DIVISION OF NATURAL SCIENCES AND MATHEMATICS
2008-2009 ANNUAL REPORT

Addendum / Chemistry Additions – shown in red, 8/11/09

I. EXECUTIVE SUMMARY

a. Chemistry Department

- The Chemistry program graduated six students at the end of the 2008-2009 academic year. In contrast to past years where more students followed the forensic option, four of the graduating students completed the requirements for the traditional option and two the forensic option. This did not indicate a decline in the popularity of the forensic chemistry program, but rather, showed student interest in merging the two options through combining a traditional major with a forensic minor. There seems to be increasing interest among our students in the traditional major.

- The Chemistry Department had notable growth in the Ch 104-106 sequence for 2008-2009 which necessitated the addition of lecture seats and two laboratory sections. The increase in enrollment was a consequence of the new nursing program. We expect to see continued growth in this area for the near future. To accommodate pre-nursing students, we are investigating the addition of a third section of this course to run as a trailing section (Ch 104 beginning in winter term). This section could accommodate up to 48 students with the addition of two laboratory sections (total .5 FTE).

- In anticipation of the increased pressure that would be placed on department resources with the influx of pre-nursing students, a new tenure track position was added for Fall 2008. Dr. Patricia Flatt, whose specialty lies in the area of biochemistry, was hired. Dr. Flatt proved a valuable addition to the department. She covered some of the new laboratory load of the Ch 104-106 sequence, as well as taking on assignments in the forensic area and the sole responsibility for biochemistry which had been previously covered by Drs. Guralnick and Galvan of the Biology Department. We were able to offer a biochemistry laboratory for the first time. The original plan had been for that laboratory, which had been in the catalog for a number of years but never offered, to be a joint venture between the biology and chemistry programs taught by Drs. Flatt and Guralnick. However, Dr. Guralnick's departure from the university left the instruction for this course totally to chemistry. Unfortunately, the enrollment proved to be low for the course, and we believe this was due to a class time conflict with Biology's Immunology. We will determine the viability of this course by offering it again during Winter 2010.

- Chemistry Department members have contributed to the University as active participants in many areas including the LACC Review Committee, the Freshman Experience Committee, the Faculty Development Committee, Faculty Senate and Student Conduct Committee

- Chemistry faculty have contributed to all areas of the Division including service on a number of committees including Building Utilization and Planning Committee, Technology Committee, Professional Concerns Committee, Curriculum Committee, Budget Committee, Personnel Review Committee; NSM seminar planning , and class scheduling action group.

- The Department has been active in recruitment through organizing activities such the Oregon Junior Academy of Science and JSHs programs and high school career day visitations.

- Two chemistry faculty members received Faculty Development Funding for major research grants while one faculty member received a National Park research internship and participated in the filming of a National Geographic documentary.

APPENDIX 1. NSM FACULTY AND STUDENT ACCOMPLISHMENTS

III. CHEMISTRY DEPARTMENT

a. Teaching

- GS 203 H is the LACC science component for the Honors Program. The third term was jointly taught by faculty members in Earth Science (Philip Wade) and Chemistry (Arlene Courtney). Two non-traditional approaches were used in teaching this course. First the students were exposed to many social networking tools for acquiring and sharing information. These tools included blogs, social bookmarking, RSS feeds, and photo sharing. Secondly, teams of students created documentary video productions on various energy topics. Students conducted research which often involved field trips or interviews, photography and/or videography. They wrote and recorded narrations and learned how to do video editing. The finished documentaries were presented during the Academic Excellence Showcase, and a DVD of eight documentaries is in production. The instructors will present the results of this project at a poster session of the fall 2009 GSA meeting.

- Students in the Ch 462 class conducted a water contamination study as a public service. The students researched methods for analyzing environmental samples for copper concentrations, acquired a series of water samples from the client's ranch in Calera, Oklahoma, conducted the analytical analyses, presented their findings in the form of a written report submitted to the client, offered suggestions for remediation of the problem and provided detailed instructions for removing stubborn residues left by the contamination. The project gave the students practical experience while providing a service to a landowner. This project exposed the students to various types if writing including a proposal, business letters, and a client report. The project required the students to take technical information and present it to a non-scientific audience.

b. Scholarship

Research Projects

Pete Poston

- Conducted research analyzing of Rock Art Pigment from the Great Gallery, Maze District, Canyonlands National Park in Utah. In conjunction with this work he participated in the filming of a National Geographic special on Canyonlands National Park, Utah. Dr. Greg Swasey of the Denver USG. This production has been scheduled to air during the second half of 2009. He also spectroscopically analyzed Barrier Canyon-style rock art using Near Infrared Spectroscopy and Raman Spectroscopy.

- Initiated analysis of possible impact-related extraterrestrial iridium and nanodiamonds temporally synchronous with the end of the Clovis Period of habitation 12,900 years ago. He has been granted a research permit by the National Park Service for collecting samples from Canyonlands National Park in Utah. His initial investigations using electron microscopy involved two Western student collaborators, Cory Perkins and James Dunning. Dr. Poston has obtained a Faculty Development major research grant for this study.

Patty Flatt

- "Pyralomicin Biosynthetic Gene Cluster Characterization": I have continued a collaborative research project with Dr.Taifo Mahmud from the College of Pharmacy at Oregon State University. The focus of this project involves the investigation of soil microbes and their ability

to produce bioactive secondary metabolites. This research topic has been the focus of a recent NSF grant proposal where I am listed as the Co-PI on the project (see below). During the Spring Term of 2009 an undergraduate student at WOU, Travis Hoagland, assisted my efforts on this research as part of CH 401 Research Course.

