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Botulism among most poisonous substances known

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Avian botulism is a paralytic disease caused by the neurotoxins produced by the bacteria Clostridium botulism. These spore-forming anaerobes are found in soils and marine sediments throughout the world. Botulism toxins are among the most poisonous substances known.

Toxins produced by different strains of botulism-causing bacteria can be separated into seven types. Types A, B and E are the toxins most often responsible for disease in humans, while types C and D only cause disease in other animals. Avian, or bird, botulism is caused mostly by type C, though it is sometimes cause by type E toxin. Humans and most mammals are thought to be immune to type C toxin so the outbreaks of avian botulism are not considered a threat to humans, pets or livestock.

This bacteria requires warm temperatures, a protein source and an anaerobic (no oxygen) environment to become active and produce toxin. Decomposing vegetation, fish and invertebrates combined with warm temperatures can provide ideal conditions for the botulism bacteria to activate and produce toxin.

Birds either take in the toxin directly or may eat invertebrates, like fly larvae or maggots which contain the toxin. Invertebrates are not affected by the toxin and store it in their bodies. A cycle develops in a botulism outbreak when maggots feed on animal carcasses and ingest the toxin. Birds that consume toxin-laden maggots can develop botulism after eating as few as three or four maggots.

The current outbreak at the Salton Sea is unusual because scientists have found active toxin in the gut of living fish, according to Linda Evans of the Pacific Wildlife Project. Thus birds are becoming ill after eating live fish rather than just the dead fish which are piling up along the shore of the lake. She also said that the outbreak is about six week earlier than usual for the Salton Sea area where temperatures have been in the 105- to 110-degree range.

Healthy birds, affected birds, and dead birds are commonly found in the same area. The toxin affects the central nervous system by

preventing impulse transmission to muscles, which results in flaccid paralysis. Consequently, birds are unable to use their wings and legs normally or to control the third eyelid, neck muscles and other muscles. Birds with paralyzed neck muscles cannot hold their heads up and often drown. Death can also result from water deprivation, electrolyte imbalance, respiratory failure, or predation.

Many birds that are affected can be saved. Birds that have recovered do not have an immunity to the toxin, however.