Volume 6 Issue 4

Plankton News

The Newsletter of the Phytoplankton Monitoring Network

Red Tide in the South Pacific Ocean

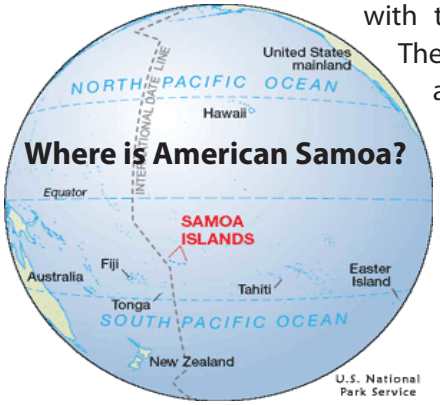
In August 2007, we were contacted to identify the organism causing a red tide in Pago Pago Harbor, American Samoa. Dr. Don Vargo of the Samoa Community College sent preserved samples along with pictures of the bloom. The organism was identified as *Ceratium furca* with maximum abundance of 2,500 cells/ml. The bloom lasted over 3 ½ months. Since algal blooms of this density and duration are unusual for tropical locations, a consistent nutrient source was required for this bloom. A potential nutrient source was the newly constructed soccer field. A New Zealand company was spraying nutrients three times per week on this field which drains directly into Pago Pago Harbor.

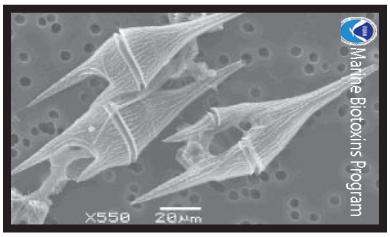
Ms. Arletta Peau, a junior at South Pacific Academy High School in Tafuna, has been collecting plankton from four different sites in Pago Pago Harbor. After collecting the phytoplankton, she uses the PMN identification key to record her findings. If Arletta needs assistance with identification, she emails pictures of the phytoplankton to Dr. Steve Morton.

Top: Liz Symon demonstrating the use of the Scanning Electron Microscope for Agnes Vargo.

Above: *Ceratium furca* bloom in Pago Pago Harbor, American Samoa.

Dr. Don Vargo and Agnes Vargo were able to tour the PMN labs during a recent visit to Charleston, South Carolina. Liz Symon, Microscopist for the PMN, demonstrated the use of the scanning electron micrscope (SEM) and shared pictures of the Pago Pago Harbor bloom that had been captured with the SEM (see below). The PMN looks forward to a continued collaboration with the volunteers in American Samoa and plans to support their efforts to monitor phytoplankton activity in Pago Pago Harbor.





Above: Scanning electron micrograph of *Ceratium furca* from Pago Pago Harbor bloom.

Left: Volunteer taking a sample from Pago Pago Harbor.

In this Issue...

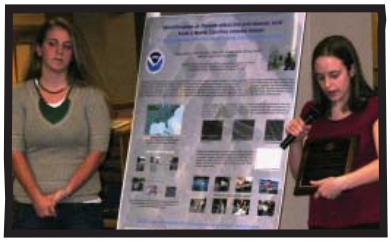
PMN Volunteer Snapshots

NC - Dick Barmore and Elizabeth White, volunteers with the NC Maritime Museum in Beaufort, show JoAnne Powell, the museum's Curator of Education, pictures of plankton from their sample site.

NC - Students from Dare County Alternative School in Manteo, NC sample from the Outerbanks Fishing Pier and are led by Teacher Ashley Bahen (far left).

SC - Amanda Leister, Assistant Interpretive Ranger at Myrtle Beach State Park and a PMN volunteer, uses creative costumes to teach groups about phytoplankton.

NC - On January 8, 2008 a presentation was made to the Dare County Board of Education by First Flight High School students in Kitty Hawk, NC. From left, senior Lauren Nelson and junior Katlin Allsbrook note the recognitions received and significant contributions made by their group in its three years participating in the program under the direction of teacher Katie Neller.



AL - New species discovered in Alabama! *Dinophysis denisi hatifieldus* was discovered by Liam Nevils and fondly nicknamed the "Evil Coach." This phytoplankton bears the name of Dennis Hatfield, a PMN volunteer who assists the Alabama Little Lagoon Preservation Society with 5 sample sites on the Little Lagoon. When Liam's swim team heard that their coach, Dennis Hatfield, was part of the Phytoplankton Monitoring Network, they created this spoof on *Dinophysis* spp. also known as "The Evil Princess."

