ABSTRACTS OF PRESENTATIONS
ACUBE 48TH Annual Meeting

Concurrent Workshop Session I
8:15-9:45 am
Friday, October 15, 2004

Easy Ways to do Physiology Labs from iWorx/CB Sciences. *Steve Andre*, iWorx/CB Sciences

Physiology teaching kits and Labs on CD, and Labs on Line from iWorx/CB Sciences make it easy to do human and animal physiology experiments includes cardiovascular, neuromuscular, and respiration exercises. Teaching kits include all the hardware (except computer), software, and courseware needed to do over 150 experiments with multiple exercises. Data collection and analysis can easily be accomplished with the “click” of a button or two. Users can also complete experiments of their own design with the same “click and play” ease.

The same types of experiments can be done without data recording hardware, on a computer in lab or at home with Labs on CD, or over the Internet with Labs on Line. With Labs on CD or Labs on Line products from iWorx, students record and analyze data just as they would with a physiology teaching kit. Animations, illustrations, and digital movies compliment each lab exercise so students have an understanding of how the experiment was conducted. Participants in this workshop will be able to collect and analyze data with Labs on CD/Labs on Line.

Using Technology with Investigative Case Based Learning, *Margaret Waterman*, Southeast Missouri State University and *Ethel Stanley*, BioQUEST, Beloit College

In this highly interactive workshop, participants will work with two investigative cases that connect nicely to software available on the internet. We will use a case in which alleged whale meat is subjected to forensic genomic analysis with the powerful genomics tools collected at the Biology Workbench. With a second case we will use web-based audio files, as well as real-time data collected about the Chesapeake Bay to illustrate how to make data-rich websites into open-ended investigations. If time permits, a third case on fermentation will be used to show how to link a CD-based simulation to investigative case-based learning. Teaching approaches for using cases, adapting cases from the wealth of those already available, and assessing learning will be addressed if participants wish. To learn more about Investigative Case Based Learning, and to see some cases online, go to http://bioquest.org/lifelines

Poster Session I
9:50-10:20 am
Friday, October 15, 2004

Investigative Case Based Learning: The LifeLines OnLine Project, *Margaret Waterman*, Southeast Missouri State University and *Ethel Stanley*, BioQUEST, Beloit College

The LifeLines project developed science teaching methods and curriculum materials useful across STEM disciplines and institutional types, prepared a cadre of faculty to use and disseminate those practices, developed a web site rich with resources and faculty products, and assessed the use of biology cases in college classrooms.

The pedagogical approach, Investigative Case Based Learning (ICBL), aligns problem-based learning methods with the investigative approaches found in the software, tools and resources of the BioQUEST Curriculum Consortium. ICBL involves learners in a collaborative problem space describing a realistic
situation. The case provides a context for learning. Case analysis allows students to identify their own questions and prior knowledge. Students are encouraged to explore questions from the case through extended science investigations, providing a more meaningful experience of science.

The LifeLines project participants developed over 65 modules, each contains case, related investigative activities, resources, assessments and implementation plans. The curriculum modules are part of the LifeLines OnLine website which includes resources for ICBL.

Development of a Blended Online/Traditional Environmental Science Course, Jennifer A. Sadowski and Michael S. Alfieri, Viterbo University

Environmental Science (ENVS 101), a non-majors general education science course with a lab component, is offered during the academic year as a traditional course (3 hours lecture, 2 hours lab per week) at Viterbo University. Due to the large number of non-traditional students at Viterbo University, the goal was to adapt the traditional course to accommodate students in the School of Adult Learning program by incorporating the on-campus laboratory component with an online lecture component as an 8-week blended online course. Environmental Science has been offered for the past 2 years in this format using technology available with Blackboard (such as discussion boards, digital drop box, Powerpoint lectures, and an online grade book), which allows for student interaction and instructor feedback while maintaining flexibility for our non-traditional students. On-campus laboratory meetings are scheduled in the evening or weekends for longer blocks than typical traditional labs. This presentation will summarize how this blended online course is constructed and discuss both the challenges and benefits of teaching environmental science in this format. The course syllabus, course outcomes, and a summary of preliminary assessment data will be presented.

