidae, Estrildidae, Columbidae), especially in gardens. They are attracted by the presence of water, seeds, berries and the thick vegetation (*Acacia*, *Cassia*, *Berassus*, *Delonix*, *Lantana*, *Prosopis*, etc.) normally associated with gardens, which provides shelter and nesting sites.

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RESULTS AND DISCUSSION

A total of 809 birds representing 43 species and 21 families were examined for blood parasites; 93 birds (11.5%) harbored one or more parasites (Table 1). Species of *Haemoproteus* were by far the most commonly encountered parasites (81.7%); species of *Plasmodium*, *Trypanosoma*, microfilaria and *Leucocytozoon* were seen relatively infrequently. Mixed infections with two or more genera of hematozoa were uncommon, only seven individuals (7.5% of the infected birds) harboring mixed infections. The low mixed infection index (MII = total infections/total infected birds) of 1.06 is the lowest for all countries cited (Table 2). The MII generally indicates that the higher the prevalence of blood parasites in an avian population, the greater the chance for mixed infections to occur — a largely self-evident truth that is frequently overlooked. However, the MII does present another measure of vector activity as based on prevalence. Probably more significantly, the fact that an MII exists indicates that intra-generic cross-immunity of avian blood parasites is not strong.

Haemoproteids encountered were *Haemoproteus coraciae* in several members of the Coraciidae, *H. lania* in *Laniarius barbarus* and *H. fringillae/orizivora* complex in the Estrildidae and Ploceidae and *H. sturni* in *Lamprotornis chalybaeus*. *Leucocytozoon coraciae* was seen in a single *Coracias abyssinica*. *Plasmodium polare* was noted in a *Ploceus velatus*, *P. relictum* was seen in one *Ploceus cucullatus* and *P. vaughani* was found in three *Ploceus cucullatus*, two *P. velatus* and in a single sturnid, *Lamprotornis chalybaeus*; unidentified species of *Plasmodium* were also noted in two *Lagonosticta senegala*. *Trypanosoma avium* was also recorded from *Lagonosticta senegala*, *Amadina fasciata* and *Streptopelia senegalensis* while *T. calmiotti* was seen in *Ploceus velatus*.

The majority of the birds sampled were members of the Estrildidae

(23.2%) and the Ploceidae (58.8%). However, the prevalence of parasitism in these two families was low (11.5%) and similar to that seen in the Columbidae (7.7%) but far lower than that in the Coraciidae (75%), the only other families with a sample size permitting comparison. The reason the Coraciidae demonstrated such a high prevalence of hematozoa in Senegal is unknown.

Many of the ploceids sampled nest in colonies (*Ploceus cucullatus*, *P. luteolus*, *P. velatus*, *Quelea erythrops*, *Q. quelea*), generally in acacias, whereas the estrildids and other ploceids are non-colonial, nesting in shrubs, holes, etc. Overall prevalence of parasitism in the colonial-nesting ploceids was 21.3%, markedly higher than the 3.1% prevalence recorded in the non-colonial estrildids and ploceids. Possibly, the presence of a large biomass in a colony may exercise a stronger attraction for vectors than an isolated nest.

Generally, the prevalence of hematozoa in this sample of birds from Senegal is lower than that recorded for other areas in Africa (Table 2) where the data suggests that prevalence (in an east-west line across the continent) is remarkably uniform with the exception of Tanzania in the east. Birds from this latter country have a substantially higher prevalence of blood parasites than other areas while those of Senegal in the west have a lower prevalence than elsewhere. The prevalence of *Haemoproteus* is similar across the continent, with the exception of Uganda (Table 2), where the higher prevalence may indicate a more favourable environment (the shores of Lake Victoria) for the *Culicoides?* vectors. Prevalence of *Plasmodium* across the continent, although variable, is low, except in Tanzania. Prevalence of *Leucocytozoon* is higher in the eastern portion of the continent, especially centered around Tanzania and Kenya, dropping sharply as one

TABLE 1. Prevalence of blood parasites in some birds from Dakar, Senegal.
 L. = Leucocytozoon; H. = Haemoproteus; P. = Plasmodium; T. = Trypanosoma; M. = Microfilaria; O. = Other (*Atoxoplasma*, etc.).

Family and species	Total birds	Total birds infected with:						
		Infected birds	H.	P.	L.	T.	M.	O.
BUCEROTIDAE								
<i>Tockus erythrorhynchus</i>	2	1					1	
COLUMBIDAE								
<i>Streptopelia senegalensis</i>	7	1				1		
*Negative birds	6	0						
Total:	13	1				1		
CORACIDAE								
<i>Coracias abyssinica</i>	8	5		1				
<i>Coracias naevia</i>	3	3						
<i>Eurystomus glaucurus</i>	1	1						
Total:	12	9		1				
ESTRIDIDAE								
<i>Legonosticta senegala</i>	165	6		2		1		
*Negative birds	22	0						
Total:	188	6		2		1		
LANIIDAE								
<i>Laniarius barbarus</i>	1	1						1
PHASIANIDAE								
<i>Francolinus bicalcaratus</i>	2	1					1	
*Negative birds	57	0						
Total:	59	1					1	

TABLE 1 (continued)

