3. Labs That Work: A Dinosaur Trachways Exercise, Robert L. Wallace and William S. Brooks, Ripon College

4. Training Biological Citizens: Definitions and Content, Tom Davis, Loras College


11:00 - 12:30 AM Luncheon with Business Meeting Rock Room (Massman Hall)

BUSINESS MEETING
Presidential Address: Karen Klyczek, UW - River Falls and Charlie Bicak, UN-Kearney
Election Results: Dick Wilson, Rockhurst College
Bioscene: Ethel Stanley, Beloit College, Tim Mulkey, Indiana State University
Executive Secretary Report: Marc Roy, Beloit College

If you are interested in presenting a workshop or paper please contact Terry Derting at Terry.derting@murraystate.edu or 502-762-6327.

ABSTRACTS OF SESSIONS

Concurrent Paper Sessions:

During the spring 1988 semester a chemistry faculty and I linked a second semester general chemistry course with a second semester introductory biology course. Sixteen students were co-enrolled in both courses that met for lecture MWF at 8:30 (General Chemistry II) and MWF at 10:30 (Biological Concepts). Students were given a survey designed to determine their understanding of the nature of the link between chemistry and biology at the beginning and the end of the semester. The extent to which each course was modified, the nature of the involvement by each faculty member, and student reactions will be discussed.

S.I.2. Enriching the Science Curriculum of Homeschooled Children Through a Community Outreach Program. Mary Haskins, Rockhurst College
Rockhurst College offers biology laboratories for middle and high school students who are homeschooled. Last year over 100 students attended a 10-week laboratory series held on our campus. The labs, which met once a week for 2 1/2 hours, provided hands-on experiences for students who may not have access to this type of scientific investigation. Benefits of the program include:
1) enhancing the science education of homeschooled children
2) enhancing Rockhurst’s visibility and reputation in the community
3) providing teaching experience for undergraduate students who work in the program
4) serving as a possible recruitment tool for our College.

Have you had students in your classroom with vision or hearing impairments, cancer, or hemophilia? Students such as these have different types of disabilities that need to be addressed when considering how your students will learn. Despite the fact that most biology educators have had students with some type of disability in their classroom, few institutions require their faculty to be formally trained about their role as educators when teaching students with disabilities.

We will present information to bring you up to date on what is required of the student with some type of disability and the teacher when designing lectures, exams, and laboratories. Specifically, we will address how teaching a biology course to students with disabilities can be very challenging as compared to courses in other disciplines. We will also provide helpful suggestions so that you will be better prepared when you realize you are teaching a student who cannot see, or perhaps, hear you.

S.I.5. The Development of Inquiry-based Outdoor Classrooms. Ed Story and Mike Quillen, UK-Maysville Community College
The presenters of this proposed session have developed a state award winning Outdoor Education Center at Ward Elementary School in Fleming County, Kentucky. Ward Elementary is located in rural Northern Kentucky.

The development of Outdoor Classrooms as a tool for Inquiry-based education is a viable option for today’s schools. The developmental process, beginning at site selection and ending in integrated cross-disciplinary curricula is both involved and rewarding. This session will
discuss various processes and pitfalls, and will present a successful sequence from planning through implementation.

The site has been developed with trails, bridges, ponds and a shelter for group instruction. A power-point presentation will guide the participants through the development phase, the curriculum development phase, the teacher and teacher aid in-service and the actual implementation of the outdoor center into the existing school curriculum.

Problems and stumbling blocks will be addressed along with solutions to them so that the center can flourish in the community. Other topics addressed will include: size of site, securing financial support, actual construction, development of activities that can be used, teacher training, teacher aide training and securing the future of the site.

S.II.1 Burn-Out Revisited. Judith Brett, Hamilton Center and William Brett, Indiana State University

Burnout is not merely worn out from working long hours. A contagious malady, it includes discouragement, disillusionment and low moral. We will cover what burnout is and helpful interventions to cure it, as well as prevention to keep it from overtaking you and infecting others.