Teaching Population Growth Using Cultures of Vinegar Eels, Turvatrix aceti (Nematoda), Robert L. Wallace, Ripon College

The dynamics of population growth is a challenging topic to explore in an ecology course that is only one semester in length. Simple options for instruction include analyzing extant data sets and the use of computer models. While more time consuming and replete with the possibility of failure, fast-growing microbes such as bacteria, yeasts, and algae or other small organisms such as protists and Lemna also can be employed. Here I present a simple laboratory exercise that follows population growth of vinegar eels (Turvatrix aceti; Nematoda) in microcosms using a culture medium comprising 1.5 L of apple cider vinegar and a bit of decaying apple.

Development of an Upper-level Comparative Bioinformatics Course, Glenna G. Temple, Viterbo University

This presentation will highlight the development of a comparative bioinformatics course at Viterbo University during the 2003-2004 school year. The comparative bioinformatics course was added to the curriculum to support the biotechnology certificate now offered to science majors in addition to a bachelors degree in biology or chemistry. The goal for this course is to provide students with the skills to apply computational methods to searching sequence databases, pairwise and multiple sequence alignment, phylogenetic methods for pattern recognition and functional inference from sequence data. This course is a requirement for students pursuing the biotechnology certificate and is an upper-level elective or all majors in the department. This poster will include course syllabus, course outcomes, sample student activities, resource materials and assessment data from the first time the course was taught.

Tools for Environmental Conservation & Restoration, Peter J. Wilkin, Purdue University, North Central.

Porter county in Northwest Indiana is threatened by sprawl. The area has high biodiversity due to its proximity to Lake Michigan, but it is also the site of industrial activity, high human population density, endless through traffic, and rapid growth. Only a few % of the land area is protected, mostly adjacent to the Lake. At Indiana's dunes, biologists are restoring wetland, woodland and prairie. An expected outcome is fewer beach closings due to high levels of E. coli. A tool developed by the Indiana Biodiversity Initiative is used to identify the most valuable areas for conservation in the county. In 2002 a Land Use Plan was adopted by the county to guide growth. Changes in zoning ordinances needed to retain both the urban &
rural character are described and compared with recent developments. The progress is assessed of conservation & restoration activities at Coffee Creek, a model community for more sustainable development. Tools developed at Purdue to model the impacts of land use change on water resources are used to determine the effects of a new mall in Valparaiso. For access to the links, and for more tools click on http://faculty.pnc.edu/pwilkin/environmentalscience.html

Concurrent Paper Session I  
10:30-11:15 am  
Friday, October 15, 2004

A Single Organism Can Serve Many Educational Purposes. **William Brett, Indiana State University**

*Amanita*, sometimes referred to as the "death angle," plays a range of roles. It can serve as a feast for some organisms and a death sentence for others. In examining this interesting organism, one finds its life cycle touches the biological fields of ecology, evolution, genetics, physiology, taxonomy, and toxicology, as well as chemistry and history. This presentation will provide a general introduction to its role in all these areas and also suggest research projects that Amanita offers.

Bridging the Interdisciplinary Divide: A Mathematical Model of Muscle Contraction and Its Uses in Undergraduate Biology and Math Education. **Tom Hoogendyk, Northeastern University, and Jennifer Galovich, College of Saint Benedict and Saint John’s University**

