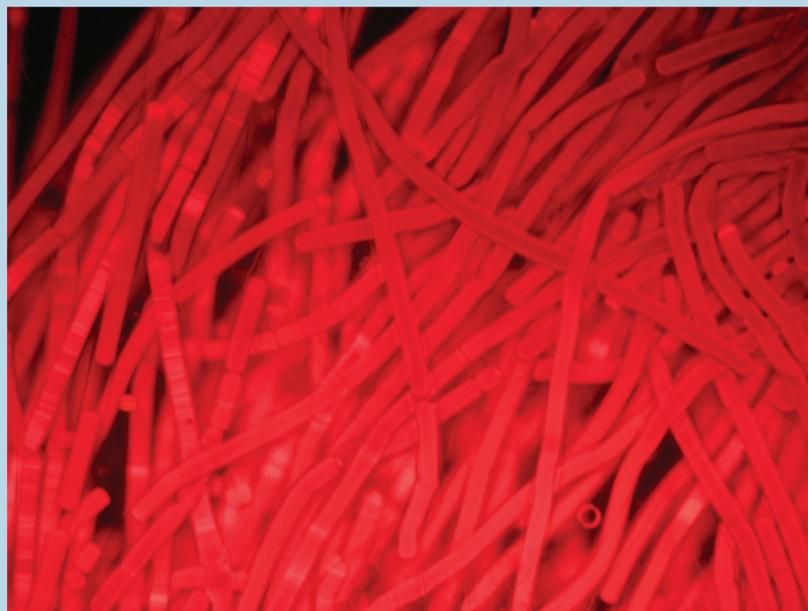


# Deadly Textiles from Cyanobacteria

Brain Chemistry Labs scientists Paul Alan Cox and James Metcalf were snorkeling in seagrass communities in Biscayne Bay, Florida, when Cox pulled from the bottom a puzzling piece of a dark textile, perhaps the remains of a decayed T-shirt. He showed it to Dr. Metcalf as they walked up the beach. Metcalf, in turn, immediately donned research gloves and a surgical mask, since he knew that what appeared to be a textile was in fact a piece of a cyanobacterial mat.

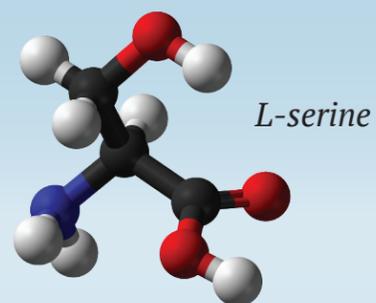


*Lyngbya* under fluorescence microscopy

Florida *Lyngbya* species (recently placed by bacteriologists in the genus *Dapis*) form vast underwater mats that are sometimes washed ashore. In Jackson Hole, we have analyzed samples of these mats washed ashore in Sarasota, and found them to have high concentrations of the cyanobacterial toxin BMAA which has been linked to serious neurological illnesses.

  
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**Brain Chemistry Labs**

A Non-profit Research Institute - Jackson, Wyoming

**discovery**  
THE SEARCH FOR NEW CURES

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**NO LIFEGUARD  
ON DUTY SWIM  
AT OWN RISK**

**TAKE CAUTION WHERE  
RED TIDE IS PRESENT**

Red Tide is caused by naturally occurring algae but it can be harmful to marine life and it may cause the following symptoms in people:

- Eye, throat or skin irritation
- Coughing or sneezing
- Symptoms can be more severe for people with serious respiratory issues—avoid the beach if you have asthma or a respiratory condition

Never touch or swim near dead fish  
Wear shoes to prevent injuries from stepping on bones of dead fish  
Keep pets away from water, sea foam and dead fish

Red Tide may not be present at all  
Pinellas County Beaches

For current red tide conditions, visit [www.myfwc.com/redtidestatus](http://www.myfwc.com/redtidestatus) or call: (866) 300-9399

To report a fish kill, call: (800) 636-0511

**Is Florida at Risk?**

# Focus on Florida

Based on our studies in Guam, we discovered that cyanobacteria produce the neurotoxin BMAA. We subsequently discovered that BMAA can trigger neurodegenerative illnesses including ALS, Alzheimer's, and Parkinson's disease in vulnerable individuals. We are now deeply interested in south Florida where people are periodically afflicted by cyanobacterial blooms. Here are a few highlights of our Florida research program.

## 1) WY Florida?

Early in our studies of cyanobacterial blooms triggered by releases of nutrient-laden water down the Caloosahatchee and St. Lucie rivers from Lake Okeechobee, we became concerned that Florida citizens were not receiving accurate scientific information about health risks from cyanobacterial exposures. As a not-for-profit organization in Jackson Hole, Wyoming, we are relatively immune to political pressures from Florida. We are now pleased to announce the creation of **WY Florida?**, a specific program within the Brain Chemistry Labs to continue to support the people of Florida in obtaining unbiased information on cyanobacterial blooms. We are pleased to accept donations from non-governmental sources to support this effort.



## 2) The Importance of Being Earnest (about N & P)

Cyanobacterial populations explode when they receive excess nitrogen (N) and phosphorous (P) from agricultural and municipal sources. The east coast of Florida has an excess of N from runoffs and drainage of the Everglades, while the west coast of Florida has an excess of P from natural geological formations. Thus, cyanobacterial blooms can be triggered in east Florida by excess phosphorous injected into waterways, while blooms along the west coast are caused by excess nitrogen.

## 3) Miami Vice?

The key to reducing cyanobacterial blooms in eastern Florida is to reduce excess phosphorous. In southwest Florida, excess nitrogen needs to be reduced in the Caloosahatchee. Red tides in that area, composed of a dinoflagellate called *Karenia brevis*, also occur. Sometimes residents of the southwest coast face a “neurotoxic vice” composed of cyanobacterial toxins from inland rivers and coastal red tide toxins from the ocean. Fortunately, this seldom occurs in Miami and the east coast.



## 4) Interrogating the Usual Suspects

Each cyanobacterial species can produce a unique set of toxins. Lake Okeechobee is rich in *Microcystis* which produces a potent liver toxin called microcystin. In 2016, microcystin concentrations in the St. Lucie River exceeded WHO standards by 2,000-fold. In Sarasota, pieces of cyanobacterial mats which wash ashore are largely composed of *Dapis* (formerly known as *Lyngbya*) which are rich in BMAA. This winter *Trichodesmium* blooms occurred. It is important that we continue to collect cyanobacterial samples from Florida, and analyze the toxins they produce in our laboratory in Jackson Hole. We fear that inadequate testing protocols may produce “all is well” outcomes that may not reflect the toxic risks.



We have continued to study the impacts of cyanobacterial blooms in Florida on people, dolphins, dogs, and fish. We are not an advocacy organization, but we hope that our unbiased analyses from Wyoming can assist the people of Florida. Please help us if you can to continue these important studies.

Sincerely,

A handwritten signature in black ink, which appears to read "Paul Cox".

Paul Alan Cox, Ph.D.  
Executive Director