



Association of College & University Biology Educators

55th Annual Meeting – October, 2011

“Interdisciplinary Teaching in Biology”

Hosted by



ACUBE 55th Annual Meeting – Program Overview

Thursday October 27

5:00-7:00 p.m. Steering Committee Meeting (CMRC*)

Friday October 28

7:00-8:20 a.m. Registration and Breakfast (BE Building**)
8:30-10:00 a.m. Opening Session and Invited Speaker Eli Hestermann (BE 124)
10:10-10:50 a.m. Session 1 (40 minute presentations)
11:00-12:50 p.m. Luncheon and First Business Meeting
1:00-1:40 p.m. Session 2 (40 minute roundtable discussions)
1:50-2:10 p.m. Session 3 (20 minute presentations)
2:20-3:00 p.m. Session 4 (40 minute round table discussions)
3:10-3:50 p.m. Session 5 (40 minute round table discussions)
4:00-4:20 p.m. Presidents Address
4:30-6:20 p.m. Poster Session, and Social Hour (Cash Bar) (WOW Dinning-Student Center)
6:30-8:30 p.m. Dinner, Second Business Meeting, and Keynote: Thomas Cooper (LMU Dinning-Student Center)

Saturday October 29

8:00-9:00 a.m. Breakfast (BE Lobby)
8:30-9:30 a.m. Bioscene Editorial Meeting (TBA)
9:30-10:10 a.m. Session 6 (40 minute presentations)
10:20-11:00 a.m. Session 7 (40 minute workshops)
11:30-12:30 p.m. Luncheon and Third Business Meeting (BE 124)
12:30-1:00 p.m. ACUBE 2012 (BE 124)
1:00-3:30 p.m. Steering Committee Meeting (CMRC)