Quantitative methods and interdisciplinary approaches are the hallmark of modern biology; yet undergraduate biology education continues to emphasize rote memorization of vocabulary and explanations over quantitative reasoning and problem solving. At the University of Massachusetts Amherst, problem-solving activities based on reasoning with causal models have been used successfully in introductory biology lectures. Here we present example laboratory activities where introductory biology students use a mathematical model of muscle contraction to pose questions, solve problems, and present results. Using the model, students manipulate five parameters: actin and myosin length, number of sarcomeres in series and in parallel, and fiber pennation angle. The model predicts maximum muscle shortening and force as a function of these parameters. Combining data resulting from model manipulations with data from wet-lab experiments and the literature provides a rich problem space for student inquiry, spanning biological levels of organization from protein to cell to tissue. These quantitative laboratory activities are intended to extend conceptual models used in lectures. Students use the model to ask whether actin and myosin lengths are constant across taxonomic groups and, if not, what are the consequences in terms of maximum shortening and force production? Do parallel-fibered muscles necessarily shorten faster and farther than pennate-fibered muscles? Are pennate-fibered muscles always more forceful? By incorporating simulation and experimental data into labs, students are challenged to reconcile differences between prediction and observation, which is, ultimately, a more authentic scientific activity.

Writing, Collaborative Media, and Interactive Online Environments. **Steve Brewer, University of Massachusetts-Amherst**

Collaborative learning has many documented benefits: students get more feedback faster from peers than from instructors and construct knowledge in a social context that more accurately reflects the way disciplines really work. A common learning goal is for students to learn to work effectively as a team. Creating the support for student groups to work effectively, however, is often a significant challenge: students often resist working in groups because of the logistical challenges of collaboration and because they fear unequal contribution by group members. A recently emerging system of collaborative media, called “wikiwikiweb” can address these problems by reducing barriers to effective collaboration and increasing the accountability of the team members. We will discuss a range of collaborative media, describe wikis in more detail, provide a history of their implementation in the curriculum of the Biology Department at UMass Amherst, and offer a summary of some of their effects.
LabWrite: Educational Technology to Enhance Students’ Writing and Learning in Biology Labs, Miriam Ferzli, Michael Carter, and Eric Wiebe, North Carolina State University

Many scholars in the fields of science writing and writing to learn science have noted a connection between writing and learning. A case in point is the lab report, the major form of writing in biology classes. Lab reports encourage learning not only by inviting students to reflect on what they have done in the lab but also, through the format of the report itself, by guiding students in thinking scientifically about the lab experience. At the same time, there is a growing recognition of the learning potential in educational technologies. The problem, then, is how to take advantage of the potential of both writing to learn and learning through technology in the laboratory setting. This paper describes one solution to this problem: LabWrite, a free, online, just-in-time instructional technology (http://labwrite.ncsu.edu). We report on a control-group study of science majors taking an introduction to biological sciences. The treatment was LabWrite. The control group received the lab report instruction that is typically given in the labs. We tested three hypotheses: that students in the treatment group would demonstrate (1) a greater understanding of the scientific concepts of the labs, (2) a greater ability to apply scientific thinking to the labs, and (3) a better attitude toward lab reports than students in the control group. Our results yielded statistically significant support for all three hypotheses.

Concurrent Paper Session II
11:20-12:05 am
Friday, October 15, 2004

The Web Enhanced Course: A Liaison, Between the Computer and the Classroom. Hugh B. Cole, Hopkinsville Community College

This session is to be, in part, a brief introduction for those who do not use a computer in the classroom very much and for those who are unfamiliar with the advantages of a web enhanced course. This session is also meant to be a discussion forum for those familiar with the web-based course. Everyone is invited to trade ideas and share strategies that have proven success.

Web enhancing immediately brings technology into a course. It can complement a course which may have been based primarily upon traditional methods of instruction. A web enhanced course sets up a private web site for each class. Here the instructor may open multiple avenues of communication with the student that may be invaluable to a student’s performance in the class.

The instructor can also almost eliminate a paper trail, not only saving a tree, but, making the copier virtually obsolete.

