1:00 - 4:00 PM  

Join us for a hike in an after-meeting field trip to an upland mixed-grass prairie. We guarantee you will see bison! OR, on your own you could tour any of the local sites (Archway Monument, MONA, Cabelas Sporting Goods Store, or other sites of local interest).

Submit Your Abstract Today !!!  Mail your completed abstract form, found in this issue, to: Mary Haskins, Biology Department, Rockhurst University, 1100 Rockhurst Road, Kansas City, MO 64110. Abstracts must also be submitted either on-line or via an e-mail attachment: on-line at http://acube.org/2001_meeting.html; e-mail: mary.haskins@rockhurst.edu. Deadline for papers and workshops is July 1, 2001. Deadline for posters is September 1, 2001. For additional information contact Mary Haskins @ 816-501-4006.

Abstracts of Presentations

WORKSHOPS


This interactive session centers on new and revised tools and simulations dealing with undergraduate biology in areas such as metabolism, ecology, physiology, evolution, and microbiology. Modules that are PC compatible will be featured in session 1. Modules that are MAC compatible will be featured in session 2. See http://bioquest.org/ for more information.

W.II.2. Assessing Student Needs In The Classroom, Abour H. Cherif, Columbia College-Chicago

There is a growing awareness among educators and educational psychologists that learning is strongly influenced by individual attributes. There is also a strong belief that assessing students' needs is essential for developing and delivering a learner-centered curriculum. In this workshop participants will have the opportunity to design appropriate assessment tools to evaluate their students' learning needs, which, in turn, might help them design effective teaching strategies and learning activities for their students.

This workshop consists of a number of exercises and activities that have been designed to achieve specific goals. The accumulation of these activities and their achieved goals might help you clarify what students needs are all about and how to help students meet those needs.

Dawna Markova (1992) once wrote: "Our students' educational needs are continuously changing but our methods of meeting those needs have not been. We have basically been doing what we've always done and getting what we've always gotten." (p. 30) We have been teaching them the way we were taught and not the way we wanted to be taught.

W.I.3. Measuring a Fitness Component in Students: Fluctuating Asymmetry, Buzz Hoagland, Westfield State College

Many students in our introductory biology courses substitute the concept of physical fitness for the important biological concept of evolutionary fitness. This is likely a result of the many evolutionary misconceptions that students bring into our biology classes. Another contributing factor to this misunderstanding is the lack of meaningful experience with measuring fitness in the laboratory. I propose one solution to this problem is to have students measure various left and right body parts and calculate a simple index of fluctuating asymmetry. Measurements include lengths of hands and feet, width of hands, lengths of digits, lengths of ears, and placement of ears. Equipment needs are simple: rulers, inexpensive calipers, and string. I have collected student-generated asymmetry data from greater than 150 students and made these data available through my web site at http://biology.wsc.ma.edu/biology/experiments/symmetry/. This site is listed by the National Science Teachers Association in their SCILINKS database.

Participants in this workshop will measure the above characters, enter the data into a spreadsheet, download data from the web, and conduct simple fluctuating asymmetry analyses.

W.II.1. The New BioQUEST Library VI: Tools and Simulations for Biological Problem Solving. Ethel Stanley and Robin Greenler, Beloit College

This interactive session centers on new and revised tools and simulations dealing with undergraduate biology in areas such as metabolism, ecology, physiology, evolution, and microbiology. Modules that are PC compatible will be featured in session 1. Modules that are MAC compatible will be featured in session 2. See http://bioquest.org/ for more information.
W.II.2. Using ESCAPE, a Web-Based Interactive Learning Environment for Exploring Introduced Species Concepts. W.W. Hoback and Kerri M. Skinner, University of Nebraska at Kearney

We have developed web-based instructional materials to enhance student learning of exotic species biology as a foundation for scientific literacy, ecological understanding, pest management, and environmental ethics. In this site, we emphasize interactive hypothesis-based learning for teaching the fundamentals of exotic species biology to undergraduate students. We provide background information, a glossary, and online quizzes that allow self-paced learning about exotic species, their introduction and potential impacts. Our project addresses topics covered in multiple biology classes and provides a model project to educate students about exotic species. In the workshop, we will lead participants through our web site and associated learning exercises and provide sample lesson plans.

