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Training For A Chemistry Olympiad

Successful competitions depend on the hard work of bright students and generous volunteers

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Courtesy of Roxana Allen

Competition Four students and two mentors traveled to Taipei in 2005 for the IChO: (from left) mentor Szczepanski, students Scott Rabin, Cheng, Sanders, Sofroniew, and mentor Roxana Allen.

This month, people around the world will tune in to Torino, Italy, to see athletic feats unfold on snow and ice. Although the Winter Olympics are held once every four years, a smaller group competes annually in a different kind of local, national, and international competition called the Chemistry Olympiad.

As a junior, Nicholas Sofroniew competed at the local level in his advanced placement chemistry class at his high school in North Hollywood, Calif. He scored high enough to move on to national competition and then qualified to participate in the 2004 summer study camp at the U.S. Air Force Academy (USAFA) in Colorado. In 2005, as a senior, on the basis of his exams and lab work at the camp that year, he was one of four students selected to go to the [International Chemistry Olympiad \(IChO\)](#) in Taipei, Taiwan, during the

summer. He finished with a silver medal.

"I loved it," Sofroniew says. And he would certainly recommend it to other students. He is currently a first-year student in Clare College at Cambridge University, in England.

Sofroniew's roommate at camp and IChO and fellow silver medalist, Jacob Sanders, is a freshman at Harvard University. Sanders attended a science-magnet high school in Hackensack, N.J. Sofroniew and Sanders remain in close contact, discussing various scientific papers and noting the differences between the U.S. and U.K. educational systems. "Even though preparing for the exams at camp and for the IChO certainly caused some stress, I honestly enjoyed every minute of it," Sanders says.

Like the Olympic Games, the Chemistry Olympiad requires dedication and rigorous training. Despite high stress, participants say the personal rewards stretch beyond medals. Students have a chance to travel and create lasting friendships with peers around the world. None of this would be possible without the dedication of American Chemical Society staff and local section coordinators, faculty and staff at the USAFA, and the mentors who serve three-year terms.

In the U.S., about 12,000 students between the ages of 13 and 18 enter the local competitions for the U.S. National Chemistry Olympiad (USNCO). ACS local sections select nominees for the national exam by various means including the USNCO local section exam, a locally prepared exam, laboratory practicals, teacher recommendations, or other regional events with competitive activities among school teams. Local competitions usually occur in March.



COMPETITION Four students and two mentors traveled to Taipei in 2005 for the IChO: (from left) mentor Szczepanski, students Scott Rabin, Cheng, Sanders, Sofroniew, and mentor Roxana Allen.

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High scorers take the USNCO national exam, which consists of multiple-choice and free-response questions and a lab practical. ACS local sections administer this four-and-a-half-hour test in late April to approximately 900 students.

Twenty of the top-scoring students from the national exam are invited to an intensive, two-week study camp held in June at USAFA. At the camp, which consists of lectures, lab work, and exams at a third- or fourth-year undergraduate level, four finalists and two alternates are selected to travel to the international competition. This year's competition will be held July 2-11 in Gyeongsan, South Korea.

Although a different host country sponsors the IChO every year, ACS supports and its staff coordinates the USNCO. A subcommittee of the ACS Society Committee on Education

oversees the program and sets goals. These goals include stimulating young people to excel in chemistry, recognizing the achievements of teachers and the importance of the school environment, and fostering cross-cultural experiences.

Seth N. Brown, a chemistry professor at the University of Notre Dame, currently chairs the subcommittee. The program is challenging, but it's worthwhile for students to test themselves against these high standards, he says.

Brown was also a member of the first U.S. team to compete in the IChO, which was held in Frankfurt, Germany, in 1984. To him, the time at the study camp "was like an all-expenses paid vacation." He enjoyed the fast pace and intensity of the chemistry. "We were doing science all the time."

Before competing in the international event, Brown knew he wanted to teach science, but he says the program "had an important role in hooking me on chemistry in particular." Specifically, he got to see the larger community of chemistry.

Being on the "other side" of the competition now, Brown knows how much effort goes into the program he enjoyed so much. USAFA has hosted the study camp since Brown attended in 1984. Approximately 15 faculty members, in addition to the three mentors, volunteer their energy and expertise at the camp to give lectures, supervise lab work, and write camp test questions. They also do assorted tasks like organizing social events and transporting the students to and from the airport. Kimberly Gardner, an associate professor of chemistry at USAFA, has served as the camp director since 1998. In addition to the planning and coordination, Gardner is a member of the task force at ACS that chooses the mentors.