* Cumberland Mountain Research Center

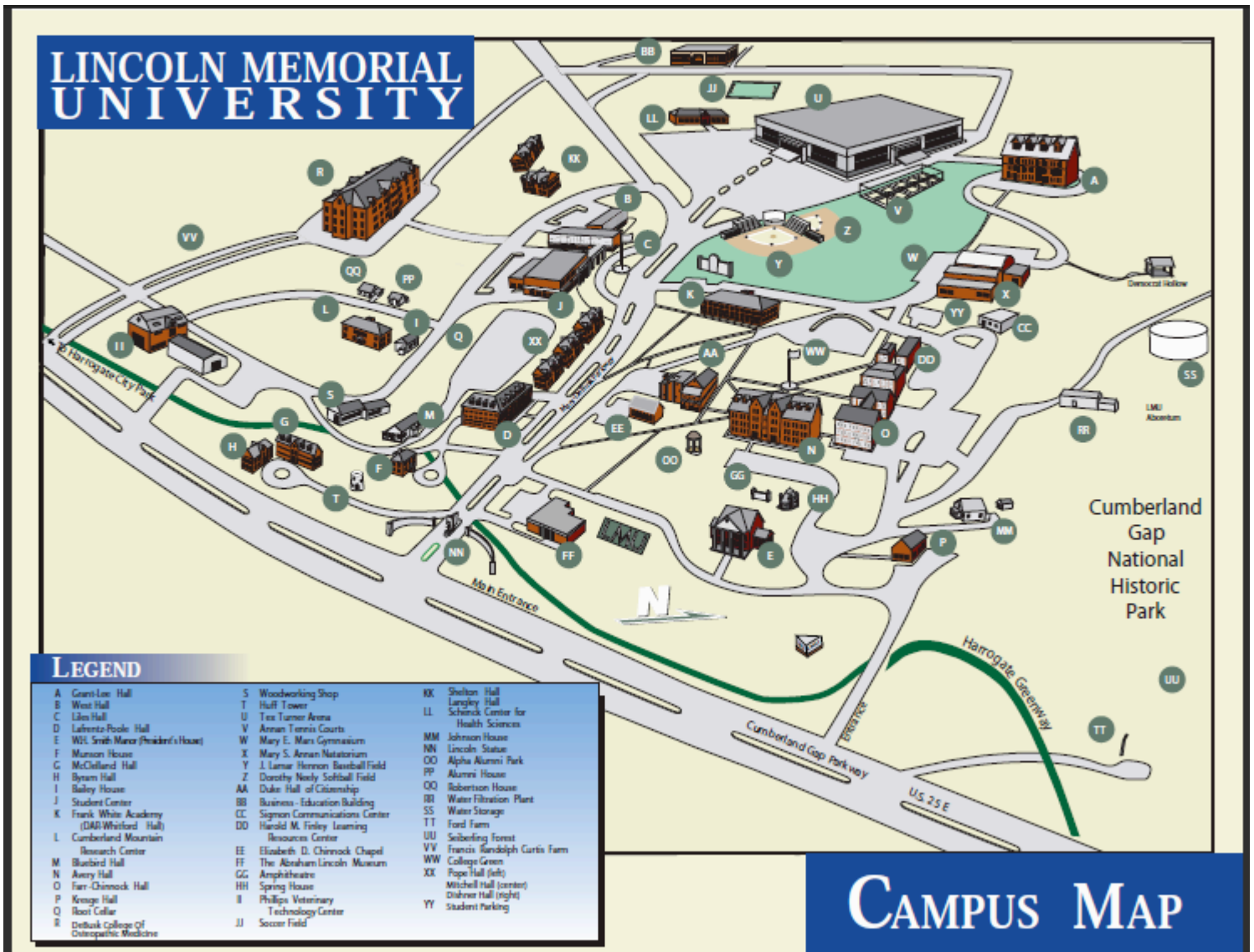
** Business/Education Building

Detailed Conference Schedule.....page 7

List of Abstracts.....page 11

Lincoln Memorial University

A special thank you to Aggy Vanderpool, our local arrangements chair at Lincoln Memorial University.



Dr. Eli Hestermann



Dr. Hestermann joins us from Furman University in Greenville South Carolina, where he teaches cell biology, intermediary metabolism and pharmacology and toxicology courses. He also serves as the coordinator of the Howard Hughes Research Fellows Program. His research interest lies in aryl hydrocarbon receptor mediated toxicity in human breast cancer lines. Prior to his appointment at Furman University he worked as a postdoctoral fellow at Harvard Medical School Dana-Farber Cancer Institute and in Niigata College of Pharmacy in Niigata Japan. He is the recipient of Carl Smith Award for Mechanisms of Toxicity. His research projects with the undergraduate students have received numerous awards. Eli will share his experiences in building an interdisciplinary and integrated research program at Furman University.

Building an interdisciplinary research program for undergraduates

Furman University's motto is "Engaged Learning," indicating strong support across the university for hands-on activity in the support of student learning. In the sciences we have built a program of undergraduate research involving faculty from multiple disciplines supported by funding from federal agencies and private foundations. Over the last decade the scope of this research program has grown considerably, tracking with increased grant support, the building of new science facilities, and the involvement of disciplines with little previous record of engaging students in research. While exciting, this growth has not been without some pains. I will identify factors critical to building and sustaining a multi-disciplinary undergraduate research program, ways to assess the success of that program, and challenges facing the program at different stages of growth.

Thomas Cooper



Thomas Cooper joins us from the Walker School in Marietta, GA where he is the Technology Department Chair. He teaches computer science, games and simulations, robotics, outdoor culture and technology. He also serves as the Technology Integration Coordinator for the school and spends part of his day helping preK-12th grade teachers integrate technology into their classroom. He will present a keynote address on the interdisciplinary projects he designed for his classes. He will also present three 40-minute workshops on teaching with technology.

Leveraging Social Media to Promote Action Learning, Collaboration and Storytelling

In his keynote address Thomas Cooper will review interdisciplinary projects he has designed over the years as part of his class in graphic visualization. Previous topics have included clean watersheds, marginalized children, human migrations, and extreme sports. Participants will gain some basic insight in how to use social media and geography as focal points for designing collaborative projects.



ASSOCIATION OF COLLEGE & UNIVERSITY BIOLOGY EDUCATORS

ACUBE Governance 2011

President, Laura Salem, *Rockhurst University*
Executive Secretary/Treasurer, Tom Davis, *Loras College*
Secretary, Debbie Beuler, *Cardinal Stritch University*
Local Arrangements Chair, Aggy Vanderpool, *Lincoln Memorial University*
Program Chair, Neval Erturk, *Converse College*
Editor of Bioscene, Jim Clack, *Indiana University-Purdue University*
President Elect, Tara Maginnis, *University of Portland*

Steering Committee Members:

Neval Erturk, *Converse College*
Cori Fata-Hartley, *Michigan State University*
Chiron Graves, *East Michigan University*
Karen Sirum, *Bowling Green State University*
Greg Smith, *Lakeland College*
Kristen Walton, *Missouri Western State University*

ACUBE Mission Statement

The Association of College and University Biology Educators (ACUBE) focuses on undergraduate and graduate biology education. Members of ACUBE share their ideas, concerns, and course innovations; present their work at the annual meeting; publish their work in Bioscene, our peer-reviewed journal; and participate in the friendly collegiality of the organization. The Association of College & University Biology Educators was first established in 1957 as the Association of Midwest College Biology Teachers (AMCBT). In 1997 we changed our name to ACUBE to reflect our growing national membership.

The objectives of ACUBE are: 1) to further the teaching of the biological sciences at the college and other levels of educational experience; 2) to bring to light common problems involving biological curricula at the college level and by the free interchange of ideas; endeavor to resolve these problems; 3) to encourage active participation in biological research by teachers and students in the belief that such participation is an invaluable adjunct to effective teaching; and 4) to create a voice which will be effective in bringing the collective views of the college and university teachers of the biological sciences to the attention of college and civil government administrations.