W.III.1. ACUBE: Are We Meeting Our Objectives? Tom Davis, Loras College; Buzz Hoagland, Westfield State College; and Margaret Waterman, Southeast Missouri State University

ACUBE has been in existence for over 40 years. Our constitution lists the objectives of our organization as:

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; 4) to create a voice which will be effective in bringing the collective views of the teachers of the biological sciences to the attention of college and civil government administrations.

Are we meeting these objectives?

In this session, we will initiate an informal discussion concerning the vision and future of ACUBE. We would specifically like to hear comments and feedback about how well the needs of our members are met by our website, our journal, and our meetings. Should there be more? What should ACUBE be doing in five years to help its members teach more effectively? Should there be regional meetings? Can the website be better defined to help answer specific questions that members or nonmembers have about a specific teaching topic or lab exercise? How can Bioscene better address the needs of our members? Please join us for this discussion as we try to improve the role of the only national association that focuses on the teaching of college biology.

W.III.2. Action Research Guidelines to Improve the Scholarship of Teaching in Biology Classrooms. Abour Cherif and Mary Patt Garr, Columbia College-Chicago

The use of research methods in one’s own classroom to examine and improve his or her educational practice has been defined as teacher action or active research, and it has proven beneficial for both students and instructors. It is educational research that bridges the gap between the theory and practice in the teaching and learning processes with the aim of improving student learning through purposeful questioning, data collection, and analysis of curricular and/or instructional practices.

This workshop is divided into three areas: In the first part we discuss the philosophy behind the use of action research in the classroom, provide a workable framework of how to successfully conduct an action research effort in the classroom setting, and discuss how to utilize the results of your action research to improve your teaching, classroom management, etc. In part two of the workshop, we will share a few examples of action research that have been conducted in biology classrooms as well as in teacher education classes. In part three, we will engage the participants in hands-on activities to design action research projects and discuss how to use the anticipated outcomes of research to improve teaching practice, classroom management, students’ learning, students’ performance, etc. The Focus of Action Research is to provide a paradigm for both documenting teachers’ efforts to improve their classes and communicating successes and failures to their peers, thus elevating teacher practice to a scholarly activity (Boyer 1990; Ria 1996). In doing so, action research provides avenues to simultaneously examine and improve instructional practices (Angelo 1991) and means to create a teaching portfolio that can be used by faculty and administration as tangible evidence of faculty success and professional development (Adams and Slater, 1998, p. 90)


This workshop presents new developments in Case It!, a National Science Foundation-sponsored project to enhance case-based learning in high school and university biology courses worldwide. Case It software modules enable students to analyze DNA sequences in preparation for Internet "poster sessions" where students discuss biological, ethical, and other issues associated with cases. A new, integrated web page editor / conferencing system was developed and successfully class-tested this past spring that enabled high school and university students in Wisconsin to interact with students at the University of London.
This workshop will give participants hands-on experience with this new integrated system, including administrative features that make it easier for faculty to manage student groups and track their progress. We welcome participation in the Case It! project, at no cost to high school and university educators.

PAPERS

P.I.1 Student-Designed Labs in Physiology – What Really Happens? Tom Davis, Loras College

I have used student-designed lab experiments for 6 years in an upper level, one semester human physiology course for majors. The semester is divided into several segments. The first two weeks cover introduction to the lab and practicing experimental design. Students in teams of 2 or 3 design their own experiments centered on Skeletal or Smooth Muscle physiology, Cardiovascular physiology, and Respiratory physiology. Each segment is three weeks in length. The first week they pose hypotheses and design their experiment together. The second week they do their planned procedures together. The third week they give an informal oral report to the rest of the class that explains their results. They also turn in a formal written laboratory report in the third week. This format gives the students direct ownership of their learning process and involves them directly in the process of the scientific method. For the most part students have enjoyed these labs. They enjoy doing something they have designed. They enjoy trying to work out the problems in design, results and interpretation. In this session, I will discuss other challenges of this teaching method and give specific examples of design, results and problems of student-designed labs in physiology. Session participants are encouraged to bring questions and their experiences with self-designed labs to contribute to a group discussion.


