SURVEY OF PARASITES OF THE BLUE-BILLED MALIMBE *Malimbus nitens* (GRAY)

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ABSTRACT
A survey of the parasites of blue-billed malimbus, Malimbus nitens was carried out from January to December 1999 in Ile-Ife, Nigeria. A total of 182 specimens of the host bird were examined and 13 species of parasites were recovered. 58.3% were infected with 7 species of parasites. Concurrent infections of Columbicola sp; Phylopterus sp and Ornithornyssus bursa were very common. 4 specimens of the host had multiple infections of Leucocytozoon sp; Columbicola sp; Phylopterus sp; Ornithonyssus bursa and Cnemidocoptes sp. Cnemidocoptes had the highest (88.7 ± 15.3) mean intensity of infection while Prosthogonimus macrorchis had the least (2.0 ± 0.7). There were no significant differences in the prevalaneces of infections between the sexes (P>0.05) but parasite intensities were significantly different among the adult and sub-adults. Six of the 13 recorded parasites had higher prevalences during the dry season while only 2 of the recorded parasites had high prevalences during the rainy season, with seasonal prevalences of infection being statistically significant (P<0.05). Leucocytozoon sp; Ceratophyllus sp; Ornithonyssus bursa and Cnemidocoptes sp. Exhibited aggregate distribution.

Keywords: *Blue-billed Malimbe, Parasites, prevalence, intensity, seasonality*

INTRODUCTION

Parasites of wild birds have been studied extensively by various workers especially temperate species (Todd and Worley, 1967; Vincent, 1972; Cooper and Crites, 1974; Forrester *et al.*, 1974). Materials on African birds, however, are scarce except for the work of Davis (1972) on the parasites of some wild birds in Ethiopia. *Trichomonas gallinae, Tritrichomonas, Pentatrichomonas,* and six *Leucocytozoon* spp. were encountered in the survey carried out by Davids (1972) apart from three genera of haemosporidians. Todd and Worley (1967) while working on Black-billed magpie, *Pica pica hudsonia*, found that 87.6% of the birds harboured helminth parasites. Thirty-two percent of the nestlings, all the juveniles and 98% of the adults had helminth infection of the trematode species *Echinostoma revolutum*, cestodes of the species *Aploparaksis picae,* Anomotaenia *constricta, Dilepis undula, Hymenolepis stylosa,* and nematodes of the species *Capillaria antis, Syngamus trachea* and *Microtetrameres corex.*

This current study is aimed at determining the prevalence of parasites encountered, on different age-range and sex of the Blue-billed Malimbe *Malimbus nitens* that is closely associated with raphia palm from which humans, along the West African sub-region, obtain raphia wine.

MATERIALS AND METHODS

One hundred and eighty three specimens of *Malimbus nitens* were mist-netted between 07.30 to 10.00 and 15.00 to 18.00 hours and examined for parasites at various intervals between January and December 1999. The species was made up of 97 males and 86 females.

Ectoparasitic examination: Captured birds were examined for parasites within the next twenty-four hours to prevent loss of parasites possibly through defecation. Each specimen was anaesthesized, all avian parameters measured before being sprayed with Mobil insecticide within a transparent cellophane bag and kept in a killing jar for twenty minutes. The bag was later examined for parasites after which the feathers and body of the specimen were brushed with a fine-toothed comb on a white background to release any ectoparasite present.

Endoparasitic examination: Immediately each bird was dissected, a sample of the blood was removed from the heart and mixed with a small quantity of an anticoagulant (i.e. saturated solution of calcium chloride). Blood smears were made, air-dried, fixed in absolute ethanol and stained with Giemsa's stain

before examination under oil immersion lens. Parasite densities were recorded as the number of parasites per 200 leucocytes. The densities were converted to microlitres of blood assuming a standard mean leucocyte count of 8000 cells per microlitres.
The lungs, liver and alimentary canal (oesophagus, crop, gizzard, duodenum, ileum, rectum/cloaca) were placed in separate Petri-dishes containing physiological saline and left for five to ten minutes. A longitudinal incision of these parts exposed the gut contents, and along with the scrapings of the mucosa, were examined for parasites. Helminth parasites were fixed in Formol-acetic-alcohol (FAA) and preserved in 70% ethanol.

