· **USA**

Cochlodinium polykrikoides in the Peconic Estuary

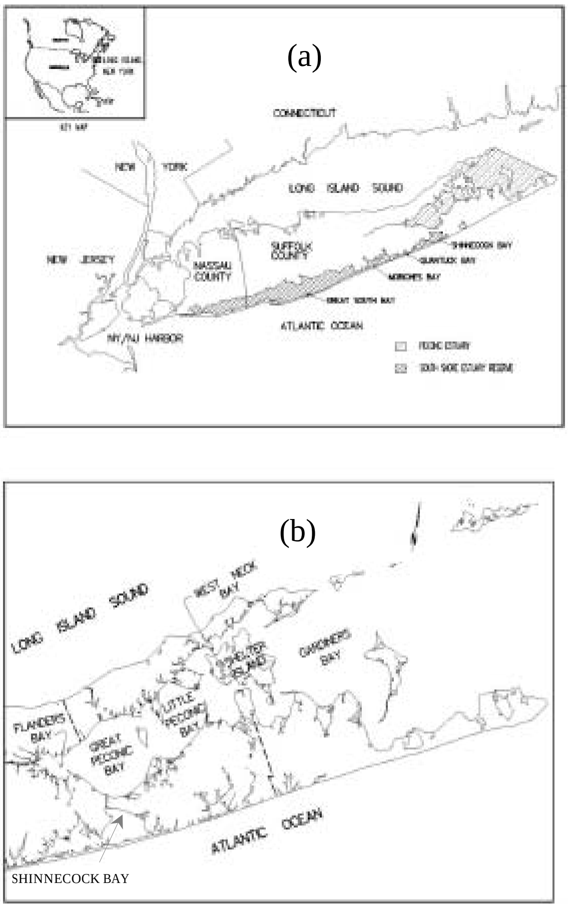

Fig. 1. (a) Long Island, NY. (b) Peconic Estuary.

A bloom of the dinoflagellate, *Cochlodinium polykrikoides* (syn. *C. heterolobatum*) has been identified in the Peconic Estuary, Long Island, NY, USA (Fig. 1), an area undoubtedly more familiar as the original focus of the «brown tide», *Aureococcus anophagefferens* [1]. The bloom occurred in late September-early October, 2004, when patches of red water were noted in Flanders Bay, extending into Great Peconic Bay and, ultimately, into neighboring Shinnecock Bay, through a one-way (south) flow canal.

The organism was found in chains of two to eight cells, with an occasional single cell noted. Cell size ranged from 25 – 40 µm, with the terminal cells somewhat longer than wide. The hyposome of the chain's terminal cell was bi-lobed. Cells within the chain were either spherical or slightly depressed dorso-ventrally. A large nucleus, and numerous chloroplasts were present, and the cingulum (girdle) made almost two turns around the cell. A stigma was contained within the episome (Fig. 2). As a live sample was not available, identification was made from lugol-preserved samples.

This had been thought to be the initial *Cochlodinium* bloom in the area, however, review of previous files and photomicrographs revealed the occurrence of a similar bloom in West Neck Bay, a sub-embayment of the Peconic Estuary, in early September, 2002. Cell numbers during the 2004 bloom were estimated, by counting all cells within a Palmer-Maloney counting chamber, to be over 2 x 10^6 per liter. No population estimate was made of the 2002 bloom, but it was noted that the waters, contained within a very poorly flushed area, were quite red.

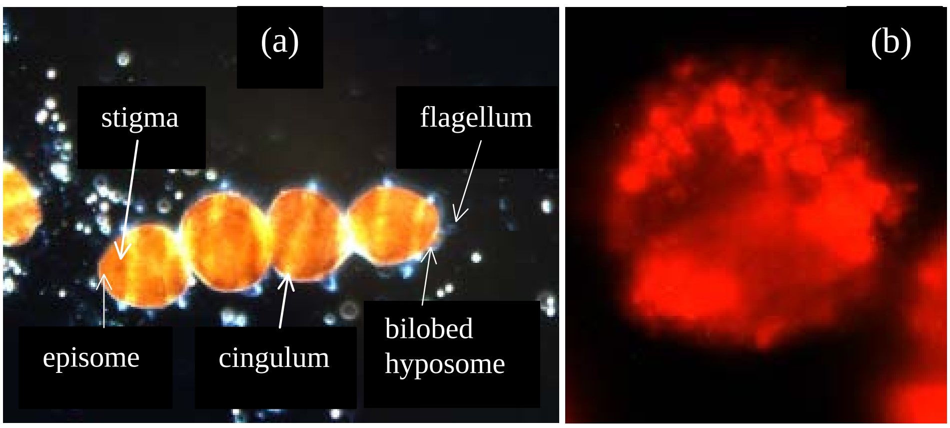

Fig. 2. (a) 4-cell chain illustrating the various structures. (b) Chloroplasts within a single cell visible under fluorescent microscopy.

