4. What on Earth is Evolution? The geological perspective as an effective framework for introducing evolution to non-majors. Jerry Adams, Columbia College, Chicago

9:45 - 10:00 AM  Morning Break

10:00 - 10:45 AM  CONCURRENT PAPER SESSIONS V

1. Biology from the Newspaper. Bill Brett, Indiana State University

2. Promoting Diversity and Multiculturalism through Teaching and Learning. Abour Cherif, Columbia College Chicago

3. Frustrations and Solutions. Tom Davis, Loras College, IA


11:00 AM - 12:15 PM  Luncheon and Third Business Meeting

BUSINESS MEETING

Presidental Address:
Buzz Hoagland, Westfield State College and Tom Davis, Loras College

Election Results:
Nancy Sanders, Truman State University

Bioscene:
Ethel Stanley, Beloit College & Tim Mulkey, Indiana State University

2000 Meeting at University of Nebraska at Kearney
Charlie Bicak, University of Nebraska, Kearney & Mary Haskins, Rockhurst University

Executive Secretary Report:
Pres Martin, Hamline University

ADJOURNMENT OF REGULAR MEETING

12:30 - 1:15 PM  Steering Committee Meeting

Includes newly elected Steering Committee members!

For additional information or to suggest a workshop or presentation, please contact Margaret Waterman by email at waterman@biology.semo.edu or by phone at (573) 651-2381. Deadline for papers and workshops is July 1, 2000. Deadline for posters is September 15, 2000.

ABSTRACTS of PRESENTATIONS

Concurrent Workshop Sessions I
8:15 - 9:45 AM  Friday October 13, 2000

New developments in Case It!: a project to integrate collaborative case-based learning into international undergraduate biology curricula via web-based poster sessions and Internet conferencing. Mark Bergland and Karen Klyczek, University of Wisconsin, River Falls

This workshop will give participants hands-on experience with new software developed for Case It!, a National Science Foundation-sponsored project to enhance case-based learning in biology courses.
A Simple Apparatus for the Study of the Effects of Environmental Factors on Drosophila Life Cycle. **Chad Greuter and Brad Greuter, University of Illinois, Springfield**

*Drosophila melanogaster* is one of the most valuable organisms in biological research. It has been used as a model organism for research, particularly in genetics and developmental biology. Conventional culture vials do not permit easy examination of different life stages and collection of the organisms throughout their life cycle. We describe here an apparatus that is cheap, easily made by the students, and allows unobstructed observations of Drosophila behavior and different stages of development. The apparatus consists of a tube adapter (with or without a plastic mesh) fitted onto a petri plate filled with a clear agarose gel medium. The adapter can be made by attaching a 4 inch clear plastic pipe with a 1 1/4 inch diameter to the lid of the petri plate, against an opening
that matches the width of the pipe. Conventional culture supplies can be used with this apparatus, but the desired medium consists of Bacto agar, corn syrup, water and mold inhibitor. The transparency of agar medium allows for easy observation, counts and measurements of developmental stages through the lid of the petri plate under the dissecting microscope. Adult flies and/or pupae attached to the mesh in the adapter can be easily separated from the eggs and/or larvae in petri plate, by transferring the adapter to a different petri plate. We have studied dose-dependent effects of estrogen added to the medium on D. melanogaster reproduction and development using this apparatus. Movable adapter and clear medium allowed us to observe the effects of hormone on development, as well as to isolate individual organisms for further study. The described apparatus can also be used to study the impact of various physical or chemical environmental factors, or the effect of the presence of other organisms on Drosophila development and behavior.

**Over-the-Counter Physiology.** **Lynn L. Gillie,**
Elmira College, NY

Many college students consume dietary supplements to improve memory, increase circulation, slim down, or bulk up. Dietary supplements contain active ingredients that can have profound effects on vertebrate physiology, including side-effects that may not be well studied. For these reasons, using a supplement obtainable from any health food store to conduct experiments in physiology becomes extremely interesting and relevant to both science majors and non-science majors alike. Students treated the water of male and female Siamese fighting fish (Betta splendens) with an over-the-counter supplement containing androstenedione and yohimbine alkaloids. The fish exhibited increased rates of operculum pumping, an increase in number of aggressive displays, and an increase in color intensity compared with control fish. Students discussed the results and the possible implications for human physiology. This experiment can be modified for upper-level physiology or biochemistry students as well as first-year students.