Human Allometry: Sexual Differences in Growth Rates of Various Body Parts
Buzz Hoagland, Westfield State College

For the past five years students (primarily non-majors) enrolled in my Human Biology courses have collected and analyzed measurements taken from their own bodies. These data have been aggregated into a single downloadable text file and is available through the web (http://biology.wsc.ma.edu/biology/experiments/symmetry/body/). Students are provided specific directions on how to collect and analyze data, but question and hypothesis development is a student-centered activity. Frequently asked questions include does handedness influence length of hands, and are height and foot length positively correlated. Occasionally, a group of students derive and test the hypothesis that males have proportionately longer feet and hands then do females. The answer is yes when foot and hand length are standardized by height. The biological rationale for this statistically-demonstrated relationship is that males grow for a longer time period and that foot and hand growth trajectories are different from the axial skeleton growth trajectory and possibly long bone growth trajectories. This laboratory exercise contains the necessary elements to get non-majors actively involved in the process of science, and they have fun.
Long-term Impacts on One Semester of Reformed Teaching on Student Learning. **Terry L. Derting**, Murray State University

Over the past four years a new first-semester curriculum has been implemented for biology majors at Murray State University. The curriculum reform arose from an NSF-Course, Curriculum, and Laboratory Improvement grant and focused on use of inquiry-based approaches to learning in a student-centered format. Throughout the implementation process, a variety of instruments were used to assess impacts of the curriculum change on our students. These assessments focused on self-efficacy, understanding of the scientific process, and learning gains. Assessments were administered to students at all levels so that long-term impacts of the new introductory curriculum could be identified. Our assessment results showed significant effects of the new curriculum on students from their first-year through senior-year of study. These long-term effects are particularly notable because no other curriculum changes, at the sophomore through senior level, occurred. The results indicate that just one semester of inquiry-based learning, occurring early in the major, can have positive impacts on students that persist throughout four years of undergraduate study. I will present an overview of the new curriculum and specific results of the different assessments. Discussion of the curriculum as a model for adaptation at other institutions and for other majors is welcome.

---

**CONCURRENT PAPER SESSIONS III**

**2:00-2:45 pm**

**Friday, October 15, 2004**

---

**The Science of Flight, Lynn Gillie, Todd Egan, and Mary Anne Perks, Elmira College**

Interdisciplinary courses in biology for non-science majors can help link the process of conducting science with experiences familiar to the students. The Science of Flight is an interdisciplinary course designed to use the recent 100th anniversary of powered flight by humans as a theme around which to study scientific principles. Class format was activity-based with labs or investigative activities taking up most of every class period. Vertebrate and invertebrate powered and gliding flight were examined along with dispersal of seeds and pollen, physics of flight and airfoils, and history of the development of flight in humans from kites to rockets. Field trips to three local museums dedicated to soaring, early flight pioneer Glenn Curtiss, and warplanes were part of the course. Other fieldtrips included birding at two different nature preserves. Activities were coordinated using ANGEL online course management system for announcements, emails, pickup and dropoff boxes, and links to relevant internet sites. The advantages and disadvantages of an activities-based approach will be shared and some sample exercises will be conducted.

---

**Round Table Discussion—Recruiting 1st and 2nd year Potential Majors—Strategies**

**Thomas A. Davis, Loras College**

This session will be an open discussion about ways we can communicate with and recruit underclassmen (currently enrolled students) as potential Biology majors. I have no magic answers and encourage participation to generate some ideas. Best 3 ideas get big prizes!!

---

**A Survival Guide for Students in the Anatomy and Physiology Course**  
**Neil Baird, Millikin University**

Today there is a wide diversity in the background knowledge, ability, and willingness to work that students bring to the Anatomy and Physiology course. Faculty cannot assume that all these students know how to approach a high-content course like this and be successful. Although some students may not be ready to listen to advice until a disastrous first exam, it is useful for them to have a survival guide in their hands on day one. This paper will review advice for A & P students covering such topics as notetaking skills, study strategies, peer study groups, use of flashcards, time management schedules, effective use of tutors, etc. A passive "looking over the notes" before an exam will not be adequate for most students. A more active drill and practice style of study is called for where the student is forced to interact with the material in recalling and thinking about terms and concepts prior to the exam. An increased quantity and quality of study time is essential for most students to be successful in the A & P course.
Amphipods as a model system for teaching ecology, evolution, and behavior.  
Susan E. Lewis, Carroll College

Amphipods are small freshwater and marine crustaceans. Several species are common throughout the United States. Amphipods are an important component of the food web in aquatic systems, and often comprise the largest percentage of the macroinvertebrate biomass in lakes or streams. For the past several years, my students in an introductory course in Ecology and Evolution have designed investigations of the pairing and reproductive behavior of Gammarus pseudolimnaeus, a common local amphipod, to gain experience with experimental design, data collection and analysis, and other aspects of the scientific method. Several of these students have gone on to independently design further investigations with amphipods for their senior capstone projects. This presentation will describe the logistics of working with amphipods, the types of investigations students have developed, and factors that make amphipods particularly useful as a model organism for biological investigations.