My relocating from Wisconsin to Arkansas in the 70’s was a rude awakening for me when it came to teaching evolution. Judge Overton’s ruling unfortunately did not help in the classroom where “evolution vs creation” was a confrontational issue for non-majors and even majors. My approach soon separated evolution from the origin of life, specifically addressing evolution first in 3 stages, two as “fact” with the third or evolutionary mechanism(s) as the only theoretical component. During the origin of life part, I did not ignore the “creationist” viewpoint. Instead, I used their language in presenting the two viewpoints on “origins” – that is, natural creation (biogeochemical) vs special creation. This opened the door for contrasting the nature of these views – that is, religion (belief) vs scientific inquiry – at the beginning and especially at the end where I could raise questions without answers. Thus the issue remained one of personal decision and with much less student resentment. The details and success of this approach will be discussed.

P.I.3. The New Science and Mathematics Building at Doane College, Crete, Nebraska, C. Robert Wikel, Doane College

The process of constructing a new science and mathematics facility on the Doane College campus began with the selection of an architectural firm in the fall of 1995. The building cost $10.2 million with the Lied Foundation as the largest single donor. The 60,000-square-foot building houses physics, chemistry, biology, geology, information sciences, and mathematics. Faculty were heavily involved in the planning process, not only with extensive input into the types and arrangement of spaces within the structure but even with the initial choice of architect. Faculty were emphatic in their desire NOT to have an "institutional" building but rather an attractive structure that would draw people to it. Emphasis therefore was placed not only on pleasing and "people-friendly" teaching and research space in the classrooms and laboratories, but also on study and social areas in an effort to promote out-of-class interactions among students and faculty. The building was constructed within a wooded ravine and is connected to the rest of the campus by a 200-foot bridge. It was first occupied during the academic year 1999-2000, and two years of experience in it has shown it to be an excellent teaching/learning facility. The architects produced an unusual triangular design that has won some awards, and other institutions who are planning new science buildings have sent delegations to inspect it. It is the third science building on the Doane campus, and the "evolution" of teaching styles and building design can clearly be seen in the three structures.

P.II.1. Radioactive Materials & Radioactive Dating, Gerald Adams and Abour Cherif, Columbia College-Chicago

In this workshop we will discuss various activities to help students understand radioactive dating that are already exist in literature. Second, we will engage the participants in hands on activity of measuring half-lives in a way that can be visualized and also quantified. Finally, we will describe the details of three different methods of radioactive dating that are used for archeological and geological materials, concentrating on how they differ and their uses.

P.II.2. Council on Undergraduate Research-a Help in Organizing Undergraduate Research, Dick Wilson, Rockhurst University
P.III.1. There's More to Digestive Physiology Laboratories than Spitting in Test Tubes. Gregory M. Grabowski and Jelena Holt, University of Detroit-Mercy

With the current focus on research-based education, physiology laboratories have to go beyond classical demonstrations to more inductive approaches to physiology. The focus of laboratories and manuals alike has been on demonstrations of human physiologic concepts that typically reinforce lectures using classical techniques. Traditional digestive physiology laboratories exemplify the demonstrative format through assays of digestive enzymes purchased from a chemical supply company or collection of salivary amylase in a test tube. The initial goal of the purposed laboratory is to attempt localization of digestive enzymes to specific digestive organs in cockroaches, and to develop general conclusions about their similarities to the functions of the mammalian digestive system. Of the organs of the digestive system, both cockroach and mammalian systems share salivary glands, liver (fat bodies), esophagus, intestines, and rectum. The crop and proventriculus of the cockroach provide storage and mechanical processing of food similar to the mammalian stomach. Pancreatic contribution to digestion in mammals is shared with the cea and ventriculus of the cockroach. This approach to investigating the physiology of digestion not only demonstrates the application of lecture material to practical research endeavors in a controlled environment, but also provides a springboard for independent research opportunities for undergraduates.