Updating Algae Sourcebook

The PMN has recently been asked to assist in the revision of ***Algae: A Sourcebook for Teaching about Harmful Algal Blooms***. This resource book is distributed to teachers participating in the network. We are excited about adding new activities to the book, such as Human Health Syndromes. The PMN is collaborating on this project with Lundie Spence and Elizabeth Vernon of Centers for Ocean Science Excellence Eduation (COSEE). If you are an educator and have used this sourcebook, we are interested in your feedback. Please contact Allison Sill with any suggestions you have.

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Published by the Phytoplankton Monitoring Network - For information on the PMN or to submit an article, contact Allison Sill
Tel: 843-762-8656, Email: allison.sill@noaa.gov, Fax: 843-762-8700 or visit us on the web at: http://chbr.noaa.gov/pmn

Q & A With a Marine Biologist
Luis Leandro

School: College of Charleston
Degree(s): BS Biology, pursuing a MS in Marine Biology
Favorite Subject: I have a broad interest in marine sciences, but am particularly interested in ecology, conservation and toxicology
Best Part of Job: I love microscopy work. Phytoplankton are way cool when looked at under a microscope.
Hobbies: Soccer, music, dancing, cooking, hiking and others. Photography is another passion of mine, that is why I enjoy microscopy so much.

Q: How did you become involved in marine science?
A: Since very young I have always been passionate towards the oceans and marine life. I would spend hours walking the beaches, picking all the stuff off the sand that I thought looked cool. After I got my degree in Biology, I wanted to learn more about marine biology and explore that field. I ended up in Charleston to get my Master of Science.

Q. What are your current research areas?
A: I am looking at the trophic transfer of the marine biotoxin domoic acid (DA) up the food chain from its source, toxic diatom species within the genus *Pseudo-nitzschia*, up to the highly endangered N. Atlantic right whale. My project focuses on determining the presence of DA in right whale feces by several methods of analysis, as well as assess the potential implications that this toxin may have on right whale health. In addition, our work focuses on determining the route(s) of toxin transfer to right whales by looking out for potentially toxic *Pseudo-nitzschia* species in several phytoplankton and zooplankton samples.

Q: What do you plan to do next with your career?
A: I have gained an interest in marine policy, and for the next year I will be in Washington DC as a Marine Policy "Knauss fellow" working for NOAA. I think it is increasingly important to break the gap between science and policy, so politicians can make inferred decisions about a given environmental issue. I am eager to learn more about this field in the next year. After that, we will see.

Species Spotlight:
Ceratium furca

Found solitary or in pairs, *Ceratium furca* is a dinoflagellate characteristically found worldwide in temperate and tropical waters. Ranging in size from 70-200 µm long and 30-50 µm wide, *C. furca*'s body is straight and triangular in shape with an epitheca that tapers gradually into three anterior horns, two of which are paired. If viewed from its backside, *C. furca* is distinctively concave in shape.

Like many dinoflagellates, *C. furca* reproduces asexually and obtains energy through photosynthetic pathways utilizing light from the sun. However, under adverse conditions *C. furca* is known to reproduce sexually and obtain energy through phagocytosis, ingesting external energy sources such as ciliates and tintinnids. This ability to obtain energy internally (photosynthesis) and externally (phagocytosis) is known as mixotrophy.

The entire genus of *Ceratium* is not known to produce toxins, however, blooms are contributing to ever-increasing ecological damage to coastal areas with serious impacts on the ecosystem. During large blooms, the three horns can cause damage to fish gills that eventually leads to large fish kills. Fish kills have also been a result of suffocation induced by mucus production in *C. furca* that clogs the gills of fish. Interestingly, the decay of a red tide of *C. furca* caused large marine mortalities in March 1994 in St. Helena Bay on the South African west coast, a result of hydrogen sulphide poisoning caused by anaerobic bacteria present in the absence of dissolved oxygen in the water.

A 1997 bloom of *C. furca* in the Elands Bay of South Africa led to anoxic conditions causing over 1500 tons of rock lobster to strand and die.
Photo: Dr. Grant Pitcher

News and Notes

Toxic *Pseudo-nitzschia*: Port O'Connor Fishing Pier, TX

On Wednesday, October 17th, 2007 Paul and Mary Meredith, volunteers with the Texas Master Naturalists Mid-Coast Chapter, collected a sample at Port O'Connor Fishing Pier. In the sample, they identified more than 1300 *Pseudo-nitzschia* cells and over 1000 *Chaetoceros* cells. After calling PMN, Paul and Mary overnighted preserved and live samples to the NOAA lab in Charleston. In the lab Dr. Steve Morton and Liz Symon prepared the sample for scanning electron microscopy and identified it as *Pseudo-nitzschia pungens,* a species that can produce the toxin, domoic acid (DA). The live sample was given to the Analytical Response Team (ART) to conduct a toxin analysis. ART reported that the *Pseudo-nitzschia pungens* cells were producing DA: Cell Count: 300 cells/mL, Toxicity: 0.22 ng DA/mL of seawater.

