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Blood parasites of vertebrates on Aldabra

BY R. S. LOWERY

Department of Biological Sciences, Sir John Cass College, London, E.C. 3

This investigation into the occurrence of blood parasites in vertebrates living on Aldabra Atoll was performed during phase IV of the Royal Society Expedition during April to August 1968.

1. MATERIALS AND METHODS

Blood smears were collected from reptiles, birds and mammals (table 1) and were processed according to the Giemsa technique (Garnham 1966). Whenever possible the live donor was kept until preliminary examination of the smear had been performed. Only those animals which were obviously infected were killed for examination of organs for tissue stages of parasites. This procedure was in accordance with the conservation policy for the atoll but meant that some slight infections might be undetected.

Despite examination of both imprints and sections no exoerythrocytic stages of any protozoan parasite were detected; identification therefore depends on erythrocyte stages alone.

Whenever practicable animals were examined for arthropod ectoparasites which might be vectors of blood parasites.

2. RESULTS

The principle findings are shown in table 1. Details of each infected host species are presented below.

*(a) Reptiles**Hemidactylus mercatorius* (nocturnal gecko)

A single specimen of *Hemidactylus* from South Island was found to be infected with a trichomonad, *Monocercomonas* sp.; this was probably a secondary infection of the blood from the gut as similar forms were found in this later site. The infection was sparse, one parasite being seen in five or six fields under oil immersion, and of no obvious pathological significance.

Most specimens of *H. mercatorius* were infected with ectoparasitic mites of the family Pterygosomidae; the significance of these as vectors of haematozoa in *H. mercatorius* is unknown.

*(b) Birds**Zosterops maderaspatana* (Malagasy White-eye)

Thirty-eight out of 47 specimens taken from several regions were infected with haematozoa.

In all infected specimens there were seen elongated gametocytes of the protozoan *Haemoproteus*; male, female, mature and immature specimens were found. The density of the gametocyte infected erythrocytes was never higher than 3% and was usually less.

In 14 of the 38 infected birds were found occasional erythrocytic schizonts of a *Plasmodium* with up to 14 merozoites. These were of *P. relictum* type; showing typical displacement of the erythrocyte nucleus. However, the precise identity is unknown as no round gametocytes of

P. relictum type were found. The frequency of these schizonts was no more than six to eight in a smear.

Exflagellation in 2.5 to 4.5 min was observed in fresh preparations of blood from six specimens. This supports the identification of the elongated gametocytes as *Haemoproteus* rather than *Plasmodium*.

TABLE 1

species	specimens examined	number with blood parasites	nature of parasite
reptiles			
<i>Geochelone gigantea</i>	78	0	—
<i>Hemidactylus mercatorius</i>	32	1	<i>Monocercomonas</i> (P)
<i>Phelsuma abboti</i>	16	0	—
<i>Ablepharus boutoni</i>	17	0	—
land birds			
<i>Zosterops maderaspatana</i>	{ 47	38	<i>Haemoproteus</i> (P)
	47	14	<i>Plasmodium</i> (P)
<i>Centropus toulou</i>	3	3	<i>Haemoproteus</i>
<i>Streptopelia picturata</i>	32	9	<i>Haemoproteus</i>
<i>Foudia eminentissima</i>	50	0	—
<i>Hypsipetes madagascariensis</i>	26	0	—
<i>Dryolimnas cuvieri</i>	35	0	—
<i>Theskiornis aethiopica</i>	5	0	—
<i>Nectarinia sovimanga</i>	15	0	—
<i>Caprimulgus madagascariensis</i>	3	0	—
<i>Corvus albus</i>	6	0	—
<i>Falco newtoni</i>	1	0	—
<i>Dicrurus aldabranus</i>	1	0	—
sea birds			
<i>Fregata minor</i>	} 62†	9	<i>Haemoproteus</i>
<i>F. ariel</i>			
<i>Anous stolidus</i>	24	1	<i>Haemoproteus</i>
<i>Sula sula</i>	28	0	—
<i>Phaethon lepturus</i>	15	0	—
<i>P. rubricauda</i>	8	0	—
<i>Gygis alba</i>	1	0	—
shore birds			
<i>Egretta garzetta</i>	25	10	nematodes
<i>Ardea cinerea</i>	5	1	nematodes and <i>Haemoproteus</i>
<i>Butorides striatus</i>	1	0	—
<i>Arenaria interpres</i>	1	0	—
mammals			
<i>Pteropus aldabrensis</i>	8	0	—
<i>Tadarida pusilla</i>	3	0	—
†rats	22	0	—
‡goats	14	0	—

† mostly immature specimens on the nest. ‡ Feral animals.
(P) = Protozoa.

