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Heart Worm, *Sarconema eurycerca*, Infection in Whistling Swans, *Cygnus columbianus*, in Chesapeake Bay

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ABSTRACT

Seven Whistling Swans from the eastern shore of Chesapeake Bay, Maryland, were examined for parasites during the spring, 1967, and all contained nematodes, *Sarconema eurycerca*, in the myocardium. The mean number of worms, most of which were female worms, was 12 per host. Both mature and immature worms were found in juvenile and adult hosts. Dimensions of these nematodes agreed with those given by Wehr (1939) in the original description of *S. eurycerca*, as well as with those specimens from a Whitefronted Goose from the Northwest Territories. This nematode is widely distributed and has been found in 3 species of swan and 2 species of goose. The life cycle is unknown.

S. eurycerca has been implicated as a cause of death among wild and captive swans and its damage to the heart is known to be severe. However, since the numbers of birds in the area do not appear to be decreasing, light infections may not be pathogenic.

In the late winter of 1967, we undertook a preliminary study on the ecology and movements of the Whistling Swan, *Cygnus columbianus*, in Chesapeake Bay in collaboration with the Canadian Wildlife Service, the Maryland Department of Game and Inland Fish and the Baltimore Zoological Society. More than 20 swan carcasses, nearly all of juvenile birds (less than one year old) were observed along the shores of the study area near Grasonville, Maryland, during the course of the work. More swans than usual remained in the Bay area after the major spring departure of birds. Many of these birds were seen feeding in nearby fields during the day. Such behavior is commonly observed among Canada Geese, *Branta canadensis*, but was rarely seen in swans until 1967. A disease, possibly aspergillosis, was suspected of being the cause of the mortality and unusual behavior of the swans.

METHODS AND RESULTS

In April a fresh carcass from a creek near the Miles River, Easton, Maryland, was routinely examined for parasites. The number of helminths in the intestinal tract was relatively large, but did not appear to be the cause of death. There was no evidence of aspergillosis or of lead poisoning. However, seven mature nematodes were found in the clotted blood in the bird's heart. These were tentatively identified as *Sarconema eurycerca* Wehr, 1939, and positive identification was made by May-Belle Chitwood, Beltsville Parasitological Research Center. *S. eurycerca* is usually found in the myocardium of the heart.

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Subsequently, 6 swans were autopsied and their hearts were carefully examined. Five were juveniles which had remained in the area after the main spring departure. The sixth, a sub-adult, had been transferred from the study area to the Baltimore Zoo and was later found dead in a very emaciated condition.

All of the 7 swans had nematodes in the myocardium. Sixty-one worms were studied and measured in the manner of Wehr (1939) in the original description of *S. eurycerca*. The nematodes ranged in number from 2 to 36 individuals per host, with a mean of about 12. Most of these were females, averaging 10.4 (1-32) worms per host, as compared with only 1.8 (0-4) males per host. Both mature (as indicated by the presence of well-developed microfilariae in the upper vagina) and immature females were present. The mean length of mature females was 29.4 mm (23.0-36.0 mm) and that of males was 11.2 mm (8.6-12.2 mm). These dimensions agree with Wehr's original measurements (30-35 mm and 11-13 mm respectively).

Sixteen mature nematodes from the heart of a sub-adult White-fronted Goose, *Anser albifrons*, collected in the delta of the Anderson River, Northwest Territories by Neraasen and Holmes in 1967, were also studied and compared with the specimens from the Whistling Swans. The worms from the goose were smaller and thinner than those from swans, but were otherwise similar.

DISCUSSION

Sarconema eurycerca has been reported from 3 species of swans and 2 species of geese. It has been found in Whistling Swans from Utah, Idaho, Wisconsin (Wehr, 1939; Quortrup and Holt, 1940; Quortrup and Schillinger, 1941; McDonald, personal communication) and, more recently in Maryland (Herman and Locke, personal communications; present study); and in captive birds from Washington, D.C. (Wehr, 1939; Kluge, 1967). Quortrup and Holt (1940) found this nematode in 9 per cent and 23.8 per cent of the swans they autopsied in Utah in 1937-1938 and 1939 respectively, while M. E. McDonald (personal communication) in 1957-1963 found it in 16.2 per cent of moribund or dead swans from the same area. In the present study, all of seven swans from the Chesapeake Bay, Maryland were infected. *S. eurycerca* has been found in hearts of Trumpeter Swans, *Cygnus buccinator*, of British Columbia (Cowan, 1946) and of Kenai, Alaska (Rausch, unpublished data); and in Bewick Swans, *Cygnus bewickii*, in Yakutia Northeastern Siberia (Skriabin and Shikhobalova, 1948; Ryzhikov, 1958 and 1959).

S. eurycerca may also occur commonly in geese. Microfilariae from the blood of Canada Geese wintering in Illinois have been identified as those of *S. eurycerca* (Levine and Hanson, 1953; Hanson *et al*, 1956). Hanson *et al* (1956) found the rate in geese they examined to be 2.9 per cent. Neraasen and Holmes (personal communication) also commonly found the worms in hearts of White-fronted Geese in the delta of the Anderson River.

It is not yet known whether the birds are acquiring their infections on the wintering grounds or on the breeding grounds in summer. Hanson *et al* (1956) postulated that unless the worms had an extremely long prepatent period, infections probably were acquired on the wintering grounds, since they found no juvenile Canada Geese to be infected. However, Hanson (1956) later observed microfilariae in the blood of wintering juvenile birds, and mature worms were found by us in juvenile Whistling Swans. Furthermore, McDonald (personal communication) found that 17.4 per cent of juvenile swans he autopsied at the Bear River Research Station, Utah contained these nematodes in their hearts. Studies are presently underway

in Alaska and the Northwest Territories to determine if the cygnets acquire their infections prior to their departure from the arctic breeding grounds.

It is apparent that *S. euryerca* is common among the swans overwintering in Chesapeake Bay. That the nematode may be pathogenic and cause the death of the host has been demonstrated (Quortrup and Holt, 1940; Cowan, 1946; Kluge, 1967). Kluge (1967) studied the lesions produced by this nematode and considered the cause of death to be heart failure resulting from extensive damage to the myocardium. In some areas, muscle cells were necrosed, with a loss of nuclei and striations, or were completely destroyed. Cardiac arrest is not uncommonly listed as the cause of death of swans and geese in zoos and refuges, but since the heart muscle is rarely routinely examined for parasites, it is only speculative to attempt to correlate the two conditions. However, if a large percentage of birds in the Bay is infected without extensive mortality, light infections may not be detrimental. Five of the infected swans examined by us were birds which did not migrate in the spring, but made only short, local flights to and from their feeding grounds. Whether the cardiac infections are related to the delayed migration and unusual manner of feeding cannot be determined without further study. It would also be important to understand the effect of the nematode in combination with the stress of the long migration from Maryland to the arctic tundra.

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