

Field and Laboratory Guide to harmful Cyanobacteria for Native American Tribes in the United States

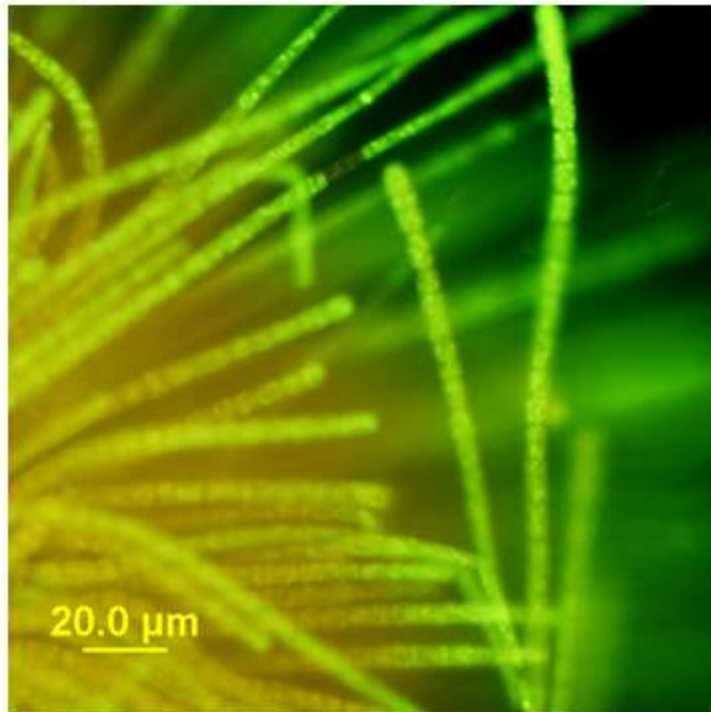
By

Barry H. Rosen, USGS

Ann St. Amand, Phycotech, Inc.

Keith Loftin, USGS

**Field and Laboratory Guide to harmful
Cyanobacteria for Native American Tribes in the
United States**



Open-File Report 2015-~~xxxx~~

U.S. Department of the Interior
U.S. Geological Survey



Background

The several Native American tribes have expressed a potential concern about exposure of tribal members to cyanobacteria and their associated cyanotoxins. Exposure can occur from drinking water from surface water sources or consuming fish where cyanobacteria are abundant.

This project is to perform a preliminary analysis of their waterbodies to determine if there is a significant presence cyanobacteria and if so, are the organisms present known producers of cyanotoxins.

Approach

The overall approach consists of 4 phases:

- 1) recognition of cyanobacterial blooms and distinction from harmless events
- 2) developing protocols for sample collection
- 3) sample from tribal waterbodies
experiencing a cyanobacterial bloom:
identification of key organisms***
- 4) publishing a field guide and developing an “app” that has both field and microscope images of blooms

Sample from tribal waterbodies experiencing a cyanobacterial bloom: identification of key organisms* **Need your help getting a sample**

1. Contact me: 407-803-5508; 407-738-0669 ; brosen@usgs.gov or text 407-738-0669
2. Follow standard sampling protocol (see next slide)
3. Ship live samples (overnight): Barry Rosen, USGS, 12703 Research Parkway, Orlando, FL 32779
4. As time permits, will do this for non-tribal waterbodies as well

Sample Protocol and Preparation

1. Collect 100 mL sample of a bloom live

Possible Methods:

- a) A whole water sample by simple immersing a 500 mL bottle (glass or plastic) into a waterbody. The small volume in a large bottle allows for ample gas exchange during shipping.
- b) A plankton tow of a bloom, which concentrates a sample, and a liquid volume of 10 mL in a 100 mL bottle.

2. Collect 100 mL sample of a bloom, preserved with Lugol's iodine

- a) same procedures as step 1 to collect the samples
- b) add 5% solution of Lugol's to turn the sample the color of tea. (5% (wt/v) iodine (I_2) and 10% (wt/v) potassium iodide (KI) mixed in distilled water and has a total iodine content of 126.5 mg/mL). Alternatively, Povidone-iodine can be used.

Distinguishing a cyanobacteria

Water Fern (*Azolla*)



Upper Left Photo:
Jennifer Graham



Upper Right and Center
Photos: Missouri
Department of
Conservation



Distinguishing a cyanobacteria

Green Algae (*Cladophora/Oedogonium*)

Photo below provided by
Jennifer Graham



Photo above provided by
Nico Clercin

Distinguishing a cyanobacteria

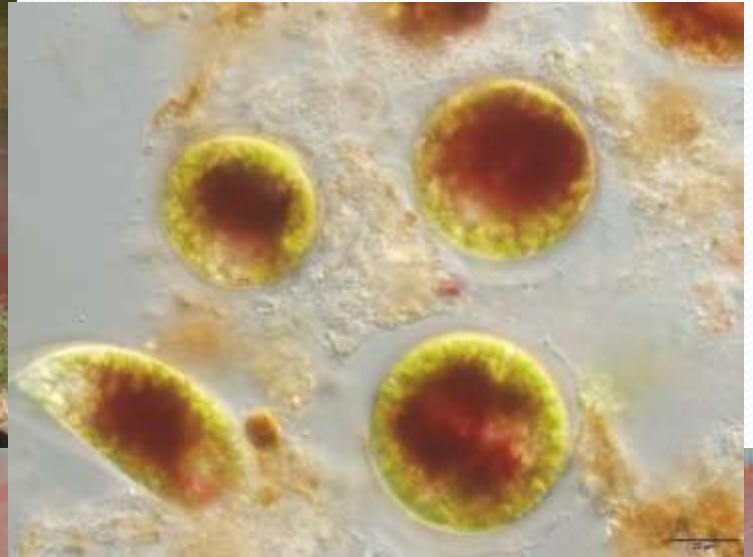
Green Algae (*Mougeotia*)