The significance of this finding is that it was the first volunteer report of domoic acid in coastal Texas Gulf waters. Previously, the western most report of DA in Gulf waters was from Louisiana. Without the sampling that is taking place in TX, this toxic domoic acid producing event most likely would have gone unnoticed. Great work Paul and Mary and to everyone involved with the PMN in Texas!

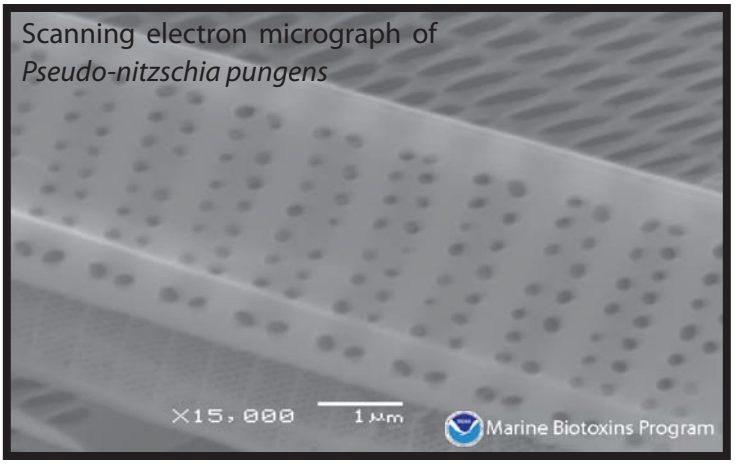
In related activity Lisa Campbell, a researcher at Texas A&M who has a Flow CytoBot deployed at Port Aransas on the ship channel commented that they observed high numbers of *Pseudo-nitzschia* in the Flow Cytobot images. Since they are looking at images in "real time" from an instrument at Port Aransas, PMN volunteer identifications would be helpful to them in identifying cells present in the water.

PMN Volunteer Groups in the Scientific Spotlight

On October 28 - November 1, 2007, Dr. Steve Morton participated in the 4th Symposium on Harmful Algae in the US making a presentation entitled "Identification of *Pseudo-nitzschia* and Domoic Acid from a North Carolina Coastal Bloom: Linkage Between Volunteer Observations and Biotoxins Research." The presentation was co-authored by the PMN staff and Katherine Neller, Danielle James (from First Flight High School) and Marcella Turonis (of the College of the Albermarle). Dr. Morton also presented a poster with our collaborators at the national coastal Data Development Center entitled "Data Management Supporting Regional Volunteer Phytoplankton Monitoring Efforts." Over 250 scientists from around the United States participated in the conference.

Networking Across the Country

October 2007 was a busy month for the PMN with presentations at the Georgia Association for Marine Educators (GAME) Conference, South Carolina Marine Educators Association (SCMEA) Conference, Mid-Altantic Marine Educators (MAMEA) Conference, and the Chesapeake Bay Education Summit. By participating in these meetings, relationships are established that lead to an increase in the number of PMN volunteers per state as well as improved communication between agencies and citizen groups. We look forward to increasing our participation in marine education meetings as we continue to expand nationally.



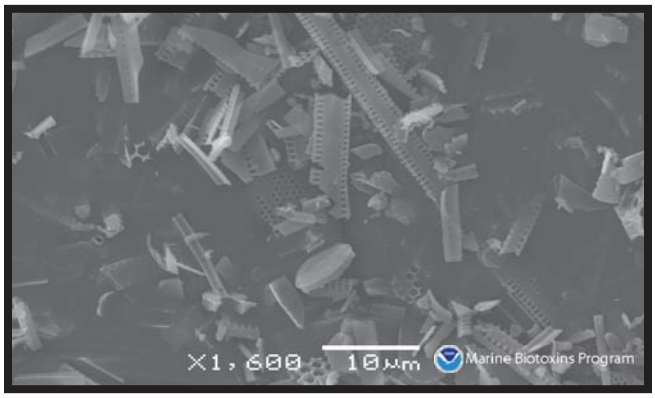
Update from Dr. Morton

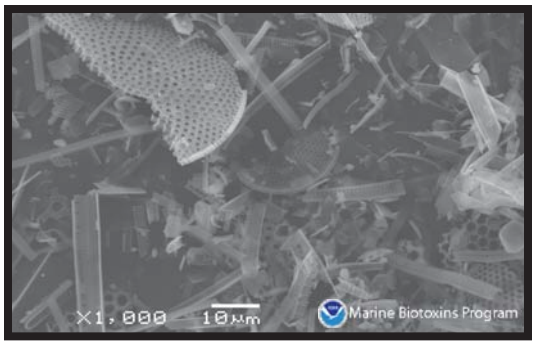
From Left: Dr. Steve Morton & Dr. Don Vargo