ACUBE 55th Annual Meeting
Lincoln Memorial University – Harrogate TN

Thursday, Oct. 27th	
5:00-7:00 p.m.	Steering Committee Meeting (CMRC)
Friday, Oct. 28th	
Registration – (BE Building)	
7:00 – 8:20 a.m.	Continental Breakfast Poster set-up, Presentation Loading Registration will remain open all day
8:30 – 10:00 a.m.	OPENING SESSION – BE 124
	<p>Welcome to our 55th Annual Meeting ACUBE President Laura Salem, <i>Rockhurst University</i></p> <p>Welcome to Lincoln Memorial University Dr. Amiel Jarstfer, Dean of the School of Arts and Sciences</p> <p>Greetings from Conference Chairpersons Local Arrangements Chair: Aggy Vanderpool, <i>Lincoln Memorial University</i> Program Chair: Neval Erturk, <i>Converse College</i> Bioscene Editor: Jim Clack, <i>Indiana University-Purdue University</i></p> <p>Invited Speaker: Eli Hestermann, <i>Furman University</i> “Building an interdisciplinary research program for undergraduates”</p>
10:00 – 10:10 a.m.	Break
10:10 – 10:50 a.m.	SESSION 1 (40 minute presentations and workshops)
	<p>Integrating cladograms and phylogenetic trees into an introductory biology laboratory LOCATION Janice Bonner – <i>College of Notre Dame Maryland</i></p> <p>Helping Middle and High School Students Develop a Working Knowledge of the Nature of Scientific Theories LOCATION Ray F. Boehmer—<i>Millikin University</i></p> <p>Creating Tours in Google Earth BE Room 118 Thomas Cooper – <i>The Walkers School</i></p>
10:50 – 11:00 a.m.	Break
11:00 – 12:50 p.m.	LUNCHEON and FIRST BUSINESS MEETING – LOCATION
	<p>Call for nominations: Two open positions for Steering Committee</p> <p>“Out of This World” Teaching Idea Contributions</p>

1:00 – 1:40 p.m.	SESSION 2 (40 minute presentations and workshops)	
	<p>Green Water, Gray Economy Marya Czech—<i>Lourdes University</i></p> <p>Active Learning, Memory Tools and Content Sorting in the Biology Classroom Sharon J. Fugate – <i>Madisonville Community College</i></p> <p>Biological Modeling in Scratch Thomas Cooper—<i>The Walkers School</i></p>	BE Room 118
1:40 – 1:50 p.m.	Break	
1:50 – 2:10 p.m.	SESSION 3 (20 minute presentations)	
	<p>Introducing the interdisciplinary nature of science: An introductory course that integrates biology, chemistry, and mathematics for low math placement students</p> <p>Cori Fata-Hartley, Maxine Davis, and Gerald Urquhart – <i>Michigan State University</i></p> <p>Would you like to help establish a field station?</p> <p>Marya Czech – <i>Lourdes College</i></p> <p>The fermentation of sauerkraut as a device for fostering conceptual connections by students in a general microbiology course</p> <p>Barbara J. Clement—<i>Doanne College</i></p> <p>Questioning the biological species concept; an interdisciplinary collaboration that led to summer research projects in both biology and philosophy</p> <p>Melissa A.F. Daggett—<i>Missouri Western State University</i></p> <p>Merging Science and Service: An Interdisciplinary Biology and American Sign Language Service Project</p> <p>Neval Erturk and David Oyler – <i>Converse College</i></p>	<p>LOCATION</p> <p>LOCATION</p> <p>LOCATION</p> <p>LOCATION</p> <p>LOCATION</p>
2:10 – 2:20 p.m.	Break	
2:20 – 3:00 p.m.	SESSION 4 (40 minute round-table discussions)	
	<p>Discussion of the AAAS Vision and Change in Undergraduate Biology Education Report and its impact on how we build biology curriculums.</p> <p>Laura Salem – <i>Rockhurst University</i></p> <p>Pre-Health Professions Advising Resources: a roundtable discussion</p> <p>Lynn Gillie – <i>Elmira College</i> and Steve Daggett – <i>Avila University</i></p>	<p>LOCATION</p> <p>LOCATION</p>
3:00 – 3:10 p.m.	Break	

3:10 – 3:50 p.m.	SESSION 5 (40 minute round-table discussions)
	<p>Class Discussions in Upper Division Biology Courses: epic failures or valuable experiences? Tara Maginnis—University of Portland</p> <p>Designing a Capstone Biology Course with Breadth and Depth Presentation Paul C. Pickhardt, Kathleen Rath Marr, and Gregory R. Smith—<i>Lakeland College</i></p>
3:50 – 4:00 p.m.	Break
4:00- 4:20 p.m.	Presidential Address: Laura Salem – <i>Rockhurst University</i>
4:30 – 6:20 p.m.	POSTER SESSION & SOCIAL HOUR (Cash Bar – WOW Dinning—Student Center)
	<p>All presenters will be at their posters from 4:45-5:15</p> <p><u>POSTER TITLES & AUTHORS:</u></p> <ol style="list-style-type: none"> A summer undergraduate research project isolating and characterizing local Cladocera Melissa Dagget – <i>Missouri Western State University</i> Keeping It Real: Using Student Projects to Bring Context to a Health Professions Microbiology Course Alex Lowrey – <i>Gainesville State College</i> Does Creativity Deserve a Place in a Biology Class? Christina Wills, Lisa Felzien, Elizabeth Evans and Chad Scholes – <i>Rockhurst University</i> Investigating the Effectiveness of Hands-on Activities for Teaching Biology to Deaf High School Students David Oyler and Neval Erturk—<i>Converse College</i> Effects of Textbook Annotations Across Disciplines Neval Erturk, Richard Keen and Sheri Strickland—<i>Converse College</i> Two (Disciplines) Are Better than One: Team-Teaching about Sexuality Edna J. Steele, Laura Feitzinger Brown, and Sara E. Byrd—<i>Converse College</i>
6:30 p.m.	Dinner & Second Business Meeting
	<p>Winner: “Out of this World” Teaching Idea Keynote Speaker: Thomas Cooper, <i>The Walkers School</i> “Leveraging Social Media to Promote Action Learning, Collaboration and Storytelling”</p>

