

Cyanobacteria

Lyngbya Toxin Monitoring & Evaluation

Conducted for the

Aquatic Toxins Program
Division of Environmental Health
Florida Department of Health

under

US Centers for Disease Control and Prevention
Grant #U50-CCU423360-01

by

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September 2004

LYNGBYA TOXIN MONITORING & EVALUATION

Personnel

- **John Burns, PBS&J**
Principal Investigator/Project Manager
- **Dr. Hans Paerl & Jennifer Joyner (student)**
UNC@Chapel Hill Inst. of Marine Sciences
Investigation of water chemistry and environmental drivers of Lyngbya production
- **Dr. Glen Shaw, Nat. Res. Center for Env. Toxicology, Brisbane, Australia**
Investigation of toxins produced by Lyngbya spp.

LYNGBYA TOXIN MONITORING & EVALUATION OBJECTIVES

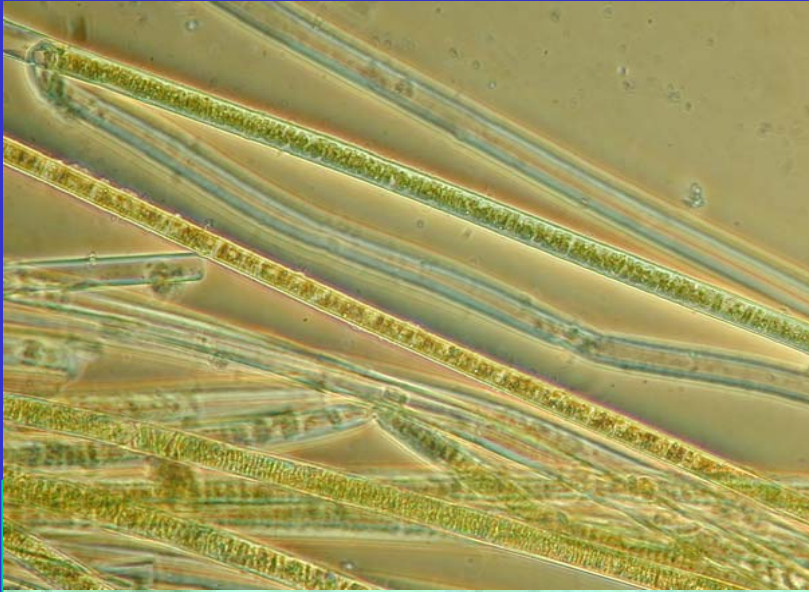
- Assessment of *Lyngbya* spp. blooms in Florida springs and other surface waters
- Identify toxins produced by *Lyngbya* spp.
- Identify implications for human health & exposure via recreational activities

