



Broadcom MASTERS

A New Contest for Middle School Scientists

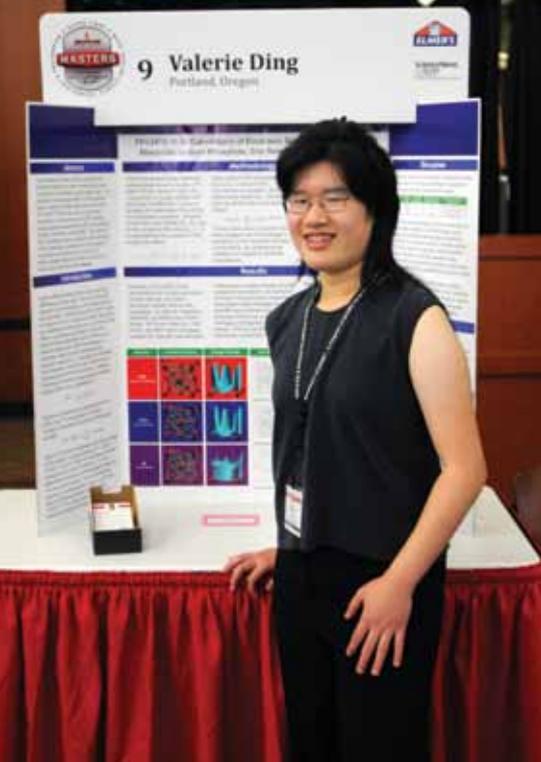
by Valerie Ding

“You now join Albert Einstein, Marie Curie, Isaac Newton, and a very select group of people worldwide, alive and dead...” The audience of curious teenagers fidgeted anxiously at the edge of their seats. “...in that each of you and your teachers are namesakes of minor planets!” A collective gasp sounded from the audience, followed by applause and cheering. The awards ceremony had begun.

This was the culminating event at the first-ever national Broadcom MASTERS (Math, Applied Science, Technology, and Engineering for Rising Stars) science competition, which had brought together 30 middle school students from around the United States whose interests ran the gamut from astronomy to zoology.

I began my journey to the national competition when I submitted my physics project on light-emitting diodes (LEDs) to the statewide Intel Northwest Science Expo. The

judges at the Expo nominated me to apply for the Broadcom MASTERS. The online application was extensive, but a few nervous months after I submitted it, I was excited to see online that I had been named one of 300 national semifinalists. A couple of weeks later, I was even more excited to be named one of 30 national finalists who would compete in the Broadcom MASTERS. In October 2011, I flew with my father from Oregon to Washington, DC, to participate in the exhilarating weeklong event.



Left: On the first day of competition, Valerie presented her research on light-emitting diodes to judges and the public at the National Geographic Society. **Right:** Valerie and her team celebrate the successful completion of a science challenge at the Maryland Science Center.



Game On!

The first evening was dedicated to ice-breakers for the contestants. We gathered in the hallways of the Hotel Palomar, where we all were staying, and began to socialize. I got to know the four other students on my randomly assigned team through activities such as the floating hula hoop and blindfolded treasure hunting.

The actual competition began on the second day, when we presented our research projects to judges and the public at the National Geographic Society. The judges asked questions unlike any I'd been asked at my state science fair; for example, one judge asked me to explain the reasoning behind electron movement in atomic energy orbitals, which is one of the central mysteries of quantum mechanics. Of course, I said just that. During the public exhibition, Zachary Lemnios, Assistant Secretary of Defense for Research and Engineering (also known as the "Geek in Chief"), approached my poster and began telling me about the research he'd conducted in college—in the same field that I was investigating. It was pretty exciting to know that I had this interest in common with a high-ranking scientist.

The third and fourth days were devoted to the main focus of the competition: team science challenges. At the Maryland Science Center, we worked together to solve real-world problems in topics such as water contamination, bridge design, circuitry in homes, estimating orders of magnitude, and even creating sales pitches for emerging technologies. Each challenge involved interpretation of graphs and tables, mathematical analysis and reasoning, and physical models or representation of our proposed solution to the problem.