Saturday, Oct. 29th	
8:00 – 9:00 a.m.	Breakfast BE Lobby
8:30 – 9:30 a.m.	Bioscene Editorial Board Meeting (LOCATION)
9:30 –10:10 a.m.	SESSION 6 (40 minute workshops and presentations)
	<p>Building Biology Based Games in Greenfoot Thomas Cooper—<i>The Walkers School</i></p> <p>Combining Art with Biology: An Experiential Learning Approach Jessica Evans, Elissa Graff, Natalie Campbell and Whitney Gibson— <i>Lincoln Memorial University</i></p>
10:10 – 10:20 a.m.	Break
10:20 – 11:00 a.m.	SESSION 7 (40 minute round-table discussions)
	<p>Converting a Traditional, Lecture-Only Pathophysiology Course to an Online Format Kristen L.W. Walton—<i>Missouri Western State University</i></p> <p>Interdisciplinary Courses: How Do You Do That Voodoo You Do So Well? And How Do You Explain What Voodoo You Don't Do? James W. Clack—<i>Indiana University-Purdue University</i></p>
11:00 – 12:30 p.m.	LUNCHEON & THRID BUSINESS MEETING
	<p>Resolutions: TBD</p> <p>Executive Secretary Report Tom Davis – <i>Loras College</i></p> <p>Bioscene Jim Clack – <i>Indiana University-Purdue University</i></p> <p>2012 Meeting (Our 56th) Lakeland College – Sheboygan, WI 2012 Local Arrangements Chair: Greg Smith</p> <p>Concluding Remarks & Adjournment Tara Maginnis</p>
1:00-3:30 p.m.	Steering Committee Meeting (LOCATION) Includes newly elected members

ABSTRACTS

(organized according to session)

SESSION 1

Integrating cladograms and phylogenetic trees into an introductory biology laboratory

Janice Bonner – *College of Notre Dame Maryland*

Although cladograms and phylogenetic trees are being included in college biology textbooks more and more regularly, students frequently have little idea of how these structures are developed and how they function as experimental tools for biologists. Many lab exercises that incorporate phylogenetic trees and/or cladograms do little to further student understanding. This session will describe a laboratory exercise in which students are presented with six experimental questions for which answers must be proposed. Three of the questions apply to animals (rodents, flightless birds, and cetaceans) and three apply to plants (Fagales, Caryophyllales, and carnivorous plants). For each question, students work in small groups to develop a cladogram from morphological characteristics provided by the instructor. Then they use this cladogram as their hypothesis which they test by developing a phylogenetic tree using either a protein-based or nucleic acid-based database. Each group is responsible for preparing and presenting a 15-minute PowerPoint presentation of their experimental work. The session will also explain how instructors can use primary literature to design additional questions that can be incorporated into the laboratory exercise.

Helping Middle and High School Students Develop a Working Knowledge of the Nature of Scientific Theories

Ray F. Boehmer—*Millikin University*

Teachers, and particularly science teachers, must have a broad and significant understanding of what theories and scientific theories are in order to teach their students about them, as is the case with any other concept or idea. This should be part of what is considered a “highly qualified teacher” in science. I will discuss some of the recent research in this area and propose some ways that someone in my position, as teacher educator, can promote the understanding and appreciation for the nature of scientific theories and how my students in turn, can assist their K-12 students to do the same.

Lawson, A. E. (1995). Science Teaching and the Development of Thinking. Belmont, CA, Wadsworth Publishing Co.

Ben-Ari, M. (2005). Just a Theory: Exploring the Nature of Science, Prometheus Books.

Duschl, R. A. (1990). Restructuring Science Education: The Importance of Theories and Their Development. New York, Teachers College Press.

Creating Tours in Google Earth (Workshop—Limited to 16 participants)

Thomas Cooper – *The Walkers School*

Participants will gain a basic understanding of how Google Earth can be used to teach various biological concepts. We will also learn how to create basic placemark balloons and combine them to create educational tours in Google Earth. Objects and programming techniques of biology-based layers from Google Earth Gallery will be reviewed. This is basic introduction, and no programming knowledge is required. More information on the software can be found at -

<http://www.google.com/earth/index.html>

SESSION 2

Green Water, Gray Economy

Marya Czech—*Lourdes University*

The continued overgrowth of the alga *Microcystis aeruginosa* and the resulting harmful algal bloom costs the economy of the Western Lake Erie Basin both recreational and health dollars. A description of the problem will be given as well as a description of the work of various academic institutions to abate the problem and return our part of Lake Erie to a more useful and livable condition.

