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Authors: LOCKE, LOUIS N., STOTTS, VERNON, and WOLFHARD, GEORGE

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An Outbreak of Fowl Cholera in Waterfowl on the Chesapeake Bay

LOUIS N. LOCKE,¹ VERNON STOTTS,² and GEORGE WOLFHARD¹

Abstract

An outbreak of fowl cholera (*Pasteurella multocida* infection) occurred in waterfowl wintering on the Chesapeake Bay during February to March 1970. Losses were primarily confined to sea ducks: oldsquaws (*Clangula hyemalis*), white-winged scoters (*Melanitta deglandi*), goldeneyes (*Bucephala clangula*), and buffleheads (*Bucephala albeola*).

Introduction

Although fowl cholera has been reported frequently among waterfowl wintering in California^{8,9,10} and Texas,^{4,5} the disease has been reported along the Atlantic Flyway only on a few occa-

sions.^{1,2,7} This paper reports observations made during an outbreak of fowl cholera on the Chesapeake Bay during the period from mid-February to the end of March, 1970.

Case History

On February 16, a group of dead oldsquaws was observed on the beaches of James Island, Dorchester County, Maryland. Within the next 2 days, additional numbers of oldsquaw carcasses washed ashore on James Island. Losses were estimated to be between 100 and 200 birds. By the end of the first week of March, carcasses of oldsquaw, white-winged scoters, and goldeneyes had been reported in numbers along the eastern and western shores of Chesapeake Bay. Dead birds were reported on beaches from Scientist Cliffs and Long Beach, Calvert County, north to South River and Annapolis on the western shore, and from Tangier Sound north to Kent Island along the eastern shore.

On March 5, word was received of dead oldsquaws and white-winged scoters washing ashore on the Atlantic beaches of the Back Bay National Wildlife Refuge

near Norfolk, Virginia. On March 7, the refuge manager and his wife walked a quarter of a mile of beaches on Fisherman's Island National Wildlife Refuge at the southern tip of Cape Charles, Virginia, and counted 145 dead oldsquaws and scoters. On the same day, U.S. Game Management Agent Parker and his assistants covered the 5.5 miles of beaches of Holland Island, Dorchester County, Maryland, and counted 1,925 dead oldsquaws, 685 white-winged scoters, 85 buffleheads, 40 green-winged teals (*Anas carolinensis*), 14 Canada geese (*Branta canadensis*), one whistling swan (*Olor columbianus*), and seven common loons (*Gavia immer*).

During the period February 22 to April 30, personnel of the Maryland Department of Game and Inland Fish and the Bureau of Sport Fisheries and Wildlife covered and re-covered 76.8 miles of

¹ Patuxent Wildlife Research Center, Laurel, Maryland 20810. Mr. Wolfhard is now a graduate student at University of Southern Illinois, Carbondale, Illinois.

² Department of Game and Inland Fish, Annapolis, Maryland 21404.

beach on both sides of the Chesapeake Bay and collected 4,780 dead birds, of which 3,371 (70.5 percent) were oldsquaws, 895 (18.7 percent) were white-winged scoters, 86 (1.8 percent) were goldeneyes, and 126 (2.6 percent) were buffleheads. The only large number of puddle ducks found dead was the group

of 40 green-winged teals found on Holland Island. All of these teals had decomposed too far for bacteriological study; in fact, the carcasses were only skin and bones. Three dead black ducks (*Anas rubripes*) and one dead mallard (*Anas platyrhynchos*) were picked up during this collection period.

Laboratory Studies

The majority of the ducks observed had been scavenged by gulls or other predators and were not suitable for laboratory examination. Ducks submitted to the laboratory were usually in excellent flesh and quite fat. Internally, the most constant abnormalities were hemorrhages on the heart and liver, which varied in size from petechiae to large, irregular-shaped blotches. Hemorrhage was frequently present in the lymph follicles lining the esophageal-proventricular junction, usually as a unilateral ecchymosis. No necrosis was seen in the esophagus, a condition useful in distinguishing duck viral enteritis from fowl cholera.

Serosal hemorrhages were often present on the gizzard and intestines. During the first two weeks of the die-off, none of

the oldsquaws examined had any lesions suggestive of hemorrhagic enteritis, but on March 2 a group of eight male oldsquaws was submitted and each bird had hemorrhagic enteritis which varied in extent from discreet annular hemorrhages to an extensive hemorrhagic enteritis involving the entire duodenum. There were no necrotic lesions in the esophagus of any of these birds.

Hemorrhages were present in the lungs, and in several white-winged scoters there were hemorrhages in air sac membranes and the pericardium, as well as in the heart and liver. A surf scoter (*Melanitta perspicillata*) collected on Fisherman's Island National Wildlife Refuge on March 7, had hemorrhages only in the liver and in the thoracic air sacs.

