

HARMFUL ALGAL BLOOMS CAN BE DEADLY TO PETS AND LIVESTOCK

Harmful Algal Blooms (HABs) are a growing concern in Ohio. From Lake Erie to the Ohio River, HABs are becoming commonplace in many streams, lakes and ponds. Besides being unsightly and sometimes odorous, some algae can produce toxins that can kill animals.

HABs include toxin-producing blue-green algae which are actually photosynthesizing bacteria (gram negative, photoautotrophic prokaryotes), called **cyanobacteria**. These organisms may produce a number of types of “algal” toxins that can cause skin irritation, illness or even death to pets, livestock and people.

Numerous dog and livestock illnesses and deaths from exposure to HABs have been reported in the U.S. and around the world. As researchers stressed in their March 2003 report to the U.S. House Science Committee’s Subcommittee on Environment,



Technology and Standards, the past 30 years has revealed a substantial increase in the rate of occurrence and the duration of harmful algal blooms.¹ There have been reports from 50 countries, including at least 27 states in the U.S. of human and animal illnesses linked to algal toxins.²

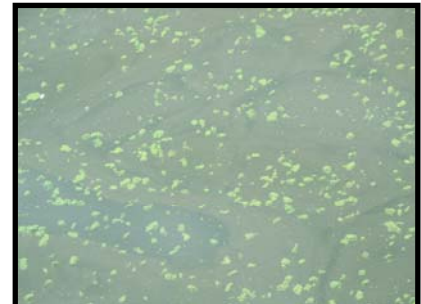
Cyanobacteria Blooms

Cyanobacteria are present in most surface waters including lakes and streams. Excessive growth (blooms) of these organisms can occur any time of the year when an abundance of nutrients (phosphorus and nitrogen) are present in the water. Cyanobacteria blooms increase the possibility of toxin production that may cause illnesses in people and animals.

It is generally thought that most blooms occur in stagnant water in the late summer and early fall when water temperatures are high. However, there are many reports of cyanobacteria blooms developing in the early spring and in slow moving waters, such as the Ohio River. In fact, some species bloom under ice, providing there is sufficient sunlight transmitted through the ice.

HAB Appearance

It is not possible to visually distinguish a toxic cyanobacteria bloom (HAB) from a non-toxic cyanobacteria bloom. Water samples need to be analyzed for a variety of algal toxins to determine if the bloom is toxic. An Enzyme-Linked Immuno Sorbent Assay (ELISA) is generally used to determine toxin



concentration of some common algal toxins, such as microcystin, a hepatotoxin. A bloom of cyanobacteria can have many appearances. These organisms can distribute throughout the water or appear as foam or surface scums. Scum color varies and includes white, brown, purple, blue-green and black. Some scums may appear to be green paint spills, green colonial formations or dots in the water. Some species such as *Planktothrix* do not generally form a scum, but distribute through the water column giving the water a blue-green or brown appearance. Some algae blooms have a foul or musty odor and others do not.

HAB Toxins

Not all cyanobacteria produce toxins. HAB blooms can produce single or multiple toxins that include hepatotoxins, neurotoxins and dermatotoxins. See <http://water.usgs.gov/owq/FieldManual/Chapter7/7.5.pdf> (page 10) for Table 7.5-1 listing some cyanobacteria species and the toxins they may produce. Toxins are tasteless, colorless and odorless.



Some common species that produce neurotoxins, hepatotoxins and/or dermatotoxins are *Anabaena*, *Aphanizomenon*, *Cylindrospermopsis*, *Lyngbya (Plectonema)* *Microcystis*, and *Oscillatoria (Planktothrix)*.

Those cyanobacteria that can produce toxins do not consistently do so and it is difficult to predict when these organisms will produce toxins at the level that may cause illness. Toxins are usually released gradually to the water during natural cell death or quickly when

algaecides are applied to a HAB bloom. When blooms die off and the water looks clearer, toxins persist until they are broken down by sunlight or by other bacteria.

