Type E Clostridium botulinum May Grow In Great Lakes Algal Mats

The USGS Great Lakes Science Center is studying the potential role of Cladophora in transmitting botulism to fishing-eating birds along shorelines of Lake Michigan.

Researchers at the USGS Great Lakes Science Center’s Lake Michigan Ecological Research Station (LMERS) are studying the occurrence of a bird pathogenic bacterium in algal mats along the Lake Michigan shoreline. The bacterium, called Clostridium botulinum (Type E), has been implicated in shore and water bird die-offs in recent years. Scientists suspect the alga Cladophora may promote the growth of the bacterium by providing a suitable habitat, but until now there was no evidence that the bacteria occurred in algal mats. “We’re not sure that the bird die-offs are connected to algal accumulations, but findings demonstrate the potential for Cladophora to act as a reservoir and even promote the growth of these bacteria,” said Dr. Richard Whitman, LMERS station chief.

C. botulinum (Type E) is commonly found in soils and lake bottoms but was not commonly reported in aquatic plants.

In 2006, about 3000 fish-eating birds died in northeastern Lake Michigan from botulism. Bird die-offs appear to coincide with massive shoreline accumulations of Cladophora, suggesting a cause-effect relationship.

While it is not known whether Cladophora may play a direct or indirect role, the present findings shows that Cladophora may promote pathogen growth. Related research has shown that other human pathogens also grow readily within decaying algae.

LMERS scientists analyzed Cladophora for C. botulinum from 14 locations using DNA analysis (above figure). Samples from Wisconsin and Michigan were allowed to decompose under lab conditions. C. botulinum increased at three locations, all located in the area of the 2006 bird die-off.

These results suggest that Cladophora may promote C. botulinum growth, potentially leading to the accumulation of the associated pathogen toxin within algal mats. Toxin ingestion causes severe neurological damage which often leads to bird death.