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THE PREVALENCE OF BLOOD PARASITES IN HELMETED GUINEAFOWLS, *NUMIDA MELEAGRIS*, IN THE KRUGER NATIONAL PARK

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ABSTRACT

EARLÉ, R. A., HORAK, I. G., HUCHZERMEYER, F. W., BENNETT, G. F., BRAACK, L. E. O. & PENZHORN, B. L., 1991. The prevalence of blood parasites in helmeted guineafowls, *Numida meleagris*, in the Kruger National Park. *Onderstepoort Journal of Veterinary Research*, 59, 145–147 (1991).

Bloodsmears were taken from separate groups of five helmeted guineafowls, *Numida meleagris*, shot at approximately monthly intervals at Skukuza and near Lower Sabie in the Kruger National Park during the period August 1988 to August 1990. Ninety-eight (86 %) of 114 guineafowls had single or multiple infections of *Aegyptianella* sp., *Haemoproteus pratasi*, *Hepatozoon* sp., *Leucocytozoon neavei*, *Plasmodium circumflexum* and *Trypanosoma numidae*. The apparent seasonal prevalence of *Aegyptianella* sp., *H. pratasi* and *L. neavei*, the three most commonly occurring parasites (42 %, 49 % and 56 % of birds infected respectively), is probably dependent on the presence of their respective vectors.

INTRODUCTION

No studies in southern Africa have reported the long-term monitoring of avian haematozoa for any bird species within the region. On a world-wide basis, only McClure, Poonswad, Greiner & Laird (1978) have done extensive work in this regard for a number of avian species from southern and eastern Asia. Surveys of the blood parasites of a number of bird species have been carried out in sub-Saharan Africa by Bennett, Okia & Cameron (1974), Ashford, Palmer, Ash & Bray (1976), Earlé, Bennett, Du Toit, De Swardt & Herholdt (1991). However, none of these data sets concerned a single species in sufficient numbers, spread over a 12-month period, to make the observation of seasonal prevalence possible.

Although the helmeted guineafowl, *Numida meleagris*, is a common resident over most of its distributional range (Maclean, 1985), studies of its blood parasites throughout Africa appear to have been based on relatively small samples. In South Africa the largest published survey of guineafowl blood parasites was carried out by Thomas & Dobson (1975) and included 24 birds. Huff, Marchbank, Saroff, Scrimshaw & Shiroishi (1950) isolated *Plasmodium fallax* from an Ugandan guineafowl, while Huchzermeyer & Van der Vyver (1991) reported the isolation of *Plasmodium circumflexum* and Huchzermeyer, Horak & Braack (1991) that of an *Aegyptianella* sp. from South African guineafowls. In Kenya, Fallis, Jacobson & Raybould (1973a, b) studied the experimental transmission of *Trypanosoma numidae* and detailed the transmission of *Leucocytozoon neavei* by and sporogony in the ornithophilic simuliids *Simulium adersi/S. impukane* complex. Bennett examined 150 blood smears from guineafowl in Northern Nigeria taken in June 1984, with negative results (unpublished records: International Reference Centre for Avian Haematozoa).

Helmeted guineafowls were collected at approximately monthly intervals during the seasonal abundance of ticks on these birds in the Kruger National Park. Blood smears were routinely taken from the birds in an attempt to study the prevalence of their blood parasites and the results are reported herein.

MATERIALS AND METHODS

During the 25-month period August 1988 to August 1990, 118 helmeted guineafowls were collected at Skukuza and its environs as well as from near Lower Sabie in the Kruger National Park. With the exeption of seven, 7–10 month-old sub-adult birds, all the birds were adult. A maximum of five birds were collected each month and blood smears taken to determine the prevalence and intensity of blood parasites in this population. The smears were air-dried and fixed in absolute methanol or May-Grünwald-Giemsa before being stained with Giemsa. They were examined and the blood parasites identified. The severity of infection was quantified by counting the number of specific parasites and expressing these as totals per 100 fields at either 200× (for *Leucocytozoon)* or 1000× magnification (for all other parasites). Six whole blood samples were collected in February 1989 and February 1990. These were used for syringe transmission of haematozoa to uninfected captive guineafowls.