Family and species	Total birds	Infected birds	Total birds infected with:							
			H.	P.	L.	T.	M.	O.		
PLOCEIDAE										
<i>Amadina fasciata</i>	3	1				1				
<i>Hypochoera</i> (= <i>Vidua</i>) <i>chalybeata</i>	148	4	2	1						1
<i>Ploceus cucullatus</i>	149	28	23	6						
<i>Ploceus luteolus</i>	73	19	18	1				1		
<i>Ploceus velatus</i> (= <i>P. vitellinus</i>)	82	19	16	3			1			
*Negative birds	21	0								
Total:	476	71	59	11		2	1	1		1
STURNIDAE										
<i>Lamprolornis chalybaeus</i>	2	2	1	1						
Grand total (including all negative birds)	809	93	76	14	1	4	3	1		
Percent infected:		11.5	9.4	1.7	0.1	0.5	0.4	0.1		

*NEGATIVE BIRDS. ALAUDIDAE: *Galerida cristata* (1). ANATIDAE: *Anas platyrhynchos* (domestic duck) (15); *A. querquedula* (3). CHARADRIIDAE: *Hoplopterus spinosus* (2). COLUMBIDAE: *Oma capensis* (2); *Streptopelia decipiens* (1); *S. semitorquata* (2); *Trepon tosalia* (1). CORVIDAE: *Corvus albus* (1). CUCULIDAE: *Centropus senegalensis* (3). ESTRILIDAE: *Lonchura cucullata* (10); *L. malabarica* (11); *Uraeginthus bengalus* (1). FRINGILLIDAE: *Serinus leucopygius* (14). MUSOPHAGIDAE: *Crinifer piscator* (1). NECTARINIIDAE: *Nectarinia pulchella* (2). PHASIANIDAE: *Gallus gallus* (56); *Philopachus pectoratus* (1). PHOENICULIDAE: *Phoeniculus porphyreus* (1). PLOCEIDAE: *Euodice malabarica*** (4); *Euplectes horreacea* (1); *Passer griseus* (14); *Quelea quelea* (2); *Vidua orientalis* (1). PYCNONOTIDAE: *Pycnonotus barbatus* (3). RECURVIROSTRIDAE: *Himantopus himantopus* (1). STRIGIDAE: *Asio flammeus* (1). SYLVIIDAE: *Camaroptera breviceaudata* (4).

**This species is here considered to be a valid member of the Ploceidae. Some authors consider this species to be synonymous with *Lonchura malabarica*, an estrilid. Some authors consider *Lonchura* to be in the Ploceidae, not in the Estrilidae.

TABLE 2. Prevalence of avian haemosporozoans in some African Countries. Abbreviations as in Table 1. N.B. Birds sampled in 1977 are not included.

Country	*Infected birds			Total birds infected with:						MII**
	Total	Percent	No.	H.		L.		P.		
				No.	%	No.	%	No.	%	
Senegal	809	11.5	76	76	9.4	1	0.1	14	1.7	1.06
Ghana ⁷	135	31.9	29	29	21.5***	4	3.0	1	0.7	1.14
Tchad ⁶	389	22.9	57	57	14.7	0	—	11	2.8	1.11
Uganda ^{3,4}	1998	31.1	563	563	28.2	34	1.7	20	1.0	1.13
Tanzania ²	306	47.0	50	50	16.0	49	16.0	24	8.0	1.41
Kenya ^{2,5}	377	24.9	45	45	11.9	41	10.9	15	4.0	1.22
Abyssinia ¹	5046	23.2	764	764	15.1	210	4.2	160	3.2	1.21

*Includes infections with *Trypanosoma*, microfilaria, *Atoxoplasma*, etc.

**MI = Mixed Infection Index

***Erroneously recorded⁷ as 27.5%.

proceeds westerly. Presumably, the higher prevalence of *Leucocytozoon* in Kenya-Tanzania is associated with a greater abundance of ornithophilic simuliid vectors — a situation that could be anticipated from the montane nature of this region providing an abundance of stream habitats for larval simuliids. Certainly, Fallis *et al.*⁵ have shown ornithophilic simuliids to be abundant in Tanzania. Considering the magnitude of the simuliid-vectored *Onchocerca volvulus* problem in West Africa, it would be anticipated that a high *Leucocytozoon* prevalence would have been obtained for this area since there is evidently suitable habitat for simuliid development. The fact that *Leucocytozoon* is virtually absent in these regions is thus surprising. Perhaps more extensive sampling, especially in

the more montane regions of West Africa, will provide an answer.

The prevalence of blood parasites varied from month to month over the course of the year (Table 3). Highest prevalence of infection was noted during the period December through May, with a marked drop in prevalence from June through November. The lack of infection in August is undoubtedly due to negligible sample size. The rainy season in Dakar extends from July through September, a period that corresponds to the time of lowest prevalence of infection. This is surprising, as one would anticipate that rains would enhance the breeding of the vectors of avian blood parasites. In Uganda³ where similar data were obtained, the highest prevalence was related to the rainy season.

TABLE 3. Prevalence of avian blood parasites by month in Dakar, Senegal. (Abbreviations as in Table 1). N.B. Birds sampled in 1977 are not included.

Month	Total birds	Infected birds		Total birds infected with:				
		Total	Percent	H.	L.	P.	T.	M.
January	57	10	17.5	5		4	1	
February	68	10	14.7	10				
March	47	5	10.6	5				
April	64	10	15.6	10	1		1	1
May	97	17	17.5	17		2		1
June	103	10	9.7	8		1	1	
July	42	3	7.0	3				
August	6	0	0.0					
September	15	1	6.7	1				
October	58	4	6.9	4				
November	55	5	9.1	5		1		
December	38	6	15.8	3		2	1	

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