P.III.2. The Evolution of Assessment, Steve Brewer and Buzz Hoagland; UMASS Amherst & Westfield State College

With the recent election of George W. Bush as our 43rd president, assessment has become a dominant theme in education reform. Unfortunately, the current emphasis is on high-stakes summative assessment and a report by Paul Black and Dylan William ("Inside the Black Box: Raising Standards Through Classroom Assessment," Phi Delta Kappan, October 1998) concluded that summative assessments such as standardized exams can actually be detrimental to learning. However, these authors provided strong evidence that formative assessment, properly implemented, is a powerful means to improve student learning. This paper briefly reviews formative and summative assessment and introduces a new formative assessment tool, entitled DUCK, developed by Steve Brewer. DUCK was developed out of a constructivist paradigm in contrast to commercially available quizzing programs which are developed out of the transmissionist paradigm. This program is part of the open-source software movement and runs on Linux.

P.III.3. Teaching About the Creationism / Evolution Issue in the College Biology Classroom, Neil Baird, Milliken University

Public opinion polls continue to report that 30-40% of the American public accepts literal creationism and rejects evolution. It seems that our students – especially in courses for non majors - share these views. Because evolution is the major unifying theme in biology, we biology professors need to help our students understand how science and religion are different domains of knowledge. Although the creationism / evolution issue is a complex interplay of scientific, religious, educational and constitutional issues, it is important for biology teachers to have enough background understanding in order to deal with this topic in the classroom. Fortunately, several recent worthwhile books and a number of useful web sites now exist to help clarify the issues for the biology professor. A discussion of various classroom strategies for dealing with this topic will make up the last part of the presentation.

P.III.4. Plagues: An Interdisciplinary Study of the History and Evolution of Infectious Disease Stephen S. Daggett and Jeffrey W. Myers, Avila College

In the 2000 and 2001 summer semesters, the authors taught a course that surveyed plagues in European history since the Middle Ages, using the disciplines of biology and history as interpretive guides. The course partially fulfilled the college core requirement that students take two interdisciplinary classes. The biological origins, modern preventative, contemporary efforts of disease control, and the social impact of plagues, such as bubonic plague, typhus, and Spanish influenza were covered in readings, lectures, and discussion periods. Students were given short-essay assignments that prepared them for a comprehensive final examination consisting of an essay and an objective component. We will discuss the structure of the course, assessment, and whether students successfully integrated knowledge and skills from foundation courses in their approach to this topic.


P.IV.2. Hands-on Demonstrations of the Principles of Plate Tectonics to Introductory and Evolution Classes. Dick Wilson, Rockhurst University

P.IV.3. Reconstruction of an Introductory Biology Curriculum using Inquiry-Based Approaches. Terry Derting, Murray State University

Retention of students in our biology major has traditionally been low. In addition, our majors are not well-prepared to succeed in upper level biology courses
in which problem-solving and research activities are common. We are in the process of reconstructing our biology curriculum using inquiry-based approaches: (1) improving student exposure of students to basic scientific concepts with significant opportunities for in-depth understanding through direct investigation, (2) placing a greater emphasis on concepts, processes, and active scientific inquiry, (3) developing the tools needed by students to grasp and explore new scientific topics at the outset of their undergraduate curriculum, (4) providing a supportive student-centered curriculum that facilitates the transition of students from a high school to an undergraduate level of study, and (5) enhancing the ability of faculty to adapt and introduce newly developed materials, pedagogical methods, and technologies into their courses. Development and implementation of the new curriculum will be discussed. Preliminary assessment data will also be presented.

