



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.

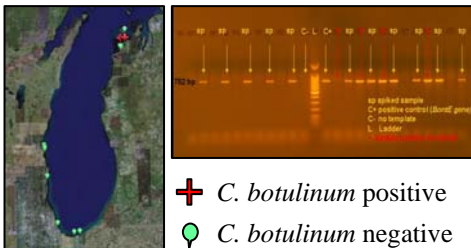


Cladophora, a green alga that grows on hard substrates and the lake bottom in the Great Lakes, becomes detached throughout the summer, and large masses accumulate along shorelines.



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.



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.



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.



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.