- "Investigation of Mycosporine-like Amino Acid Production in Cyanobacteria": Genome-mining of the fully sequenced Nostoc punctiforme cyanobacterial genome has revealed the existence of a biosynthetic gene cluster related to that of the pyralomicins and other aminocyclitol containing compounds. To further investigate the secondary metabolites produced by this gene cluster, we have been investigating the biosynthetic potential of N. punctiforme and the gene expression pattern of novel biosynthetic gene cluster when exposed to ultraviolet radiation. In the fall, undergraduate students from WOU will be involved in characterizing these mutant strains for their biosynthetic potential. This project is the focus of a recent Faculty Development Research Grant awarded in December 2008 from WOU (see below).

- "Profiling Oregon Soil Microbes for Use in the Production of Biofuels and Medicines": The overall goals of this project are to involve undergraduate science majors at WOU in biochemical research exploring the potential use of soil microbes in the development of biotechnological and medicinal applications. This project is currently supported through a WOU Foundation Grant and is the topic for a grant writing workshop that I will be attending through the CUR program in July.

Presentations and Abstracts

Flatt, P.M., Wu, X., and Mahmud, T. (2009) CHARACTERIZATION OF THE PYRALOMICIN BIOSYNTHETIC GENE CLUSTER. Poster Presentation at the American Society of Pharmacognosy Annual Meeting, Honolulu, HI.

Flatt, P.M., Cruise, H., and Mahmud, T. (2009) USE OF GENOME MINING TO IDENTIFY THE BIOSYNTHETIC GENES INVOLVED IN MYCORSPORINE-LIKE AMINO ACID BIOSYNTHESIS. Oral Presentation at the Oregon Academy of Science 68th Annual Meeting, Western Oregon University, Monmouth, OR.

Publications and Reports

Fosto, S., Zabriskie, T.M., Proteau, P.J., Flatt, P.M., Santosa, D.A., Sulastri, and Mahmud, T. (2009) Limazepines A-F, Pyrrolo[1,4]benzodiazepine Antibiotics from an Indonesian Micrococcus sp. J. Nat. Prod. 72(4): 690-695.

Wu, X., Flatt, P.M., and Mahmud, T. (2009) Biosynthetic gene cluster of Cetoniacytone A, an unusual aminocyclitol from the endosymbiotic bacterium, Actinomyctes sp. LU9419. ChemBioChem 10(2):304-314.

Poston, P., 2009, Report to the National Park Service summarizing research on Barrier Canyon style rock art entitled "Preliminary Results of a Raman Spectroscopic Analysis of Rock Art Pigment from the Great Gallery, Maze District, Canyonlands National Park, Utah", submitted to Chris Goetze - Cultural Resource Program Manager, Southeast Utah Group, 2282 S. West Resource Blvd., Moab, Ut 84532, PH (435) 719-2134, Chris_Goetze@nps.gov

Grants

Mahmud, T. (P.I) and Flatt, P.M. (Co-P.I.). (Submitted). A $380,184 grant application to the National Science Foundation entitled: 'Characterization of the Flavin-Dependent Halogenases from

the Pyralomicin Biosynthetic Gene Cluster.'

Flatt, P.M. (Dec, 2008 – Dec, 2009) $500 grant award from WOU Foundation Grant entitled, 'Profiling Oregon Soil Microbes for Use in the Production of Biofuels and Medicines.'

Flatt, P.M. (Jan, 2009 – Jan, 2011) $3,500 grant award from WOU Faculty Development entitled, 'The Biosynthesis of Photoprotective Mycosporine-like Amino Acids.'

Flatt, P.M. (June, 2007- June, 2009) $12,000 grant award from the Oregon Agricultural Research Foundation entitiled, 'Genetic Engineering of Pseudomonas fluorescens as Biocontrol Agents'.

Poston, P., 2009, "Detection of Impact-Related Nanodiamonds and Magnetic Microspherules in a Younger Dryas Black Mat Using Transmission Electron Microscopy on Materials Sampled From the Maze District, Canyonlands National Park, Utah" (Pete Poston, funded $4375)

c. Service

- Arlene Courtney served as Oregon co-director for JSHS. Duties included assisting in the organization and hosting of the Oregon Junior Academy and Oregon JSHS symposia.

- Arlene Courtney served as a sponsor/session chair for six 40 minutes student seminar presentations at Academic Excellence and co-sponsor with Philip Wade for nine video presentations in a second session.

- Arlene Courtney along with four Ch 462 students (Ryan Burge, Shawn Decker, James Dunning, and Cory Perkins) consulted with citizen Becky Woodruff, Calera, Oklahoma to determine the source of residential/ranch water contamination.

d. **Student Achievement**

Acceptance into Graduate Programs

Christina Demke	University of Utah (Chemistry PhD program)
Shanley Young	John Jay University (Forensic Science)
Cory Perkins	Oklahoma State University (Chemistry PhD program)

Forensic Laboratory Positions Obtained

Positions in forensic laboratories are very difficult to obtain since there are typically several hundred applicants for each opening. Three chemistry program graduates were successful in obtaining forensic laboratory positions in 2008.

Brenda Vaandering	Las Vegas
Kaylon Wells	Oregon State Police Lab main facility Portland
Michael Jackson	Oregon State Police Lab main facility Portland

Other Achievements

Cory Perkins - accepted into a summer REU (Research Experiences for Undergraduates) program at Oklahoma State University

Shawn Decker – recipient of NASA scholarship
Jennifer Blaser – Phi Kappa Phi
Jennifer Blaser - Outstanding Chemistry Major award – NSM Awards Night