P.IV.4. Evolution of a Plant Morphology Course, Austin Brooks, Wabash College

Traditionally plant morphology courses have presented the student with a survey of a group of plants. While the emphasis of most of these courses was the structure, reproduction and life history of an often-bewildering number of species, the central thread was evolution of the group. For the student there were information dense lectures that centered on botanical nomenclature and laboratories that made very heavy use of the microscope and dissections. Laboratory observations were recorded principally as labeled drawings and assessment took the form of hourly exams over the lecture materials, while the lab work was evaluated through the dreaded lab practical. The non-vascular and vascular plant courses I taught early in my teaching career fit this traditional pattern perfectly. Over the past three decades, evolution continues to be the central theme of my lower plant morphology course, but the course also has evolved chiefly as a result of new technologies. In this presentation, I will describe how my lower plants course has evolved since it was first taught in 1966 as a way of promoting conversation among participants of the session about course evolution in a broader sense.

P.V.1. Analyzing the Creation/Evolution Debate or What Students Should Know About the Nature of Knowledge, of Science, of Evolution, and of Creationism, Malcolm P. Levin, University of Illinois at Springfield

This presentation will examine the nature of truth and scientific and religious theories with the goal of understanding the similarities and differences in theory formation and development at a basic level. Using these basic distinctions, I examine aspects of evolutionary theory and creation science and assess their validity. I have used versions of this lecture in my course, Evolution, and in a formal seminar to the Creation Club at the local community college.

P.V.2. "This isn't Club Med": Field Ecology in the Bahamas, Lynn L. Gillie, Elmira College

A travel/field course in Marine and Island Ecology can be used to introduce science majors and non-science majors to biological diversity. This course is team taught at the Bahamian field station on San Salvador Island each spring. Several strategies have been implemented to prevent students from treating the class like a vacation. Pre-trip interviews, daily journal writing, and mini-projects have all been extremely useful tools in guiding and assessing student learning.


Kimchee is a traditional, fermented Korean food that can offer rich opportunities for hands-on student inquiry in microbiology. Extensive research on the biochemical, microbiological and nutritional aspects of kimchee provides a rich base for student-led exploration while real time data acquisition systems allow for rigorous quantification and data collection of experimental results. By constructing and monitoring kimchee fermentation chambers in the classroom, students can measure changes in pH, turbidity, CO2 production, O2 consumption, microbial populations, sugars and vitamins. The BioQUEST computer simulation, Sim Chee, (currently under development) will allow students to bridge the gap between wet-lab data collection and model construction.

P.V.4. Meals To Molecules, Abour H. Cherif, Columbia College-Chicago

Students in introductory biology classes, especially non-biology majors, often ask why they need to study chemistry in biology classes. Often, the reasons which we provide them for studying biology don't make sense to them, or don't make the connections between the relevancy of chemistry, not only in understanding biology, but also to their survival and well being. In this workshop we will demonstrate how the use of food and nutrition can be used as a starting point to introduce basic chemistry in biology classes, and is very effective in helping students understand the importance of chemistry in both understanding biology as well as the importance in their daily life. This paper integrates food and nutrition, atoms and molecules, periodic tables, chemical bonds, and chemical reactions as well as energy. The participants will be engaged in "hands on-mind on” activities, and they will be provided with ready to use in-the-classroom handouts.
POSTERS

Using theme concepts and the one-minute paper in Invertebrate Zoology, Robert Wallace, Ripon College