RESULTS

Although 118 blood smears were made, only 114 were used in the study as 4 smears were damaged. The prevalence of haematozoa was high, with 98 (86 %) of the 114 birds showing an infection with at least one haematozoan species; double and triple infections were common, averaging 1,8 parasite species per infected bird. Parasites from six families and genera of avian haematozoa (Table 1) were identified, three species occurring commonly while the other three were rare. *L. neavei* (56 %) was the most frequently seen parasite, followed by *Haemoproteus pratasi* (49 %) and *Aegyptianella* sp. (42 %). *P. circumflexum* (3,5 %), *T. numidae* (2,5 %) and *Hepatozoon* sp. (1,0 %) were infrequently noted.

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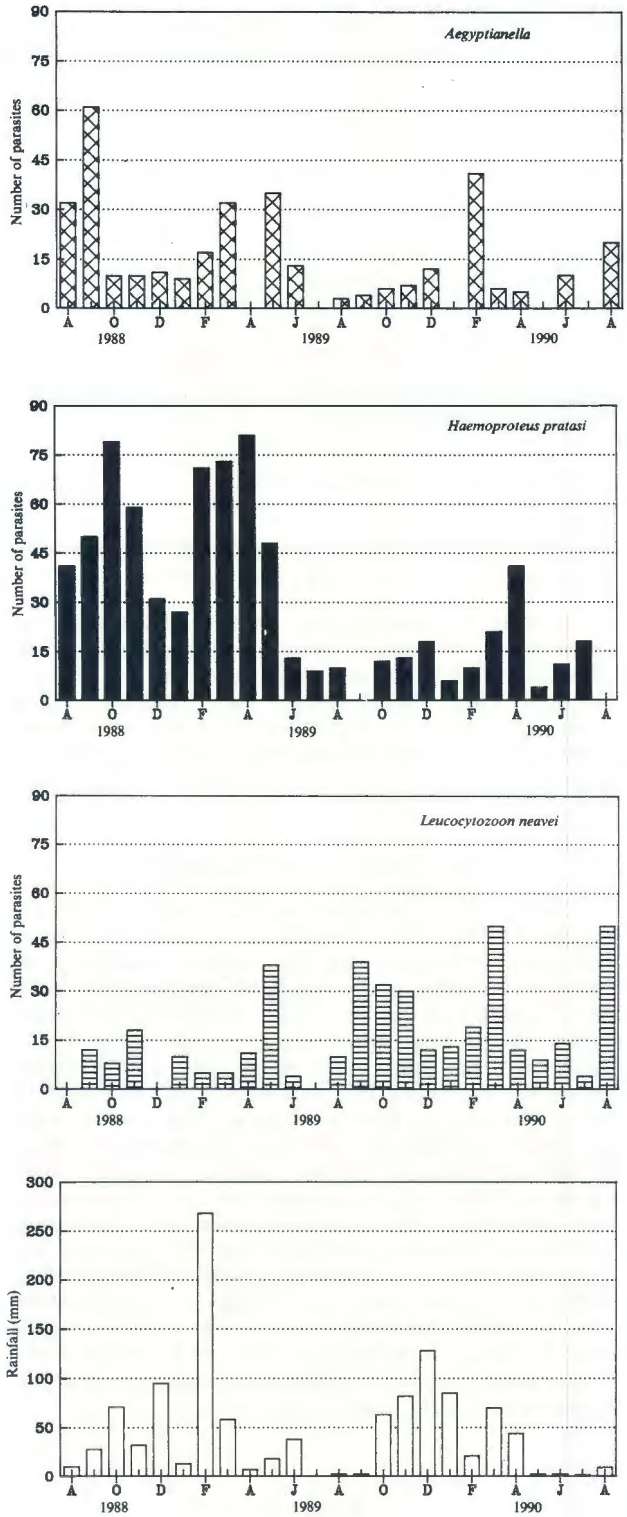

FIG. 1 Fluctuations in infections of *Aegyptianella* sp., *Haemoproteus pratasi* and *Leucocytozoon neavei* in helmeted guineafowls, *Numida meleagris*, from the Skukuza and lower Sabie regions of the Kruger National Park, Republic of South Africa, in relation to rainfall

Aegyptianella sp. was isolated from 6 out of 6 recipient guineafowls and *P. circumflexum* from 2 out of 6 of these after syringe passage. No microfilarial infections were encountered although microfilariae have been reported from this host (Tendeiro, 1948; Oosthuizen & Markus 1967; Bennett & Herman, 1976). Spirochaetes were found in a blood smear made in February 1989, while a low parasitaemia with an unknown parasite was found in another made in April 1990.