LYNGBYA TOXIN MONITORING & EVALUATION

Past Year Accomplishments

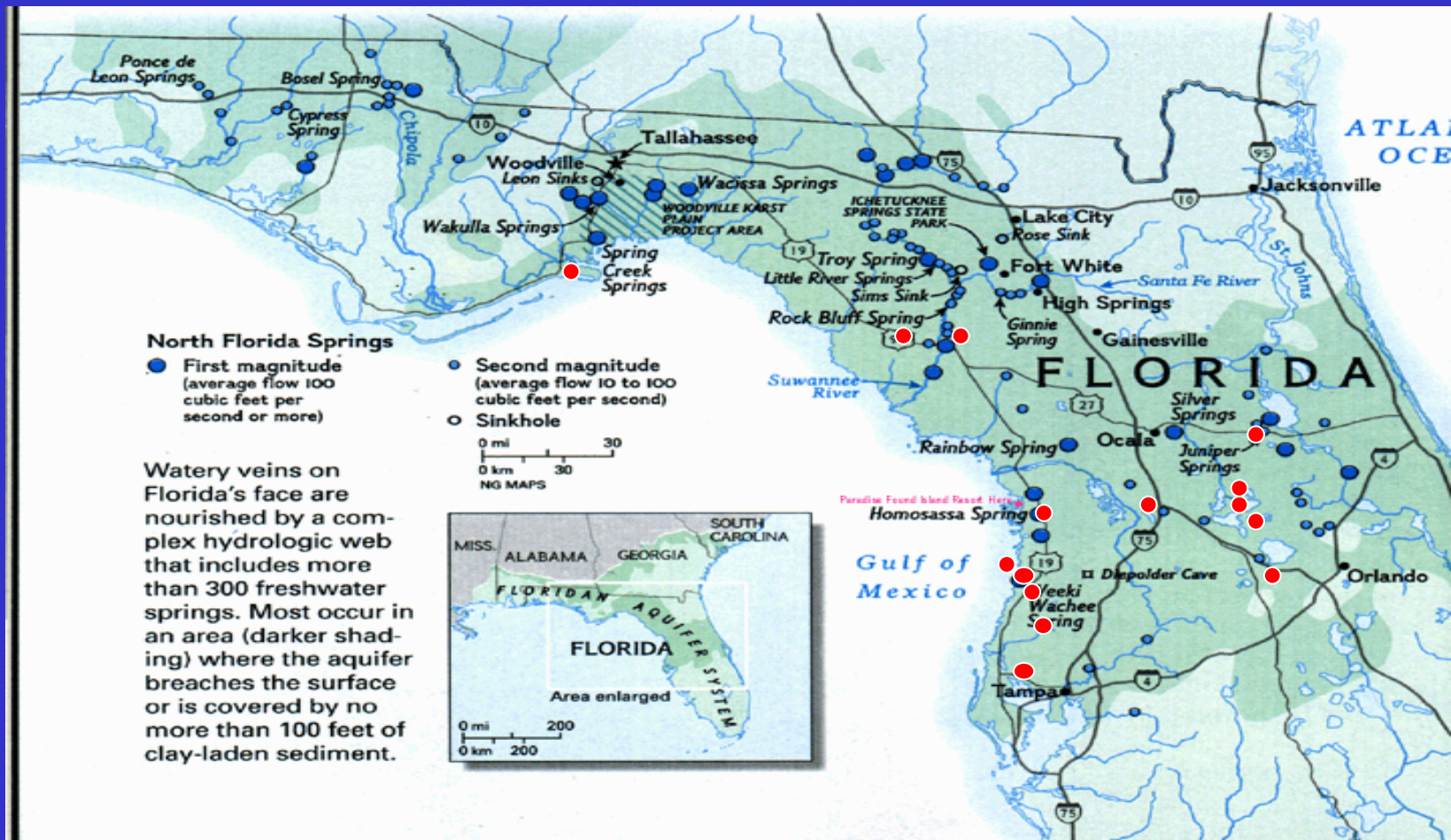
- **Findings:** *Lyngbya* spp. are common in many Florida springs and often form thick benthic and surface mats. Lyngbyatoxin-a and debromoaplysiatoxin have been identified from freshwater *Lyngbya*. Elevated groundwater nitrate and other nutrients may be responsible for the proliferation and expansion of toxic *Lyngbya* spp.
- **Public Health Significance:** Florida's springs are utilized for recreational activities and drinking water purposes. Limited reports of acute dermatitis, blisters, desquamation, and respiratory distress may be related to *Lyngbya* exposure
- **Challenges:** Characterizing exposure and strengthening links between toxin production and human illness.