CONCURRENT WORKSHOP SESSIONS II
3:00-4:30 pm
Friday, October 15, 2004

Case It! Computer Simulations for the Analysis of Genetic and Infectious Disease—An Update, Mark Bergland and Karen Klyczek, University of Wisconsin, River Falls

Case It! is a National Science Foundation-sponsored project to promote collaborative case-based learning in biology education worldwide, via molecular biology computer simulations and Internet conferencing. We have developed software that will analyze any DNA or protein sequence using a variety of techniques (DNA gel electrophoresis, restriction enzyme digestion, Southern, Western and dot blotting, PCR, and ELISA). Cases have been constructed for a variety of disease conditions including HIV, breast cancer, Alzheimer's, cystic fibrosis, Huntington's disease, and DMD. Students use Case It! software to analyze DNA or protein sequences associated with genetic or infectious diseases of humans and domestic animals, then discuss results with their peers at other institutions via web-based "poster sessions." Case It! Investigator, an application used in conjunction with a web browser, helps students to gather background information on cases. Participants will use a new, integrated web editor/conferring system and will also use new protein-based simulations based on ELISA and Western blotting. A new version of Case It! Investigator that has video capability will also be used. Five years of class-testing of the DNA simulations have shown the pedagogical value of our approach. High school and university educators throughout the U.S. and in foreign countries have downloaded Case It software, which is free of charge for educational use (see http://www.uwrf.edu/caseit/caseit.html for details).

Using LabWrite: Helping Students Write Better Lab Reports, Michael Carter, Miriam Ferzli, and Eric Wiebe, North Carolina State University

Perhaps the area of biology education that has attracted the least attention in terms of teaching technologies is the laboratory report. Though students may work on virtual labs and record data and write and submit reports electronically, the typical instruction for writing lab reports still consists of one or two pages listing the parts of the report with brief descriptions of each part. This workshop will introduce participants to LabWrite, a free, online resource designed to help student learn science by writing better lab reports (http://labwrite.ncsu.edu). LabWrite enables students to take advantage of the learning potential in writing lab reports by guiding students through the entire lab experience. In a control-group study of students in biology labs, those using LabWrite demonstrated significantly greater understanding of the science of the labs and a greater ability to apply formal scientific reasoning to the labs than students receiving the typical instruction in writing lab reports.
The workshop consists of a brief introduction to LabWrite, a tour of the website, a hands-on activity using the site, an overview of LabWrite for Lab Instructors (an online “teacher’s manual”), and a discussion of how to use the website effectively in lab classes. By the end of the workshop, participants will have all the information they need to incorporate LabWrite in their lab classes. LabWrite is funded by the National Science Foundation.


Historically video cameras, like a VideoFlex are seen as ancillaries to microscopic presentations. We will demonstrate a number of possible classroom applications, on- and off- microscopes. We will have cameras, microscopes and computers available for participants to make their own movies, time-lapse movies, time-lapse pictures, or still pictures. Everyone will be able to take home their own on-microscope made movie and some suggested laboratories in which video cameras can be essential. Finally we will allow some time for creative brainstorming of other potential applications in both our lectures and laboratories.

CONCURRENT PAPER SESSIONS IV
9:00-9:45 am
Saturday, October 16, 2004

Teaching with Ultrastructure—Active Learning with Rotating Teams, Thomas A. Davis, Loras College

This is NOT a talk about cellular or tissue or plant morphology but about a different kind of ultrastructure. I use this term to describe the teaching method that I have used that employs student groups, active learning, question-based learning and a lab component to have the students develop more direct ownership of classroom information and the learning process. Its purpose is to get students to pick topics, generate questions, and invest their time into the learning process. Please come to spend 20 minutes hearing about my big ideas and the remaining 20 minutes discussing and critiquing this learning strategy.