Active Learning, Memory Tools and Content Sorting in the Biology Classroom

Sharon J. Fugate – *Madisonville Community College*

This presentation contains examples of how active learning, memory tools and content sorting were incorporated into a variety of biology courses. Active learning promotes student engagement and content retention. The techniques used can be modified in any class subject. The following modes of learning were addressed in the planned lessons -auditory, visual, and kinesthetic. The presentation contains photos and examples of student work with tips for managing course content.

Biological Modeling in Scratch

Thomas Cooper—*The Walkers School*

Scratch is a programming environment that allows novices in the field to create stories, games and simulations. Participants will learn how to create a basic model of an ecosystem. We will also discuss how this program can be used to model other environments. This is a basic introduction, and no programming knowledge is required. More information on the software can be found at -

<http://scratch.mit.edu/>

Introducing the interdisciplinary nature of science: An introductory course that integrates biology, chemistry, and mathematics for low math placement students

Cori Fata-Hartley, Maxine Davis, and Gerald Urquhart – *Michigan State University*

Many undergraduate biology students fail to recognize that scientists and biomedical professionals are truly interdisciplinary practitioners, who use skills from multiple disciplines, including mathematics, chemistry, and biology. At Lyman Briggs College in Michigan State University, this is particularly true for the at-risk population of students who perform poorly on the math entrance exam and who must take algebra before beginning a typical science track. The “Introduction to Quantitative Science and Research” course was designed to prepare these low math placement students to excel in studying college science by demonstrating the explicit connection between disciplines. The overall learning goals were to understand the relationship between disciplines; build competency in applying basic mathematical principles to scientific problems; understand the scientific method and connections to real-world problems; and develop problem solving approaches. The curricular framework centered on a guided inquiry laboratory in which team of students attempted to isolate and characterize bacteriophage from local soil samples. Early in the course, students learned about basic chemical and mathematical principles while preparing the solutions and buffers they would use for the biological experiments. Evaluation of the course revealed modest increases in quantitative literacy and increased levels of retention for the low math placement students.

Would you like to help establish a field station?

Marya Czech – *Lourdes College*

Because of the continued emphasis on undergraduate research, it is good for field ecologists in small and medium-sized institutions like ours to have access to a field station at which on-site courses can be offered. Such a site can also serve as a base from which to send students for field research and/or service learning with various agencies. If you are within a day’s driving distance from the Keweenaw Bay area of the Upper Peninsula of Michigan, please consider joining me in forming a consortium to create such a field station on Lightfoot Bay on a preserve owned by the Keweenaw Land Trust. Our cooperating agencies will be Fish and Wildlife (DOI), Michigan DNRE, and the Keweenaw Bay Indian Community, among others.

The fermentation of sauerkraut as a device for fostering conceptual connections by students in a general microbiology course

Barbara J. Clement—*Doanne College*

Sauerkraut fermentation is utilized as a multi-dimensional model system for a mid-semester group project in a general microbiology course. Students apply previously-encountered course material relating to anaerobic and aerobic environments and metabolism, aseptic techniques, microbial communities, microbial succession, microbes in the environment, the use of selective and differential

media, and microscopy to investigate the biological activities taking place in the fermentation vessel. The model provides an opportunity for students to quantitatively analyze temporal changes in the chemistry and microbiology of the fermentation, including the dynamic changes taking place in the bacterial communities, and stresses the relationship between a specific metabolic activity and the production of a high-quality, familiar food product. Students collect and analyze data, compare and interpret data between groups, and write up and communicate their work. This project utilizes guided questioning to help the students understand the microbial activities related to fermentation, and helps to set the stage for the next, more open-ended microbiology project.

Questioning the biological species concept; an interdisciplinary collaboration that led to summer research projects in both biology and philosophy

Melissa A.F. Daggett—*Missouri Western State University*

When Missouri Western State University had a faculty search to hire a new philosophy faculty member, the Department of History, Philosophy and Geography actively pursued a candidate that would be able to interact and collaborate with faculty in the Department of Biology. Biology faculty members were asked to serve on the search committee, attend candidate seminars, and to provide input regarding which candidate to hire. My goal in this presentation is to share how I benefited from this interdisciplinary process, in which I came to revisit and question the biological species concept that I had previously taken for granted and how this eventually led to two independent undergraduate summer research projects for both a team representing Philosophy and one representing Biology. This demonstrated that interdisciplinary collaborations do not have to merge their disciplines in order to benefit from exchanging ideas and pursuing answers to questions specific to their own discipline.