S.II.2 SCIENCE STUDIO (A science intervention program for middle school girls). Faith Wilson, St. Teresa’s Academy

The academic literature still clearly shows that young women shy away from scientific and technical activity despite the importance of these areas in modern society and their future employability. Studies also indicate that young women lose self-esteem beginning with early middle school. Evidence continues to suggest that a single-sex setting can have a positive impact on the above factors. The literature indicates that without further research on the single-sex classroom in a coeducational world we will not know the following: (1) Which techniques, if any, are particularly successful? (2) Is there an age, development stage, or point in a course sequence at which it is especially useful to pursue a single-sex alternative? (3) What strategies are helpful and at what stage is it useful to ease the transition back to the coeducational environment? The long-term rationale for Science Studio is to uncover possible answers to these questions and to impact the overall systemic issue of women in science.

The core Science Studio is a five-day, summer camp held for each of six science modules. During this experiential camp, and subsequent follow-up activities, young women will explore many scientific principals that form the foundation for understanding how the world around them works. Experienced faculty will be co-teaching with St. Teresa’s alumnae still in college, majoring in science, and current honor students from the Academy. The honor students will act as role models and mentors.

This single-sex, educational experience will also contain a number of messages about the history and capability of women in science. This, combined with the presence of strong role models, including guest lecturers from the corporate world, will help to counteract the gender bias messages from other sources.

S.II.3 What Do Your Students Say About Evolution? Nancy Sanders, Truman State University

What do your students say about evolution? Do you know, or do you think you know? What preconceived ideas do they have about evolution when they walk into your classroom? How do your views shape their views, or do they? I will share with you some of the responses my students give to the question “What do you think/know about evolution?” that I generally ask during the first week of class in my introductory biology classes for majors. I will then share my perspectives on how to address their question and concerns, and I will invite you to share yours!

S.II.4 Teaching Sexual Differentiation: Beyond the Textbooks. Marc Roy, Beloit College

Most introductory and many advanced biology textbooks describe mammalian sexual differentiation as a process regulated, in males, by the Y chromosome and the actions of androgenic hormones. Typically, female differentiation is described as being the result of the absence of these factors. In essence, the female phenotype is described as the default form. In this presentation I will show how this model is out-of-date with current research findings and how sexual differentiation in both males and females is due to a complex interaction of biological factors. Discussion will focus on how we can incorporate this changing paradigm into our courses.
S. II.5 Collaborative Case-based Learning for Introductory Biology Students Using Molecular Biology Computer Simulations and Internet Conferencing. Mark Bergland, UW-River Falls

This presentation updates Case It!, an NSF-sponsored project to engage introductory biology students in critical thinking and problem-solving by making topics in molecular biology more interesting and relevant. Open-ended computer simulations integrated with Internet conferencing will facilitate collaborative case-based learning among teams of students at a variety of educational institutions across the nation and the world.


Come see new multimedia CD ROM titles for anatomy and physiology. Learn how you can customize software to your specifications. New testing and assessment tools will be demonstrated. Lab guides and student software to your specifications. New testing and assessment programs will be discussed. Free demonstration software for attendees.

S.III.1 Problems of Teaching Large Numbers of Students in General Education Laboratory Classes Involving Many Graduate Student Assistants. Rita Ghosh, Indiana State University

Keeping students alert and attentive is one of the most challenging tasks in General Ed. Lab. classes. These students are not interested in science. They come ill prepared and cannot relate to diverse areas of science. These topics do not touch their daily life. It is no wonder that science laboratory seems even more daunting to a large majority of the Gen. Ed. students who enroll because it is a requirement. Then, there are students who do have good backgrounds, and for them, these courses are too easy to warrant attention. The problem is accentuated by the fact that these Gen. Ed. Science Labs require participation of Graduate Teaching Assistants, who come with varying degrees of background, ability and expertise. Thus they could greatly affect Gen. Ed. students’ interest and involvement, if they are not properly trained.

Therefore, it is important for science teachers, strategists and policy makers to devise ways to improve our science education and make it meaningful. To help initiate a dialogue in this important area, I would focus on areas that are pertinent to this discussion.