Using Technology to Teach an Integrated Mathematics/Biology Course – Preliminary Report, George M. O’Connor and John G. Koelzer, Rockhurst University

Biology majors at Rockhurst University – especially those contemplating graduate school – are urged to take Calculus I and in this course they are exposed to mathematical modeling. Several models of interest to biologists are studied in the calculus course; for example, population growth models and S-I-R models for the spread of infectious diseases. The students and teachers use the computer algebra system Mathematica (in classroom activities, demonstrations, long-term projects and computer laboratory exercises) to help visualize and explore the models developed in class.

After finishing Calculus I, however, there is very little opportunity for biology students to further investigate the uses of mathematics in biology. In this talk, the presenters, one a biology teacher and the other a mathematics teacher, will describe an interdisciplinary honors mathematics/biology course to be taught in the spring semester of 2005. This course will present the students with a broad range of mathematical biology models and applications of these models to real world problems. The prerequisites for this course are relatively minimal – General Biology I and Calculus I – so Mathematica and other software tools will be used to augment the students’ biological and mathematical background and provide hands-on tools for exploring biological models.

The presenters will describe several of the topics to be covered in the course and will demonstrate how computer technology will be used to develop the underlying concepts.
Grantsmanship and NSF-Style Student Peer Review In Undergraduate Research Experience,
B. G. Blair, G. R. Cline, and William R. Bowen, Jacksonville State University

Although the ability to critically assess scientific research is an important aspect of becoming a scientist, there is little formal training for undergraduates. The JSU Biology Department has emphasized an undergraduate research experience for several years. Prior to conducting undergraduate research, all majors as sophomores take "Introduction to Research in Biology" which has 2-3 sections. Students develop an insight into scientific inquiry, literature searching and analysis, hypothesis development and produce a grant proposal with budget to conduct a research project. Previously, the instructor has evaluated the proposal. This year students submit their proposals to an NSF-style student peer panel whose members are students from another section. As peers, individually and as a panel, they also evaluate and rank proposals based on scientific content, writing style, format, budget, and overall proposal quality. Student participants become very cognizant of the need for cognitive, analytical and communicative skills and are much more critical of their own proposals. Their comments are very insightful, constructive and reasonable. Student peer review was so successful in this course that it is now been integrated into the Department’s capstone course, Senior Seminar. That is, biology majors now undergo peer review of their senior thesis and presentation, the latter in a symposium format.

Interdisciplinary Impact of Evolution, David P. Benson, Marian College

One hundred and fifty years after Darwin proposed a mechanism for evolution it has permeated all but the most blind corners of biology. That evolution and Darwin’s mechanism have affected the study of biology is not surprising. What is fascinating is how Darwin’s idea has impacted areas outside of biology. This was the premise for a course I taught with the help of many of my colleagues in the fall 2002. The class began with an introduction to the science of evolution to give students a good grounding in the biology behind the theory. The second half of the course involved colleagues form the College explaining how Darwin and evolution have impacted their disciplines. A psychologist explained the field of evolutionary psychology. An art historian and a British literature expert explained the impact of the publication of The Origin of Species on art and 19th century British literature as we read H. G. Well’s War of the Worlds. Evolutionary theory has been co-opted to explain national relations as elucidated by a political scientist. The course ended with a look at the creation/evolution debates beginning with the Scopes Monkey Trials by a historian, how the theory has affected theology by a theologian, and the societal implications of the Creation/Evolution debates by a sociologist. The students, all biology majors, were fascinated by the wide ranging applications of evolutionary theory to a diversity of human endeavors. Teaching evolution using this method resulted in the students developing a deep understanding of the theory and could be adapted by anyone teaching evolution at an institution with a reasonably engaged faculty.

