

FROM THE DESK OF DR. TIMOTHY HOMAN, CHAIR

Retirement News:

Dr. David Jones retired in May of 2008. He taught Biochemistry in the department for 18 years and served as the department chairman for 15 years.

Faculty News:

Dr. Kevin Shaw is now teaching Biochemistry with a joint appointment in the Chemistry and Biology Departments. (You can learn more about Dr. Shaw's research in the research spotlight in this newsletter.)

Curriculum Review:

The department completed a curriculum review last fall and will be implementing a number of changes in the curriculum this year. The department continues to be committed to a rigorous curriculum. Using several benchmark institutions and the new ACS undergraduate guidelines, we have retooled the curriculum, allowing students greater flexibility in choosing upper level elective courses. Two electives that were recently added are courses in computational chemistry and advanced instrumental analysis. See our new website for details.

Other News:

The department has continued to expand and upgrade its instrumental capabilities. The department now houses a 60 MHz teaching NMR, a 300 MHz NMR, two FT-IR and four UV-VIS spectrometers, an AA, GC, GC-MS, HPLC, LC-MS, TGA and DSC. These instruments continue to be integrated into the curriculum as well as support faculty/student research projects. The College, through the Swezey Fund, has provided financial support for students and faculty to conduct research in the department during the past two summers. Three students participated in the program in 2009 and two more in 2010 under the direction of Dr. Charles Kriley.

With a generous bequest from the estate of Kent S. Dennis (Class of 1950), the Chemistry department purchased a new Anasazi Instruments 60 MHz FTNMR which will be used in the organic chemistry laboratory. A Rigaku XtaLABmini bench top x-ray diffractometer (the first of its kind in North America) has been installed and will be used to determine structures of molecules synthesized in GCC research labs and in a soon to be offered crystallography elective course.



2010 GRADUATING CLASS
SEE UPDATES AT BOTTOM OF PAGE 5

COMING HOME

FOR HOMECOMING?

If you're planning to attend Homecoming 2010, we'd enjoy the opportunity to catch up with you at the Chemistry department breakfast. This event is shared with the Biology department, so plan on seeing some familiar faces of former classmates and professors. Come share a continental breakfast anytime between 9:00 and 10:30 AM in the first floor hallway of beloved Rockwell Hall, and then go enjoy the parade.

In addition to the breakfast, feel free to ask for a tour of our updated instrumentation lab (lots of great new additions to our labs).

Finally, come prepared to share your ideas for improving our department. After all, you're the experts on being GCC students and alumni.

Hope to see you on Saturday, October 9th!

ERLENMEYER TO EINSTEIN: International Education Experience 2010

CHEM 390 “The History of Chemistry” and SCIC 203 “Baby Chemistry” (the chemistry class provided for non-science majors to complete their lab science requirement)

Nine students traveled to Germany this past May intersession for two weeks (5 for SCIC 203 and 4 for CHEM 390). Both classes spent time during the spring semester preparing for the trip by completing about ½ of the class material on the GCC Campus. The students were then ready to head to Germany by way of Amsterdam. Along with the students were two alumni and Dr. Kriley.

The SCIC 203 students were given lectures in both the youth hostels and trains, taking quizzes along the way. Laboratories were handled in a unique way; traditional labs were performed at Grove City College and oversea labs consisted of visiting a chocolate factory in Köln, the Deutsche Science museum in Munich and, yes, even the Heineken plant in Amsterdam (perhaps the most modern and instructional tour of the three).

Students, faculty and alumni stayed in various youth hostels during the two week trip, providing the students with close interaction with a variety of different cultures. Next to the Berlin hostel was a three day intercultural fair which the students attended on two different nights, absorbing not only the German culture but a variety of other countries as well. Some of the other highlights of the trip were a Fat Tire Bike Tour in Berlin, a stay in Rothenberg (one of the few remaining walled in cities in Germany), a trip to Neuschwanstein and a day at Dachau, one of the first concentration camps in Germany. The trip included a multitude of cities including Amsterdam, Hamburg, Berlin, Munich, Rothenberg, Frankfurt and Köln as well as a 4 hour Rhine cruise.

The CHEM 390 students were required to write and present two papers, one on a German scientist and the other on the top ten scientific discoveries that have happened in their lifetime. These students were also required and tested on reading “Uncle Tungsten” by Oliver Sacks (a great book to read if you are interested in the development of science during the 18th and 19th century). It was a great trip which will hopefully be repeated in the next couple of years. Next year another group of students will be going to Nantes, France, for a similar trip during the May intersession 2011.

