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Brown Tide Genes Are Illuminating

BY MICHAEL WRIGHT

Using samples of the "brown tide" algae taken from Quantuck Bay in western Southampton Town, scientists from Stony Brook Southampton's Marine Science Center have identified the genes in the destructive algae that have allowed it to thrive in some local estuaries, choking out other algae and wither-

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STUDY: *Students Take A Look At Brown Tide At Genetic Level*

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ing marine plants and shellfish stocks.

In a study led by Stony Brook University Professor Christopher Gobler, Ph.D., students from the Southampton marine science lab used the recently completed genome sequence for the brown tide algae to identify a number of genes that have given the brown tide a particularly lethal ability to bloom and out-compete other less harmful algae species.

Among the many traits that have given the brown tide algae an upper hand are genes that allow it to survive in very low levels of sunlight, meaning that the shading effects of its own blooms do not retard its own continued blossoming. They do, however, starve other algae species and marine plants of the sunlight they need to survive.

"It has something like 61 or 62 light harvesting genes," Dr.

Gobler said. "Other species might have a couple dozen."

The brown tide is also particularly good at gobbling up and processing organic nutrients in the water column and using the particular minerals that are found in East End waters.

Knowing what gives the brown tide its advantage does not mean that scientists will be able to come up with an antidote to its spread, Dr. Gobler said. Short of using genetic engineering on a massive scale, controlling brown tide algae will require a systemic approach. But a better understanding of what has allowed the brown tide to take over could guide that effort.

"Now we have a good sense of the part of the environment it is taking advantage of," Dr. Gobler said. "Which could tell us what we have to clean up."

As long believed, Dr. Gobler said the new work with the algae seems to indicate that the brown tide algae likely was present in local bays long before the first destructive blooms appeared in 1985. Changing conditions in the local bays, a delicate balance of nutrients and temperatures, finally combined to allow the brown tide species to explode in numbers.

"If you scoop a bottle of water out of the bay, you'll find literally thousands of species of phytoplankton or algae," Dr. Gobler said. "Unlike the others, [the brown tide algae] comes to totally dominate the ecosystem once it bloomed, to the exclusion of the others. It was probably part of the background noise until the system turned into one that it is so well suited to take advantage of. The organism has always been that way—it's the estuaries that have evolved."

The brown tide's most devastating trait was that shellfish, which normally feed on algae filtered from the surrounding water, would not ingest it. When the brown tide appeared, killing off other species of algae, shellfish stopped eating and effectively starved to death. Harvests of bay scallops from the East End typically topped 300,000 bushels a year prior to the 1985 brown tide emergence, but reached barely 10,000 bushels a year since, often much less.

The brown tide blooms appeared throughout the Peconic Estuary and most of Long Island's South Shore bays most summers until 1995, earning its name from the deep coffee-colored tint it lent the waters. It has been persistent nearly ever summer since in Quantuck Bay and certain corners of other bays.

Dr. Gobler requested that the U.S. Department of Energy map the brown tide's genome, arranging 56 million pairs of genes, in 2007. The analysis of the genome was headed by Stony Brook University researcher and East Quogue resident Dianna Berry. The Stony Brook-Southampton scientists studied some 12,000 of those genes selected from parts of the sequence believed to lend the brown tide its strengths.