**Sight and Sound: A Cross-disciplinary approach to non-majors science teaching.** **Peggy Shadduck Palombi and James C. Day,**
Transylvania University, KY

At Transylvania University, all students are required to take at least one laboratory science class. Many students majoring in disciplines outside of the sciences lack confidence in their math and science abilities. They are often apprehensive even before setting foot in the science building, making it all the more difficult to engage these students in a productive laboratory class. To try to overcome some of the apprehension, we recently developed a cross-disciplinary science course called Sight and Sound which was team taught by a member of the biology program and a member of the physics program. Because there is an emphasis on human biology, in particular on sensory function, students have an inherent interest in the subject matter. By emphasizing subjects with an obvious impact on their own lives, we were able to challenge students with simple physics as well as basic cell biology, anatomy, and physiology, applying the ideas immediately to the sensory systems. In the laboratory, students did both observational and hypothesis driven exercises. They learned to keep a laboratory notebook, to question improbable results, and to draw on the strengths of different members of the lab group. Classroom experiences included physics demonstrations, sensory demonstrations and problem solving.

Because both professors participated in all classes and lab experiences, they also learned that scientific communication often depends heavily on the jargon within each field and the point of view of the scientists involved, but that tremendous progress can be made through collaboration. The greatest challenge in teaching the course was a lack of a relevant textbook. We hope to remedy that through posting of supplementary course material on the Transylvania intranet using CourseInfo’s Blackboard.

**Measurement of seed respiration by CO2 release: a simple method adaptable to both biology major and non-major courses.** **Angela Glascock,**
Truman State University, MO

An experimental method was developed to evaluate respiration rate through CO2-induced pH change in water surrounding seeds. A pH meter and/or indicator dyes can be used to measure pH changes caused by CO2 released from respiring seeds. This simple method can be adapted for courses ranging from non-major biology to advanced major’s courses such as plant physiology. Color changes in pH indicator dyes visually demonstrate respiration, but this approach is strictly qualitative. A pH meter can be used to measure respiration quantitatively, and respiration rates can be compared between seeds at different stages of germination.

Tested with broadbean and soybean seeds, this method demonstrates that respiration rates increase in seeds throughout an eight-day germination period. Seed respiration rates between light-grown, and etiolated seedlings also can be compared. Additionally, this method allows related concepts to be introduced to students, for example, that plants not only undergo photosynthesis, but also respire. Also, it demonstrates mobilization of seed reserves via gluconeogenesis, an additional source of CO2 liberation from seeds.
Concurrent Workshop Session II  
10:30 AM – Noon  
Friday October 13, 2000

Cross Roads: Learning from Real Life Cases of In Vitro Fertilization. *About Cherif*, Columbia College, Chicago

In this workshop we use a number of real life cases that were centered around Assisted Reproductive Technology (ART), specifically, *In Vitro* Fertilization (IVF). They were caused by the same problem, produced similar outcomes, but resulted in a variety of different decisions. The cases are real but modified here for educational purposes. Embedded in most of these cases is human error in technological procedures, cultural differences, decision-making, and emotional drama.

In each case, what was intended initially as a normal in vitro fertilization procedure resulted in a fierce legal battle and resulted in a variety of different decisions. The cases are real but modified here for educational purposes. Embedded in most of these cases is human error in technological procedures, cultural differences, decision-making, and emotional drama.

An educational activity has been designed and developed around these real cases and their outcomes. The aim of the activity is to engage students in active learning by involving them in discussions that demand the use of prior knowledge, focused attention, restructing thoughts, use of reasoning, and interaction of student-student and student-instructor. In engaging in this activity, students learn different aspects about *in vitro* fertilization and related issues of assisted reproductive technology, and develop problem-solving skills, while exploring their own feelings, attitudes, and values toward the intended learning issues and objectives.

