

DISEASES ACQUIRED BY CAPTIVE PENGUINS: WHAT HAPPENS WHEN THEY ARE RELEASED INTO THE WILD?

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SUMMARY

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The possibility of diseases being picked up by penguins and other birds during captivity and the effects which could follow if such birds are released into the wild are discussed. Ways of mitigating such problems are suggested for the African Penguin *Spheniscus demersus*.

INTRODUCTION

Offering succour to the sick and injured is a normal humanitarian reaction which is widely applied to animals as well as humans. Veterinarians are vital to us, working as they do on pets and on poultry or mammals in the food chain. On the voluntary front, any animal or bird unable to fend for itself will readily find helping hands. Death may often be inevitable, but sometimes the creature can be released and it will disappear into its natural habitat. In our times, an increasingly large group of people now take animals or birds out of the wild, either to allow healing of disease or to rear fledglings or cubs which have lost their parents; or, increasingly, to attempt to breed species considered to be endangered. Many moving stories have been written about such experiences, and the challenge usually is what decision to make when the creature reaches maturity: release into the wild is difficult, especially for predators which need parental guidance to learn how to cope for themselves. These efforts may fail, but if they succeed, they produce a fresh set of problems the importance of which we are just beginning to appreciate. One of the most serious is the spread of diseases acquired in captivity into the wild population. This paper will address these problems, specifically for the African or Jackass Penguin *Spheniscus demersus*, and suggest some solutions.

METHODS

African Penguins *Spheniscus demersus* and other seabirds are regularly brought into rehabilitation centres such as that of the Southern African National Foundation for the Conservation of Coastal Birds (SANCCOB) near Cape Town, South Africa, after oiling and injury. Recovery times vary from a few days up to several weeks. The birds are then released at a convenient nearby site. Over the past six to seven years the authors have taken samples from approximately 2000 African Penguins (Brossy 1992). Eight hundred of these were taken from wild birds at their breeding sites. Localities sampled include St. Croix and Bird Islands, Eastern Cape Province, South Africa (34°S, 25°45'E), and Dyer Island (34°41'S, 19°25'E), Boulders (34°30'S, 18°25'E), Robben Island (33°50'S, 18°22'E), Dassen Island (33°25'S, 18°10'E) and two islands in Saldanha

Bay, Marcus and Malgas (33°05'S, 18°10'E), all in the Western Cape Province of South Africa. The remainder were sampled at the SANCCOB Centre. In all cases thin blood smears were prepared and stained with a modified Romanowsky then examined microscopically for parasites. An average of 10 medium-power fields (400×) were examined for 5–10 minutes per slide. In about 30 penguins venous blood samples were stored in citrated tubes for subsequent blood counts. These will be reported separately. For about 300 birds a drop of blood was collected on blotting paper and stored between sheets of plastic. These were sent for ELISA tests to check for antibodies to *Plasmodium* (Graczyk *et al.* 1995a,b) and *Babesia* (Graczyk *et al.* 1996).

RESULTS

Plasmodium

Only *P. relictum* was found in the penguins tested. Parasitaemia in captive birds at the SANCCOB Centre occurred regularly during the austral summer months (October to April/May) and peaked at about 40% around December. Fortunately, this is the quietest time of the year in terms of penguin arrivals at the centre, but the facility handles over 2000 birds a year so a significant number are at risk, and mortality may approach 50%. This finding contrasts sharply with the fact that peripheral parasites were rarely found in the wild birds tested from breeding islands. The ELISA tests show that most of the birds tested at the SANCCOB Centre had antibodies to *Plasmodium*, but they were also present in 60–80% of birds tested in the wild. The possible reasons for this will be discussed later.

Babesia

Babesiosis was found to be endemic in African Penguins. It was the first time this organism had been seen in penguin blood, and after consultation with various authorities it was described as a new species, *B. peircei* (Earlé *et al.* 1993). Our impression is that the organism does not cause overt clinical symptoms except under stress or in association with other debilitating diseases. The seroprevalence of antibodies as

shown by ELISA testing lies between 65–75% (Graczyk *et al.* 1996). The vector is believed to be the argassid tick *Ornithodoros capensis*, because ixodid ticks, usually implicated in the spread of babesiosis, have never been found on any of the birds we have examined. No information is available for the prevalence of either disease prior to 1990.

DISCUSSION

The evidence suggests that most African Penguins, both in the wild and in captivity, have been exposed to avian malaria; but we cannot yet account for the discrepancy between the clinical picture and blood smears in the two groups. Avian malaria is found in a number of common mainland flying birds in the Western Cape (e.g. the House Sparrow *Passer domesticus*, Fiscal Flycatcher *Sigelus silens*, Red Bishop Bird *Euplectes orix*, Karoo Prinia *Prinia maculosa* and Karoo Robin *Erythropygia coryphaeus*). The vector of *P. relictum* is a culicine mosquito, common in the Western Cape, so cross-infection from flying bird to penguin is apparently easy and common. It is possible that the *Plasmodium* infecting penguins in the wild is a variant or subspecies of *P. relictum* which cross-reacts to the ELISA test being used, which is prepared from *falciparum* (e.g. as with *P. relictum capistranoae* found in Hawaiian Crows *Corvus hawaiiensis*, Massey *et al.* 1996). Another possibility is the existence of a dormant stage normally in the liver (the 'hypnozoite', M. Markus pers. comm.) which is activated by the stress of capture and subsequent handling. The hypothesis currently favoured is that *P. relictum* subsp. *spheniscidae* is endemic in wild penguins and that this may at best confer a low degree of cross-immunity to the *relictum* typical of mainland flying birds. The morbidity and mortality suffered by penguins with 'mainland' malaria show that any cross-immunity is very limited. A research programme to distinguish these variants is needed.

All penguins which live in temperate or sub-Antarctic climates are susceptible to avian malaria. The research quoted above suggests that if *P. relictum* subsp. *spheniscidae* is endemic in the island populations it is unlikely to cause any major survival problems. Mosquitoes occur sporadically on the islands given favourable weather (i.e. rain and sun) (pers. obs.), and many who have visited the South African offshore islands can testify to having been bitten. Relatively few mainland flying birds reach the offshore islands and their environments do not allow many to survive for long. However, there are two penguin colonies, both of which have recently been breeding very successfully, in which these constraints do not obtain. The first is Robben Island which is in the lee of the mainland in Table Bay, on which many exotic trees and bushes have been planted and which is partially covered by the trees Port Jackson Willow *Acacia saligna* and Rooikrans *A. cyclops*. Terrestrial flying birds common to the mainland thrive, especially because the several quarries provide abundant water, as well as freely breeding mosquitoes. Here and at the mainland Boulders penguin colony the risk of epizootics of *P. relictum* is

great. During the past two summers a significant number of penguins with clinical malaria have been rescued from both breeding localities. In the absence of a vaccine, individual birds cannot be prevented from getting the disease, and in both colonies aerial spraying may be advisable to control mosquito breeding. At the SANCCOB Centre, which is on the border of a large wetland, several measures have already been initiated to reduce the risk of infection, including placing shade netting over the facility and regular spraying with an insecticide. An additional measure which should be seriously considered is prophylactic medication during summer. No controlled trial has been performed to establish which drug would be the most effective, nor any study of toxicity. Such a trial is long overdue.

The diseases which penguins and other birds can spread to their natural environments after release include Newcastle, aspergillosis, leucocytozoonosis and perhaps others we do not yet know about. Thus the consequences of releasing captive birds and animals after contacts in captivity could be considerable and devastating. We need to take these factors into account when we plan our efforts to help wild animals.

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