

Documenting a dinoflagellate bloom off Scripps pier - a report from the Pier Chlorophyll Program

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On January 23rd, 2006 an elevated chlorophyll *a* concentration of 12.88 mg/m³ was observed from samples taken at Scripps pier (the long term mean of eleven years for chlorophyll *a* concentration at Scripps pier is 3 mg/m³; and the highest concentrations recorded is of 218.95 mg/m³). Qualitative analysis revealed that two dinoflagellate species were dominant: *Gymnodinium sanguineum* and *Cochlodinium* sp. (Figure 1 and 2), and a total of 56,000 cells per liter were counted. Both species could be responsible for the observed light brown patches near Scripps pier.

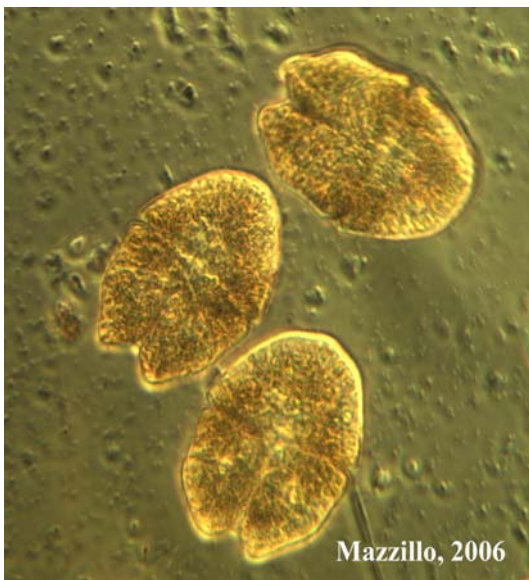


Figure 1: *Gymnodinium sanguineum*
(New species name: *Akashiwo sanguinea*)

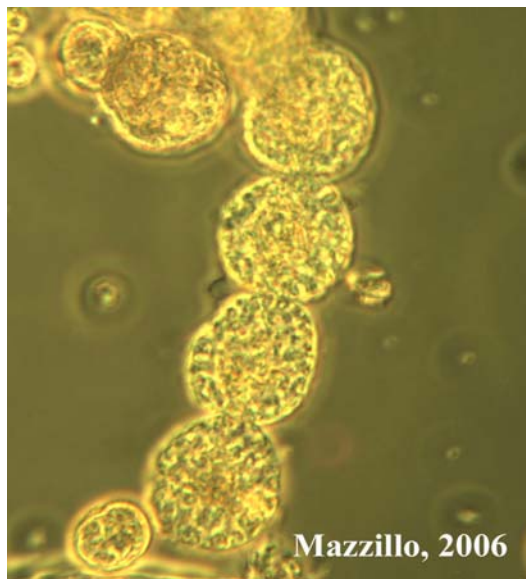


Figure 2: *Cochlodinium* sp.

Although *Gymnodinium sanguineum* is not known to produce toxins, *Gymnodinium sanguineum* blooms have coincided with fish, crustaceans, and oyster mortality in many parts

of the world (Bricelj *et al.*, 1992; Robichaux *et al.*, 1998; Wu *et al.*, 2000; Burge *et al.*, 2003). Mortality may be due to clogging of shellfish gills or to oxygen depletion when blooms decay (Wardle *et al.*, 1998; Horner, 2002).

Kofoed & Swezy (1921) observed twenty-five species of *Cochlodinium* San Diego waters. Future investigation will be performed to determine which species of *Cochlodinium* is being observed in our local waters. Nevertheless, two species of *Cochlodinium* (*Cochlodinium polykrikoides* and *Cochlodinium catenatum*) have been previously reported to cause fish and coral mortality in Korea, Canada, Panama, and Costa Rica when high cell numbers were observed (Guzman *et al.*, 1990; Whyte *et al.*, 2001). The precise means of toxicity of these two species is yet to be determined. However, production of reactive oxygen species (ROS) and mucus substances have been suggested as possible mechanisms of fish and coral mortality (Guzman *et al.*, 1990; Kim *et al.*, 1999; Kim *et al.*, 2002).

Even though *Gymnodinium sanguineum* and *Cochlodinium* sp. are known to be harmful, it is not known if the observed bloom had a negative effect. The elevated chlorophyll *a* concentration and the high number of cells per liter clearly indicated the occurrence of a bloom. However, the definition of a bloom does not imply that it is harmful given that specific thresholds exist for each phytoplankton species before it becomes noxious.

The Pier Chlorophyll Program has a long term data series of chlorophyll *a* (1983 to 2000; 2005 to present), and it is now part of the Southern California Coastal Ocean Observing System (SCCOOS). Together with the Harmful Algal Bloom Program (also funded by SCCOOS), one of our goals is to monitor the occurrence of harmful algal blooms off Scripps pier. Samples are taken twice a week for measurements of chlorophyll *a* and nutrient concentration, qualitative and quantitative analysis of phytoplankton species composition, temperature, and salinity. This data is currently being prepared to be available through the SCCOOS website (<http://www.sccoos.org>) in February 2006.

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