*Dr. Chuck Kriley (class of '88 and
Professor of Chemistry at GCC)*



Students take an historical tour of Berlin.



Doner Kebab: the Traveler's Choice

ALUMNI INFORMATION

COLLIN MOORE ('93) SHARES BUSINESS EXPERTISE WITH GCC STUDENTS...



SHARE YOUR UPDATES WITH US...

We believe that our alumni community has a wealth of wisdom, insight, and experience to share with our current and prospective students. We've designed an on-line survey to start tapping into this wonderful resource. Please click on the link below and take a few minutes to answer the questions in our survey. The questions focus on drawing out your experiences, reflections, and perspective on your career, your college experience and your advice for our students. It should only take a few minutes and, with your permission, we will incorporate your insights in the alumni section of our departmental website and in departmental planning and instruction. Just click on the link below and join in building our community knowledge base.

<http://www.surveymonkey.com/s/6CJYWK2>

NOTE: If you do not wish to share your information in future publications, simply indicate so at the end of the survey.

We are pleased to share the following interview with Collin and want to express our thanks to him for his ongoing contributions to the Chemistry department.

Q: Please share reflections or recollections of your experience at GCC and explain how this has impacted your life & career.

CM: The most basic and straightforward answer to this question, is the solid, fundamental, education GCC provided. This is true of both the chemistry education I received (I felt prepared for whatever branch of Chemistry I wanted to pursue), and also in the solid, Liberal Arts background. Outside of science, I have truly cherished the rounded curriculum. You meet people with varying experiences and backgrounds during your career. Thanks to the core curriculum, I had a broad enough background to find common ground with everyone with whom I have had to work. Since you meet people from all different cultures, religions and value systems, the solid grounding provided by GCC is a huge benefit. In the end, it is not always the smartest or even the hardest working person who gets the most done. It is often the person who is best at interacting with people and convincing them to follow a vision that is the most productive. Also, being a Beta Sigma really helped keep my feet on the ground.

Q: Please share a bit about your perspective on the future and what skills our students might need to develop in order to contribute to their chosen career paths.

CM: We in the chemical industry face an ever increasing pressure from the new Global economy. I would say that the ease of information exchange and travel have made the world a very small place. This began with manufacturing, but quickly moved to technical service and computer industries.
(interview continued on page 4)

ALUMNI INFORMATION (cont'd)

Interview with Collin Moore (cont'd)

I am aware of two paint companies who have moved entire labs to India, where a salary for PhD's is only about \$15,000. This, I believe, is only the beginning. Things like digital X-rays make cheap diagnoses from highly qualified doctors in India fast and cheap. This trend will continue. For the best chance of success in today's economy, I believe graduates must become globally aware. Technical expertise is soon to be the entry level qualification for a job. For a career, the ability to function in a global economy is absolutely essential. My advice? Learn all you can about different cultures. A misunderstanding due to ignorance can ruin a relationship, but a good understanding of a culture can advance your relationship very quickly. Learn another language, maybe two. Lastly, our graduates can no longer be simply good. They must be the best when facing talented people from all over the world. This trend must be viewed as an opportunity for those who are willing to seize it.

In March 2010, Collin & a colleague from BASF visited campus to present a seminar & lead Chem 406 (Instrumental Analysis) students in an experimental design project. Here, Collin shares his reflections on this collaborative project:

I have always had a great desire to give back to Grove City College. As a parent of four in a single income household, however, my financial resources are limited. That said, one day it occurred to me that there was one way I could give back, and this was in the area of sharing what I have learned in my industrial career. I contacted Dr. Homan and shared some of my ideas. With the fluid grace of a highly experienced manager, he said, "Sure, how about you help with that?". (I had just been out-managed by a professor, although he may have been helped along by the fact that I thought a collaborative project sounded like a lot of fun.) Dr. Homan put me in touch with Dr. Mike Falcetta and an exciting collaboration began. Initially, it started as a suggestion about incorporating experimental design into the curriculum so that the students could have a taste of the technique, and ended up evolving into a short course on "life in the big city". Dr. Falcetta found a clever problem that the bio department was wrestling with and tasked his Senior class with solving the problem.