Although *C. polykrikoides* has been implicated in kills of impounded fish in Japan [2], China and Korea [3] and, more recently the west coast of Canada [4], the Gulf of California [5], and the Philippines [6], no incidents of dead fish were reported during or after either bloom in the Peconic Estuary where motile species were free to leave the area. Hargraves and Maranda [7] reported a bloom in Pt. Judith Pond, Rhode Island, USA approaching 10^7 cells per liter, but also did not observe any fish mortality. *C. polykrikoides* (identified as *C. heterolobatum*) has also been reported to form intense blooms in the mouth of the York River, a tributary of Chesapeake Bay [8] and, beginning with a bloom in 1992, spreading into the lower bay [9].

Because *C. polykrikoides* is myxotrophic [10], engulfing phytoplankton species with equivalent spherical diameters of < 12 µm, its place in the food web, and its effect on estuarine ecology, regardless of its fish-killing potential, is difficult to determine. While larvae of the mussel *Mytilus galloprovincialis* have been shown to be capable of preying upon *C. polykrikoides* [10], its nutritional value relative to other species that may have been displaced has not been determined. Other studies have indicated that metamorphosis of oyster (*Crassostrea gigas*) trochophore larvae is retarded [11], and calcium uptake by larvae of the American oyster, *Crassostrea virginica*, is depressed, and mortality elevated by exposure to *C. polykrikoides* [12].

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XI th International Conference on Harmful Algal Blooms, Cape Town Nov 2004

Cyanobacterial news

Those of us researching into toxic cyanobacteria were offered two excellent conference choices this year. The first was the International Conference on Toxic Cyanobacteria in Bergen, Norway in June, and the second the HAB conference in Cape Town in November. Few could afford both! Fortunately this coincidence does not occur in 2006, when the HAB conference is in Copenhagen, as the Toxic Cyanobacteria conference is in Brazil in 2007.

Among the cyano papers at the HAB conference was a fascinating account by **Karen Arthur** of tumours in green turtles feeding on seagrass covered by the filamentous *Lyngbya*. This organism is well known for causing severe skin burns on bathers rubbing against the filaments, but had not previously been recognised as an ecological problem. The turtles were exposed to *Lyngbya* toxins through feeding on the seagrass, and also through physical contact with the filaments. The tumours appear at the flipper junctions and on the face. The increased dominance of *Lyngbya* is attributed to nutrients from fertiliser and sewage increasing in the shallow coastal bays of southern Queensland. Karen received the award for best student presentation for this paper.

Two other papers also focussed on the carcinogenic effects of algal toxins, **Valerie Fessard** evaluated the genotoxic effects of okadiac acid (the toxin of diarrheic shellfish poisoning) on cultured mammalian cells, showing that it caused chromosome loss and therefore potential cancer. To identify whether this is a real risk will require epidemiological studies of people who were sick in past outbreaks of this shellfish poisoning.

In my paper on the health impacts and carcinogenicity of the cyanobacterial toxin cylindrospermopsin, both the acute poisoning and potential carcinogenicity were discussed. Preliminary data on cancer rates in a population known to have been acutely poisoned and whose water supply was contaminated by this toxin for several years, indicated an increase in gastrointestinal cancers.

The majority of research on cyanobacteria was located in the poster sessions, and included several studies of *Microcystis* and *Cylindrospermopsis* and their toxins. The sophistication of new techniques applied to these studies was impressive, with increased use of genetic markers for toxin gene detection coupled with chemical or immunological toxin measurement. One interesting ecological aspect was the generally toxic North American, South African, Indian and European strains of *Microcystis*, compared to tropical African lakes with huge *Microcystis* populations with negligible toxicity.

The increasing data on *Cylindrospermopsis* and cylindrospermopsin in Europe is fascinating. In an extensive survey of German lakes by **Claudia Wiedner**, **Jutta Fastner** and colleagues, no *Cylindrospermopsis* strains were found that produced cylindrospermopsin. However many lakes tested showed cylindrospermpsin in the water. It is apparent that some other species is producing the toxin in European waters, whereas in North America, Asia and Australia the most frequent source is *Cylindrospermopsis*. This implies that the presence of cylindrospermopsin in water supplies may be a much wider risk than was anticipated.

On Wednesday morning the cyanobacterial researchers gathered for a round-table discussion on research priorities, and the particular problems faced by southern Africa. The Global Water Research Coalition earlier in 2004 did a similar exercise, meeting in Australia. The key areas of the toxicity of cylindrospermopsin, management of reservoirs and on-line or direct monitoring techniques for toxicity were discussed. The need for very basic detection methods and drinking water treatment technology in less developed countries was highlighted.

Overall a good conference, well organised and in a delightful setting.

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