It is an understatement to say that Invertebrate Zoology (IZ) is an enormously diverse field. One major difficulty in teaching IZ resides in its vocabulary, which is both alien to common language and filled with obscure or confusing terms (e.g., the rotifer jaws are called trophi; the nematode pharynx is sometimes termed a muscular esophagus). Thus, while we may invite our students into this rich cognitive space, some quickly lose their bearings. What are we to do? While employing the fundamental principle that less-is-more, I use the theme concept approach within a format that integrates lecture and lab (i.e., three, 2-hour blocks per week). As the course progresses and key concepts are explored, I add them to our theme board. Themes include concepts such as Culture, Defense, Ecology, Economics, Evolution, Geodesic domes, Geology, Medicine, Reproduction, and Symbiosis. Once we have discussed a sufficient number of themes and have adequate examples for each, the students are ready to write one-minute papers (OMP). (Write for one minute on the theme of XYZ as it applies to IZ.) OMPs force students to focus on the big picture, while providing the instructor with timely information about whether individual students are grasping the concepts. OMPs may be employed with open book (notes), with study sheets, or without any aids.

Thirty-Three Year Daily Weather Data Analysis from Lock and Dam 21, Quincy, Illinois, 1968-2000, Alfred F. Pogge, Quincy University

The global increase in greenhouse gases in the atmosphere has been well documented. The related increase in global temperatures is still being debated. Thirty-three years of temperature and precipitation shows an increase of approximately 0.5 degrees F in the mean annual temperature. However, the mean annual high temperatures declined approximately 1.5 degrees F during the period while the mean annual low temperatures increased approximately 2 degrees F. The mean monthly temperature declined for seven months with the largest drop, approximately 2.5 degrees F occurring in April. Monthly mean low temperatures increased during all months except April which declined approximately 1.5 degrees F and December which remained the same. Annual precipitation declined during the period more than six inches.

Evolution Lab with Living Organisms, Mark Salata, Gordon College

Students tend to learn about evolution at the macro level through textbooks and at the micro level through games. Few laboratory exercises are created to teach evolution principles by using living organisms. This situation may lead students to think of evolution as an abstract and untestable concept. In order to demonstrate certain aspects of evolution, a hands-on laboratory exercise was designed. Two distinct populations of Drosophila, wildtype and ebony, were used in the exercise. Ebony flies were chosen for three reasons: 1) they can be distinguished by the naked eye from the wildtype morph; 2) the allele causing ebony phenotype is recessive; and 3) they have a decreased fitness in comparison to wildtype flies. Each one of these characteristics help simplify the mechanics of the experiment. Given an introduction on raising Drosophila, Mendelian genetics, and population genetics, students were well prepared to conduct the exercise, predict the outcomes, and analyze the results. Students displayed their understanding of the semester long exercise by writing a journal article based on the results and an open discussion period about Mendelian genetics and population dynamics.

Digital Photomicrography, Austin Brooks, Wabash College

The light microscope is unquestionably one of the seminal tools of all time in understanding living systems. Its usefulness was enhanced dramatically with the development of photomicrography for then the observations of the microscopist could be shared easily. While a great variety of camera systems for the microscope have been developed, photomicrography has been used, for the most part, as a research tool because of the expense of film and processing as well as the time delay before a micrograph is available for viewing. Furthermore there is always an element of uncertainty regarding the quality of the image until the processing has been completed. Digital microscope cameras allow for inexpensive and immediate images, both essential features for a teaching lab. Additionally teachers and students can be assured that acceptable images of a unique specimen are not lost. A variety of digital photomicrography systems are currently available but most are expensive ($1000-$6000) and hence not practical for teaching labs. This poster describes a simple, rapid, digital photomicrography alternative that employs a moderately priced ($350) Olympus consumer quality digital camera.

The Evolution of a Successful Peer Led Study Group, Claire Sandler, University of Michigan

Over the past four years, the University of Michigan’s Science Learning Center has developed a highly successful Peer Led Study Group Program targeting students in large enrollment introductory courses including Introductory Biology, Animal Physiology, Genetics, and Biochemistry. A team of 6 advanced undergraduate students help recruit, train, and support over 70 undergraduate students who serve as peer study group leaders. We’ll present information about the organization of our program and what we’ve learned over time. We’ll also present some preliminary results of our program evaluation.