Identification of the parasites, at least to generic level, was based on the various keys presented by different authors (Chandler and Read, 1961; Soulsby, 1978; Wardle and McLeod, 1968; Schmidti, 1970; Yamaguti, 1958; 1959; 1961).

The prevalence and mean intensity for male and female specimens were statistically compared using contingency tables. Dispersion pattern of the parasites were determined by chi-squared analysis of the ratio of the mean number of parasites per bird (x) to the sample variance (S^2)

RESULTS
Of the 183 specimens of *Malimbus nitens* examined, 58.3% were infected by seven species of parasites which included a trichomonad, a cestode, two nematodes, two mallophagans and an acarina. Concurrent infections of *Columbicola* sp; *Phylopterus* sp and *Ornithonyssus bursa* were very common. Four specimens of the host had multiple infections of *Leucocytozoon* sp; *Cnemidocoptes* sp; *Columbicola sp; Phylopterus sp.* and *Ornithonyssus bursa*.

Table 1 shows the mean intensities of infection with *Cnemidocoptes sp.* Having the highest (88.7 ± 15.3) and *Prosthogonimus macrorchis* the least (2.0 ± 0.7). Prevalences of infection by the sex of the host were not statistically significant (P>0.05) but the parasite intensities were significantly different among the adults and sub-adults of the host (Table 2). Netlings and fledgelings were never caught in this study.

Table 1: Prevalence, Mean Intensity and Variance/Mean Ratio of Parasites Recovered from *Malimbus nitens*

Parasite species	Prevalence %	Mean Intensity (x ± S.D.)	Variance/Mean (5^2/x)
Apicomplexa: *Leucocytozoon sp.*	2.2	1460 ± 254.6/ul	44.4
Sarcomastigophora: *Trichomonas gallinae*	10.4	4.5 ± 2.0	0.9
Tritrichomonas *gallinarum*	3.3	5.3 ± 2.0	0.7
Trematoda: *Prosthogonimus macrorchis*	4.9	2.0 ± 0.7	0.3
Cestoda: *Fimbriariella sp*	9.3	2.8 ± 1.2	0.5
Skjarbinoparaxis sp	3.8	3.4 ± 1.4	0.6
Nematoda: *Capillaria obsignata*	7.7	2.9 ± 1.6	0.9
Syngamus trachea	16.9	3.9 ± 1.6	0.6
Mallophaga: *Columbicola sp*	12.6	5.9 ± 1.8	0.5
Phylopterus sp	9.3	7.0 ± 1.8	0.5
Siphonaptera: *Ceratophyllus sp.*	2.2	4.0 ± 2.6	1.7*
Acarina: *Ornithonyssus bursa*	14.2	38.0 ± 11.6	3.5*
Cnemidocoptes sp.	3.3	88.7 ± 15.3	2.6*

*S^2/x > 1; P > 0.05

Table 2: Distribution of Parasites by Age of *Malimbus nitens*

Age Group	Parasite species	Total number of parasites	% of total
Adult:	*Leucocytozoon sp.*	2920	100
	Trichomonas gallinae	59	68.6
	Tritrichomonas gallinarum	21	65.6
	Prosthogonimus macrorchis	18	100
	Fimbriariella sp.	31	64.5
	Skjarbinoparaxis sp.	18	75.0
	Capillaria obsignata	23	56.1
	Syngamus trachea	121	100
	Columbicola sp.	96	71
	Phylopterus sp.	81	68.1
	Ceratophyllus sp.	7	43.8
	Ornithonyssus bursa	643	65.1
	Cnemidocoptes sp.	469	88.2
Subadult:	*Leucocytozoon sp.*	0	0.0
	Trichomonas gallinae	27	31.4
	Tritrichomonas gallinarum	11	34.4
	Prosthogonimus macrorchis	0	0
	Fimbriariella sp.	17	35.5
	Skjarbinoparazis sp	6	25.0
	Capillaria obsignata	18	43.9
	Syngamus trachea	0	100
	Columbicola sp.	39	29.0
	Phylopterus sp.	38	31.9
	Ceratophyllus sp	9	56.2
	Ornithonyssus bursa	346	34.9
	Cnemidocoptes sp	63	11.8