It began with a literature search, followed by a visit to GCC where my colleague & I observed the students' oral reports and discussed the potential solutions they found during their investigation. It was our goal to help them think about the work that was done, rather than simply regurgitate their readings. We treated them like researchers in an industrial setting and expected them to be our company experts. Lest you judge us too harshly, you should know we were very gentle. Over the next few weeks, they labored furiously on the topic, incorporating experimental design into their work. In the end, they delivered a procedure for the freshman BIO class. They were expected to provide the team with regular updates, based on a predetermined set of milestones. We felt this was the best way to give them a "practice run" of what they may soon be facing. I can only imagine how crabby they were at first, but in the long run, they all told Dr. Falcetta how great an experience it was and that we should do it again for another class. It was only at the end that Dr. Falcetta let them know what we were trying to do. When they began to understand what was expected of them, they rose to the challenge and that was extremely rewarding. GCC faculty greatly desire to prepare their students for what lies ahead.

ATTENTION ALUMNI! SEND US YOUR PHOTOS FOR OUR NEW CHEMISTRY DEPARTMENT WEBSITE...

We would like to have pictures of our alumni in the alumni section of our new website.

As a visitor navigates to that webpage, they would see pictures of alumni which would change every few seconds.

If you're willing to be part of the slide show, send an electronic photo via e-mail to mffalcetta@gcc.edu.

Just remember that anyone who visits the website can see the photo, not just GCC alumni.

Thanks for helping to build our website!

DR. KEVIN SHAW ('95) CONTINUES RESEARCH INTO PROTEIN STRUCTURE

DNA → RNA → Polypeptide → Protein

Watson-Crick
base pairing

The Genetic
Code

?

The central dogma of molecular biology describes the flow of genetic information from genes to proteins. An expanded view of the central dogma is illustrated above with the “rules” for each transformation included. Our research focus is to contribute to the understanding of the less well understood rules which govern protein folding (“?”). One of the major open questions of protein folding is “can a three-dimensional structure be predicted given only a polypeptide sequence?” The current state-of-the-art methods for answering this question are displayed every two years at the CASP meetings (Critical Assessment of Structure Prediction, <http://predictioncenter.org/>) where predictions are made for several newly solved but yet unpublished protein structures. We would like to develop *de novo* prediction methods (those which do not use sequence homology modeling or meta-predictions, combinations of published prediction methods) in order to participate in these meetings. The data for the development of these methods come from a wealth of experimental studies with proteins in test tubes as well as statistical surveys of known protein structures, many dating back to the late 1960s.

We are, as a first step, looking at some of the classic surveys of protein structure. The first area in which we have learned something is the conformational preferences of the amino acids, particularly the tendency to form an α helix, helix propensity. The first statistical description of conformational preferences was made in 1974 (and is still the classic reference) using 15 proteins containing 2,473 residues. At the time, these were *all* of the non-homologous protein structures known. Today, however, if you look through the 66,324 structures currently in the protein data bank (<http://www.rcsb.org/>, as of early July, 2010), you find several thousand non-homologous structures, a *much* larger sampling size. Using this observation, we assigned secondary structures to a large group of structures (3,978 proteins, 559,075 residues) using standard methods and calculated all of the statistical parameters. We write our code in Perl, and the complete calculation takes less than ten minutes. The results for the larger data set are not dramatically different, but the subtle differences become apparent when compared to experimental measures of helix propensity.

In the 1980s, the helix propensity for each of the twenty amino acids was measured in synthetic peptides, and in the early 1990s, with the development of PCR methods for site-directed mutagenesis, they were also measured in several protein models. If all the experimental scales (more than twelve) are taken together to form a unified scale, the classic data show a moderate correlation ($R=0.78$) and only capture approximately seventy-five percent of the energy range. However, our scale correlates much better with the experimental data ($R=0.88$), and the encapsulated energy range (0.00-0.95 kcal/mol).

Class of 2010 Post Graduation Plans:

David Earl: Pursuing a Ph. D. in the Chemical and Physical Biology Program at Vanderbilt University

Cerise Fereshetian: Quality control, Estee Lauder

Tom Lilly: Pursuing a position as chemistry, secondary education teacher

Elizabeth Michael: Pursuing a Ph. D. in the Energy Engineering Program at Penn State

Charles Neff: Pursuing a position as chemistry, secondary education teacher

Doug Pichler: Attending pharmacy school at The University of Pittsburgh

Andrew Scharf: Pursuing further education in the health care field

Laura Seavy: Pursuing a Master of Science in Physician Assistant Studies at Marietta College

Nancy Stabley: Working for Americorps in the “Change a Heart: Franciscan Volunteer program”; applying to medical school

Katherine Watkins: Pursuing a Ph. D. in the Chemistry Department at Vanderbilt University