Short Communication

First African record of *Leucocytozoon tawaki* (Apicomplexa: Leucocytozoidae) from the jackass penguin *Spheniscus demersus*

R.A. Earlé *
Department of Parasitology, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 Republic of South Africa

G.F. Bennett
International Reference Centre for Avian Haematozoa, Department of Biology, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, A1B 3X9

J.J. Brossy
Department of Anatomy and Cell Biology, Medical School, University of Cape Town, Observatory, 7925 Republic of South Africa

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The occurrence of *Leucocytozoon tawaki* is recorded from blood smears of the jackass penguin *Spheniscus demersus* taken along the South African coast. These records represent both the first African specimens of this parasite as well as the first records since its description from the Fiordland crested penguin *Eudyptes pachyrhynchus* in New Zealand in 1976.

Leucocytozoon tawaki is gevind in bloedsmere van brilpikkewyne *Spheniscus demersus* langs die Suid-Afrikaanse kus. Hierdie is die eerste maal dat die parasiet in Afrika aangeteken is en dit verteenwoordig ook die eerste rekord van die spesie sedert die beskrywing daarvan vanuit die Fiordland kuifkop-pikkewyn *Eudyptes pachyrhynchus* in Nieu-Seeland in 1976.

* To whom correspondence should be addressed

The avian blood parasite *Leucocytozoon tawaki* was first described from the Fiordland crested penguin *Eudyptes pachyrhynchus* from South Island, New Zealand after examination of blood smears (Fallis, Bisset & Allison 1976). This parasite represents the only *Leucocytozoon* species reported for the penguin family (Spheniscidae). Although 17 penguin species have been examined for blood parasites, *L. tawaki* has only been recorded from the type host to date (Bennett, Whiteway & Woodworth-Lynas 1982).

During a survey of blood parasites of the jackass penguin *Spheniscus demersus*, blood smears were taken from penguins received at the Rescue Station of the South African National Foundation for the Conservation of Coastal Birds (SANCCOB) in Milnerton, Cape Town. These birds originated from Plettenberg Bay, Bredasdorp district, and from various offshore islands, viz. Dyer, Dassen, Marcus and Malgas. Additional smears were taken from free-ranging birds handled at Bird Island, Algoa Bay. Smears were air-dried, fixed with 100% methanol or May-Grunwald's Giemsa and then stained with 2% Giemsa for 50 min before being examined.

Blood smears were procured from 400 birds of which three harboured a *Leucocytozoon* infection. Two of these were taken from adult birds originating from Plettenberg Bay and the third from a sub-adult received from along the coast in the Bredasdorp district. All three of these birds were received at the SANCCOB resue station between 17–28 December 1990 and the blood smears were made between 2–10 January 1991.

The leucocytozoid found in the jackass penguin is similar to the description and illustrations of *L. tawaki* provided by Fallis *et al.* (1976). Because leucocytozoids are host-family and not host-species specific (Fallis, Desser & Khan 1974), we have no hesitation in identifying the leucocytozoid of the jackass penguin as *L. tawaki*.

The diameter of each parasite was measured with a calibrated eye-piece on an Olympus BH3 research microscope. Only undistorted, round forms were measured across the parasite at the point where it is not covered by the host cell nucleus (measurement D2 in Bennett & Campbell 1975). The mean measurements of both macro- and microgametocytes from jackass penguins are significantly larger than those given by Fallis *et al.* (1976) in the original description of the species from the Fiordland crested penguin (Table 1). The reason for this is not clear but because Fallis *et al.* (1976) did not state exactly how measurements were made it is difficult to compare directly those from the jackass and Fiordland crested penguins. There can be a great variation in the size of several *Leucocytozoon* species, even at different times of infection in the same bird (Bennett & Campbell 1975), which may also account for the size difference. The dimensions were re-measured from the parahapantotype

Table 1 Measurements of *Leucocytozoon tawaki* in the jackass and Fiordland crested penguins

Host species	*n*	Mean diameter (µm)	*SD*	Range
Jackass penguin *Spheniscus demersus*				
Macrogametocyte	36	13,9	0,8	12,0–15,2
Microgametocyte	20	12,0	0,7	11,2–12,8
Fiordland crested penguin *Eudyptes pachyrhynchus* (Fallis *et al.* 1976)				
Macrogametocyte	100	12,1*	1,0*	10,0–14,0
Microgametocyte	55	9,9*	0,7*	9,0–11,0
Fiordland crested penguin *Eudyptes pachyrhynchus* (parahapantotype)				
Macrogametocyte	60	13,4	1,1	12,7–15,3
Microgametocyte	20	12,7	1,6	8,1–15,1

* Calculated from the data given by Fallis *et al.* (1976).

Comparisons between *L. tawaki* in jackass penguins and those given by Fallis *et al.* (1976). Macrogametocyte comparison: $t = 9{,}774$; $p < 0{,}001$; $df = 134$. Microgametocyte comparison: $t = 11{,}701$; $p < 0{,}001$; $df = 75$.

slide of *Leucocytozoon tawaki* deposited by Fallis *et al.* in the collection of the International Reference Centre for Avian Haematozoa, according to the protocols of Bennett, Earlé, Peirce, Huchzermeyer & Squires-Parsons (1991). These measurements indicate that the parasites from the two hosts are of similar size, as the mean diameters lie within one standard deviation, notwithstanding the original measurements published by Fallis *et al.* (1976) (Table 1).

Fallis *et al.* (1976) established that three species of *Austrosimulium* (Diptera: Simuliidae) are the vectors of *L. tawaki* in New Zealand. Since this genus does not occur in southern Africa (Scholtz & Holm 1985), other species of ornithophilic simuliids must act as vectors in South Africa. Simuliid flies do not occur on the offshore islands (Brooke & Crowe 1982) and probably only feed on jackass penguins when they visit the mainland. This may explain the scarcity of *L. tawaki* in jackass penguin hosts received at the SANCCOB Rescue Station. It is also possible that the penguins are accidental hosts, contracting the parasite from some other avian host when on the mainland, rather than on the colony islands. This possibility should not be completely dismissed, but experimental evidence is required to confirm this point because of the known host-family specificity of other species of *Leucocytozoon* (Fallis & Desser 1977). Furthermore, since there are no *Leucocytozoon* spp. in other New Zealand birds (Bennett *et al.* 1982) it is likely that *L. tawaki* is indeed maintained in only a few penguins where it occurs. In the interim, considering the close similarity in dimensions and appearance of the parasites in the two hosts, we maintain that the leucocytozoid in the jackass penguin is indeed *Leucocytozoon tawaki*.

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