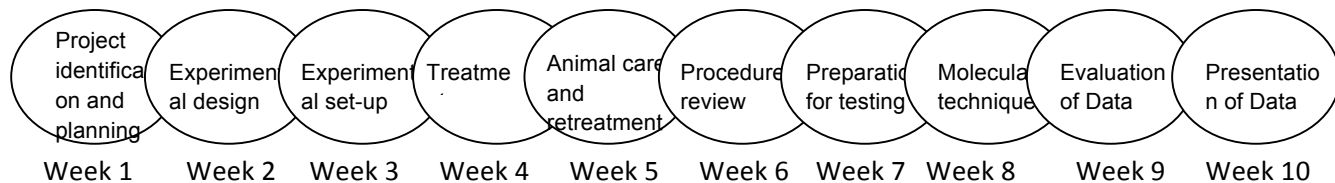
Merging Science and Service: An Interdisciplinary Biology and American Sign Language Service Project

Neval Erturk and David Oyler – *Converse College*

This is a continuing service project that aimed to increase the involvement of Deaf students in scientific research. The Deaf demographic is one of the most under represented people groups in the sciences. This mostly stems from inaccessibility to the learning tools and resources and lack of role models coupled with significant delays in Deaf childrens' reading comprehension. Inaccessibility of resources is a larger problem that involves the lack of vocabulary to teach and/or explain concepts. The purpose of this project was to partner with the Deaf students in creating a science vocabulary as the students carried out a scientific research project. The project involved Converse College students and faculty as well as South Carolina for the School for Deaf students and faculty. The name of the students who contributed to the project is listed at the end of the abstract in alphabetical order.

Deaf students were involved in the project for 6 months. They met at Converse College Biology laboratories for 3 months on a weekly basis. During this period they performed experiments to investigate the effects of the oil spill and cleaning efforts on fish populations at the molecular level. Cleaning efforts were simulated via mixing crude oil with detergent. Students designed the

experiments with the help of the biology faculty. All communication was interpreted by the hearing science teacher who is bilingual in American Sign Language and English. The following flowchart shows the course time line and content of how the meeting times were utilized.



Throughout this period we also developed vocabulary for the scientific terminology. A copy of the DVD is available to interested educators. This vocabulary enabled easier communication, less cumbersome science teaching.

After the conclusion of the experiments, Deaf students, with the assistance of their science teacher, developed a poster presentation to compete at the RIT National Science Fair for Deaf and Hard of Hearing Students held at the Rochester Institute of Technology - National Technical Institute. The project won second place in the high school group project category.

The assessment of the was done via non-quantitative means. We interviewed the students about their experience and the impact of the project. We also evaluated student journals. The students indicated increased interest and less intimidation of science and increased motivation for higher education. One student involved in the project was accepted to RIT.

This project was sponsored by Converse College Creative Collaboration Funds. The student participants from Converse College in alphabetical order by last name are: Xochtil Arzeta-Ferrer, Jordan Denski, Kala Downey, Lauren Hammond, Krystal Jackson, Veronica Obregon, Alex Roman, Chelsea Smith. Jessica Bergeron, Director of Deaf Education also participated in this program.

SESSION 4

Discussion of the AAAS Vision and Change in Undergraduate Biology Education Report and its impact on how we build biology curriculums.

Laura Salem – *Rockhurst University*

This roundtable will focus on the AAAS Vision and Change in Undergraduate Biology Education report. In this report, the authors define both core competencies and core concepts for biological literacy. I would like to use this document as a basis for discussing how we build biology curriculums. I would also like to ask ACUBE members to see what role, if any, ACUBE can play in defining national standards in biology education.

A link to the report is here: <http://visionandchange.org/viewfinalreport/> I will bring copies of the key pages for participants to glance through during the session.

Pre-Health Professions Advising Resources: a roundtable discussion

Lynn Gillie – *Elmira College* and Steve Daggett – *Avila University*

Prehealth advising has moved well-beyond assisting students through the process of applying to medical school or dental school. There are many more options in healthcare for students to consider. In order to be an effective advisor, faculty who advise must remain informed on these options and retain updated information about application procedures for professional schools. This is a significant responsibility for faculty who are feeling pressured to carry out research, in addition to their teaching and service responsibilities. This roundtable discussion will examine how faculty can fulfill these responsibilities, as well as teaching and research duties at their respective institutions.

SESSION 5

Class Discussions in Upper Division Biology Courses: epic failures or valuable experiences?

Tara Maginnis—University of Portland

Class discussions are common experiences for students attending four year liberal arts institutions. However, given the nature (and traditional approach) to content heavy biology courses, student-led explorations of lecture topics and readings can be difficult to integrate. During this roundtable I will first present a variety of techniques I tried in three courses (freshman biology, animal behavior [300-level], and a capstone evolution course), and then facilitate a discussion about strategies to implement potentially constructive and effective class discussions. The main topics of this roundtable aim to include preparation, accountability, grading/assessment, and the overall costs and benefits of including class discussions into biology courses.