This activity can also be used to review a student's understanding of the purpose of reproduction, the various types of fertilization, various assisted reproductive procedures, identical twins, blood types and blood testing for parents, DNA and DNA testing for parents, etc.

This activity has the advantage of realism and resembles a “case study” approach to teaching. Case studies are commonly used as methods of instruction. For example, in the disciplines of law and business (Cage, 1996), in the integration of science, community, and global problems (Robinson, 1993), and in the integration of science into how humans deal with animal issues in public zoos (Diamond, 1995, Cherif, Verma & Somerville, 1998), all have been used for education.

Most often, a real-life situation is discussed and analyzed from the point of the speaker’s opinion about the solution to a problem. The distinguishing feature of this activity is that not only do students analyze the problem and the solution, but they personally experience the complexities of making decisions by putting themselves in the shoes of the people who were involved in these real-life cases. It is not until the students have discussed the cases and explored their own conceivable outcomes, that they become aware of the “real-life” solutions. At this point, students will have already invested in their particular perspective and will be able to compare their possible outcomes with the actual ones.

The activity has been implemented in various classes such as General Biology, Genetics, Bioethics, ‘Science, Technology and Society’, Biotechnology, Introduction to Sociology, and Culture in Modern Societies. These classes were taught at three different institutions.

Using Physical and Computer Modeling to Make the Molecular World Real. *Michael Patrick*, University of Wisconsin, Madison and *Tim Herman*, Milwaukee School of Engineering

Understanding biology at the molecular level is, for many students, a daunting challenge because it is abstract. They are asked to make inferences about systems with which they have no experience and to provide answers to questions they have never been asked. We have developed an inquiry-driven approach to help make the molecular world real and relevant to students, including those whose interest and direction may lie outside the sciences. At the core of this approach is the integrated use of computer visualization software (e.g., RasMol, Chime, etc -- all of which is public domain and can be downloaded free of charge and does not require state-of-the-art computer technology) and unique, 3-dimensional physical models of proteins, nucleic acids, and other biomolecules. These are used to make predictions about structure-function relationships that can be tested experimentally. We will outline, with demonstrations, strategies and experiences using this approach at both the introductory and advanced levels of undergraduate biology and chemistry curriculum as part of an NSF/CCLI grant.

Concurrent Paper Session I  
10:30 - 11:15 AM Friday  
October 13, 2000

Student Ownership of Teaching and Learning as a Means of Making Science Real. *Terry Dorting*, Murray State University

A pervasive problem in content-oriented biology courses is the reduction of learning to simple...
memorization of a host of terms and facts with little meaning. Much attention has been given to the incorporation of inquiry and understanding of process in biology courses, with relatively little attention to course components that involve learning of numerous terms or facts. Using a comparative anatomy course as a model, I will discuss strategies that have been implemented to make learning of anatomical parts and systems more meaningful to students. Each approach places the learning and teaching of anatomy into the hands of the students. The approaches also provide students with the freedom to learn anatomy in ways that are meaningful to them. These approaches include production of a web-based anatomy atlas by students, group quizzes, and use of student teachers. Consequences of the implementation of these strategies will be discussed in terms of student attitudes and performance.

Large Science Classes: How the web can promote interaction and course management. Scott Gordon, University of Southern Indiana

In recent years, the use of Internet resources (i.e. web pages) in course and curriculum development has increased and made a significant impact on teaching and learning. These technologies have made it possible to easily distribute course information and materials to students via the Internet and have allowed for greater online communication and interaction. Some of the newer technologies to be developed and refined are the web course management tools such as Convene, CourseInfo, WebCT, Web Course in a Box, etc. While these tools were initially developed for use in distance education based pedagogies, their use in on-campus classroom settings to compliment traditional courses is a viable option. These online course development tools can significantly increase student involvement in multiple aspects of courses. The ability of instructors to control access to a variety of course materials - syllabi, lecture notes, outlines, images, etc. allows students easy access from virtually any location. For the instructor, a multitude of options exists for developing, implementing, and delivering course content. The use of one Web-based instructional tool, Blackboards' CourseInfo, has been utilized in a variety of instructional settings and has been especially beneficial in large, 100+ student classes.