Bacteriology

A gram-negative bipolar cocco-bacillus, seen in blood films stained with Giemsa, was isolated from heart, blood and livers of the oldsquaws, goldeneyes, and white-winged scoter collected at James Island. The bacterium was non-hemolytic when grown on 5% sheep blood or on 5% rabbit blood, was non-motile, and produced acid but no gas with glucose, sucrose, and mannitol. The bacterium produced no change in lactose, maltose, rhamnose, or raffinose, and was indole positive. The organism did not grow on MacConkey's agar. On the basis of the morphology and biochemical characteristics the bacterium was identified as *Pasteurella multocida*.

Two isolates, one from an oldsquaw and another from a white-winged scoter, were sent to Dr. K. Heddlston, National Animal Disease Laboratory, who con-

firmed their identification and serotyped the isolates as 3(B-1059).

When ducks were submitted from new areas or whenever new species were submitted to the laboratory, bacteriological isolations were attempted and all isolates from oldsquaws, goldeneyes, and scoters resembled the original isolates in the tests conducted.

Only six whistling swans of 24 submitted were positive for fowl cholera. Most of the remainder were emaciated. In a few cases, lead poisoning, impaction, or aspergillosis was diagnosed. Neither of two herring gulls (*Larus argentatus*) submitted had fowl cholera, but both had aspergillosis. One ring-billed gull (*Larus delawarensis*) from Taylor's Island had hemorrhages on the liver, and *Pasteurella multocida* was isolated from the liver. Three common loons collected at Fisherman's Island National Wildlife Refuge,

and a gannet (*Morus bassanus*) collected at Back Bay National Wildlife Refuge on March 9, had died of the effects of oil pollution. Internally, there were no changes suggestive of fowl cholera, and cultures made of their livers failed to reveal any *Pasteurella*.

Although the Eastern Shore peninsula is a major wintering ground for Canada geese, only one goose was found to be infected with fowl cholera. Another Canada goose found dead on the beach near Claiborne, Maryland, had focal necrosis in the liver and petechiae on the heart, lesions suggestive of fowl cholera. However, only *E. coli* could be cultured from the liver and heart blood of this goose. Fowl cholera had been diagnosed in many oldsquaws that had washed ashore on this same beach.

Discussion

Although dead ducks were quickly scavenged, there was little indication of the spread of the infection to the scavenger species. Only three dead gulls were collected, and only one of these had lesions suggestive of fowl cholera. There are frequent reports of California gulls contracting the disease by feeding on dead waterfowl. In 1959, Rosen and Morse¹⁰ reported on the spread of fowl cholera (*Pasteurella multocida*) from waterfowl to meadow mice (*Microtus*), and then to owls, hawks, and weasels. However, no *Pasteurella* were isolated from a skunk (*Mephitis mephitis*) found dead on the beach near Claiborne, Maryland (where numbers of dead oldsquaws had washed ashore).

One of our most significant findings was the occurrence of hemorrhages at the esophageal-proventricular junction. These hemorrhages were present in oldsquaws, buffleheads, and goldeneyes, were usually ecchymotic and unilateral, and were frequently 8-15 mm in diameter. Similar hemorrhages were seen in an outbreak of fowl cholera which occurred in muscovy ducks (*Cairina moschata*) in Delaware in 1969. Such lesions are also seen in duck viral enteritis (duck plague).³ Another lesion often encountered in cases of duck viral enteritis is a hemorrhagic enteritis, varying in intensity from annu-

Pasteurella multocida was isolated from an adult female surf scoter (*Melanitta perspicillata*) collected at Back Bay National Wildlife Refuge on March 9. This scoter showed a quite different set of lesions: There was a small amount of petechiation along the coronary arteries and spleen; there were focal necrotic areas in the liver, and the air sacs adjacent to the lungs were thickened, yellowish, and appeared necrotic; and there were ecchymotic hemorrhages at the ileocecal junction. Pure cultures of *P. multocida* were isolated from the heart blood, liver, and lungs of this scoter. Other oldsquaw and scoter carcasses collected the same day at Back Bay Refuge were reduced to skeletons and unsuitable for bacteriological studies.

lar or ring hemorrhages at the site of the annular lymphoid bands to a massive, hemorrhagic enteritis in which the entire length of the intestinal tract is filled with blood and cellular debris.³ The occurrence of similar intestinal hemorrhages in a group of eight male oldsquaws on March 2 was quite surprising. However, attempts to isolate the virus of duck viral enteritis were unsuccessful.

Why was the outbreak largely confined to sea ducks? During the weeks immediately preceding the first positive cases, the weather had been extremely cold, and large numbers of oldsquaws had moved from the shallower waters at the river mouths into the estuarine bays and Chesapeake Bay proper. This was the first year in which the majority of sea ducks were noticed to concentrate in the shallower portions of the Bay until freeze-up occurred.

It is of interest that on January 20, 1970, an emaciated swan was submitted to Dr. F. R. Lucas, Animal Health Laboratory, Centreville, Maryland. From this swan he isolated both *E. coli* and *Pasteurella*. Did oldsquaws pick up the *Pasteurella* from the swans? Swans and oldsquaws were concentrated together in the shallower waters prior to the exceptionally cold weather of January.

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