Lyngbya

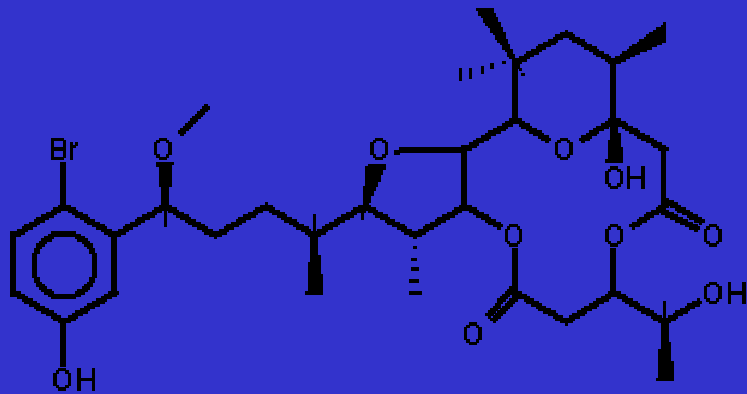


FLORIDA SPRINGS

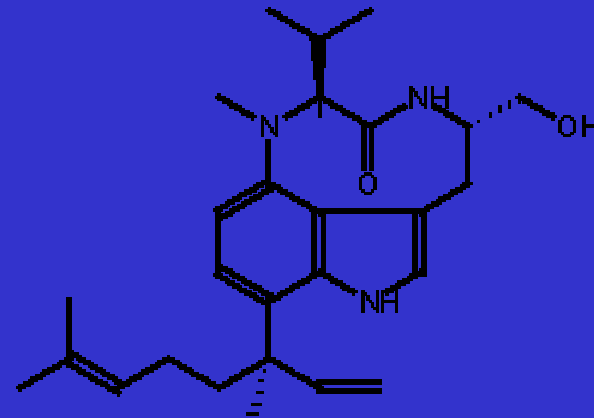
Lyngbya Distribution



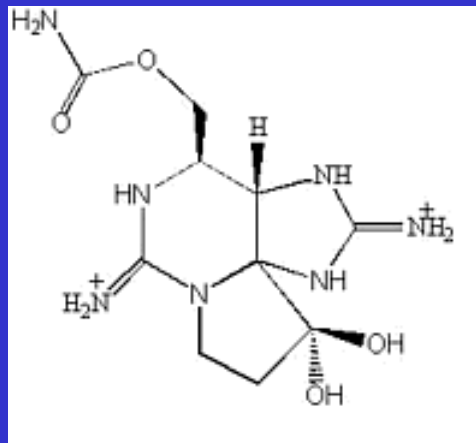
Lyngbya Toxins



Aplysiatoxin

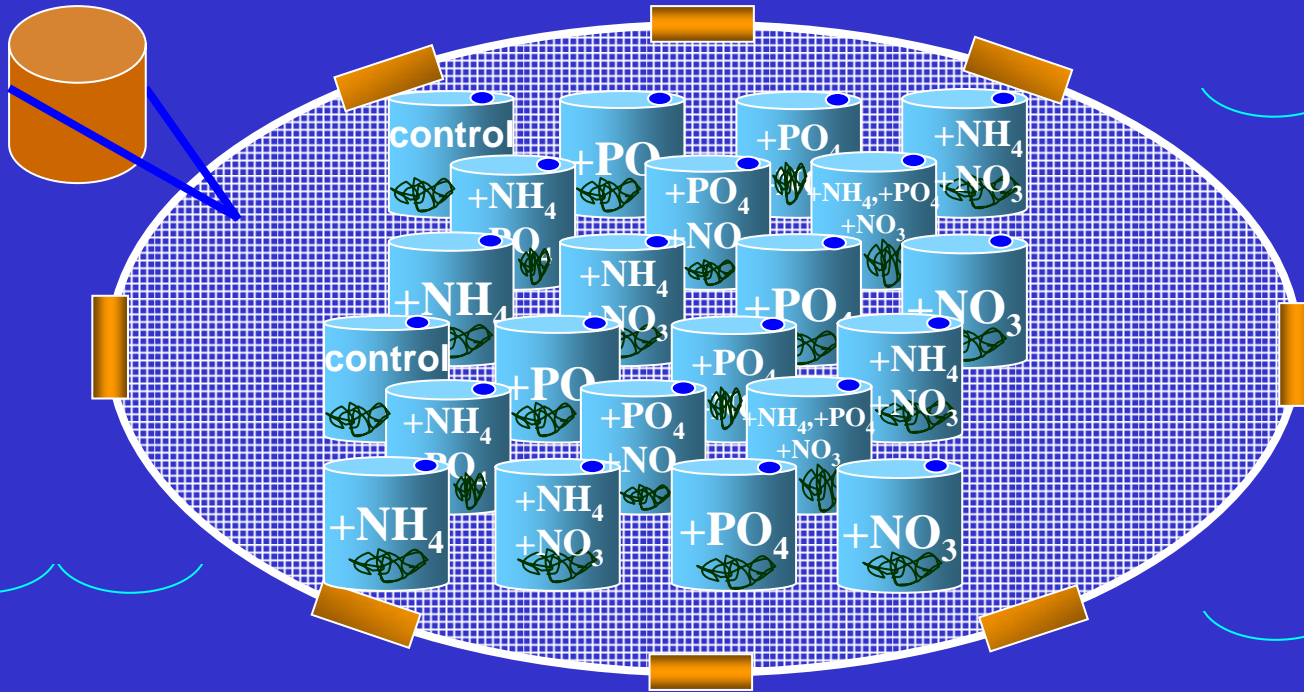


Lyngbyatoxin



Saxitoxin

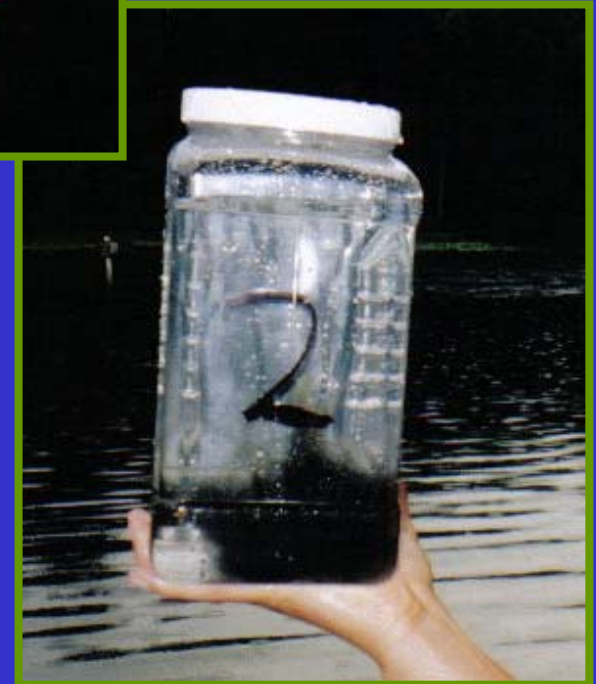
Lyngbya bioassays



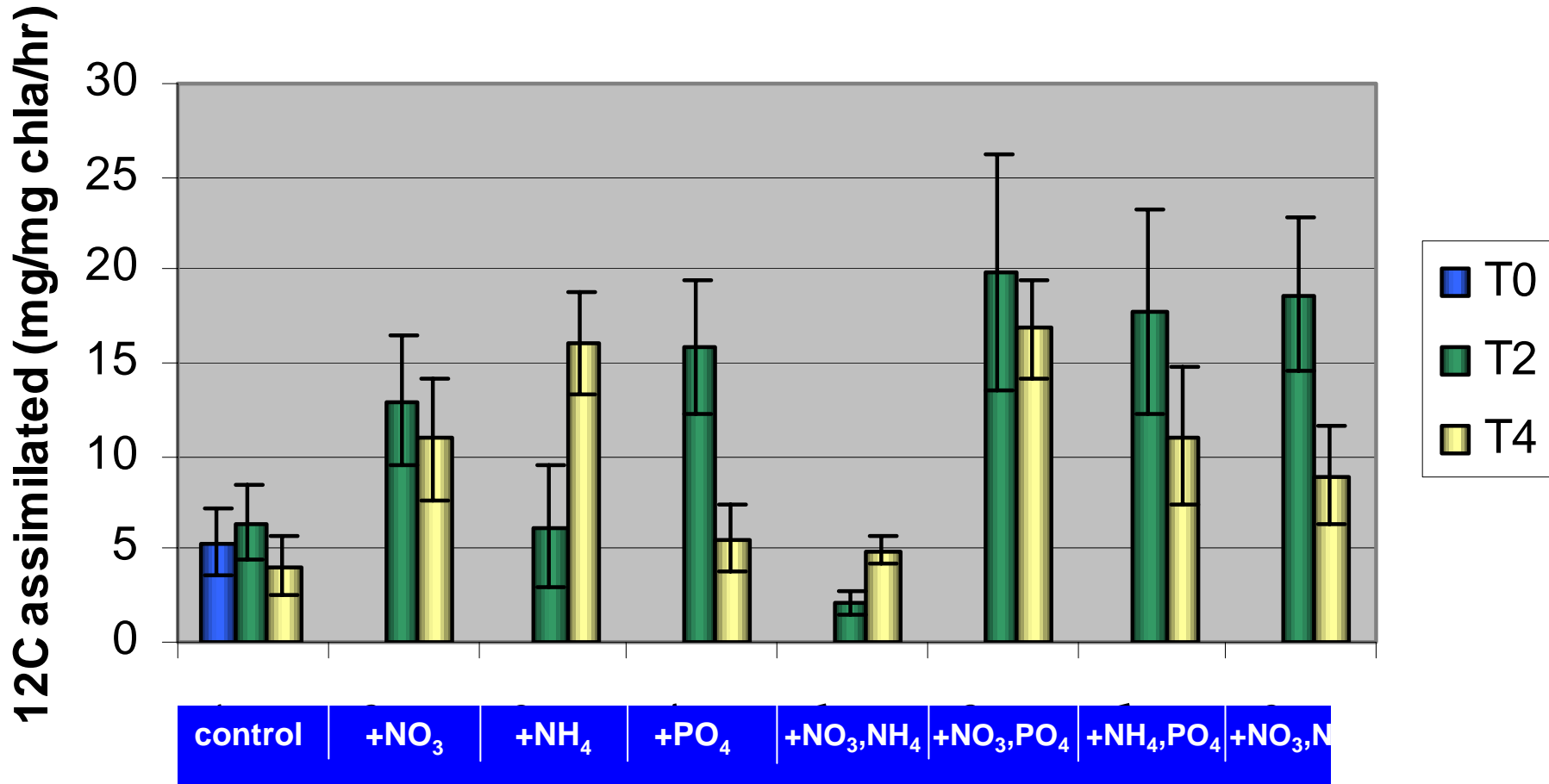
- growth (Δ photopigment concentrations over time: chlorophyll *a*, productivity-¹²C incorporation)
- acetylene reduction experiments to measure nitrogenase activity

Lyngbya Bioassays





Alexander Spring Primary Productivity July 2004



Joyner, et al. dissertation in progress

LYNGBYA TOXIN MONITORING & EVALUATION

Future Direction

- Build on previous investigation by providing an epidemiological survey of recreational users of Florida springs where toxic Lyngbya spp. have been identified and human illness has been reported
- A prospective cohort study, modeled after a previous epidemiological investigation of recreational users of lakes and reservoirs in the US and Australia (Stewart et al., NRCET), will be conducted.

LYNGBYA TOXIN MONITORING & EVALUATION

Synergism & Collaborations

- Results from this study have provided FDOH, CDC, and health practitioners new information regarding algal toxins in freshwater systems associated with the proliferation and expansion of *Lyngbya*.
- New information necessary to respond to HAB related events will be available to managers who are responsible for recreational activities and the environmental quality of Florida springs
- The project data will also be applicable to other areas of the U.S. where toxic *Lyngbya* spp. proliferate in lakes and reservoirs

Study is Ongoing



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Aquatic Toxins Program
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To report illnesses related to Lyngbya or
other Blue Green Algae (Cyanobacteria)
call the toll free Aquatic Toxins Hotline at
1.888.232.8635