

CU graduate students partner with area high schoolers to push science inquiry

By Susan Lang

Can we recognize our friends by their scent? Are plant-friendly road salts as effective in melting ice as other salts, and are they really harmless to plants and other life? What effect does acid rain have on building materials? Does the pH of laundry soap affect its effectiveness? Can carbon help mop up nitrates from pig manure in the groundwater?

These are a few of the original research projects presented by area middle and high school students at the Student Research Congress March 22 on the Cornell campus. The projects were conducted with help from Cornell graduate students who are fellows in the Cornell Science Inquiry Partnership (CSIP), funded by the National Science Foundation and Cornell.

"The program funds Cornell graduate students to partner with secondary science teachers to enhance inquiry learning and update science content taught in rural and urban schools," explained program director Nancy Trautmann, who works with Marianne Krasny, Cornell professor of natural resources and CSIP principal investigator, and Linda Tompkins, a former biology teacher who mentors the teaching fellows as the CSIP coordinator.

"The CSIP fellows, who are Cornell graduate students in the physical sciences, social sciences or engineering fields and who receive tuition and a stipend for their efforts, help the partner teachers design inquiry-based activities that meet the needs of their class and that draw from the fellows' scientific interests," Trautmann said.

At the Congress, Thomas Eisner, the Jacob Gould Schurman Professor of Chemical Ecology at Cornell, gave a presentation highlighting the chemical communication of bombardier beetles. The students then peer-reviewed each other's research posters and later toured some Cornell laboratories.

Shannon Olsson is a CSIP fellow and a fourth-year doctoral student in neurobiology and behavior at Cornell studying chemical communication (such as pheromones, secreted



Annette Michaels, right, and Holly Bakker, seniors at Geneva High School, discuss their Great Stinky T-Shirt Project at the Student Research Congress, March 22, in Kennedy Hall at Cornell. With the help of Shannon Olsson, a neurobiology and behavior doctoral student and Cornell Science Inquiry Partnership fellow working at the Geneva school, the class tested whether they could use smell alone to identify different genders, themselves or their friends. *James Skillen*

chemicals that influence members of the same species), particularly in insects. When she told Geneva High School basic level and advanced placement biology students that it is not clear whether humans have pheromones, the students decided to test whether they could recognize themselves, or their friends of both genders, only by smell. Olsson helped them set up a stringent scientific protocol: Each student slept in a T-shirt three nights in a row and used the same grooming products and laundry detergents for sheets. The findings: Students couldn't recognize differences in gender by smell, but 37 percent correctly identified their friends, which is significantly greater than the 20 percent success rate expected by chance.

The study was so well done, Olsson said, that she will present the results at the Association for Chemoreception Sciences meeting in Sarasota, Fla., April 21- 25, and write it up for submission to an academic journal, with the partner teachers as her co-authors.

"I am so impressed with what intellectual and scientific reasoning skills high school students can have if you give them the opportunity to think for themselves," said Olsson. "They constantly amaze me."

This year, 11 Cornell students are partnering with 15 schools, which are as close as Ithaca High School and as far as an inner city school in Rochester, N.Y. Jamie Skillen, for example, a doctoral student in the Department of Natural Resources at Cornell, is partnering with CSIP research fellow Mark Johnson, an instructor for the New Visions Biological Sciences program of Tompkins-Seneca-Tioga BOCES, which enables high school seniors to study environmental science on the Cornell campus.

Last semester, Skillen worked with the New Visions students on an analysis of the health of forests in the Ithaca area. This semester, the students evaluated four de-icing solutions for their effectiveness and their effect on plants. Johanna Smith, a senior at Ithaca High School, said that she tested calcium magnesium acetate, a road salt that is advertised by its manufacturer as being harmless to plants.

"Overall, we found that this de-icer did well with plants, though it wasn't the most effective de-icer," she said. "Of everything I learned, the most important part was consumer awareness. Every company promises efficiency and environmental safety from their products, but it's important to know what to trust."

This kind of project, Skillen said, gives students the opportunity to see how research in environmental science is used in environmental legislation.

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