The intensities of infection of each of the three most commonly encountered parasites expressed as the number of parasites per 10 000 erythrocytes are graphically represented in Fig. 1.

TABLE 1 Prevalence of avian haematozoa in 114 helmeted guineafowls examined from the Skukuza and Lower Sabie regions of the Kruger National Park

Parasite species	No. of birds infected	% of birds infected	% of infected birds infected
Aegyptianella sp.	48	42,1	49,0
Haemoproteus pratasi	56	49,1	57,1
Hepatozoon sp.	1	0,9	1,0
Leucocytozoon neavei	64	56,1	65,3
Plasmodium circumflexum	4	3,5	4,1
Trypanosoma numidae	3	2,6	3,1
Unknown parasite	1	0,9	1,0

Note: The total number of infections far exceeds the total number of infected guineafowls because of double and triple infections in some birds; there are a total of 176 infections, averaging 1,5 parasite species per guineafowl and 1,8 species per infected bird

DISCUSSION

We do not known whether carrier states for the haematozoa of guineafowl exist and have based our observations on the possibility that they do not. The variations in the prevalence of haematozoa in the guineafowl population would suggest that this might be the case.

Although the pattern is somewhat clouded, presumably because of the small monthly sample size, it appears as if rainfall had a marked effect on the intensity of infection. This is consistent with the findings of Earlé *et al.* (1991), that the prevalence of parasitism is more associated with rainfall than with season of the year. In the present study *H. pratasi* probably illustrates this best as it is dependent on the presence of *Culicoides* flies as vectors.

These flies flourish during the wet season and *H. pratasi* was common and all birds had parasitaemias of high intensity during or following periods of rainfall of more than 50 mm per month (October and December 1988; February and March 1989). This was also the case early in 1990 (Fig. 1). However, during the dry period from April–September, 1989, the prevalence of this parasite was low and remained low until after the rains of November 1989–January 1990, probably because of the dearth of suitable vectors.

L. neavei showed three periods of increased prevalence. Two of these periods, May 1989 and March 1990 coincided with the end of the rains when there was abundant flowing water in the streams that form the breeding areas for the ornithophilic simuliids, which transmit this parasite in Tanzania (Fallis *et al.*, 1937b) and probably also in southern Africa. The September–November peak is difficult to explain, but it is possibly due to birds which acquired their infections elsewhere before moving into the area. This period was very dry and birds probably moved to Skukuza, as there was some food to be scavenged from the garbage dump, where two of the birds were collected each month.

There seemed to be a difference in the timing transmission of *H. pratasi* and *L. neavei* as a high prevalence of one parasite coincided with the low prevalence of the other (Fig. 1). This is in agreement

with the findings of Stacey, Couvillion, Siefker & Hurst (1990) who, in a study on the seasonal transmission of *Haemoproteus meleagridis* and *Leucocytozoon smithi* in wild turkeys, *Meleagris gallopavo,* found no overlap in the timing of transmission of these two parasites.

Aegyptianella showed much the same pattern as *L. neavei* in producing two peaks namely, in March 1989 and March 1990, but the fluctuations throughout the study period were too great to permit definite conclusions (Fig. 1). The burdens of argasid tick larvae (possible vectors of *Aegyptianella*) of the birds also fluctuated considerably with a peak being reached from August to October 1989 (Horak, Spickett, Braack & Williams, 1991). This might strongly influence the parasite fluctuations.

The study of blood smears is not an accurate method for detecting chronic infections with very low parasitaemias. Culture diagnosis for *Trypanosoma,* as done by KirkPatrick & Suthers (1988) for various bird species, will probably show helmeted guineafowls to have much higher infection rates than reported. Similarly a centrifuge technique (Bennett, 1962) is far more accurate for the diagnosis of both trypanosome and microfilarial infections. During this study, syringe passage also gave higher infection rates than those reported from the smears alone (2:6 for *P. circumflexum* and 6:6 for *Aegyptianella* sp.). Syringe passage techniques are unsuitable for detection of *Haemoproteus, Hepatozoon* or *Leucocytozoon* infections as these parasites cannot be transmitted without the intervention of the vector species. There is, unfortunately, no single technique that is ideal for diagnosis of all the haematozoans that might be encountered. This together with the effect immunity as well as the recruitment of young, previously uninfected birds to the population and possible recrudescence of infections in older birds could further influence the parasite levels.

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Miss Andrea van Niekerk drew the graph.

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