Donald G. Crosby Endowed Chair in Environmental Chemistry
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ENDOWMENT PURPOSE
The Donald G. Crosby Endowed Chair was established in 2010 through the estate of the late Dr. Charles (Charley) J. Soderquist in honor of his good friend and mentor, Professor Donald Crosby. Soderquist was an agricultural chemistry PhD student of Crosby’s in the 1970’s. The endowment supports a faculty member whose research is in the field of environmental chemistry, with a broad focus on the challenges related to the source, environmental fate, or consequences in the environment of chemicals that affect living organisms.

RESEARCH
My research program is focused on the fate and toxic actions of agricultural pesticides, petroleum hydrocarbons, oil dispersants and pharmaceuticals in aquatic systems and organisms. Specifically, it is focused on the processes (reactions and rates) by which chemicals are degraded by sunlight, microbes or higher organisms. The less persistent a chemical is, the fewer long-term problems it may present. My program is also focused on the use of traditional chemical tools, such as nuclear magnetic resonance spectroscopy (NMR), for the characterization of toxic actions. Coined "environmental metabolomics," it is focused on elucidating biochemical responses to toxic chemicals in whole organisms under simulated natural conditions.

One key accomplishment of the Crosby Endowment has been the purchase, via five-year payment plan, of a new departmental liquid chromatograph-mass spectrometer (LC-MS/MS) for use by all graduate students and postdoctoral researchers investigating the fate of chemicals of environmental importance. Installed in January 2013, it has already contributed to the research of over a half-dozen doctoral students representing at least three faculty mentors.
TEACHING

At the undergraduate level I instructed ETX 10, "Principles of Environmental Toxicology." An introductory course, it presents basic information on the fate and toxic actions of chemicals in the environment. Over the years many students have decided to major in environmental toxicology based upon their experience in the class. I also instructed ETX 102A, "Environmental Fate of Toxic Chemicals." Originally developed by Professor Crosby and now offered annually, it is one of the core requirements for the undergraduate major. In the course, students are exposed to the many processes that govern the ultimate fate of environmental contaminants. They also select a chemical of interest and develop a brief report to review the properties and processes that contribute to its fate.

I also continued as a team instructor for PTX 201, "Principles of Pharmacology & Toxicology I," by presenting three lectures on chemical fate in the environment. In addition, I presented lectures on pesticides for ETX 30, "Chemical Use and Abuse," and aquatic toxicology for ETX 101 "Principles of Environmental Toxicology."

Teaching involves the communication of new information and concepts to students. Fortunately, research supported by the Crosby Endowment continues to form the basis of new information that I present in my various courses.

STUDENTS

This past year the Crosby Endowment has contributed to the activities of at least five doctoral students and another two postdoctoral scholars investigating the fate and toxic risk of various chemicals in the environment. Such research can aid in the management of anthropogenic chemicals to ultimately reduce their impacts. Support was provided in the form of salaries, benefits, research supplies and travel expenses to scientific meetings. The current members of my research team and their activities during the past year are described below.

Julie Bower (Postdoctoral Scholar) is currently characterizing the toxic risk posed by pesticides in agricultural runoff in the Central Valley, with a focus on chemicals that adhere to soils.

Monica Maier (Pharmacology & Toxicology) is currently investigating the degradation of the antibiotic azithromycin by sunlight, microbes, invertebrates and fishes.

Rebecca Mulligan (Agricultural & Environmental Chemistry) recently completed her dissertation focused on characterizing the environmental fate of the insecticide clothianidin. She is now employed as an environmental chemist for Regis Technologies, Inc. and has published three articles from her research:


Zachary Redman (Agricultural & Environmental Chemistry) is investigating the environmental fate of the insecticide chlorantraniliprole, and is currently focused on its association with soils.

Caitlin Rering (Agricultural & Environmental Chemistry) is completing her dissertation focused on the environmental fate of the herbicide imazosulfuron. She has published one article and has submitted a manuscript for publication:


Kelly Trunnelle (Postdoctoral Scholar) is currently preparing new risk assessment methods for pesticides in sediments.

Katryn Williams (Agricultural & Environmental Chemistry) is currently investigating the environmental fate of the herbicide benzobicyclon. She has published one article and is preparing a second manuscript for publication:


OUTREACH

For over 25 years I have instructed three courses for UCSC Extension. NATSC 422.3, "Principles of Toxicology" and NATSC 424, "Environmental Fate of Pollutants" are required for the Certificate in Hazardous Materials Management; "Principles of Toxicology" is also required for the Certificate in Occupational Safety & Health Management, and both courses are electives for other certificates. NATSC 429.3, "Toxicology Basics for Biotechnology" is an elective for the Certificate in Biotechnology. Over the past year I have used endowment support to assist in the acquisition of literature and materials to make all three courses available on the internet. They now reach a larger audience of working professionals and are available year round.

I also continued to closely collaborate with scientists at the California Department of Pesticide Regulation, State and Regional Water Resources Control Boards, Office of Spill Prevention & Response and the California Rice Research Board on issues related to the environmental fate and toxic risk of agricultural pesticides, petroleum and dispersants. The Crosby Endowment provided matching funds to expand on important research questions.
PROJECTS SUPPORTED
During the past year, I used the fund to continue expanding into the new area of pharmaceutical fate in the environment, as well as support current research activities focused on pesticide fate and risk. In addition, the fund was used to maintain the new departmental LC-MS/MS so that it remained available to all departmental students working in the area of environmental chemistry. I also continued to serve on a select panel for the National Oceanic and Atmospheric Administration (NOAA) charged with developing a guidance document for the future use of dispersants on marine oil spills in the Arctic.

As to new developments in my program, during the past year I gave the following presentations:

Public Lecture, "The Deepwater Horizon Oil Spill: Behind the Headlines and the Lessons Learned." Tahoe Environmental Research Center, Incline Village, CA

Plenary Address, "Application of NMR-Based Metabolomics to Issues in Aquatic Toxicology." International Symposium on Persistent Toxic Substances, Riverside, CA

Invited Presentation, "The Environmental Fate of Pesticides Important to Rice Culture." California Rice Research Board, Davis, CA

In addition, in June 2015 the European periodical International Innovation published "The Fate of Pesticides: Sustainable Californian Sustenance." A review of my research focused on the fate of pesticides in rice fields, it highlights both the new techniques we utilize and the role of the Crosby Endowment in supporting the research.

THANKS
Dear Chris:

I want to again thank you and your family for the generous gift in the form of the Crosby Endowment. It continues to provide the opportunity to both enhance the activities of my doctoral students in environmental chemistry and enhance our department’s ability to support a wide range of students working in this area. In honor of both Professor Crosby and Charley, my goal is to continue utilizing the support to enhance such activities within both the department and the College.

Very best wishes,

Ron