Spring 2005

The ArmStrong Chemical Bond

Armstrong Atlantic State University

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The Link Between Faculty, Alumni and Friends of the Pirate Chemist

Faculty Profile-Dr. Richard Wallace

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"Changing Horses In The Middle Of The Stream (Not Exactly But Certainly A Different Research Area)"

All my life I have enjoyed growing plants for both the food they provide and for the beauty they possess. Although I'll never lose my love for what I consider "traditional" organic chemistry over the past few years I've developed an interest in a very different area of chemistry that bridges my lifelong love of plants and organic chemistry. It has long been known that plants produce a wide range of biologically active secondary metabolites in addition to the primary metabolites that we use as food (carbohydrates, proteins, fats and lipids). Secondary metabolites are usually produced in smaller quantities than primary metabolites and have been employed by humans as pharmaceuticals, flavorings, fragrances, pesticides and fungicides. Some examples of biologically active secondary metabolites isolated from plants include: taxol (isolated from Taxus brevifolia and used in the treatment of breast and ovarian cancers) and morphine and codeine (isolated from Papaver somniferum and used as analgesics.

Secondary metabolites are found in nearly all parts of the plant. The isolation can be tedious and expensive because the desired compounds have to be separated from the primary metabolites that constitute the majority of the plant mass. Most often, the plant is destroyed in the process of isolating the desired compound. One solution to these problems uses plant tissue culture for the production of secondary metabolites. Plant tissue culture involves growing of plant material (called plantlets or explants) under sterile conditions on a nutrient rich growth media under artificial lighting.

Plant tissue culture can be used to produce secondary metabolites for biological activity studies. There are a number of advantages to this method including that a number of plantlets eliminate their secondary metabolites into the growth media. This means that isolation of metabolites can be easier than when the plant is grown in soil. Also, in the laboratory, it is easier to control the conditions under which the plantlet is grown and study the impact on the secondary metabolites produced.

In our current studies, secondary metabolites produced by members of the genus Annona (family Annonaceae) are being explored. This is a family of tropical plants grown for their fruits. Some of the more widely known fruits in this family are the sugar apple (Annona squamosa), the cherimoya (Annona cherimola), the atemoya (Annona squamosa X Annona cherimola) - a hybrid of the sugar apple and cherimoya, and the soursop (Annona muricata). In addition to yielding delicious fruits, the members of this family provide compounds that can be used as insecticides and in a variety of medicinal applications. The expected outcome of this project is a better understanding of how tissue culture conditions (light levels, growth media composition and temperature) can be manipulated to increase the quantity of secondary metabolites obtained from members of the Annonaceae family. Increasing the quantity of secondary metabolites will allow for a detailed investigation into the biological activity of these compounds and their possible use as therapeutic agents or for other applications. It has been and will continue to be very exciting to explore this marriage of my love of organic chemistry and plants.

Inside this issue:

AASU

Alumni News

We received updates from many of you since the first news letter! Keep them coming in! Email: nivensde@mail.armstrong.edu

Many former students are getting married this summer! In May its **John Stone** (2002). John is currently pursuing his PhD at the University of South Carolina. **Jarrett Walsh** (2003) is marrying an AASU Nursing graduate Jessica Tuten. Jarrett is pursuing his MD/PhD at the Medical University of South Carolina. Last but not least, two chemistry graduates **Brian Helmly** (2003) and **Katie Kuyk** (2003) will also be tying the knot. They are living in Macon where Brian is pursuing his MD degree at Mercer University. Brian was also the recent recipient of two scholarships to help with his studies at Mercer. Congratulations to all!

John Hopkins (2001) is an Associate Scientist in the Technical Services Department at American Pharmaceutical Partners in Grand Island, New York. He tells us that his family is doing well, with 2 children Autumn (age 11) and Annabelle (age 3).

Radha Narayanan (2000) defended her PhD thesis this semester at Georgia Tech. She was working with Dr. El Sayed on nanoparticles. She had a number of publications in various journals including the *Journal of the American Chemical Society, Nano Letters* and *Langmuir* to name a few. She is currently in a postdoctoral position with Dr. Marc Porter at Iowa State University.

LeAndra Hanbury Higginbotham (1992) has received her PhD in Forensic Toxicology and working in the Florida Department of Law Enforcement.

Alex Yang (1999) is in the MD/PhD program at Louisiana State University.

Jeremy Olson (2003) is in the PhD. Program in Medicinal Chemistry at Suny-Buffalo.

Robert Long (1998) is in the PhD. Program at Auburn. He is working with Dr. Eric Bakker.

Charlie Parker (2002) works for Spectra Tech EM Inc. in Atlanta GA, which does work for the U. S. EPA. Last summer he was involved in the clean-up from the four hurricanes that hit Florida.

Crystal Crow-Wilson (2003) is a laboratory chemist at Arizona Chemical Company in Savannah.

Stephen West (2001) is teaching both science and music at Providence Christian School in Savannah GA.. Mr. West has a baby boy named Noah.