Animal Illnesses

Animals are not hesitant about swimming in or ingesting water with algal blooms. They are exposed to HAB toxins by primary contact resulting in skin irritation, and most importantly by ingesting HAB infested waters; eating blue-green algae on the beach; or when licking fur when self grooming after swimming. And since dogs have a smaller body mass, they are likely to experience more adverse illness and even death at lower algal toxin levels.

According to Dr. Michael Carlson, diagnostic toxicologist with the UNL Veterinary Diagnostic Center at the University of Nebraska, hepatotoxins such as microcystin can cause lethargy, vomiting, diarrhea, weakness, pale mucous membranes and death. Animals suffering from the neurotoxin, anatoxin-a poisoning can experience muscle tremors, rigidity, lethargy, respiratory distress, convulsions and death. Victims of the neurotoxin anatoxin-a(s) poisoning can experience salivation, urination, lacrimation, defecation, tremors, dyspnea and convulsions and death.

Dr. Carlson emphasizes that time can be critical because some exposures to HABs can produce life-threatening illnesses within a half-hour of ingestion, while other exposure may take several hours to days. Time for illness expression is dependent upon the dose of toxin ingested, but other factors are also involved

In September, 1976, four dogs reportedly died after ingesting water from Long Lake near Spokane, during an *Anabaena* bloom. And then in 1982, two hunting dogs died after exposure to a cyanobacterial bloom in Moses Lake. In 1989, five cats died after exposure to a cyanobacterial bloom west of the Cascade Mountains. And in 2007, two dogs and two hunting dogs died after exposure to a cyanobacterial bloom in Potholes Reservoir, Washington.³

Other states such as Minnesota, Nebraska, Oregon, Vermont, and Missouri have reported dog deaths from exposure to algal toxins.

Treatment:

Treatment for HAB illnesses is generally supportive as there are no known antidotes.

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Report Blooms

- Ohio EPA HAB Coordinator
(614) 644-2001

Report Illnesses From HABs (After Immediate Treatment)

For Animal:

- State Veterinarian (614) 728-6220 or (800) 300-9755
- Ohio Veterinary Medical Association (614) 486-7253



For Human:

- Ohio Department of Health (BEH@odh.ohio.gov) or Local Health Department.

References Cited:

¹http://commdocs.house.gov/committees/science/hsy85516.000/hsy85516_of.htm

²USGS: Guidelines for Design and Sampling for cyanobacterial Toxin and Taste-and-Odor Studies in Lakes and Reservoirs. Jennifer L. Graham, Keith A. Loftin, Andrew C. Ziegler, and Michael T. Meyer. 2008

³ Washington State Department of Health, Division of Environmental Health, Office of Environmental Health, Safety and Toxicology
http://www.doh.wa.gov/ehp/algae/faqs.htm#Should_pets_or_livestock_drink_or_swim_in_water_containing_algal_blooms

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Microscopic Cyanobacteria Images:

<http://www-cyanosite.bio.purdue.edu/images/images.html>

Web Links for More Information:

Ohio EPA HAB information -

<http://www.epa.ohio.gov/dsw/HAB.aspx>

Dept of Agriculture, Farmnote: Toxic Algal Blooms. D.C. Main, Veterinary Pathologist, South Perth-

http://www.agric.wa.gov.au/objtwr/imported_assets/content/lwe/water/watq/fn052_2004.pdf

Microcystins: A brief overview of their toxicity and effects, with special reference to fish, wildlife and livestock -

<http://www.oehha.ca.gov/ecotox/documents/Microcystin031209.pdf>

Toxicology Summary -

<http://cal.vet.upenn.edu/projects/poison/cases/case2/c2toxsum/c2toxsum.htm>

Centers for Disease Control and Prevention (CDC) HABISS program website -

<http://www.cdc.gov/hab/>

World Health Organization (WHO) cyanobacterial toxins website -

http://www.who.int/water_sanitation_health/diseases/cyanobacteria/en/