Fig. 1: Monthly % parasitic infection of *Malimbus nitens*

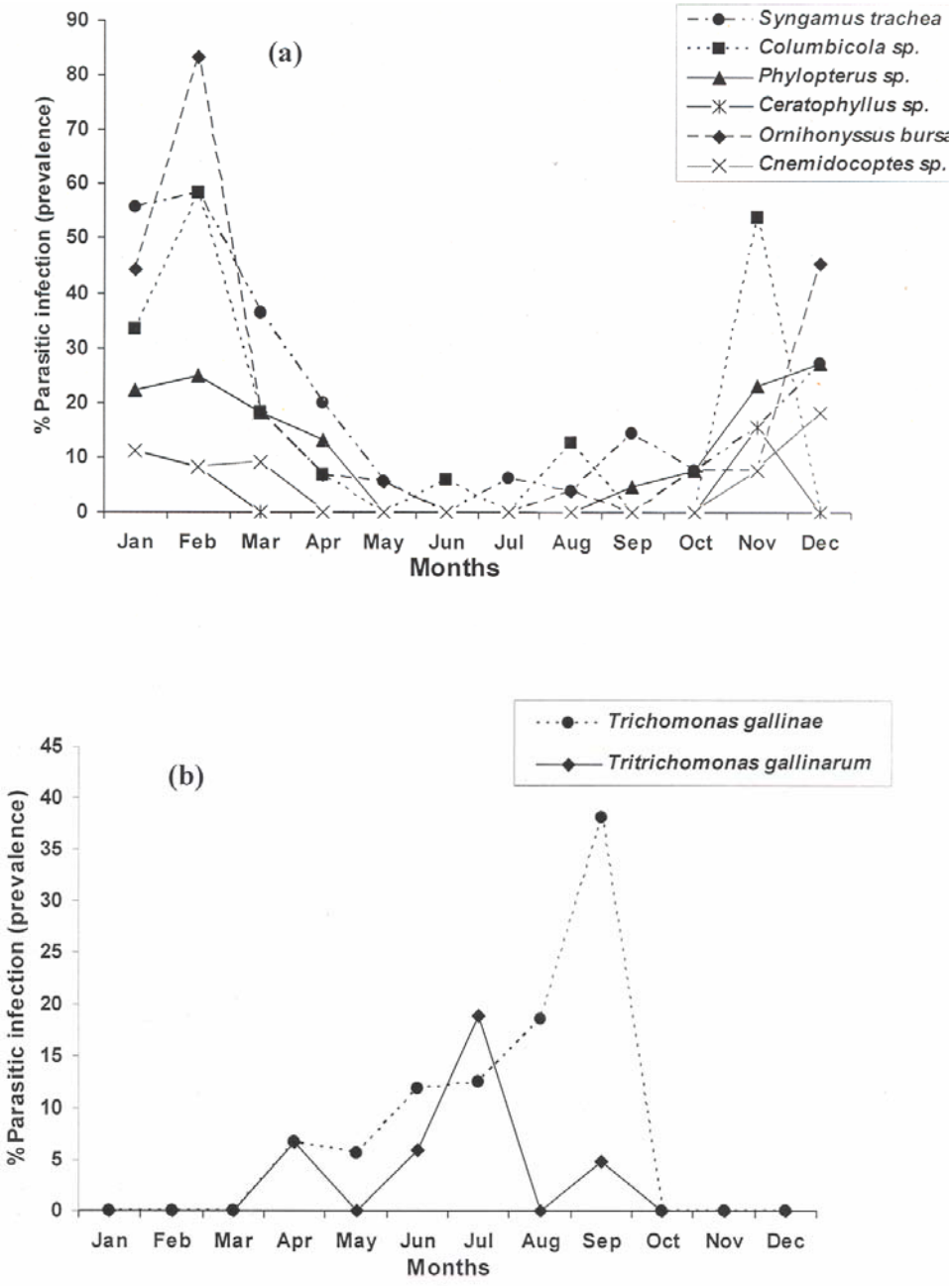

Table 3: Distribution of the parasites in *Malimbus nitens* (183)