Understanding Ecology through Art: An ecology course for art, media and communication students. Zachia Middlechild, Columbia College Chicago

In this presentation, I will talk about the development and teaching of an ecology course that is designed specifically for Art, Media, and Communication students. I will show how this course capitalizes on the use of visual thinking and expression, primarily drawing, to learn scientific and ecological concepts, and their assessment. It is specifically designed for those students in the Arts who think, learn, and express their understanding visually, and who would benefit from a course taught in this manner. For example, using sketchbooks and materials provided by the instructor, the students complete drawings of different kinds of ecosystems, showing how different organisms interact with their environments, such as (temperate forest, grasslands, oceans, etc.); which we will have researched through various literary and visual sources, (internet, library, Science & Math Department, hand-outs from instructor, and textbook). Through drawing, and painting students will "see" how an ecosystem works, and will then be able to describe not only visually, but also in words their understanding of the ecological principles and concepts. The prerequisite for this course is Beginning Drawing from the Art Department or equivalent, or permission from the instructor.

Concurrent Paper Session II
11:20 AM -12:05 PM
Friday October 13, 2000

From Yeast to Hairdryers: Ideas for Teaching Environmental Science. Kathy Nolan, St. Francis College, NY

A variety of activities that you can introduce into your non-science majors ecology and the environment curriculum will be presented. Examples include: role playing scenarios, letter writing campaigns, comparison and contrast activities such as watching the video "Far Cry of a Long Gone Bird" (the auk) and comparing this information to that in an article about the "comeback" of the snow geese, pulling objects from a bag and describing them as "needs" and "wants"(a hair-dryer and deodorant are included), picking questions from a card out of a hat, environmental bingo, soil analysis, yeast population growth, integrating science and art through visits to photo galleries (ship-breaker exhibit), and utilizing local sources as guest speakers for Ecology Forums. Sample activities will be conducted, copies of articles will be provided, and segments of useful videos will be shown.

Using the 3 P's and the Invertebrate Zoology Teaching Lab: Some Open-ended Enrichment Exercises. Robert Wallace, Ripon College

In my Invertebrate Zoology course, I seek ways to enrich the laboratory by adding cooperative learning opportunities that engage the students in the scientific narrative: problem posing, problem solving and persuasion (presentation) - the 3Ps of the BioQUEST agenda. These enrichment exercises are brief (<0.5 hr), open-ended studies where students apply the 3Ps to specific problems. Whereas I run my course in a form in which lecture and laboratory are fully integrated,
the laboratory. In this presentation, I will offer several examples of these exercises selecting from the following: (1) numerical analysis of common screws, (2) telegraphic writing exercises, (3) development of taxonomic keys (numerical and dichotomous), (4) water capacity: natural vs. artificial sponges, (5) birefringence in hard parts, (6) intracolony polyp distribution in cnidarians, (7) anhydrobiosis in bdelloid rotifers (spread out over several labs), (8) observing shell sorting in death assemblages (field trip), (9) protozoan parasites of earthworms, (10) nematode parasites of earthworms, (11) mechanical advantage of crustacean chelipeds, (12) cladistical analysis using trilobites, (13) visualizing the graptolite bauplan, (14) monticule function in fossil bryozoans, (15) nature's geodesic dome: strength in sea urchin tests.

