LI scientist: Genes help brown tide thrive

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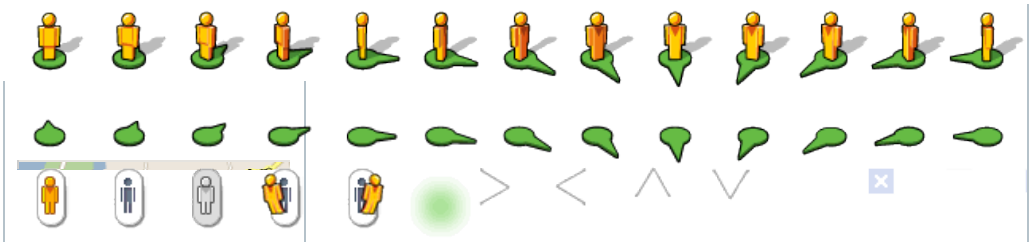
Photo credit: Suffolk County Department of Health Services | Aerial image of Great South Bay during a harmful brown tide bloom in June 2008.

Brown tide, a recurring algae that nearly decimated Long Island's bay scallop population, owes much of its staying power to genes that help it thrive in shallow, polluted estuaries like those along the South Shore, according to new findings from a Stony Brook University scientist.

That genetic edge gives brown tide an advantage over rival microscopic organisms that are less able to cope with cloudy waters or nutrient-laden septic waste and runoff, said lead researcher Chris



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Gobler.

The results bolster theories that link human degradation of coastal waters to a global uptick in algae blooms that damage fisheries and impair waterways, Gobler said.

"These harmful algaes are built to take advantage of these modified coastal ecosystems," said Gobler, an associate professor at the university. The research is due to be published in this week's online edition of the Proceedings of the National Academy of Sciences.

First detected here in 1985, brown tide is not harmful to humans. But in large concentrations it can produce toxins that starve shellfish by hindering their ability to filter-feed. It blooms in summer months, tinting waters brown and shading out light that eelgrass and other marine plants need for photosynthesis.

The federal Department of Energy sequenced the genome for brown tide in 2007 at Gobler's behest, using a culture from Long Island waters. After the results were released, Gobler formed a research team of 33 scientists to comb the 12,000 genes for clues.

The team compared the brown tide genome with those of six other local phytoplankton species. They found brown tide - known scientifically as Aureococcus anophagefferens - had many more genes that helped it find sustenance and energy in polluted waters.

Shallow estuaries with high nutrient levels, such as the Great South Bay, tend to be turbid and cloudy, making it harder for plants to harness the sun's energy through photosynthesis. But brown tide has an easier time. It has 62 genes that help harvest light, while its rivals have on average only a couple dozen, the research showed.

"You could almost look at it as a solar panel - it's got double the number of solar panels as everybody else," Gobler said.

Brown tide was also better able to make productive use of pollutants, the team found. It has more genes to turn organic nitrogen and decaying plant matter into energy than its competitors. The algae also uses metals in the water to create enzymes Gobler said "function almost like antioxidants" to help cells cope with stresses.

He said brown tide blooms will persist in local waters unless action is taken to improve water quality in impaired South Shore bays.

"It's probably been around forever; it was just waiting for the right conditions to crop up," Gobler said. "It's the changes that we have brought to the system that have shifted it - to make it perfectly suited for brown tide."

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