THE CANVASBACK DUCK (Aythya valisineria); A NEW HOST RECORD FOR Plasmodium

Author: KOCAN, RICHARD M.

Source: Bulletin of the Wildlife Disease Association, 4(3) : 86-87

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-4.3.86

CASE REPORTS AND BRIEFER ARTICLES

THE CANVASBACK DUCK (Aythya valisineria); A NEW HOST RECORD FOR Plasmodium

The reported incidence of *Plasmodium* in waterfowl is relatively low when compared with that in other species of avian hosts. The only record of a diving duck with a natural malaria infection was that of Savage and McTavish (1951. Parasitology, 37:533-534) who transported an eider duckling (*Somateria mollissima*) from the Bering Sea to Lake Manitoba where it became patent with *Plasmodium circumflexum* and died.

During routine examination I isolated an organism from an adult male canvasback duck (*Aythya valisineria*) that had been captured at the W. K. Kellogg Bird Sanctuary in Michigan on November 18, 1966, by inoculating two 4-week-old mallards with 2 ml of blood. The organism was maintained thereafter by serial passage through Pekin ducklings. The susceptibility of the following hosts was determined by intravenous inoculation of infected blood: Japanese quail (*Coturnix coturnix*), bobwhite quail (*Colinus virginianus*), Khaki Campbell ducks (*Anas platyrhynchos*), mallards (*A. platyrhynchos*), and 3-day-old white leghorn chicks (*Gallus domesticus*). All but the white leghorn chicks were readily infected with the organism. From the characteristics observed during passage through Pekin ducklings, the organism is tentatively identified as *Plasmodium circumflexum*.

Relative parasite density was determined by examining slides under oil immersion (970X).

Examination of stained blood films from the canvasback revealed only one immature parasite. Seven days after inoculation with this infected blood the two mallards showed a maximum parasitemia of 1-3 percent infected cells. Transfer to 2-week-old Pekin ducklings produced similar low parasitemias for two consecutive passages. Intravenous blood transfers (3 ml, I.V.) from these to day-old Pekins produced, after six passages, a massive parasitemia of 90-120 parasites per 100 red cells. Continued passage through older ducklings continued to produce high parasitemias but no mortality was recorded for five such transfers.

Until the parasitemia reached at least 50 percent during successive transfers there was no detectable red cell loss. No mortality occurred in the 20 ducklings used, even though the number of infected red cells reached 100 percent in several cases and was accompanied by severe anemia.

Gametocytes usually filled ½ to 2/3 of the host cell cytoplasm partially encircling the nucleus, and very rarely completely encircling it. The nucleus was only slightly displaced laterally. The outline of the terminal ends of the gametocytes was frequently irregular.

During the early transfers, the schizont, which lay to one side of the host nucleus, contained 6 to 14 merozoites. When the parasitemia became overwhelming, merozoite numbers went up to 16-30 per cell with no change in location of the schizont. Occasionally a schizont was observed lying at one pole of the red cell.

Ring stages were small (1-2 μ), and the trophozoites appeared irregular or ameboid, lying laterally to the nucleus but occasionally terminal. Often 3-4 were present in one cell.

The relatively few reports of naturally occurring *Plasmodium* in ducks may be due to two factors; the first being the unavailability of wild ducks for examination and the second being the techniques used to determine whether the bird is infected. The most common

method used is direct blood film examination. This has value only when the infection is in a state of patency; latent infections often going unnoticed.

Manwell and Herman (1935. J. Parasitol., 21:415-416) and Herman et al. (1966. Avian Diseases, 10:541-547) have shown that much higher incidence of infection is observed when isodiagnosis is employed. This technique, however, is limited by the availability of susceptible hosts, time and personnel to handle the animals, and the need for extensive routine microscopic examinations.

Since the canvasback was an adult, it is impossible to know where it became infected. A comparison of the rate of infection in birds of the year moving south with that of birds returning north would demonstrate whether the nesting grounds or wintering grounds was the site of transmission.

Apparently the parasite is well adapted to the duck host. Regardless of the level of parasitemia, no mortality was observed in Pekin ducks. Perhaps this is not true for young canvasbacks, but since studies of these young birds have not been carried out it is impossible to predict its pathogenic significance for the species.

I believe that this is the first report of a natural infection of *Plasmodium* in the canvasback duck.

RICHARD M. KOCAN
Bureau of Sport Fisheries and Wildlife
Patuxent Wildlife Research Center
Laurel, Maryland 20810
January 31, 1968

PROGRESS REPORT: DUCK PLAGUE SURVEILLANCE OF AMERICAN ANSERIFORMES

The first reported outbreak of duck plague on the American Continent occurred in a flock of White Pekin ducks in the concentrated duck-producing area of Long Island, New York, on January 3, 1967 (Leibovitz and Hwang, Proceedings of the 39th Annual Northeastern Conference on Avian Diseases, 1967). While some members of the order Anseriformes (ducks, geese and swans) have been shown to be experimentally susceptible to duck plague (Van Dorssen and Kunst, 1955. Tijd. Diergeneesk. 80: 1286), reports of natural infection have been limited to domestic ducks (*Anas platyrhynchos domesticus*), muscovy ducks (*Cairina moschata*) (Jansen, J. 1964. Ind. Vet. J. 41: 309-316), and geese (*Anser anser domesticus*) (Jansen and Wemmenhove, 1965. Tijd. Diergeneesk. 90: 811).

Subsequent to the first reported American outbreak in White Pekin ducks referred to above, a surveillance was initiated for duck plague in American Anseriformes other than White Pekins (Leibovitz and Hwang, Bull. Wild. Dis. Assoc., Jan. 1968). The following is a progress report of the continued surveillance on Long Island, representing approximately the last six months of 1967. Further attempts were made to isolate and identify the virus from wild birds during this period.

Virus Isolation and Identification

Swans, geese and ducks submitted to the laboratory for diagnosis were examined for gross lesions. Pieces of the livers and spleens of individual birds were taken for virus isolation. The tissues were homogenized, and antibiotics were added to the homogenate which was used as inoculum. Each inoculum was injected intramuscularly into newly-hatched susceptible White Pekin ducklings, and onto the chorio-allantoic membrane of duck eggs on the 14th day of incubation. Tissue samples were considered duck plague virus positive if the inoculated ducklings and duck embryos died within 7 days postinoculation, and with mortality patterns and gross lesions characteristic of duck plague virus infection. When requested, specimens of duck plague virus positive tissue samples were then submitted for confirmation to the Plum Island Animal Disease Laboratory of the U. S. Department of Agriculture.