Designing a Capstone Biology Course with Breadth and Depth Presentation

Paul C. Pickhardt, Kathleen Rath Marr, and Gregory R. Smith—*Lakeland College*

We will share our experiences designing and implementing a capstone biology course at Lakeland College. This course is split up into two semesters with students earning two credits each semester. In the first semester, the course is team-taught and students are led through the critical analysis of a paper in each faculty's preferred biological sub-discipline (ecology, anatomy/physiology, and cell/molecular). In the second semester, students choose a topic of their own and, under the guidance of one of the faculty, perform an in-depth literature review. Their work is presented as an extensively edited written review and the semester culminates with an oral presentation and defense to faculty and fellow students. We will use our experiences as a starting point for a general discussions of how to integrate all the sub-disciplines of biology into a single course, how to effectively teach students critical data analysis of multiple forms of scientific data, and how to help students improve their oral and written presentation of scientific content.

SESSION 6

Building Biology Based Games in Greenfoot

Thomas Cooper—*The Walkers School*

Greenfoot is a Java programming environment that allows students new to the computer science field to create games and simulations. It's graphics library makes it easy for new programmers to quickly produce games or simulations. Participants will learn how to put together a simple food web game on the beach. More information on the software can be found at - <http://www.greenfoot.org/>

Combining Art with Biology: An Experiential Learning Approach

Jessica Evans, Elissa Graff, Natalie Campbell and Whitney Gibson—*Lincoln Memorial University*

This presentation summarizes the experiences gained during an interdisciplinary trip to Belize that was taken during the Spring of 2011. Teaching across multiple disciplines enhances learning and relevance to both fields. Additionally this presentation discusses the importance of how service learning reinforces lessons learned while giving back to the community. In addition, the perspectives of both faculty and students will be used to address art and biology's impact on environmental awareness.

SESSION 7

Converting a Traditional, Lecture-Only Pathophysiology Course to an Online Format

Kristen L.W. Walton—*Missouri Western State University*

Pathophysiology at Missouri Western State University is a 4-credit-hour, lecture-only course primarily serving pre-nursing majors. In response to demand from this student population, the course was offered as an online course for the first time in Summer 2011. In this presentation, I will discuss the structure I used for the online course and outcomes for students in the online course versus face-to-face courses from previous summer and regular academic semester course offerings. Video lectures, study guides, and other materials were posted online, and exams were given in a proctored, written format. Of the 34 students who enrolled in the course, 31 finished, with an overall course GPA of 2.65. This is similar to the course GPA from the prior summer offering (Summer 2010 GPA = 2.53) and the average GPA across four regular academic year semester offerings (average GPA = 2.61, n=319). Student responses to a course survey indicated that the video lectures were very useful, while the most frequently cited negative aspect of the course was the requirement for proctored exams. These data will be used to refine the course structure for future online course offerings.

Interdisciplinary Courses: How Do You Do That Voodoo You Do So Well? And How Do You Explain What Voodoo You Don't Do?

Our faculty have been approached by faculty members from other disciplines who wish to collaborate on interdisciplinary courses. However, collaborators from outside the discipline seem to see biology as a monolithic science, where every biologist understands and is capable of teaching every discipline in biology. How can we best enlighten our non-biology colleagues about the broad, complex nature of biology and help them understand the practical limits to our expertise when collaborating on an interdisciplinary course?

POSTER SESSION

1. A summer undergraduate research project isolating and characterizing local Cladocera

Melissa Dagget – *Missouri Western State University*

Cladocera are planktonic crustaceans that have been studied for over 250 years. Cladocera have flattened legs that are used to produce water currents for filter feeding, reproduce both sexually and asexually (parthenogenesis) and exhibit phenotypic plasticity. *Daphnia*, a type of Cladocera, are commonly called waterfleas due to their jumping like behavior during swimming. The specific aims for students performing this project were: to isolate Cladoceras from different habitats and to develop standardized culturing methods for maintaining isolates in the laboratory. In addition, students explored various cell and molecular techniques in order to characterize each isolate. Students were successful in collecting, identifying and photographing a variety of different living Cladocera and were able to develop a standardized culture method for maintaining isolates in the laboratory. Students also developed a microtiter plate protein assay and a polyacrylamide gel electrophoresis procedure that can be further developed and used to monitor phenotypic plasticity of culture clones over time.

2. Keeping It Real: Using Student Projects to Bring Context to a Health Professions Microbiology Course

Alex Lowrey – *Gainesville State College*

To encourage students to put *abstract* microbiological concepts into *real* (applied/multi-disciplinary) contexts, each student from two lecture sections (Summer Semester, 2009) was given one choice from among four course project “types” (worth 50 points or 10% of course grade). For a type 1 project a student wrote an essay on a selected infectious disease and presented it as a term paper or brochure. Done for several years, this had been the traditional course project. The other project types were newly added to the course. For a type 2 project a student “shadowed” a health care or public health professional. For a type 3 project a student did volunteer work. For a type 4 project a student conducted an original lab research project. Students presented project types 2-4 as posters or PowerPoints and were awarded 10 extra-credit points. Students’ choices for their projects were as follows: type 1 (12%), type 2 (16%), type 3 (38%), and type 4 (34%). In end of course comments students appreciated being able to choose their project types, apply their learning in fun and creative ways and (especially) get extra-credit.