The judges wanted to see creative teamwork and active listening as well as energetic leadership. Often, judges would point out what might improve our efficiency, such as brainstorming ideas as a group rather than individually, and then we acted on the advice. My team performed well because we delegated tasks based on individual expertise. For example, we decided that I would focus on math calculations and scientific concepts, while a teammate who was interested in mechanical engineering took on responsibility for building and constructing models. Another who enjoyed natural sciences discussed with judges the effects of each challenge, if utilized commercially, on neighboring ecosystems and communities. Together, we answered the judges' probing questions and learned a great deal from each other in the process.

Beyond Competition

After two days of competition, we were excited to visit Capitol Hill, where we all had the chance to meet our senators and representatives. I got to speak with Oregon Senators Ron Wyden and Jeff Merkley. I realized how hectic their schedules were, so I was happily surprised and honored that they took the time to answer questions I asked about my state's science education program. As a group, we also met with John Holdren, President Obama's science advisor, and other members of the White House science advisory staff who use applied sciences such as nuclear physics, organismal biology, and forensics in their work.

We also went on outings to the Lincoln and Jefferson Memorials in Washington, DC, and one evening after the team challenges, we visited the National Aquarium in Baltimore. And



then there was the segment we did for *The Daily Show with Jon Stewart*, filmed in a makeshift studio in the Hotel Palomar.

Before the competition, four of us had received invitations to participate in the filming of a comedy sketch about science that would eventually be featured on Comedy Central. We were obviously excited and slightly nervous; we hadn't been given much information, and we'd guessed that we had been selected based on our research topics, which included math and physics. It wasn't until we stepped into the filming room that we realized what would actually be happening to us. The segment was about a former scientist who had grown to despise science and traveled to a national science fair to interrogate and discourage participants. I explained my project to the furious ex-scientist played by Aasif Mandvi, who improvised his lines. There were no official lines, so I just tried to react normally and intelligently, but the situation we were acting out was just so bizarre that occasionally I was at a loss for words. The producer spent almost an hour on my project alone, adjusting lighting and audio settings. I spoke three lines in the official "Science: What's It Up To?" segment, so I was surprised at how much time was needed to perfect such short scenes.

Reward & Reflection

At the awards ceremony, held at the Carnegie Institution for Science in DC, each of our schools received \$1,000 to support science and math programs, and each finalist received a \$500 award from

Broadcom. The top three participants were awarded scholarships of \$5,000, \$10,000, and \$25,000. But I think we found it most exciting to learn that the MIT Lincoln Laboratory Ceres Connection named minor planets* after each of us and our science teachers.

On the flight back to Portland, I reflected on this experience and opportunity of a lifetime. Being surrounded by students from around the nation who share your interest in science is a life-changing experience, and I'm honored to be a member of the first class of Broadcom MASTERS. Like about half of the 2011 finalists, I'm not eligible for the competition this year because I'm in high school. But I have a feeling I'll meet my fellow finalists again, whether it's through science fairs or our future careers in science. **i**



A freshman at the Catlin Gabel School in Portland, OR, **Valerie Ding** is the founder and president of the Catlin Gabel Mu Alpha Theta chapter. She has received numerous national and state science fair awards as well as awards for piano, and she has performed concertos with musicians of the Oregon Symphony and Oregon Ballet Theatre. Valerie is a Caroline D. Bradley Scholar and Davidson Young Scholar.

**Upon investigating its orbit, I was relieved to confirm that minor planet 27392 Valerieding is far, far away from Earth. I don't want to worry about my name being associated with new craters or mass extinctions any time soon.*

The 30 finalists in the inaugural Broadcom MASTERS were chosen from 1,476 applicants.

More about Broadcom MASTERS

Society for Science & the Public (SSP) has been running some of the most prestigious high school science fairs—namely the Intel Science Talent Search and the Intel International Science and Engineering Fair—for years. With Broadcom MASTERS, SSP offers middle school students the chance to compete on the national level.

Students begin by entering a local, state, or regional SSP-affiliated science fair. Each of those science fairs may nominate participants who finish in the top 10 percent to apply for Broadcom MASTERS. Nominees then submit an online application. Finalists receive an all-expenses-paid trip to Washington, DC, for the national competition.

For more information, see www.societyforscience.org/masters.