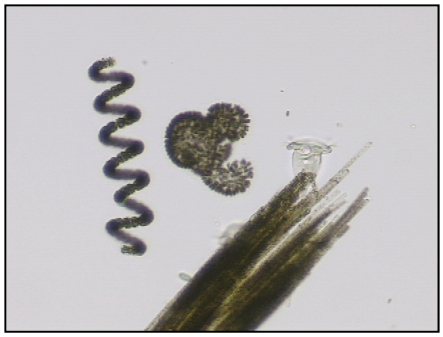
Science Museum of Minnesota

St. Croix Watershed Research Station

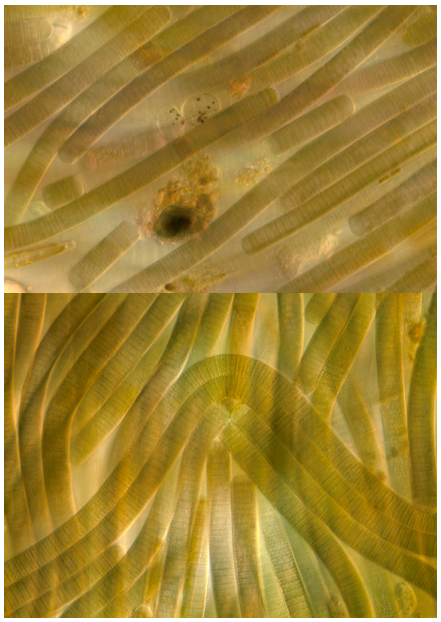
Blue-green algal mats in the St. Croix River

Issue: Occurrence of blue-green algal mats at the headwaters of Lake St. Croix



St. Croix blue-greens
Anabaena, Woronichinia, Aphanizomenon

Blue-green mats in the St. Croix



Oscillatoria limosa filaments

Blue-green algae or Cyanobacteria

- ✓ Cyanobacteria or blue-green algae are one of the common types of "algae." As their name implies, the cyanobacteria are very simple plants without membrane-bound organelles like nuclei or chloroplasts, are usually dark olive-green in color, and range in size from microscopic cells to colonies or growths that can be seen with the naked eye. Some species contain specialized cells called heterocysts where nitrogen fixation occurs – within the cells, nitrogen gas is converted to ammonia – that's cool.
- ✓ Cyanobacteria are common in most freshwaters and live attached to rocks and plants, floating or suspended in the water, or even grow on moist soil.
- ✓ Several species (upper left) are notorious for forming blooms in lakes that suffer from high nutrients. Even more troublesome are that some populations of these species produce neurotoxins (affect the nervous systems) and hepatotoxins (harm the liver) prompting officials to post warnings for people and pets to avoid contact.

Blue-green algae in the St. Croix River

- ✓ Reports of blue-green algae in the St. Croix River date back to the early 1900s. For example, E.G. Reinhard (1931) reported blooms of *Aphanizomenon* in the St. Croix in 1920s. Edlund and colleagues (2009) analyzed algal pigments in sediment cores from Lake St. Croix and showed that blue-green algae have been increasing in Lake St. Croix since the 1960s. Efforts to reduce nutrient loading to the St. Croix River are designed to reduce the frequency and extent of blue-green algae blooms.

The mat-forming blue-greens of the St. Croix

- ✓ There have been recent reports of blue-green algal mats floating in the St. Croix River near the headwaters of Lake St. Croix.
- ✓ The mats are primarily a single cyanobacterium called *Oscillatoria limosa* (left). This alga is very common and forms dense mats on organic-rich sediments in quiescent water. The mats are freed by either mechanical disturbance (e.g., currents or boating) or break free and float due to oxygen production from photosynthesis. Once floating, the mats are easily moved by wind and current and accumulate on the windward shore.

What can be done about the mats?

- ✓ Initial efforts might be best directed at determining where the mats grow, if the growth area experiences excess nutrient loading, and what causes the mats to break free. Understanding the source and cause of mats is necessary to determine how they might be controlled.

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