(1) How to improve laboratories and make presentations interesting, yet focused.
(2) How to challenge students to think and come up with simple answers, or motivate them to design simple experiments which they can do at home. We should point out to the students that many things they are enjoying in life are fruits of scientific endeavor.
(3) Try to include topics and experiments that the students can relate to in their daily life.
(4) How to overcome many of the cultural hindrances and accept scientific reasoning. It is important not only to appreciate science but to be receptive of diverse thoughts and reasoning.
(5) How best to train graduate teaching assistants so that they all acquire a good teaching method, communication skill, and attitude. The objective is to insure a degree of uniformity in all sections of the same lab.

S.III.2 Gas Chromatography in the Non-Major Environmental Course. James Edmiston, Quincy University

Detection and measurement of environmental toxins found in field samples with gas chromatography techniques provides the non-science major an opportunity to make connections between fieldwork and quantitative lab analysis. GC techniques, using smaller-scale instruments designed for field analysis, are used in non-major environmental science courses. Specific exercises for the quantitative and qualitative analysis of trihalomethanes in water supplies will be provided.


In an experimental course on the biology of dinosaurs (Dinosaurs: The Course), we had our students test Alexander’s (1976) model that the velocity of a bipedal dinosaur is a function of stride length and hip height:

\[
\text{thus, } V = 0.7826 \times (S^{0.5} H^{1.67}), \quad \text{where, } S - \text{stride length in meters and } H = \text{hip height in meters.}
\]

To do this our students measured their Foot length (F) and Leg length at the hip (H) and examined that data to test Alexander’s assumption that 4F is a good approximation of H, at least for humans. The students then became dinosaurs and made trackways on rolls of newsprint of at least 20 meters long. Dinosaur velocity along the trackway (V) was independently determined, and from that data and data extracted from the trackway (S) the students tested Alexander’s model. This lab exercise worked well and probably has many applications from high school through college. Besides a special class such as ours, other that might make use of this include courses in general biology for major or non-majors, biostatistics, human and vertebrate anatomy, and paleontology. However, based on experience, we recommend that the trackway be made in a warm hallway rather than a large, poorly heated gymnasium.

S.III.4 Training Biological Citizens: Definitions and Content. Tom Davis, Loras College

Participants in this session will discuss first, what is a “good” biological citizen and second, what subject matter should be specifically included to train better biological citizens in a one semester, introductory, non-majors biology course. In the past I have chosen the following six broad topics: a. Cells; b. DNA, Genetics, Heredity; c. Plants; d. Viruses, Prokaryotes, Proctistia and Fungi; e. Evolution; f. Ecology and Environmental Ethics. Third, participants will discuss their ideas on how to best promote active student ownership of this information.

ASSIGNMENT: Participants in this session are asked to prepare and bring to the session their definition of a “good” biological citizen and choose 6 major topics that they would include in a one semester course to train biological citizens.

S.III.5 Learning and Learning How To Learn: A Reflective, Conversational Model. Robert J. Martin, Truman State University and Suzanne L. Martin, Moberly Area Community College

This presentation examines three approaches to learning how to learn: the traditional realist approach based on the idea of transmission of knowledge, the Piagetian
constructivist approach based on the idea of individual construction of knowledge, and the conversational constructivist approach based on the idea of knowing as a characteristic of communities which embody the interactions which constitute what we think of as knowing. Examples from a non-major biology class are presented with emphasis on helping students learn to learn through content oriented conversations.

**Concurrent Workshop Sessions**

**WS.I.1 Differential Centrifugation Using Density Gradient Beads.** Harold Wilkinson, *Millikan University*  
Abstract not yet available

**WS.I.2 Virtual Biology: Design and Implementation of Web-Based Biology Courses.** Tim Mulkey, *Indiana State University*  
Today, the traditional classroom is expanding into the home and workplace. Place- and time-bound students are taking courses via the Internet at locations and times which better suits their schedule and lifestyle. This change in instructional delivery impacts the content, scope, and effectiveness of instructional materials. These virtual classrooms can reach larger student populations with a diverse range of backgrounds, interests, and needs. New challenges are presented to faculty charged with the design of instructional materials for the virtual classroom.