Bioinformatics Instruction: Using Microarray Data Sets to Stimulate Student Learning, Hugh A. Miller III and Karl H. Joplin, East Tennessee State University

As an approach to teaching bioinformatic resources, we have made use of data from a Drosophila Microarray. Students learn to use databases and sequence analysis to identify genes. Each student is given 20-25 genes from the Microarray dataset. With over 14,000 data points, it is easy to provide each student with a unique set of data including gene identification variables, fluorescent intensity and background for two channels of cDNA hybridization. Students are shown how to use databases such as NCBI and Flybase to look up a possible identity for each gene. In many cases, the student finds that a gene has no immediate identity, thus the predicted amino acid sequence for each unidentified gene is used in a BLAST similarity search. This analysis frequently provides a possible name based on significant alignment within the BLAST results. For those genes that do not give significant similarity to a protein in the database, students are encouraged to examine their proteins for known domains. If all these approaches fail to provide an identity, the students (with much consternation) have to label their gene as unknown. We use this approach in two different classes with non-overlapping populations: Cell Biology Lab and Recombinant DNA Lab. At the end
of this project each student will prepare a PowerPoint presentation outlining their results. We will discuss the use of databases, BLAST analysis, and domain searching with real examples from student projects.

**PDAs in the Biology Classroom an Lab: The Future or Fad?  **Timothy Mulkey, Indiana State University

PDAs (Personal Digital Assistants) and other portable wireless devices are growing in popularity. These devices provide opportunities for a wide variety of teaching experiences in both the classroom and the laboratory. In the classroom, these devices provide for distribution of teaching materials, quizzing and testing of students, and real-time feedback concerning the effectiveness of the classroom experience. In the laboratory, these devices can be interfaced to a variety of probes for collection of data. Simple interface modules are available for most PDAs, which allow a variety of different probes to be attached. Probes are available for collection of temperature, pH, light, conductivity, humidity, oxygen, heart rate, heart flow, pressure, radiation, and a variety of other data. Discussion and demonstration of the myriad of potential uses of these devices will be presented.

### Housing Preview

**48th Annual ACUBE Fall Meeting**

**Technology in Biology Education**

Wabash College  
Crawfordsville, IN  
October 14-16, 2004

**Lodging:** Blocks of rooms have been reserved until September 14, 2004 at the Comfort Inn and Holiday Inn.  

**IMPORTANT:** Please note this is the same weekend as the Parke County Covered Bridge Festival which draws thousands of visitors on weekends. As you will note, weekend rates can be higher than weekday rates. Rooms are at a premium during this time.  **PLEASE BOOK YOUR ROOMS EARLY.**

<table>
<thead>
<tr>
<th>Comfort Inn</th>
<th>Holiday Inn</th>
</tr>
</thead>
</table>
| Phone: (765) 361-0665  
(800) 329-5150 | Phone: 765-362-8700  
*Book by: 8/17/04* |
| 10/14 $ 89.95+tax  
10/15 $ 89.95+tax | 10/14 $ 69.00+tax  
10/15 $122.95+tax |

<table>
<thead>
<tr>
<th>Super 8 Motel</th>
<th>Days Inn</th>
</tr>
</thead>
</table>
| Phone: (765) 361-8800  
(800) 800-8000 | Phone: (765) 362-0300  
(800) 329-7666 |
| 10/14 $ 60.00+tax  
10/15 $ 75.00+tax | 10/14 $ 65.00+tax  
10/15 $ 75.00+tax |

<table>
<thead>
<tr>
<th>Ramada Limited</th>
<th>General Lew Wallace Inn</th>
</tr>
</thead>
</table>
| Phone: (765) 364-9999  
(800) 272-6232 | Phone: (765) 362-8400 |
| 10/14 $ 63.00+tax  
10/15 $ 82.00+tax | 10/14 $ 56.00+tax  
10/15 $ 75.00+tax |

<table>
<thead>
<tr>
<th>Trippet Hall (on campus)</th>
<th>Phone: (765) 361-6490</th>
</tr>
</thead>
</table>
| 10/14 $ 87.00+tax  
10/15 $ 87.00+tax |