Parasite species	Total number of parasites	Location
Leucocytozoon sp.	2920	Blood stream
Trichomonas gallinae	86	Intestine
Tritrichomonas gallinarum	32	Caecum
Prosthogonimus macrorchis	18	Intestine
Fimbriariella sp.	48	Intestine
Skjarbinoparaxis sp.	24	Intestine
Capillaria obsignata	41	Intestine
Syngamus trachea	121	Trachea
Columbicola sp.	135	Body, among feathers
Phylopterus sp.	119	Body, among feathers
Ceratophyllus sp.	16	Body, among feathers
Ornithonyssus bursa	989	Head and body feathers
Cnemidocoptes sp.	532	Head and body feathers

All the parasites encountered in the bird exhibited site preferences (Table 3) *Leucocytozoon* sp. was found in the leucocytes of the blood; *Trichomonas gallinae*, *Tritrichomonas gallinarum, Prosthogonimus macrorchis, Fimbriariella sp., Skjarbinoparaxis sp.* and *Capillaria obsiganata* were recovered from the intestine and Syngamus trachea from the trachea. Specimens of *Columbicola sp. Phylopterus sp.* and *Ceratophyllus sp., Ornithonyssus bursa, Cnemidocoptes sp* and *Leucocytozoon sp*. exhibited aggregated distribution (S^2 to the mean $x>1$; $P>0.05$).

DISCUSSION

The present studies show that thirteen species of parasites made up of two species of mastigophora, one species of trematode, two species of cestodes, two species of nematodes, two species of Mallophaga, one species of Siphonaptera and two species of Acarina occur in the blue-billed Malimbus in Ile-Ife. Several genera, including *Leucocytozoon, Trichomonas, Capillaria, Syngamus, Columbicola, Ornithonyssue and Cnemidocoptes,* found to be very common to wild birds were recorded in this study (Todd and Worley, 1967; Davis 1972; Vincent 1972; Cooper and Crites 1974; Forrester *et al.* 1974; Forrester and Spalding, 2003). *Trichomonas gallinae, Syngamus trachea, Columbicola sp*. and *Ornithonyssus bursa* were more prevalent in the study. *Leucocytozoon sp., Tritrichomonas gallinarum, Prosthogonimus macrorchis, Skjarbinoparaxis sp; Ceratophyllus sp* and *Cnemidocoptes* species with very low intensities were part of the haemotozoan, sarcomastigophoran, trematode, cestode, siphonapteran and acarina respectively recorded in this study.

In general the prevalence of the parasites were relatively lower than those reported in Brazil (Figueiroa Lyra de Freitas *et al*., 2002), Ethiopia (Davis 1972), Nigeria (Fabiyi 1972, Fatunbi & Olufemi 1982) and U.S.A. (Courtney and Forrester 1974). This could be attributed to ecological differences occurring in the various countries and the disposition of the different species of birds studies to parasitic infection.

The differences in parasite intensities and prevalences among adult and sub-adult blue-billed malimbus conforms with the observations previously reported by Fabiyi (1972) and Fatunbi and Olufemi (1982) on the guinea fowl in Nigeria. The almost identical prevalences of infections of both sexes will indicate similar exposure and susceptibility to infection. Almost all the parasites recorded exhibited seasonality in their prevalences with the ectoparasites being more prevalent during the dry season and the trichomonads and tritrichomonads during the wet season (Figure 1a and 1b)

The aggregated distribution of *Ceratophyllus* sp; *Ornithonyssus bursa* and *Cnemidocoptes sp* in this species is striking. Various factors can cause such dispersion pattern (Cropton, 1971; Anderson 1976; Crompton *et al*. 1984 and Rosza *et al.,* 2000) along with the heterogeneity of *Malimbus nitens* feeding behaviour.

CONCLUSION

The thirteen species of parasites encountered do not appear to cause mutual interference in *Malimbus nitens*, i.e. the presence of one does not preclude the others, although the figures are strongly suggestive of some relationship among them. Males were found to have higher prevalence but there were no significant differences between the sexes although statistically significant differences occur between the adults and sub-adults.

Most of the parasites exhibited seasonality in the prevalences of infection and it would be interesting to investigate the predisposing factors and their limits on the host.

Finally, since humans in the West African sub-region cherish raphia wine tapped from raphia palm, to which the *Malimbus nitens* is associated, the possibility of human aberrant infection with these parasites is not ruled out and hence require further elucidation.

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