This hands-on workshop will provide participants with an overview of the tools available for web course design and implementation. During this session, participants will use selected tools to begin the design of a web-based course. Participants are encouraged to bring on a PC-format disk the syllabus and other materials that they currently use in a course; this will allow the participant to convert these materials into a format useful in a virtual classroom. [Note: no previous experience with HTML or web design is required. Resource materials will be provided to allow participants to continue development of their virtual courseware after the workshop.]

**WS.I.3 Interdisciplinary Student Projects for Introductory Science and Mathematics Courses.** John Jungck, *Beloit College*; Anita Salem and Dick Wilson, *Rockhurst College*

One of the most important attributes of undergraduate programs that attract and sustain students in science is a thriving community of students and faculty. Such natural science communities help make learning personally meaningful to students and faculty, allowing them to think about connections to other fields of inquiry. The focus of this workshop will be on the ways in which institutions can cultivate an interdisciplinary, research-rich environment.

The workshop will be structured around two projects in population genetics: *A Mathematical Model for Weak Selection of Alleles* and *A Mathematical Model for Selection at a Locus with 3 Alleles*. These two projects are part of a collection of interdisciplinary projects created as part of an NSF grant (DUE-9653093) awarded to Rockhurst College. Included in the workshop will be presentations and discussions on the rationale and motivation for including interdisciplinary projects in mathematics and science courses. Participants will be encouraged to experiment with difference implementation methods and evaluate the suitability of including interdisciplinary projects in their courses.

**WS.I.4 Rediscovering Chlamydomonas.** Stephen S. Daggett, Avila College and Donna L. Ritch, *UW-Green Bay*  
*Chlamydomonas reinhardtii* is a eukaryotic unicellular, green alga. It is found in freshwater and moist soil environments. *Chlamydomonas* sp. are biflagellated and undergo a haplontic life cycle characteristic of many algal protists. *Chlamydomonas* has been used extensively as a research system in cell biology and genetics. It can also be readily incorporated into an undergraduate teaching curriculum. There are several exercises that undergraduates can successfully carry out using *Chlamydomonas* at each level of study. We will demonstrate this by carrying out two protocols. One protocol will involve matings between *Chlamydomonas* cells of opposite mating type and the other will explore *Chlamydomonas* phototaxis. Students find each of these protocols to be both educational and exciting.

**WS.I.5.Virtual Problem-Based Learning.** Karen Klyczek, *UW-River Falls*

This workshop will demonstrate the use of various types of collaborative problem-based learning (PBL) groups in biology classes. The “virtual” in the title refers in part to using Internet conferencing for intragroup and intergroup collaboration, but also to the use of a more open-ended style of problem than is seen in typical clinical case studies. A summary of results obtained with the PBL strategies in Virology and Immunology classes will be presented, after which participants will have an opportunity to try a couple of different internet communication programs to solve sample problems and to design their own problem scenarios.

**WS.II.1 Developing Teaching Strategies For Case-Based Learning.** Margaret Waterman, *SE Missouri State University* and Ethel Stanley, *Beloit College*

Helping students to become life-long learners who are able to connect biology to their lives is an important goal of science education. One strategy for accomplishing this goal is case-based learning. Learners pursue their own questions, identify and use a wide variety of resources, and present their reasoning and possible solutions.

Join us as we rather interactively consider three cases about students who are engaged in case-based learning using “Kingdoms Entangled: Molecules, Maize, and Malaria” in quite different ways. We will focus on effective teaching strategies for your classroom as well as ours! We will provide a copy of the multi-part biology case “Kingdoms Entangled: Molecules, Maize, and Malaria,” and resource information for each participant as well.

**ABSTRACTS OF POSTERS**

**Biology Textbook Errors in Systematics.** John Richard Schrock, *Emporia State University*

Two generations ago, Dr. Richard Blackwelder first pointed out serious errors in biology publications that confused concepts of classification and nomenclature: calling the specific epithet the scientific name, presenting a hierarchy of groups as classification, etc. Since his retirement, the errors have re-appeared in both high school and college level texts.