3. Does Creativity Deserve a Place in a Biology Class?

Christina Wills, Lisa Felzien, Elizabeth Evans and Chad Scholes – *Rockhurst University*

To stimulate creativity and critical thinking, we created projects that integrated disciplines including visual arts, performance arts, poetry and cooking into biology classes. In General Biology I, students constructed a detailed integral membrane protein to strengthen their ability to visualize three dimensional structure and improve their understanding of protein structure and function. General Biology I students also created a dynamic molecular process (projects could include a dance, play, sporting event, claymation show, etc) of DNA replication, transcription or translation. To increase familiarity with invertebrate taxa, General Biology II students researched recipes using a species, genera or class from one of the phyla (excluding chordates) discussed in the animal evolution section. Students presented the recipe, the culture that developed the recipe, phylogeny and geographic map. In Plant Biology, students wrote poems to demonstrate their appreciation for a plant they were fond of, found aesthetically pleasing, or wanted to learn more about. Poems were compiled in an annual Plant Poetry collection and shared with Biology faculty and students. Preliminary assessment of student attitudes about these integrated projects was examined in General Biology I, through surveys in which students compared the impact of various course approaches on their understanding of course concepts.

4. Investigating the Effectiveness of Hands-on Activities for Teaching Biology to Deaf High School Students

David Oyler and Neval Erturk—*Converse College*

Lack and availability of resources in Deaf education is one of the main barriers to effective science teaching. Most Deaf classrooms still use "outdated" strategies or methods while teaching biology, while public school classes forge forward with new technology and procedures enriched by technology. The purpose of this study is to investigate the effectiveness of kinesthetic and hands-on science teaching in a Deaf classroom. This project was carried out at the South Carolina School for the Deaf and Blind with the participation of seven Deaf students. We utilized Dragon Genetics Lab developed by Dr. Pamela Esprivalo Harrell. This lab teaches basic Mendelian Genetic concepts and probability. Students worked in pairs to produce a dragon from the random mixing of genetic traits. The exercise aimed to teach Mendel's Law of Independent Assortment and Sex-linked Inheritance. A pretest was given to each student to determine what prior knowledge they had in the field of Genetics, specifically Mendelian Genetics. The post test showed that 5 of the 7 students showed significant improvement in their grade even though over all the improvement was not significant. The qualitative assessment showed that many of the students found the exercise fun and enjoyable and that they understood better how probability works and students also developed a better understanding of many traits being linked to one allele, as well as codominance, sex-linked and sex-influenced traits, which are difficult to explain in a lecture-style lesson in a Deaf classroom.

5. Effects of Textbook Annotations Across Disciplines

Neval Erturk, Richard Keen and Sheri Strickland—*Converse College*

The goal of this study was to determine how textbook annotations affect test performance across three introductory courses: biology, chemistry, and psychology. Further, we wanted to determine if there was a differential effect on questions that span Bloom's taxonomy of questions. Textbook annotations require active reading and thus, deeper levels of processing. We hypothesized that 1) textbook annotation homework would improve test performance when compared to a group with no such homework, and 2) test performance on questions that require deeper processing would show a more pronounced effect relative to questions that only require shallow processing. Participants were randomly split into two groups in each class. Groups alternated in doing textbook annotation homework assignments. Thus, group A completed annotation homeworks for tests 1 and 3 while group B completed the homeworks for tests 2 and 4. The annotation homeworks resulted in significant improvements in test performance in the biology and psychology classes. Further, this improvement was greatest for questions that required deeper processing levels. No significant differences were observed in the chemistry class. We conclude that textbook annotations can serve as a strong pedagogical tool, although its usefulness may be limited to certain classes.

6. Two (Disciplines) Are Better than One: Team-Teaching about Sexuality

Edna J. Steele, Laura Feitzinger Brown, and Sara E. Byrd—*Converse College*

Converse College, a small liberal arts college for women, encourages faculty members from different disciplines to team-teach courses to help students make connections across disciplines. The Honors Program especially encourages this kind of teaching. Converse's Biology Department responds by offering a number of team-taught interdisciplinary courses, including Science Theatre (Biology and Theatre), Biphology (Biology and Art), Altruism (Biology and Philosophy), CSI: Converse Summer Workshop (Biology and Chemistry) and Biology of Sexuality and the Literature of Love, Marriage, and Birth (Biology and English). The last example provides the focus for our poster. In this interdisciplinary team-taught honors course, students learned human anatomy in relation to its sexual functions; the physiological bases of conception, pregnancy, childbirth, and lactation; methods of birth control and their effectiveness; the causes, effects, prevention, and treatment of sexually transmitted diseases; legal aspects of sexuality; and biological issues related to sexual orientation and gender identity. For each biology topic, students read, interpret, discuss, and debate a corresponding English literary work that explores that topic. The course helps the students from a variety of majors not only learn biological aspects of sexuality but also understand the ways that the biological topics appear in literary works spanning several cultures and centuries. The combination of biological and literary approaches allows students to become better able to test and explore ideas about sexuality and relationships and act responsibly according to those ideas than if the students approached the course's topics from English or biology alone.