The infections were of no obvious pathological significance; one ringed specimen recaptured 4 weeks after initial sampling still carried both *Plasmodium* and *Haemoproteus*.

Search for vectors for *Haemoproteus* has revealed no hippoboscids on this species but mosquitos of the genera *Culex* and *Aedes* are present as possible vectors for parasites of *P. relictum* type.

Centropus toulou (Malagasy Coucal)

The three specimens of this species were all infected with elongated gametocytes of typical *Haemoproteus* form; male, female, mature and immature specimens were present. The level of infection of erythrocytes was heavy in each case; reaching 5% in one specimen. The birds showed no obvious signs of being affected other than the presence of pigment in the liver and spleen. No ectoparasites were recorded from these or from coucals inspected by other workers.

Streptopelia picturata (Malagasy Turtledove)

Nine out of 32 specimens of this species collected in various regions were infected with elongated gametocytes of *Haemoproteus*; male, female, mature and immature specimens were seen. The erythrocyte infection reached 1% in some specimens and some double infections of erythrocytes were seen. Infected individuals were kept in captivity for 15 days without showing obvious signs of ill health or any change in their infections. No hippoboscids were recovered which might have provided a vector for *Haemoproteus*. The parasite resembles, but is not identical with, *H. columbae* which has been found on other species of *Streptopelia* in East Africa (Garnham 1966). The possibility therefore exists that this is an island form of the parasite, but more information is required before this is known for certain.

Fregata minor (Great Frigatebird) and *Fregata ariel* (Lesser Frigatebird)

Young birds were captured at the nest but it was difficult to obtain adults for blood sampling. Since immature specimens of the two species may have been confused birds of this genus are here considered together. Nine out of 62 specimens were lightly infected with elongated gametocytes of *Haemoproteus* type; only one or two parasites were found during extensive searches of individual smears. It is probable that the level of infection among the population was higher than that observed.

Many of the birds were heavily infested with the hippoboscid fly *Olfersia spinifera* Leach, up to 14 specimens being taken from an individual; hippoboscids are known to be vectors for *Haemoproteus* in other species of bird (Baker 1963) but their role on *Fregata* is unknown. A related fly *O. aenescens* Thomson was found on the booby *Sula sula* which nests alongside the Frigatebirds but no haematozoa were found in this species.

Anous stolidus (Noddy)

Adults of this species were sampled while nesting or roosting and in one individual only were found elongated gametocytes, probably of *Haemoproteus*; male, female, mature and immature specimens were seen. The mature gametocyte was very long and thin and almost completely encircled the nucleus; this was quite different from any other *Haemoproteus* seen, but this does not necessarily mean that it is of a different species. The infected bird was apparently quite healthy. Specimens of a tick of unknown identity have been reported from *A. stolidus* but the role of these as possible vectors is unknown.

Egretta garzetta (Little Egret)

The only blood parasites found in this species were nematode worms of the subfamily Splendidofilariinae. Microfilaria were first detected in the peripheral blood and adults were found in the heart and great vessels of the one specimen which was killed. Despite the large numbers

of worms present in the circulatory system the bird was not obviously unhealthy. The arthropod vectors of the nematodes are not known for either the egret or the heron.

Ardea cinerea (Grey Heron)

An injured bird was found to have microfilaria in the peripheral blood and adult nematodes in the heart and great vessels. These were members of the subfamily Splendidofilariinae as seen in *E. garzetta*. In addition to the nematodes elongated macro-gametocytes were seen, probably of *Haemoproteus*. This was a very light infection and no further information is available.

3. CONCLUSIONS

The blood parasites of vertebrates on Aldabra are interesting for two main reasons: (a) as possible pathogenic organisms, (b) as organisms evolving in geographical isolation.

On the evidence available the parasites detected do not cause obvious mortality or disease over the months of April to August. However my trapping methods tended to sample those animals which were mobile and therefore, presumably, healthy. It is possible that during the preceding months, when the majority of birds are breeding, these parasites might be pathogenic for the young birds. Garnham (1967) records that *P. relictum* is pathogenic for the English black-bird and various game birds and suggests that *H. columbae* is pathogenic for young pigeons.

During April of phase IV large numbers of mosquitos were seen biting tortoises, but later on these numbers were greatly reduced. My sampling of the tortoises took place during the latter period and this might explain the absence of blood parasites from this species. Sampling of tortoises during the wetter part of the year when mosquitos abound might reveal a quite different state of affairs in their blood and would certainly be worth doing.

There is as yet no definite evidence that any of the parasites found are specifically island forms. Both *Haemoproteus* and *P. relictum* are of widespread occurrence both in Africa and Asia and local morphologically distinct strains of both organisms occur.

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