

E.U.-U.S. Atlantis Program Focuses on Biorenewable Resources and Bioproducts

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The E.U.-U.S. Atlantis Program, jointly administered and funded by the Fund for the Improvement of Postsecondary Education (FIPSE) and the European Commission's Directorate General for Education and Culture (DGEC), provides grants for international curriculum development and related student exchange. The program is an umbrella program/grant competition for a variety of innovative, educational opportunities for students and faculty to study and conduct research abroad and develop curriculum. Roland Verhe, University of Ghent (UG), Belgium, originated the concept and secured the initial grant from the DGEC in 2004. U.S. partners submitted the same grant to the Atlantis Program at FIPSE to obtain parallel funding. The first of the two biorenewable resource projects was Renewable Resources and Clean Technology from 2004 to 2009.

Among students from the United States and Europe taking advantage of an E.U.-U.S. Atlantis Program to study in a broad range of disciplines related to biorenewable resources and bioproducts for food and nonfood uses are Wil Gilbert, Kerry Campbell, and Katherine Smith. Gilbert, Campbell, and Smith are at the University of Arkansas (UA), Iowa State University (ISU), and Kansas State University (KSU), respectively, which are the three U.S. partners in the current Atlantis Program.

Andy Proctor, professor of food science at UA, is codirector of the current Atlantis Program—Integral Valorization of Bio-Production—with Koen Dewetnick, a professor at UG. Other U.S. campus coordinators are Larry Johnson, director of the Center for Crops Utilization at ISU, and Ron Madl, director of the Bioprocessing and Industrial Value-Added Program at KSU. The other European partners are Anton Huber at Karl Franzens University in Graz, Austria, and Carlos Vaca-Garcia at the National Polytechnic Institute of Toulouse in France.

The current program, Integral Valorization of Bio-Production, funded from 2008 through 2012, provides financial assistance for U.S. students to study in Europe and for E.U. students to study in the United States. "Integral valorization" means the essential or true nature, value, or cost. It relates to the life cycle or "carbon footprint" of all energy and material inputs and outputs of a particular energy source or other biomaterial. A program description states that integral valorization must be the basic concept driving the design of new processes for food, biomaterials, and bio-energy production to achieve sustainable development. This will necessitate the optimal utilization of all coproducts and waste streams.

Each participating university is a leader in renewable resources research. The three European universities have premier programs in biorenewables and/or biofuels. The U.S. universities are leaders in agricultural, food, and environmental sciences. ISU has the first graduate program in biorenewable resources in the United States. The Bioeconomy Institute at ISU seeks to advance the use of biorenewable resources for the production of chemicals, fuels, materials, and energy.



Anton Huber of Karl Franzens University in Graz, Austria, explains opportunities with the Atlantis Program to students at the University of Arkansas.

At KSU, the Bioprocessing and Industrial Value-Added Program specializes in developing biomaterials processing technology and using agricultural-based materials to produce higher value products for economic development. The feed science and management degree within their Department of Grain Science and Industry offers a biofuels production option, and an interdisciplinary graduate certificate program is offered in bio-based products and bioenergy through the graduate school.

The UA Division of Agriculture has placed a high priority on multidisciplinary research and extension projects to develop the state's biofuels and bioenergy infrastructure. The development of value-added food products and the use of coproducts from the food industry are major areas of food science research at the university. At a recent presentation for prospective exchange students at the university, Anton Huber, of Karl Franzens University, noted that students can work with a faculty mentor to select courses, a research project, or a combination of both in the semester program of five to six months. The program provides up to \$5,000 for each participating student. Students enroll at their home university and have their tuition waived at the E.U. institution. There are two types of programs available for seniors and graduate students. One provides opportunities to study at one of the E.U. partner institutions for one semester by completing coursework and/or research. The second opportunity, in addition to the E.U.-U.S. Atlantis Program, is a series of two-week intensive study programs, consisting of lectures and field trips with a final exam.

Fifty-two students—21 from the United States and 31 from Europe—have participated or are scheduled to participate in the four- to six-month semester program for 2010. Thirty-eight students and 33 faculty members from the United States have attended two-week intensive programs in Europe and the United States.

A broad range of interests for students in any agricultural-, science-, or engineering-based discipline can be accommodated, Proctor said. UA students have been in the disciplines of food science, agricultural economics, biological engineering, animal science, horticulture, chemical engineering, and crop, soil, and environmental sciences.

A few examples of previous and current courses of study and projects include the use of algae for biofuel, biorenewable resources in gastronomy and nutrition, biorenewables economics and law, and the chemistry, physics, and biology of various biorenewable materials. More information about the program is available online at www.uark.edu/ua/biorenew.

The program at UA also promotes faculty exchanges. Ya-Jane Wang, a food science professor at UA, spent four months in the Pharmacy Department at UG in 2006. She conducted research on the use of modified starch in controlled-release applications for pharmaceutical products. Her graduate student, Stephen O'Brien, studied in the same department in 2006 and was funded by the Atlantis Program. Wang also hosted a student from UG, Thomas Quentin, for two visits to study and work in her lab at the university.

"It was a great opportunity to learn from leading scientists in the area of controlled-release applications in pharmaceuticals," Wang said. "We developed a very good, continuing working relationship."

Raj Raman, director of graduate education for the Biorenewable Resources and Technology Graduate Program at ISU, taught a two-week intensive study in the summer of 2008 in Tarbes, France, on modeling fermentation processes and optimizing microbial conversion of sugars and starches into biochemical products.