Concurrent Paper Session III
2:00-2:45 PM
Friday October 13, 2000

Hey, I've Got a Question About That! -- Students Teaching Students in a Human Biology Course for Non Majors. Tom Davis, Loras College

When students are encouraged to ask applied questions about their interest in a topic and work in a supportive environment to answer them, active enthusiastic learning happens. This session will describe a student-centered approach to teaching a 4 credit, one semester Human Biology course with lab. Students are first given a list of possible topics related to Human Biology. THEY choose 2 topics to be investigated for the first 3 exams. (The instructor chooses the 2 topics for the last exam!). Next, they were asked to write questions that THEY had about everyday applications of the topic that they chose. The class of 20-32 students was divided into teams of 2 or 3 students and given a team assignment: 1) Interview Team, 2) Internet Team, 3) Disease Team or 4) Summarizer Team. Teams worked together to find information, presented it in class and helped each other answer their own applied questions. Come to this session to find out more about the duties of these teams, what happened in lab, and the successes and the problems associated with this teaching approach. Half the session will be spent presenting other aspects of the course. The second half will be a group discussion on how others at the session have helped non-majors learn, apply and retain "real" science.

Induced Diabetes-Milletus: A model of homeostasis in the rat. Gregory Grabowski and Lindsay Piejak, University of Detroit, Mercy

One of the difficulties of teaching physiology laboratory exercises from standard manuals is the lack of experiments demonstrating homeostasis. Typical experiments focus on the specific function of an organ or organ system, but they rarely demonstrate the contribution of these functions to the overall balance of an organism's internal environment. Students measure isometric muscle contracts, heart rates in response to cholinergic and adrenergic drugs, and the specificity of digestive enzymes, but the contributions of these actions to homeostasis are typically neglected.

Within a lecture setting, homeostasis can be exemplified through descriptions of diseases that disrupt the normal range of hormone, salt, water, or glucose levels. The endocrine system lends itself particularly well to demonstrate homeostatic disruption. This rationale can also be utilized in the laboratory setting to overcome the absence of experiments dealing with homeostasis. With the induction of diabetes mellitus in rats, students are able to study and witness the pathophysiology of one of the most commonly encountered endocrine disorders.

The induction of diabetes by streptozotocin results in destruction of insulin-secreting cells (B cells). Within a week, induced rats begin to display clinical manifestations of diabetes (Polyuria, polydipsia, and polyphagia). Students monitor weight changes and food and water intake over a two-week period. After this period, the rats are sacrificed and various parameters are measured. Comparisons with control rats include serum glucose and albumin levels, glycated hemoglobin, and liver weight. Histochemical analysis of the pancreas using the chrome alum haemotoxylin-phloxine method corroborates the destruction of B cells. Another histochemical analysis is qualitative comparison of glycogen content of liver and kidney using either Best's carmine method or periodic acid-Schiff reaction. Quantitative comparison of glycogen and various liver enzymes have been performed in biochemistry and cell biology laboratories. Anomalies discovered by students, through comparisons with control rats, allow them to determine disruptions in normal homeostasis, the various organs involved, and the physiological mechanisms initiated to counter-act the diabetic state. The induced diabetes model not only demonstrates homeostasis, but it also stimulates student interest in health-related research. Student initiatives have resulted in independent investigations through various modifications of the model.

Understanding the Changing Student Population. Mary Haskins, Rockhurst University, Kansas City MO

The transition from high school to college academics is often challenging for students. Understanding why this transition is difficult may help faculty enhance their students' ability to succeed. Participants in this workshop will re-examine their own concepts of what it means to be successful, and will work as a group to identify specific strategies to aid freshmen in their studies.
An Introduction to Knot Theory for Biology Educators.  Stafanos Gialamas, Illinois Institute of Art