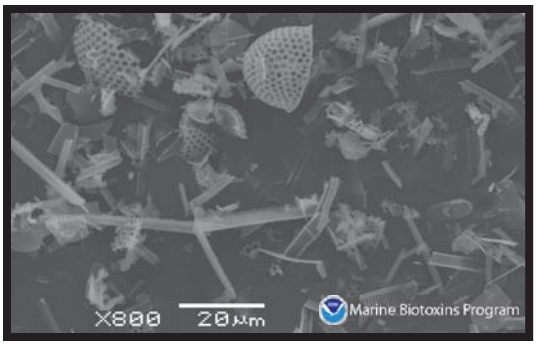
Happy New Year to all the volunteers! I hope your phytoplankton hunting goes well in 2008.

Since the last newsletter, the network has been involved with two separate *Karenia brevis* events. In the fall of 2007, a red tide was reported along the coast of Jacksonville, FL. Our southern Georgia volunteers were kind enough to sample to determine if this bloom would make a northward push. The second was during December 2007 along the coast of Alabama. The "Crimson Tide" groups were able to detect the westward progression of this bloom before it was detected by satellites.

On the research side, we started a collaboration with Savannah State University to examine fossil diatoms of a core sample collected off of the west coast of Africa. This core was dated to over 3 million years old. By examining species composition, we hope to be able to determine the paleoceanographic upwelling events and link this to paleoclimatological events. From the scanning electron micrographs below, how many species can you name?







Harmful Algal Bloom Integrated Observing System (HABIOS): Gulf of Mexico Workshop

In November 2007, a meeting took place in New Orleans, Louisiana to finalize a plan that will create a Harmful Algal Bloom Integrated Observing System (HABIOS) for the Gulf of Mexico. Bart Bibler (Florida Department of Health) and Dr. Worth Nowlin (Gulf Coast Ocean Observing System) have agreed to oversee the development of this plan. The PMN was asked to present on the first day of the workshop in order to educate participants about the network and its possible inclusion in the HABIOS. Representatives from Florida, Louisianna, Mississippi, Alabama, Texas and Mexico were in attendence.

PMN Bulliten Board: What's Happening

Monitoring the Chesapeake Bay

After presenting at the Chesapeake Bay Education Summit in Williamsburg, Virginia in October, the PMN has been eager to recruit volunteers in the Bay area. In collaboration with Doug Levin, of the NOAA Oxford Labs and Ann Marie Chapman with NOAA's Nauticus program, it will soon be a reality. The PMN is offering two training workshops for educators in the Chesapeake Bay area who are interested in joining the network. Trainings will be held on March 15 at the NOAA Nauticus facility in Norfolk from 8-11am and at the Virginia Institute for Marine Science (VIMS) from 2-5pm. If you are interested in attending one of the workshops, please contact Ann Marie Chapman (annmarie.chapman@noaa.gov or 757-627-3823).

Microscopy Workshop

It's time for the 3rd Annual Microscopy Workshop! It will take place on April 4, 2008 from 9:30-4:30,at the CCEHBR Lab at Fort Johnson in Charleston, SC. Come refresh your microscope techniques and learn about new technologies that you can bring back to the classroom. Dr. Steve Morton will be the key presenter and there will be hands-on activities for you to use in your classroom along with microscopy take home materials. Please bring a personal or school microscope along with you. Dress is causal, but you must wear closed-toed shoes. Contact Jeff Paternoster (jeff.paternoster@noaa.gov or 843-762-8657) if you are interested in attending! Space is limited to 25 participants.

PMN Plankton Field Trip at the 2008 National Marine Educators Association Conference

NMEA 2008 will be held July 21 – 24 in Savannah, Georgia. The Phytoplankton Monitoring Network and North Inlet-Winyah Bay will be sponsoring a ***Dive into Plankton*** Field Trip at the UGA Marine Education Center and Aquarium on Skidaway Island. Come join us and get your hands wet while exploring the diversity of zooplankton and phytoplankton of Coastal Georgia. Learn how to implement plankton studies into your school curriculum or into informal educational programs. Or come along and learn what it takes to become a volunteer monitor. See you in Savannah!

Phytoplankton Monitoring Network
219 Fort Johnson Road
Charleston, SC 29412