Photos: Steve Heiskary, MNPCB

Distinguishing a cyanobacteria

Euglenoid Algae (*Euglena sanguinea*)



Photos: Barry Rosen, USGS

Cyanobacteria (*Microcystis aeruginosa*)



Microcystis aeruginosa



Cyanobacteria (*Dolichospermum lemmermannii*)



Dolichospermum lemmermannii





Cyanobacteria
(*Woronichinia naegeliana*)



Inset Photo provided by Linda Green

Woronichinia naegeliana



Cyanobacteria (*Cylindrospermopsis raciborskii*)



Photo by: Michael Martin



Cylindrospermopsis raciborskii



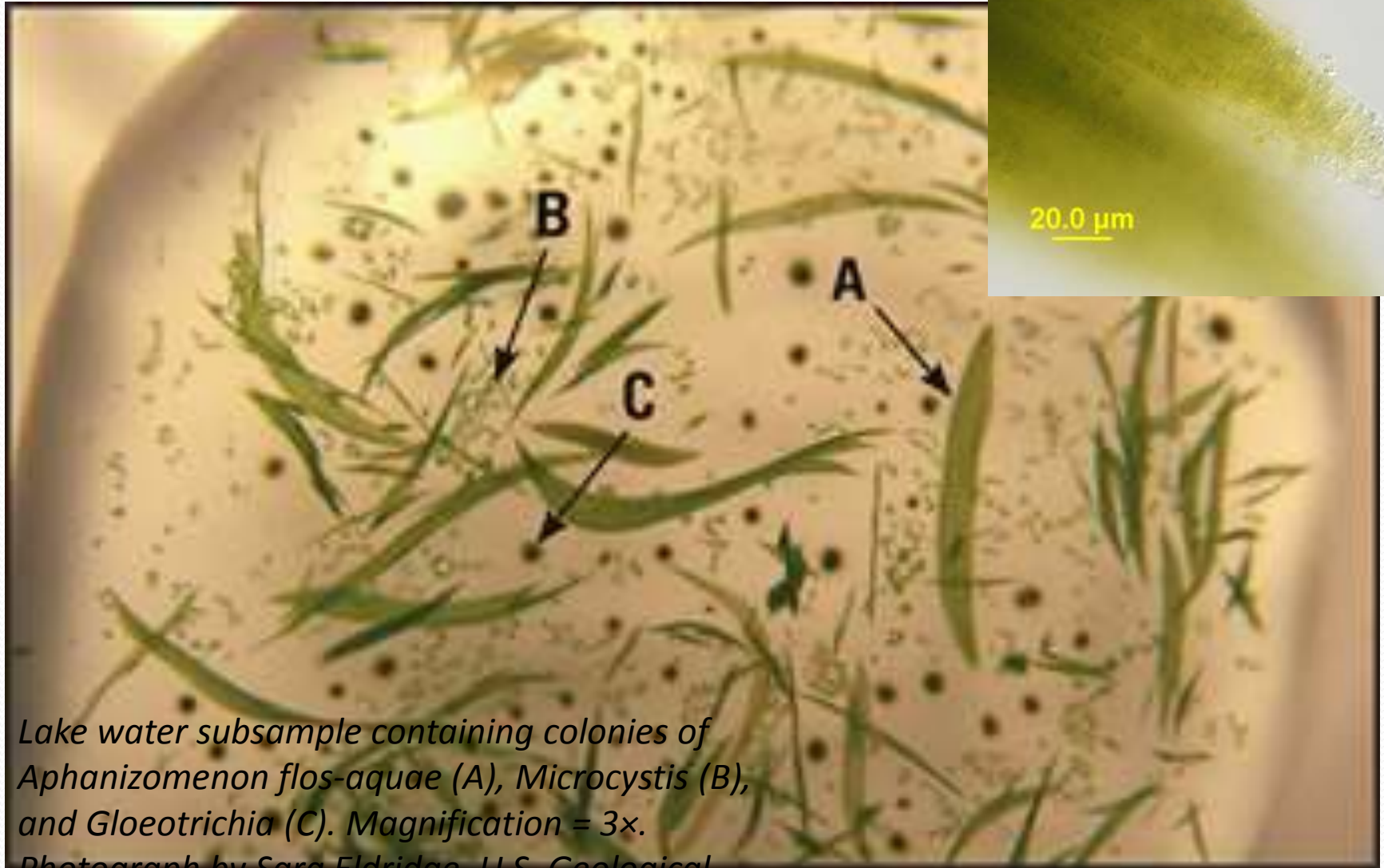
Planktothrix



Cuspidothrix issatschenkoi



Aphanizomenon flos-aquae



Lake water subsample containing colonies of *Aphanizomenon flos-aquae* (A), *Microcystis* (B), and *Gloeotrichia* (C). Magnification = 3×.

Photograph by Sara Eldridge, U.S. Geological Survey

Sample from tribal waterbodies experiencing a cyanobacterial bloom: identification of key organisms* **Need your help getting a sample**

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