FLOW: Amigos de Bolsa Chica Citizen Science Program

Plankton Collection and Identification Report

Date: 05/24/13 Time: 2:30 PM

Collectors: Nicole G., Kevin J., Joey Victor (Fullerton College students); Sandy M., Shawleen G., Jeremy B., Belen C. (Orange Coast College students); Frank Z., Karl S. (Long Beach City College students); Joana T., Dennis P., Judy H., Brian W., Chuck D. (Amigos de Bolsa Chica)

Tide: ebb (going out)
Secchi: N/A
Temp.: 23°C/ 74F
Salinity: 38 ppt
pH: 8.4- 8.6
Nitrates: 0 ppm
Phosphates: 0.23 ppm
Ammonia: 0.75 ppm
Weather/ wind: Sunny and clear; intermittent onshore breeze (W-SW)

Summary:

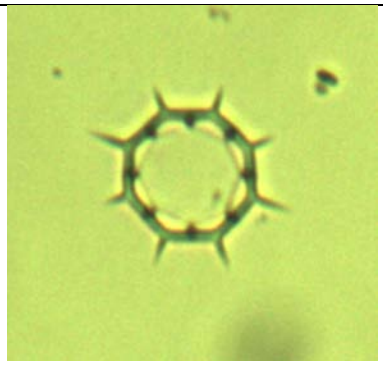
We collected plankton at the Tidal Inlet this afternoon following our usual procedures and with the assistance of 13 volunteers and Citizen Scientists (a new record!). Back at the Visitor Center, we measured nutrients and pH and observed samples under the microscope: Nicole, Kevin, Belen, Shawleen, Joey, Judy and Sandy were in charge of microscopy; others were in charge of measuring and recording the chemical parameters.

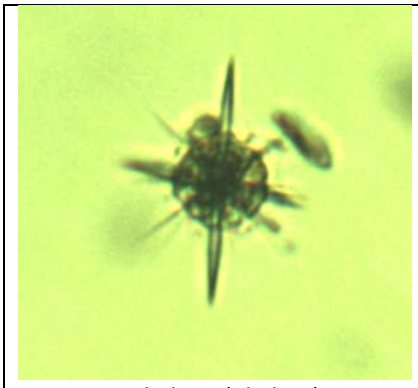
Today's sample was relatively similar to last week's. There were very few phytoplankton organisms in the water with a few dinoflagellates and diatoms (various groups and shapes, including small triangular specimens) being observed among much detritus and fragments (see complete list at the end of the report).

Nutrients and pH were within expected ranges (this water was collected when the tide is going out so it makes sense that salinity was higher than ocean's average and that ammonia and phosphates are a little above 0 ppm).

Here are a few species and genera of plankton that we observed, identified and photographed under the microscope today. (See complete list of organisms observed at the end).

 *Prorocentrum micans*	*P. micans* is a marine bloom-forming dinoflagellate. This is a cosmopolitan species in cold temperate to tropical waters. Although *P. micans* is capable of forming extensive blooms, it is usually considered harmless. It may excrete substances that inhibit diatom growth, but apparently these substances do not enter the food chain or affect organisms at higher trophic levels. The concentration of *P. micans* observed in today's sample was much lower than the high abundance that we've observed in the past 2-3 weeks but similar to last week's concentration.
 *Ceratium divaricatum* var. *balechii*	Distribution of *Ceratium divaricatum* is wider than previously documented (mainly because of previous misidentifications): the North Pacific Ocean, from British Columbia in Canada to temperate or subtropical waters of Mexico, and then is interrupted to reappear again in coasts of Peru and Chile, and also in coasts of the Benguela area, the South-west Atlantic Ocean. In tropical and equatorial areas of the Pacific Ocean, a more delicate form occurs: *Ceratium divaricatum* var. *balechii*. *C. divaricatum* var. *balechii* may be relatively abundant, even producing non-toxic red tides, in various spots along coasts of the Pacific Ocean (Canada to Mexico). I t appears to be a neritic form, with high sensibility to changes in water temperature, and presumably associated to upwelling areas. *Ceratium divaricatum* was reported as "common to abundant between San Mateo and Sonoma counties by the end of the month of September of 2011. The abundance of *C. divaricatum* in today's sample was low.
 *Pseudo-nitzschia spp.*	The genus ***Pseudo-nitzschia*** includes several species of marine diatoms known to produce the neurotoxin called domoic acid; this toxin is responsible for the illness called amnesic shellfish poisoning, which affects higher consumers, such as sea lions, sea birds, humans and mammals in general that have consumed contaminated shellfish. This genus of phytoplankton is known to form harmful algal blooms in coastal waters of Canada, California, Oregon, Washington state, Europe, Asia, Australia, New Zealand, Central America, and South America. At least nine species within the marine diatom genus *Pseudo-nitzschia* are now known to produce DA. In California, *Pseudo-nitzschia australis* and *Pseudo-nitzschia multiseries* are the main toxin producers. The correct identification of these species is very difficult without the use of electronic microscopy. Blooms of these diatoms in CA often occur during the spring and summer causing the intoxication and death of hundreds of marine mammals and birds. The abundance of *Pseudo-nitzschia* in the sample analyzed today was low; most chains were short/ broken? Over the past 6-7 weeks, we observed the development and decline of this genus' bloom at Bolsa Chica.