Annual Giving

The Department of Chemistry and Physics maintains accounts within the non-profit Armstrong Atlantic State University Foundation, Inc. If you are considering a donation to the university, please keep us in mind. The Department relies on foundation monies for the maintenance and upkeep of instrumentation, travel, the annual banquet, undergraduate and faculty research, the student affiliates and outreach programs. If interested visit http://www.external-affairs.armstrong.edu/pledge.htm or contact Gail Rountree, Coordinator of Annual Fund, Office of External Affairs 11935 Abercorn Street, Savannah, GA 31419, (912) 927-5208, (912) 921-5740 (Fax).

Please designate your gift to Chemistry/Physics (189) so that you will have the biggest impact on our students and faculty. You can also designate funds to the Robert Kolodny Scholarship Fund (#333) to support outstanding chemistry and physics students.

Current Student News

Nguyen Nguyen, a rising chemistry senior, was accepted into Clemson University's NSF summer undergraduate research program this summer. He will be doing biological assays via electrochemistry with Dr. Steven Creager.

Juan Aragon (2005) was named "Outstanding Honors Student" for 2005 by the Honors Program at AASU at the Awards Convocation. Juan recently had his summer research work published in *Nature Structural and Molecular Biology*. This is the second time in three years that a graduating chemistry student has been named honors student of the year with Jarrett Walsh (2003) being named 2 years ago.

Nin Dingra (2005) and **Joyce Chow** (2004) (picture to the left) won second place for their undergraduate research in the inorganic division of the Southeast Regional Meeting of the American Chemical Society . The award was for their research, "Nanoparticle Mediated Photodefluorination Monitored by F-19 NMR."

The AASU Student Affiliates of the American Chemical Society received a Commendable Award for their activities for the 2004-2005 School Year. The student affiliates are advised by Dr. Nivens and Ms. Carpenter.

Jennifer Fiser (2005) was accepted to Veterinary school at two schools and will attend the University of Georgia.

The Annual Chemistry and Physics Banquet

Many of you probably remember the annual banquet held in the spring. Traditionally, this banquet has been held at Carey Hilliards and sponsored jointly between the department and the Student Affiliates. Well, this year we made a BIG change...NO CAREY HILLIARDS! The banquet was instead held on the Armstrong campus in the newly renovated Faculty dining room. In addition, we sent personal invitations to all the chemistry and physics majors and thus had an attendance of over 70 people. At the banquet we formally renamed the Harris-Brewer Scholarship to the Robert Kolodny Scholarship. In addition, a number of awards were given to students. The award winners were :

Morris Whitten Physics Award: Ty Wangsness
General Chemistry Award: Missa P. Sanou, James Grayson, Jon McDowell, Kristina Nelson
Analytical Chemistry Award: Nguyen Nguyen
Organic Chemistry Award: Richard Anuskiewicz
Chemistry Faculty Senior Award: Joyce Chow
Outstanding Chemistry Senior (Coastal Georgia ACS): Jennifer Fiser
Outstanding Chemistry Senior (Academic Achievement): Juan P. Aragon
John G. Brewer Award: Nin.N. Dingra
Outstanding Performance on the Chemistry Exit Exam: Bryan Jacobs

Congratulations to all the awardees and graduates!

The 2004-2005 Student Affiliate Officers receive their plaque. Left to right: Juan Aragon, Marquit'a Bullock, Beverly Harris and Jennifer Fiser.

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A busy year!

We have had a busy year! Our faculty have been very active teaching and pursuing other activities including both outreach activities and scholarly work. As you will see inside, our students have done an excellent job this year also.

Some highlights include three published manuscripts from our faculty. Dr. Richard Wallace and Ms. Suzy Carpenter have published two articles on experiments and activities for organic chemistry students. "Using Spreadsheet Software in a 'Value-Added' Review of Infrared Spectroscopy in the Organic Chemistry Laboratory Course", was accepted by *The Chemical Educator*. The article details their efforts to include a module in organic chemistry where students learn to manipulate their data as well as data downloaded from an IR spectra database using EXCEL. The pair also had an article entitled, "A Quick and Easy Simplification of Benzocaine's NMR Spectrum", accepted by *The Journal of Chemical Education* where they modified a classic organic chemistry experiment to simplify the collection and interpretation of the NMR data.

Dr. Will Lynch and Dr. Delana Nivens have had a paper entitled, "Nanoparticle Mediated Photodefluorination monitored by 19F NMR" accepted to the *Journal of Photochemistry and Photobiology*. The paper includes four student co-authors: Joyce Chow, Nin Dingra, Elizabeth Baker and Brian Helmly. The paper details their research efforts in identifying the photodegradation pathway and products when fluorinated aromatic hydrocarbons are degraded with both light and ZnS nanoparticles.

Our outreach teams visited many schools and had many schools visit this year. Some of the schools involved in outreach programs this year included Savannah Christian, Windsor Forest, Claxton Middle School and White Bluff Elementary.