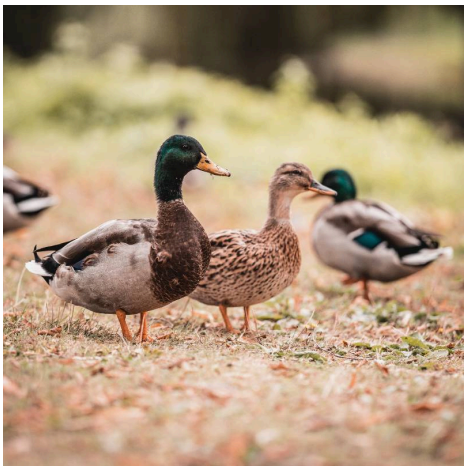
Urban Duck Dead

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The case described is loosely based on a case submitted to UVDL. Details have been changed and added or omitted by the author.

In late summer, the police department of a small town was contacted by concerned citizens because several ducks had died at a small urban park with a pond. A police officer went to the park and noticed several dead ducks close to the pond. Other ducks were still alive but were unable to fly and seemed weak and green fluid was draining from their mouths. The officer was able to catch affected ducks easily and they couldn’t lift their heads. People sometimes swim in the pond. Because of concern for the ducks’ health and any possible pathogens in the pond that may affect swimmers, three deceased ducks were submitted to the Utah Veterinary Diagnostic Laboratory. The ducks had a variety of minor gross lesions: one had an enlarged hemorrhagic spleen, in one duck the liver was enlarged and in the third duck there were numerous small rice-like structures in the breast muscle (sarcocystis). Histologically, there were multiple and varied lesions but no definitive diagnosis was determined. They had evidence of multiple parasitic infections that were unlikely to be of high clinical significance overall: schistosomiasis and sarcocystis are relatively common in waterfowl. Cloacal swabs from the three ducks were pooled and tested for avian influenza. Results were negative: avian influenza virus matrix gene was not detected by real-time PCR testing of cloacal swabs from the ducks.

Case Summary

Diagnosis: Botulism

Pooled gizzard content and intestine content were submitted to the Botulism Diagnostic Laboratory at the University of Pennsylvania for testing. The lab no longer does the mouse bio-assay test (the classic test for botulism, it is still performed at NVSL and at the California Animal Health and Food Safety Lab system, San Bernardino Lab). A real time PCR assay for the botulism toxin gene has been developed and validated and offered commercially by the University of Pennsylvania. The duck intestine contents were positive for Type C botulism by real time PCR and negative for types A and B.

The diagnosis was botulism in this case due to the clinical signs and the positive botulism toxin assay. There are actually 9 known toxins produced by the *Clostridium botulinum* bacterium. They are designated by letters A through I. Waterfowl such as ducks are usually affected by type C toxin as in this case. Ingestion of decaying organic matter or ingestion of the maggots feeding on decaying matter is a common source of the toxin in ducks and sometimes botulism causes large waterfowl die-offs. Spores of type C botulism strains are often present in sediments of wetlands. Type A botulinum toxin sometimes causes disease in birds, most often chickens. Fish-eating birds are sporadically affected by type E toxin. In large waterfowl die-offs due to botulism, sick and dead birds are often found at the edge of receding water, often in warm or hot weather (summer and fall). Botulism affects the peripheral nerves resulting in paralysis of voluntary muscles. Clinical signs seen include inability to fly, inability to walk, paralysis of the nictitating membrane of the eyes, and inability to hold the head up (the classic clinical sign known as Limberneck). When birds can no longer hold their heads up, they often drown (before dying from respiratory failure caused by the toxin). The so-called carcass-maggot cycle (maggots feed on carcass, ducks eat maggots and die, maggots feed on carcass and so on) is a large factor in the large waterfowl botulism die-offs where thousands to millions of ducks may die. Botulism spores are ubiquitous in the wetland environment so eradication of the bacterium is not feasible. To reduce outbreaks in ducks efforts to reduce the accumulation of organic and decaying material in or around ponds will be

helpful (for example, reflooding land that has been dry for some time is not recommended). Also, carcass removal (dead ducks and fish) and disposal by burning or burial is important to reduce substrates for toxin production. A duck can die of botulism after eating as few as 2 toxic maggots. Ducks can recover from disease if given access to fresh water, shade, minimal stress, and/or injection with antitoxin.

Botulism is caused by a potent neurotoxin that is produced by the anaerobic spore-forming bacterium *Clostridium botulinum*. Botulinum toxins are the most potent naturally occurring protein toxins known. Botulism affects a wide variety of animals and birds worldwide and causes flaccid paralysis. Types C and D cause most outbreaks in domestic animals in the United States. Of course, botulism affects humans too, and is the reason that infants under 1 year of age should not be fed honey. Botulism in humans is usually due to ingestion of improperly home-canned foods and is often caused by Type A or B toxin. Humans may also be affected by type E toxin if they eat improperly smoked or cooked fish. Type C botulism has rarely associated with human disease. In French Guyana, a 46-year old man developed clinical signs of botulism after consuming poultry from a flock with confirmed type C botulism. He recovered quickly and the botulism was not confirmed. Perhaps he only ingested a very small amount of toxin or perhaps humans are less susceptible to type C botulism than birds? In addition, type C botulism has very rarely been reported in infants. Most infant botulism is caused by type A or B toxin as in adults.

In conclusion, type C botulism affected a group of ducks at a pond in an urban park in a small town. Type C botulism has only very rarely been reported in humans so the risk to humans swimming in the pond is minimal; however, it is not possible to say that there is zero risk for humans. Removing and disposing of duck carcasses and reducing decaying organic matter around and in the pond will reduce the number of ducks affected by the toxin.

References

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