"It was a great way to interact with a range of really outstanding students from the E.U. and U.S. as well as other scientists," Raman said. "It was a catalyst for us to organize our own version of an intensive course," he added. The short course on biorenewables at ISU in June 2009 was attended by 50 students from the United States and the European Union and included presentations by U.S. and E.U. scientists.

"It is a wonderful way to create collaborations and to expand the academic and cultural horizons of our students," Raman said.

Katherine Smith, who received an M.S. degree in food science and technology in 2009 at KSU, spent March to August studying at the Faculty of Bioscience Engineering in the food science labo-

ratory of Koen Dewettinck, University of Ghent. Her research focused on food applications of soy protein isolate.

"One of the great benefits was being able to compare American and European academics and research," Smith said. "It was very interesting hearing how Europeans feel about their system and ours and having in-depth conversations about what an ideal learning and research environment would be."

Most faculty members speak English, and students can function well with a minimum of host country language skills, but "the more the better," especially in France, Smith said. "Don't be afraid of the language barrier," she advised. "I discovered that pantomiming brought more joy and fun to the adventure than using plain old English."

Kerry Campbell, who received his Ph.D. degree in January 2010, and his wife spent about five months in Toulouse with a research team trying to develop a water-based process for extracting oil from sunflower seeds. His dissertation research at ISU was with a team working on water-based extraction of oil from soybeans.

"I gained a better understanding of the differences in cellular geometry of soybeans and sunflower seeds," Campbell said. The work in Toulouse provided a chapter in his doctoral dissertation. He now has a post-doctoral appointment with the research team on water-based oil extraction at ISU.

Campbell, who took his road bike on the trip, joined a local cycling group and participated in a local bike race, which was a highlight of his experience. He and his wife also enjoyed sightseeing and hiking in the Pyrenees. Because he had spent a year in France as an undergraduate student, Campbell could speak French.

"Speaking French makes it much easier, but people respond well if you show a strong interest in learning French and they can tell you are making the effort," he said.

Wil Smith, a food science major with an emphasis on human nutrition at UA, studied at UG from September 2009 to January 2010. His project involved the qualitative and quantitative measurement of proteins from the milk-fat globule membrane in milk fractions using a proteomics-based approach.

"I'm more optimistic about my future because I've been exposed to a place that I felt like was a better fit for my personality," Gilbert said. "I did have a hard time returning from Europe because I really liked being there. If I were to do it again, I'd leave at the start of the spring semester and return in the summer so I'd have more time to adjust."

Gilbert's experience was enriched by friendships with other exchange students, he said. "I met people from France, Poland, Bulgaria, Slovakia, Czech Republic, Greece, Germany, Ireland, Scotland, Britain, New Zealand, Latvia, Turkey, Slovenia, Portugal, Spain, Finland, Brazil, and Italy. Most exchange students enjoyed talking to a native English speaker, as lots of them go on the exchange programs to another country in order to improve their English skills. They like hearing American English because they watch a lot of American TV and movies. I enjoyed living in a city where I could walk or bike everywhere with ease, or travel between cities and countries using the excellent train system. The food and beer is much better in Belgium than in Arkansas."

To find out more about the E.U.-U.S. Atlantis Program, visit www2.ed.gov/programs/fipseec/index.html. In addition, each participating university has a website for more information: www.uark.edu/ua/biorenew—University of Arkansas, www.sustainable-energy.ksu.edu—Kansas State University, www.biorenew.iastate.edu/academics/international-exchange-program.html—Iowa State University, and www.cepolmc.nawigraz.at/components/com_mambowiki/index.php/Integral_ValORIZATION_of_BioproductiOn—Europe (Graz).



Roland Verhe of the University of Ghent and his wife, Monique. Verhe originated the concept for the Atlantis Program on biorenewable resources and bioproducts. He secured the initial grant from the European Commission's Directorate for Education and Culture in 2004.



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Andrew Proctor is a professor in the Department of Food Science, University of Arkansas, and conducts research on lipid chemistry and value-added research. He is U.S. director of the current Atlantis Program, Integral Valorization of Bio-Production. He also consults with the food industry on the production of value-added products from co-products. Proctor can be reached at aproctor@uark.edu.



Lawrence A. Johnson is the director of the Center for Crops Utilization Research at Iowa State University (ISU), a center comprising 50 faculty members focused on developing value-added uses for crops. He was also recently appointed director of the ISU BioCentury Research Farm, which is an integrated research and demonstration facility dedicated to biomass production and processing. He can be reached at ljohnson@iastate.edu.



Ronald L. Madl is a research professor and director of the Bioprocessing and Industrial Value-Added Program in the Department of Grain Science and Industry, Kansas State University (KSU) (<http://grains.ksu.edu/bivap>). He is also codirector of the Center for Sustainable Energy at KSU. Madl can be reached at rmadl@ksu.edu.



Raj Raman is associate professor of agricultural and biosystems engineering at Iowa State University. He is serving as first associate director of education for the Bioeconomy Institute, director of university educational programs for the NSF Engineering Research Center for Biorenewable Chemicals, director of graduate education for the Biorenewable Resources and Technology Program, and director of graduate education for the graduate minor in biorenewable chemicals. He can be reached at rajraman@engineering.iastate.edu.

An NP Analytical Labs ad appeared here in the printed version of the journal.