The three mentors are primarily responsible for shaping and running the camp. Duties include planning meetings in Colorado, testing the lab work before the camp, providing the USAFA staff with a list of materials needed, and organizing lectures. Because these students are performing at advanced collegiate levels, mentors usually have to study up on chemistry they have not seen in years. Travel demands are heavy: For each of the summers in his or her three-year commitment, a mentor spends about three weeks at USAFA. During the second and third years, they also spend two weeks at the international competition. Travel expenses are covered, and mentors get a stipend: \$2,000 the first year and \$3,000 for each of the second and third years.

Mentors are selected on an alternating basis. One year, high school educators are chosen the next year, college educators are selected. Some years, many applicants are excellent, and the selection committee will ask people who were not chosen to please reapply, Gardner says.

"Some mentors have managed to stay in touch with students beyond just the camp and continue to encourage them and mentor them as they continue on in their careers, whether in chemistry or not," she adds.

Larry D. Strawser, a former USAFA instructor and now the technology director for precision engagement at Johns Hopkins University's Applied Physics Laboratory, served as a mentor (1997-99). He remains in contact with many of his former camp students. "I consider my work with the USNCO program to be the pinnacle of my career as a chemical educator." While the rewards are far greater than the challenges, he "would forewarn any who apply to be aware that the summer study camp and the IChO are physically,

intellectually, and emotionally demanding."

Most mentors contacted by C&EN learned about mentor opportunities through magazine or journal announcements. Some chosen to be mentors have doctorate degrees; others do not. All report the time commitment is intense and the brilliant students, a bit humbling. In return, they learned how chemical education differs around the world and are proud to have been involved.

The camp and international competition give "tomorrow's global science leaders" a chance to "get together for competition and camaraderie," says Nadine Szczepanski, a professor of chemistry at MacMurray College in Jacksonville, Ill., and former two-time mentor (1999-2001, 2004-05). "We send the students a college-level organic chemistry textbook and tell them to come to camp knowing the first eight chapters. Amazingly, they are able to do this without difficulty.

"However, most of the students do not have a lot of lab experience," Szczepanski says. "It's also sometimes hard to remember that even though the students are academically at the junior- or senior-college chemistry level, they are socially and emotionally still high school students."

Therefore, maintaining a sense of humor when dealing with students or labs that don't go as planned is a skill that is probably just as important to a mentor as strong commitment and organizational skills, says Jane Nagurney, an assistant principal at Scranton Preparatory School, a high school in Scranton, Pa., and a former mentor (2000-02).

In 2005, a fourth, unpaid, mentor was invited to attend the camp. A bronze medalist in the IChO in Melbourne, Australia, in 1998 and a gold medalist in Bangkok, Thailand, in 1999, Wei Ho is now a second-year graduate student in mathematics at Princeton University. "While I'm no longer in chemistry," she says, "I think that many of the skills I gained from the program, such as how to solve problems and how to learn independently, can be applied to much more than just chemistry." And her knowledge of physical chemistry remains strong. As a volunteer last summer, she attended the lectures, helped in labs, and held nightly tutoring sessions for the students. Having been in their position, Ho says, she could act as a role model and "advise them on study skills and attitudes for the camp, the IChO, and even high school or college." Although she found the mentoring opportunity rewarding, she says, "I feel like the USAFA personnel and the mentors might work even harder than the students."

Sanders is one of the students who still keeps in touch with Ho. "She went to Harvard as an undergraduate, so she sometimes advises me about course selection and we also just chat."

Ho helped to break down the wall that used to exist between students and mentors, according to Allen Cheng, also a Harvard freshman. He took the local exam at his high school in Arcadia, Calif., and made it to the study camp three times. In Taipei, he earned a silver medal. The chance to visit Taiwan was special for him; not only did he compete, but he also visited the birthplace of his parents.

Sofroniew, Sanders, Cheng, and Ho are grateful to all who contributed to their Chemistry Olympiad opportunities. The college students want to give back but will have to wait a few years for eligibility as the fourth, unpaid, mentor. Coincidentally, that will be right around the time of the next Summer Olympics.

INTERESTED IN KNOWING MORE?

For more information, go to www.chemistry.org/education/olympiad.html or contact Cecilia Hernandez at c_hernandez@acs.org.

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