

Cue the Crickets

AN INTERNATIONAL COLLABORATION AMONG TEEN RESEARCHERS GOES CHIRPINGLY.

THE BELL SIGNALING THE PERIOD'S END HAD RUNG FIVE MINUTES earlier, but students in this morning biology class were still tightly huddled around lab tables. What could possibly keep teenagers so riveted that teachers need to shoo them out?

A dozen students at the Academy of Science (AOS)—an HHMI-supported effort at Dominion High School in Loudoun County, Virginia—were in deep consultation with 12 colleagues from the prestigious Hwa Chong Institution (HCI) in Singapore. These students, all 11th graders, had been collaborating for weeks via e-mail. For 10 days in early November, they finally had the chance to interact face to face.

This program is the brainchild of AOS director George Wolfe, a former Peace Corps volunteer who includes among his professed goals to produce “globally aware citizens.” Three years ago, Wolfe was invited to Singapore to train teachers. While there on a later visit, he suggested to Har Hui Peng, HCI’s principal research consultant, that “our students collaborate like real scientists.” AOS requires that students undertake a two-year research project after their sophomore year. With the exchange program in place, those interested could apply to work with their counterparts at HCI.

Two students from each school teamed up to tackle one of six scientific ventures, which ranged from comparing the antibacterial properties of Western and Asian herbs to looking at a possible link between fish feminization and estrogen concentrations in waste water.

Devin Bowers, an AOS junior and avid guitarist, wanted to study something that involved acoustics. After consultation with Wolfe, he and classmate Aliya Jamil decided to investigate the evolutionary divergence of cricket song, on scales both local and—thanks to the involvement of Singapore students Cedrych Beh and Tse Yean Teo—global. The cricket song project also pulled in Gus Lott, a scientist at HHMI’s nearby Janelia Farm Research Campus, who is interested in educational applications of software he developed that can be used to analyze insect sounds (see sidebar).

Both groups faced some real-world obstacles. For one thing, urban Singapore does not have big cricket populations, so Beh and Teo regularly traveled a mile-long causeway to cross the border to Malaysia and its cricket-rich fields. Because they could not carry live insects across the border, the boys, crouched side by side in the tall grass that crickets favor, made their recordings on site.

Back in Virginia, Bowers and Jamil had their own problems. One batch of crickets died in an unsanitary aquarium. As winter approached and temperatures dropped, so did the

young researchers’ hopes when crickets outside started dying off. Then, Jamil’s mother took time during a family gathering in Pennsylvania to collect crickets from a field near her relatives’ home. And Bowers reports that “my mom and I went to the National Arboretum, which was like the Garden of Eden: crickets everywhere!” The aquarium was then thoroughly cleaned, and “most of them lived long enough for us to record them,” says Bowers, adding that, “One escaped during recording. I still haven’t found him....”

Next, the vast differences in scientific approach between the young scientists’ countries had to be reconciled when Beh and Teo visited AOS, where the style tends to be “hands-on,” fostering an

READY FOR PRIME TIME

Janelia Farm’s Gus Lott received a rock star’s welcome when he showed up at the Academy of Science (AOS)—on a Harley Davidson 2005 Sportster, no less—during the Singapore students’ visit. At first the group appeared mesmerized, listening reverently and nodding their heads as the tall, confident, and undeniably hip scientist—cowboy boots peeking from the hem of faded blue jeans—demonstrated his “g-PRIME” software.

When AOS student Devin Bowers admitted to finding the program “intimidating,” Lott, an engineer in Janelia’s instrument design and fabrication shop, gathered AOS’s Bowers and Aliya Jamil and Singapore’s Cedrych Beh and Tse Yean Teo at the whiteboard to show in layman’s terms just how g-PRIME, which turns a computer’s sound card into a tool that can acquire and analyze signals, does its thing. For someone who believes, as Lott does, that “the engineering is easy, while the relating of it to scientists—both established and budding—is difficult,” he made that look easy too. **“In the case of cricket chirps,** the software measures parameters such as chirp frequency, duration, amplitude, and time between chirps,” he said, jumping at once into colleague-to-colleague discourse with the students. In mere minutes, neither Lott nor his complex computer program seemed quite so intimidating. Bowers later described g-PRIME as a “godsend” in their analysis of cricket mating songs. By the time Lott headed back to Janelia Farm, the students were well-versed in g-PRIME, and their awestruck stares had turned into smiles of comprehension and gratitude.



Clockwise from lower right: Students Cedrych Beh, Devin Bowers, Aliya Jamil, and Tse Yean Teo learn about each others' cultures while analyzing cricket song; Teo and Beh are students at Singapore's Hwa Chong Institution; Gus Lott (right) created software the students are using to analyze the insect sounds; George Wolfe, director of Loudoun County's Academy of Science, set the collaborative project in motion.

appreciation of scientific inquiry for the sake of discovery. Tradition (and financial realities) in Singapore means that all science projects there, even in high school, must aim for practical applications; embracing a less rigid approach was an adjustment for the visitors.

"They both have pros and cons," Teo says of the schools' differing methods. "I'd prefer a combination of their relaxed environment and our task-oriented approach."

Between experimenting and drafting reports, the hosting and visiting students ate, toured, and lived together. Each boy from HCI, an all-male institution, stayed with an American family.

What did the Singaporean students find most surprising about America? For one thing, they got to sleep in. At HCI, students

often are expected to be at school before sunrise. With time to kill every morning, Beh and Teo usually could be seen in the mist-covered fields alongside Dominion High School collecting the season's last crickets.

Back in Singapore, the HCI students now no longer have free time in the morning, but they stay in touch with their Virginia collaborators—via e-mails that contain, in equal measure, details of their projects and typical teenage banter. In August, using funds from an annual HHMI grant to Loudoun County Public Schools, the American students are planning a trip to Singapore, so the six teams can present their final results together. ■

—LINDSAY MORAN