Siemens Westinghouse continued from page 1

said Mason, "Genetics and speciation really interested me, and Dr. Amy Sheck turned me on to hybrid sterility. Yuan Yang, a classmate of mine, noticed that Dr. Willis at Duke [University] studies this very thing. I asked [him] to sponsor my project, and, lucky for me, he agreed!" Mason's project will soon be entered in the Junior Science and Humanities Symposium, another science competition.

Regional Finalists on a tour of Georgia Tech *Jeff Hu*

Lucie Guo and Xianlin Li's project was entitled, "CpG island methylation of GADD45? is marker of breast carcinogenesis." The team investigated a tumor-suppressor gene named GADD45? and found that its DNA methylation patterns (an epigenetic change in the DNA structure where a methyl group attaches to a cytosine base, forming 5-methylcytosine) can be used to distinguish between normal and cancerous cells and serve as a marker of disease. Guo began conducting research at Duke Comprehensive Center the summer before her junior year, where Li joined her shortly after. "What led us to pursue breast cancer research," the pair stated, "is the magnitude of the problem posed by breast cancer around the globe. ... We were interested in finding alternative methods of distinguishing between cancerous and normal cell lines in order to enhance the efficacy of early detection methods." Guo and Li worked with Dr. Jeffrey Marks and Dr. Wei Wang from Duke University and Dr Tsahai. Tafari and Ms. Leslie Brinson from NCSSM throughout the research and competition process.

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> **-Luce Guo and Xianlin Li**

Claire Reddy and Yajing Gao's project, "Optimization of Sample Preparation Conditions for the Dispersion of Single-Walled Carbon Nanotubes for SEM Analysis," dealt with finding ways to prepare a sample of carbon nanotubes to view with a scanning electron microscope (SEM) so that they were as spread out and unclumped as possible. (The nanotubes tend to clump together due to Van der Waals forces.) The team did their research during a three-week period over the summer, working under Dr. Stephen Craig of Duke University. Craig is an NCSSM alum and has mentored other NCSSM research students, including a team of three who made Regional Finals last year. Reddy and Gao turned their results over to him and are currently undertaking another project for Research in Chemistry here at NCCSM. However, Gao indicated, "There is a NASA opportunity of a rocket launch. We could potentially send carbon nanotubes into space and see what [they] do under high radiation."

Ying Liu and Jeff Hu looked at the effects of an antioxidant, vitamin C, on E. coli exposed to UVC. The team found that vitamin C caused less E. coli to die and that it also caused generational resistance, meaning that the E. coli became more and more resistant to UVC. "We basically decided to do [this project] because I was interested in antioxidants, and Jeff was interested in resistance," said Liu, "so we combined the two and found a lab. We were very lucky." Liu and Hu's summer research was conducted in the environmental engineering department of Duke; they worked with Dr. Karl G. Linden for three weeks. Liu and Hu are presently continuing work on their project and want to send their vitamin C treated E. coli into space on a NASA flight.

Buro, Jing, and Lucy listening to a lecture on Georgia Tech's robotics program. *Jeff Hu*

Lee Ricketson and Nick Cook's project explored the r-process, the most rapid and complex mechanism by which heavy elements are created and thought to occur in supernovae, by investigating the equilibrium achieved [during the r-process], which explains the abundance patterns of elements. The team devised a method for determining this state of equilibrium for each nucleus and used it to identify specific nuclei thought to be responsible for the abundance pattern mystery. They had started learning background material during Miniterm their junior year. "I decided to pursue this project because it was the only physics research opportunity around campus at the time," said Ricketson, "I've been into physics since the start of high school, and the opportunity to do research is a big part of the reason I came to [NCSSM]."

NCSSM has sent students to regional competition every year since the start of Siemens-Westinghouse. "I like Siemens because it is rigorous, prestigious, and the students can win scholarship money. In addition, the format reflects how real scientists do and present their work," said Dr. Sheck, Mason's advisor.

> **"the opportunity to do research is a big part of the reason I came to [NCSSM]."**
> **-Lee Ricketson**

Lucy and Xianlin with their prize. *Dr. Halpin*

"I think it is important for students to learn to do independent work," added Dr. Bennett, who advised Ricketson and Cook. "Siemens provides some extra motivation for students to get involved in research and put forth their best efforts."

"I like how it's been judged, mainly on research," said Gao, "That's the main difference between Siemens and Intel and other types of projects."

"What did I like best? I guess the sense of accomplishment," said Ricketson, "Realizing something that no one has ever realized before is one of the best feelings I've ever had. I would absolutely recommend that juniors get involved in research/Siemens. With core classes at this school becoming more like the core classes at ordinary schools every year, research will be one of the only really cool things you can do pretty soon, and Siemens will help you immensely if you're looking at really competitive colleges."

"Doing the research and writing a paper for the Siemens Westinghouse Competition is a pretty good gauge of your dedication to a science or to research," added Reddy. "If you can still love research after Siemens, it's probably something you might want to pursue in or after colleg. It's also an invaluable learning experience."

Guo and Li agree. "Unless you participate in some type of research," they say, "you can't ever be certain that science is for you. Through mundanely collecting data, you find out that science isn't as glamorous as others make it out to be. But its rewards are incredible. Learning in the classroom is nothing like hands-on learning at the lab bench. Also, it's a great way to get to meet professionals. We have kept closely in touch with our mentors who-still, to this day-are valuable sources of inspiration."

"I would highly encourage research participation during the summer and during the year, but certainly not for the sole purpose of doing Siemens," Mookerji stated. "The best research that you can involve yourself with is the research that stands alone from science competitions like Siemens or the Intel Science Talent Search. In my opinion, finding the opportunity for steady work in a university laboratory under a professor with vested interest in your work is an absolutely wonderful route towards success in research. Yes, Siemens is very prestigious and the consequences of the competition may help your pay for the college of your dreams, but the opportunity of carrying out important, unprecedented, and publishable research is one that leaves you with an advantage over other students that is far beyond academic.