

## Blue Green Algal Toxicity



**What are Algal Blooms and Blue-green Algae?** - When microscopic plants called algae become so thick that they make lake water look like pea soup, the condition is called an algal bloom. Among the more common types of algae producing blooms are the blue-green algae. More than 100 species of blue-greens have been recorded in Alberta, although the most troublesome blooms in central Alberta are caused by only three of these: *Aphanizomenon flos-aquae*, *Microcystis aeruginosa*, and *Anabaena flos-aquae*. Associated with blooms of these species is the threat of

toxicity or poisoning. Intense and widespread toxicity has not occurred in Alberta lakes, although some have been severe enough to cause the death of domestic animals, waterfowl and other wildlife.

**Why Do Blue-greens Make Lakes Toxic?** - Blue-green algae have been known to be a cause of toxicity in lakes, ponds and dugouts for over 100 years, since the first poisoning cases were recorded. Cases of animal poisonings have occurred all over the world, including Alberta. Continuing research has shown that blue-green algae can produce different types of toxins or poisons. Only a few of the toxin-producing blue-green species are normally abundant in central Alberta lakes. Fortunately, these few species are toxic only on occasion because each species may have many strains and only some strains produce toxins. Toxins may be released as soon as they are formed or upon the death or decomposition of the algae.

Toxicity due to blue-green algae can only occur if there is a blue-green bloom dominated by the toxic strains of the bloom species. Toxic strains and non-toxic strains of a bloom may occur at the same time in a lake, and as a result some parts of the lake could become toxic while others could remain safe. Toxicity in a lake is normally temporary, lasting only as long as the bloom or signs of the bloom persist.



**Can Toxicity be Predicted?** - The reason why toxic strains suddenly become more dominant than the nontoxic strains is not known. Consequently, toxicity due to blue-greens is even less predictable than the blue-green blooms themselves. Lakes that have never had a problem can suddenly become toxic. Conversely, lakes that have shown toxicity in the past may never show it again. Careful vigilance of lakes where blooms have occurred is the best approach to identify a problem.

**How Do Blue-green Toxins Affect Animals?** When a lake becomes toxic as a result of a blue-green bloom, the only sign of a problem may be dead waterfowl or

wildlife along the shoreline. Occasionally, domestic animals such as cattle or dogs may be poisoned if they have no other source of drinking water.

Strains of blue-green algae produce a number of toxins that can be classified into two groups according to their effects on animals. Neurotoxins affect the nervous system and cause a rapid death, often within 30 minutes, due to paralysis and respiratory arrest. The second group, hepato-toxins, affect the liver and cause a slow death, up to 36 hours after drinking the water. Common symptoms are lethargy, pallor, hemorrhaging, and swelling of the liver.

Several toxins may be present at the same time and the symptoms may vary or lack clear definition. The amount of toxic water that will kill an animal is generally proportional to the size of the animal. Old, very young, sick or weak animals may have lower tolerance levels and will be poisoned with much smaller amounts.



**How Do Blue-green Algal Toxins Affect People?** - Humans are just as susceptible to blue-green toxins as animals, but it is unlikely that people would voluntarily drink much lake water during a bloom because of the objectionable appearance and odour of the water.

This explains why there are no records of toxicity causing death in humans. However, people may suffer acute discomfort after ingesting or contacting toxins. Symptoms may include fever,

headache, dizziness, stomach cramps, vomiting, diarrhea, skin and eye irritations, sore throat and swollen lips. Symptoms seldom persist for more than two or three days. Children may be more intensely affected because they spend more time in the water than adults and they may accidentally ingest contaminated shoreline water. They also may have lower tolerances than adults to the toxins.

**How is Toxicity Determined?** - Determining the presence of toxins in lakes is not a routine procedure. If the death or distress of animals is observed near a lake, several methods, each of which has limitations, can be used to decide whether algal toxicity is implicated.

The presence of potentially toxic blue-green species can be determined microscopically, but this technique cannot distinguish toxic from nontoxic strains because the strains look alike. A standard mouse bioassay is the fastest way of determining the presence of toxins. Laboratory mice receive injections of lake water or stomach fluids from the dead animals. The survival time of the mice is a measure of toxicity.

Definitive chemical analyses for algal toxins that affect the nervous system can be performed by Alberta Agriculture within a matter of hours. The analysis for the toxins that affect the liver takes more than two days and is complicated because the toxins are difficult to differentiate from some other chemicals.

### **What Precautions Can You Take?**

- ? Treat any intense bloom with suspicion
- ? Do not drink water from bloom-infested lakes and reservoirs
- ? Do not swim or wade in water containing concentrated algal material
- ? When at the lake, watch your children carefully
- ? Provide alternative sources of drinking water for domestic animals and pets

Remember that most blooms are short-lived and that an affected lake will likely be safe again before long.

### **Who Can You Contact?**

If you suspect a problem related to an algal bloom, or if you find dead animals in or near a lake, contact:

- ? Your local **Regional Health Authority** or the nearest Alberta Environment office in [your region](#).
- ? If someone experiences symptoms that may be related to an algal bloom, **contact a physician** immediately.
- ? If your pet has symptoms, **contact a veterinarian** as soon as possible.