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Three Saint Mary's College students presented their research at an annual undergraduate science symposium in Montreal in November, and each returned with a merit award that recognized the quality of their work.

Stephen Schluchter '05, Barry Amos '05, and Monica Needoba '06 attended the fourth annual Sigma Xi Science Society and Undergraduate Research Symposium. Sigma Xi is an honor society for scientists and engineers that promotes original research and recognizes scientific achievement. About 180 undergraduates attended, representing institutions such as Harvard, Columbia, McGill, and other Canadian and U.S. universities.

Schluchter earned an award of "Superior" for his research on an aspect of internet transactions that is relied on each day by millions of consumers yet probably taken for granted by most of them: the time needed to encrypt and decrypt personal information that is transmitted over the internet. His presentation was titled "R.S.A. Versus Cayley-Purser: A Comparison of Modern Public-Key Cryptosystems." He compared the time required to perform those operations in two information security programs, RSA and Cayley-Purser.

"I wrote the programs from scratch, and then compared the run times of the two different systems of encrypting and decrypting text files," said Schluchter. He wrote three programs: one to translate the RSA algorithms into computer code, one to do the same for Cayley-Purser, and one to compare the two.

"Steve didn't want to just use information that I handed to him," said James Sauerberg, professor and chair of the Department of Mathematics and Computer Science. "Rather, he needed to know how did this work, why did this work. Because of his attention to detail and his need to complete things, he made this project his from beginning to end."

Amos' research was in nuclear physics, and his presentation, which earned an "Excellent" award, was titled "Determination of Event Centrality of Heavy Ion Collisions." His work was designed to better understand the behavior of gold ions-gold nuclei whose electrons have been removed-when they collide under certain conditions. Using data that was generated in an experiment conducted over a ten-year period at Brookhaven National Laboratory, in Long Island, N.Y., Amos used a mathematical model to infer the distances between the ions after they collide. Although his work is not the kind that would lead to applications in the near term, Amos said, it would be of interest to scientists involved in nuclear energy.

"Barry's was very fundamental research," said Jessica Kintner, associate professor and chair of the Department of Physics and Astronomy. "He was trying to understand the conditions that may exist in a star or in a possible Big Bang event."

"I was surprised to win the award," Amos said. "There were a lot of good presentations at the meeting. I felt good that in competition with some of the top

schools around the nation, like Harvard and U.C. Berkeley, I was able to do so well."

Needoba selected and analyzed data that originated in a thirty-year study of the Suisun Bay, which borders northern Contra Costa County, near Martinez. Her presentation was titled "Environmental Change in Suisun Bay Over Thirty Years," and it earned her a "Good" award.

Needoba examined changes over time in the concentration of nitrates and phosphates, the number of different clam species found in the mud, and the total number of plankton. Among her conclusions were that the bay waters appear to be getting cleaner in terms of nitrates and phosphates, pollutants generally considered to be due to human activity, and that an Asian non-native clam, introduced to the bay in 1977, appears to be declining in numbers.

Steven Kelley, assistant professor of biology and director of the Environmental Science and Studies program, attributed much of Needoba's success to her personal qualities. "Monica is very mature, determined, organized and very bright." The quality of her research also was remarkable, he added, because she was between her first and second years as a student when she conducted it.

Needoba, too, was surprised by her award. "I went without expecting anything, other than to speak with people who might know more about what I'm researching. Winning the award has made me want to achieve more at another conference," she said.

Schluchter, Amos, and Needoba have all participated in the Saint Mary's Summer Science program, which provides students with stipends, research funds, and housing to pursue research between academic years.

"These three students exemplify all the best that can come from the opportunities we offer to our Saint Mary's science students through our Summer Research Program," said Judd Case, dean of the School of Science. "The high quality of their research, their understanding of their work in a larger context and the excellence of their presentations are all tributes to the student's hard work, the shared engagement with their faculty mentors and to the science program in general at the College. This is not the first time we have won awards at the Sigma Xi conference. In the two previous years, students have presented their research, and each year at least one of the students has won one of the fifteen awards. The quality of our students is beginning to be noticed by science programs at other colleges and universities, in that we now have established a pattern of strong performances at these meetings."

-- Joseph Wakelee-Lynch
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