The theoretical and the practical understanding of the knot theory is essential for better understanding the mechanism of DNA supercoiling and in turn several other important biological processes such as DNA replication, transcription, gene expression, and genetic crossing-over processes, as well as how DNA winds itself around the core protein of the nucleosomes. Knot theory provides an adequate theoretical framework for interpreting the behavior and understanding the mechanisms of how DNA double helix wind and unwind through its helical axis during the process of DNA replication and transcription. DNA from viruses, prokaryotes and eukaryotes exists in a supercoiling state, meaning that the axis of the double helix is twisted around itself. In this hands-on-workshop, the participants will be engaged in active learning by transforming their theoretical understanding to practical life situations.
Recent media attention has refocused the American public on the teaching of evolution in public schools. Nationwide, differences in state standards for science education offer a wide variety of possibilities of how to teach about evolution – or not - for public school science teachers. Missouri does not mention evolution in the standards, and anecdotal evidence led to the perception that many Truman students know little about the science of evolution, and have many misconceptions about this concept. A survey was designed to elucidate attitudes toward and understanding of evolution by students in Truman biology classes. We predicted that non-major biology students would have the least understanding of evolution, and senior biology majors in the capstone course would have the greatest understanding. Preliminary data support this prediction.

LifeLines OnLine News Stories and Modules: Investigative Learning Activities for Contextualizing Biology. Margaret Waterman, Southeast Missouri State University and Ethel Stanley, Beloit College

Like all adults, college biology students learn more when what they’re learning is meaningful to them. One way to increase the meaningfulness of biology is to use realistic situations as the beginning point of instruction. Further, it’s important that all students understand and participate in investigative learning in biology.

In this session we’ll share new developments in the LifeLines OnLine project in which instruction begins with fictionalized newspaper stories. Once students read the story, they can access resources and learning activities, including investigative activities. Assessments for the modules are also available. A variety of biology instructors have been developing new stories for LifeLines OnLine and the supporting modules to coordinate with their introductory biology, A&P, and ecology courses. Participants will see some of the variety of these modules and will be given access to them.

Mitochondria: An Integrating Theme for Non-Majors. Gary Oxford, Longwood College, VA

All too often, the non-majors biology course can come across as an arbitrary set of unrelated topics. To a neophyte, what does aerobic respiration have to do with genetics or evolution? We want our students to make connections, to integrate apparently disparate units of information into understanding, maybe even wisdom. How do we guide them? One approach to model such integration is by weaving a theme throughout the course. In this case, the organizing theme is the biology of mitochondria. Probably all non-majors biology courses introduce mitochondria as the "powerhouse of the cell," but in this course, students learn about mitochondria in every unit. For example, in the genetics unit, the maternal inheritance of mitochondrial DNA is covered, and the endosymbiont theory of mitochondrial origins is covered in the evolution section. Not only does this help to integrate the course material, it also allows for the introduction of current event topics that involve mitochondria, such as cloning, DNA fingerprinting, apoptosis, human mitochondrial diseases, and antioxidants. In this paper, a strategy for using mitochondria as an integrating theme for non-majors biology courses will be discussed, as well a variety of resources for information on mitochondrial biology.

Promoting Diversity and Multiculturalism through Teaching and Learning. Abour Cherif, Columbia College Chicago

Diversity is a gift that enhances our survival as a species biologically and our collective wisdom and intellectual progress. The more different we are, the more chances we have as a species to survive a variety of natural catastrophes, particularly diseases. Different ways of thinking multiplies the collective richness of human potential. So diversity is a gift. It can also be a curse that can produce the worst atrocities all in the name of patriotism.

In this paper I will discuss how the faculty and administration of the Science and Mathematics Department at Columbia College Chicago promote diversity and multiculturalism in their department, and in their classrooms through teaching and learning. I will provide examples at the departmental level and at the classroom level of the some instructional strategies my colleagues and I have composed and applied in classroom teaching and management.

In the classroom setting, the term multicultural refers to any group of students outside of the mainstream of the society. In this sense, developing an awareness of and showing the positive influence of a multicultural classroom increases the potential of success in the learning process for all individuals. Our philosophy of diversity and multiculturalism goes beyond this. For us, it is the philosophy and attitude of inclusion of all elements of society, the interaction of those different cultures and backgrounds that make up a multicultural society, and the celebration of the similarities and differences between all the elements within the society. Some people might believe that those who come from a multicultural background would necessarily practice an attitude of acceptance, tolerance, and understanding. This is not necessarily the case. It depends upon how people have been raised and taught both at home and in school. Thus, education plays an important role in developing awareness and appreciation of and a positive attitude toward diversity and multiculturalism. However, administrative support is a very important ingredient in promoting diversity and multiculturalism in the classroom. The administrative support is needed at
Concurrent Paper Session V
10:00 - 10:45 AM
Saturday, October 14th

