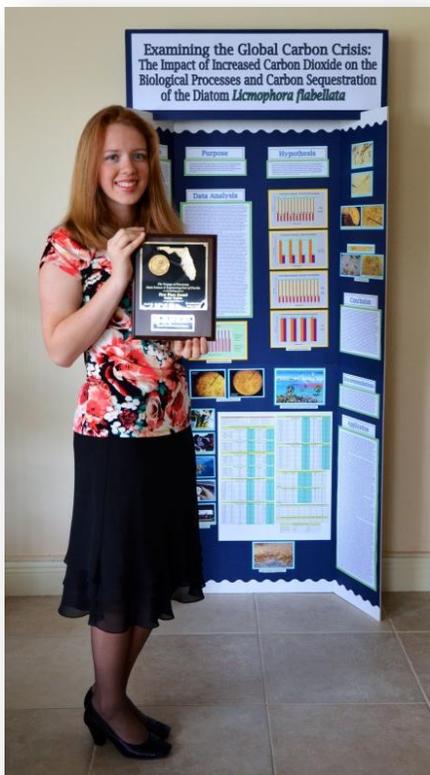


Sophomore Wins State, Captures 3rd at International Science Competition



University School sophomore Rachel Sereix followed a first place win at the Broward County Science Fair with a first place win at the Florida State Science and Engineering Fair and a third place win at the Intel International Science and Engineering Fair to name three of the many honors garnered by her examination of the global carbon crisis. As she prepared for the world’s largest pre-college science competition, Rachel reflected on her research and offered advice to young scientists.

“What I am most excited about is that I get to present my experiment to scientists from Stanford, National Geographic and other prestigious colleges and organizations,” Sereix said. “Not only will I develop connections and further understanding of my subject matter, but I also have the opportunity to present my research to people who may not be involved with the world of diatoms.”

Sereix’s project demonstrated that the smallest form of aquaculture, diatoms, can serve as indicators of environmental mitigation. This means that scientists on either side of the global warming issue can examine the thin, pasty film seen floating near coral reefs to gauge the depletion of macro nutrients, disruption of the food chain, inhibition of aqua photosynthesis, and reduction in aquatic resilience to thermal stress. In simple terms, diatoms turn bad, gaseous carbon into good, solid carbon that drops to the ocean floor and produces the calcium carbonate that makes up the coral reefs. As diatoms diminish, coral reef resilience diminishes signaling unfavorable humanistic and aquatic implications associated with global warming.

“We have to recognize global warming as an imminent threat or disprove it, and the first step is using the smallest form of aquaculture to look at each component,” Sereix said. “I love to snorkel and when I was about 11 years old, I started to notice after frequent visits over the course of several months that the amount of coral within a concentrated area in my favorite dive spot, the Florida Key’s Molasses Reef, was rapidly declining. I also noticed that the algae floating on the sea surface had some form of coating that was unknown to me at the time, but I realized over the same span that the thickness of this ‘slime-like’ coating had diminished. I started researching and realized that it was micro algae with the top layer comprising diatoms. I wanted to see the correlation between the diminishing algae and the diminishing coral reef resilience, and that’s how my project evolved.”

After spending the summer reading scientific literature to advance her knowledge of ocean chemistry and diatom features and processes, Sereix conducted her four-month experiment at Florida Atlantic University’s Gumbo Limbo Marine Science Center. During the experiment period, she had the opportunity to measure quantum yield (the activity of electrons within each photosystem) using the state-of-the-art Pulse Amplitude Modulation Fluorometry technique.

“Marine biology requires several advanced tools and [Gumbo Limbo] has a measurement for detecting photochemical energy efficiency,” Sereix said. “So I was able to see on a microbiological scale the productivity and photosynthetic processes of the diatoms there.”

One reason that scientific studies don’t often take diatoms into account, Sereix added, is because the size and hyperactivity of diatoms make them hard to study. This sophomore, however, is nothing if not tenacious and driven to innovate, two characteristics at the heart of her advice to up and coming scientists:

2012-2013 Awards To Date

1 st Place	Broward County Science Fair (Environmental)
★	NOAA “Taking the Pulse of the Planet” Award
★	Broward Air and Water Quality Control Award
★	Stockholm Junior Water Prize (+ Advancement to this award’s international level)
★	US Army Award
1 st Place	Florida State Science and Engineering Fair
★	Florida Marine Science Educators Association John Booker Award
★	Florida Foundation for Future Scientists Award
★	Association of Fertilizer and Phosphate Chemists Junior Science Award



Rachel Sereix

1st Place Florida State Science and Engineering Fair

2013 Science Fair Project:

*Examining the Global Carbon Crisis: The Impact of Increased Carbon Dioxide on the Biological Processes and Carbon Sequestration of the Diatom *Licmophora flabellata*.*



Saahil Jain

3rd Place Florida State Science and Engineering Fair

2013 Science Fair Project:

Utilizing Multiple Light Sources to Create a Physiologic Light Spectrum that Reduces Interference with Circadian Rhythms (Biophysics)

1. Focus on Innovation

“Scientific innovation requires you to look at things that haven’t often been studied to avoid repetition. Diatoms are studied quite a bit, but they are not correlated to the global carbon crisis. Working in marine biology, I took a totally different direction from what I studied previously, but with all of my projects I wanted to discover something that people haven’t really looked at before.”

2. View Rejection as a Challenge

“The only thing I won in elementary school was a spelling bee; I never heard my name called at Science Night. In 6th grade I was extremely dejected when I won first in the school with my group, but I didn’t win anything at county. It brought me back the next year more driven and I ended up getting 2nd in the county and then the next two years I got 1st, but I never went to International until this year.

“Pull yourself through those down times because science fairs are a roller-coaster of emotions. The most important thing is to build from those experiences.

“Sometimes you will find no information about what you want to do. Sometimes what you are passionate about will have no correlation to what is prevalent in the scientific community at that time. But there’s always going to be an opening for you to develop further interests.”

3. Dedicate Yourself

“Working in a lab requires dedication. I had to go to [FAU’s Gumbo Limbo] frequently to check on my diatoms algae production as well as to assist with the tanks employed in my experiment and to help with ongoing FAU experiments.

“[A successful project] takes additional research whether it’s on the internet or in the library. The good news is that just reading scientific literature and understanding these essential biological functions changes one’s perspective on their surroundings – experimental research develops parts of your life that you wouldn’t really expect.”

4. Explore the Resources Available to You

“My favorite part of science fair isn’t just the biology; it’s presenting and explaining what I spent months of my life doing, particularly when presenting things that haven’t been emphasized before in scientific literature. I’ve been able to apply my public speaking skills from science fair to the debate team, so one part of science fair may positively influence many different parts of your life.

“My ambition is self-driven, but my teachers have always encouraged me to challenge myself and they have always provided me external support for everything I need for science fair. Whether it is contacts, information about a certain topic or scientific literature, my teachers have always been there for me.”

5. Speak Your Mind

“The most important thing [to remember] is to not be afraid of speaking your mind about science. We often think that parts of science are controversial, but it takes those debates about science to produce groundbreaking research.”

Next month Rachel will be among the 1,500 high school students from over 70 countries, regions, and territories who will showcase their independent research and compete for more than \$3 million in awards at the Intel International Science and Engineering Fair. Entry into these prestigious science competitions is facilitated by USchool’s Science Research Coordinator, Arnold I. Miller.