 *Dictyocha* sp.	Dictyocha is a genus of silicoflagellates- unicellular heterokont marine algae. Dictyocha spp. have a silica test with one or more "windows", and when alive (not the case in this photo) they also have one or many gold or yellow chloroplasts, and one winged flagellum. The cell body wraps around the test. Sillicoflagellates are most common in inshore waters, though can be present in temperate, polar, coastal and oceanic regions. Silicoflagellates are a poorly understood group of phytoplankters that are difficult to study due to their small size. They secrete silicon dioxide either in the form of a framework (as shown above) or in the form of multiple scales. The marine forms commonly have the framework type secretion. The cell body wraps around the siliceous framework - like cotton candy around a stick. They have two flagellae, one is long and very efficient at moving the cell through the water. The other flagellum is very small and nearly impossible to see. Like other phytoplankters, they can produce blooms which can block sunlight from reaching underlying parts of the ocean - including blocking light from understory marine plants.
 *Protoperidinium* sp.	*Protoperidinium* is a type of marine armored dinoflagellate. Although often listed as a type of phytoplankton (mainly due to the fact that they are dinoflagellates), most species within this genus lack chloroplasts and therefore are heterotrophic (i.e. they graze on diatoms and other planktonic organisms). The genus has several species, but none associated with potentially harmful effects or toxins; the genus is cosmopolitan (i.e. widespread throughout the world). The abundance of *Protoperidinium* observed in today's sample was low to medium



Radiolaria (Phylum)

ZOOPLANKTON.

The Radiolaria are amoeboid protozoa (diameter 0.1–0.2 mm) that produce intricate mineral skeletons, typically with a central capsule dividing the cell into inner and outer portions. They are found as zooplankton throughout the ocean, and their skeletal remains cover large portions of the ocean bottom as radiolarian ooze. Radiolarian species are non-motile; they drift along water currents. Radiolaria appear to be most abundant in warm waters of the equatorial zone. Besides water temperature and salinity, there is evidence that maximum concentrations of radiolarian below the surface are associated with maximum concentrations of chlorophyll. Potential sources of food can influence Radiolaria behavior. They may possess symbiotic relationships, can act as particle feeders (meaning they just hang out and wait for food), and can also act as predators. Radiolaria often share relationships with dinoflagellate symbionts. Radiolaria provide ammonium and carbon dioxide for the dinoflagellate symbionts, and in return the dinoflagellates provide their radiolarian host with a jelly-like layer that serves as both for protection and capturing prey. Another symbiotic relationship for in radiolarians is with algal symbionts. When food is scarce, an algal symbiont can provide its host radiolarian with much needed nourishment. When feeding as predators, Radiolaria may capture diatoms, tintinnids, and other calcareous organisms by ingesting them into their central cavity.

Observations show that polycystine Radiolaria have their greatest density and diversity in the eutrophic, nutrient rich, waters of the California Current, with decreasing densities in the Gulf Stream and Gulf of Mexico.

The concentration of this group in today's sample was low.

Plankton ID	
05/24/13	Conc/ Rel. Abundance
Pseudo-nitzschia spp.	Low
Chaetoceros spp.	Low-medium
Bacteriastrum sp.	Low
Nitzschia spp.	Low
Coscinodiscus spp.	Low-medium
Ditylum sp.	Low
Navicula spp.	Low
Rhizosolenia sp.	Low
Ceratium furca	Low-medium
Ceratium fusus	Low
Ceratium divaricatum var. balechii	Low
Prorocentrum micans	Medium
Protoperidinium spp.	Low-medium
Dictyocha spp.	Low
Tintinnids (zooplankton)	Low
Radiolaria (zooplankton)	Low
Noctiluca sp. (zooplankton)	Low

For those of you interested in reading and learning more about phytoplankton taxonomy and ecology, here are some interesting sites that I'd recommend you to visit and study when you get a chance:

http://oceandatacenter.ucsc.edu/PhytoGallery/index.html
http://www.mbari.org/staff/conn/botany/phytoplankton/DEFAULT.HTM
http://botany.si.edu/references/dinoflag/intro.htm

If you are interested in learning more about eutrophication and the chemical cycles of Nitrogen and Phosphorus (which we measure through our Phosphates, Nitrates and Ammonia tests), read the materials available on the following sites:
http://cfpub.epa.gov/watertrain/pdf/issue1.pdf
http://pubs.usgs.gov/circ/circ1136/
http://www.coastalwiki.org/wiki/eutrophication_in_coastal_environments
http://en.wikipedia.org/wiki/Nitrification