Biology from the Newspaper. Bill Brett, Indiana State University

Students in the General Education course "Human Aspects of Biology" are required to submit, on a weekly basis, a write up on an article appearing in that week's newspaper or popular magazine. The write up consists of a brief paragraph explaining the significance of the information to them and must "touch upon" some topic covered in the course. Examples of write-ups will be examined and the role this exercise plays in the course will be discussed.

Out of Africa: How travel impacts biology in the college classroom. Marion Field Fass, Beloit College, and Charles Stinemetz, Rhodes College

Some benefits to biologists of travel are obvious - the ability to explore new ecosystems, to study different organisms, and to understand the impact of physical environment on microbial diseases. Other benefits are equally important. International travel allows us to look at the cultural context of the work we do and the role of funding, equipment, and public interest in determining the kinds of questions scientists can ask. By visiting with other scholars we can begin to understand what scientists see as important questions. As we understand this we can better share with students how social contexts affect the utility of scientific innovation, and demonstrate the value of enhanced cultural understanding. We are also able to address the concerns of students who have traveled internationally.

The authors, a plant physiologist and a public health microbiologist, participated in a 2-week interdisciplinary seminar in Kenya funded by the Andrew W. Mellon Foundation. The seminar provided the opportunity to learn from Kenyan scholars, to see the landscape, the farms and the game preserves, and to find out how science is taught in their universities. We found that many of the questions asked by scientists are concrete and related to pressing needs. We were able to contrast the tourist Kenya of fabulous biological diversity with the lived Kenya of identity, priorities and problems complicated by poverty, drought and political corruption. We suggest that travel both for the ecology and the politics can have dramatic effects on the way we teach and do science.

What on Earth is Evolution? The geological perspective as an effective framework for introducing evolution to non majors. Jerry Adams, Columbia College, Chicago

In this presentation, we will demonstrate the use of geological concepts and principles as an effective approach to teaching evolution and in turn the scientific method in the classroom. This approach to teaching makes it easier for students to understand the basic concepts of evolution which is important if we want to understand nature as it really is, for example: that the genetic code is universal for terrestrial life forms, that basic mechanisms of life are very similar in seemingly diverse life forms, that we are part of an interrelated web of energy and life on the planet earth, that diversity and unity are characteristic of living systems, etc. The model we have used in teaching evolutionary biology through the geological perspective consists of three integrated components. The first of these deals with the nature of science and what constitutes scientific compared to non-scientific explanations of observations and phenomena. The second component examines the notion of geologic time and the age of Earth, from the combined standpoints of Steno's Law the record of ancient life on Earth, and radioactive age determinations on rock materials. The third looks at the implications of the age of Earth and our concepts of geologic time on our understanding of the evolution of life. With the combination of these three components, biological evolution is introduced and explored in the classroom. For example, we can begin to examine questions like; "How could the relatively few and simple organisms of billions of years ago give rise to the many, complex organisms that inhabit Earth today?"

Frustrations and Solutions. Tom Davis, Loras College

Inattentive students, inattentive chair people, great ideas that flop, not enough time per class, a coherent interconnected biology curriculum – (I wish), big ideas and no one with whom to discuss them, post tenure review, my role in the department, balancing research, teaching and service, teaching to the middle of the class, “I learned the most from my most uncooperative teacher” – fact or fiction, etc., etc. These are just a few possible topics that could be brought out in this session. Here is an opportunity for teaching biologists to vent their frustrations, have a few colleagues listen and hopefully discuss a few suggested directions for dealing with frustrations. (Disclaimer: All problems are not solvable and participants are not guaranteed to be problem-free when they leave. But it really feels good to vent and talk to someone who will listen! Good listeners are encouraged to attend as well!)