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Cover Illustration: Curvature of Maize Roots by Calcium Application. Application of 1 mm$^3$ agar blocks contain 5 mM calcium chloride to the tip of a root induces curvature toward the calcium source. Repeated application of the calcium source to different areas of the root tip results in intricate curvature patterns. Details of the use of this procedure for use in a teaching laboratory can be found in Bioscience Volume 17(1):3-7, March 1991.

Photo provided by T. J. Mulkey and S. Y. Kim, Indiana State University
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- Philosophy of Biology
- History of Biology

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Reassessing Van Helmont, Reassessing History

Douglas Allchin

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History is not a stranger to the biology classroom: many if not most textbooks present evolution through a history of Darwin's voyage on the Beagle and his visit to the Galapagos; we rarely separate a discussion of inheritance from Mendel and his pea plants, or present the structure of DNA without some anecdote from James Watson's The Double Helix. History serves as an occasion to organize the serial development of concepts, to reconstruct reasoning, to celebrate scientific discovery, and to bring humor into a lecture; in each case, episodes from the past can extraordinarily enrich our teaching. Yet teachers can also abuse history just as researchers can abuse data: by asking it to speak for a specific theory or perspective it does not "represent." Here, then, I would like to highlight some potential dangers to avoid in applying history in teaching biology.

In particular, I would like to give an award for the "Most Outlandish Use of History in Biology Education." And I would like to nominate a textbook, Biology (by Nason and Goldstein 1965), that included the following two accounts of work by Jean Baptiste van Helmont, a Dutch physician from the early 16th century.

The pair of examples is even more striking, however, because they grossly misrepresent van Helmont, the conclusions he drew, and what we might want to convey about the nature of science historically.

In the first example, the authors describe an "experiment" devised by van Helmont to demonstrate the spontaneous generation of mice. The procedure was to throw some grains of barley or wheat in an old rumpled shirt in a damp cellar: one should return several weeks later to find that the cereal grains have been transformed into baby mice. The lesson, of course, is clear, even to the unsophisticated science student: van Helmont is one of those ignorant, short-sighted scientists of history who failed to understand the "obvious" origins of living matter and the virtues of a controlled experiment. We know better now. Science progresses.

In the second example, we learn about van Helmont's now renowned "willow tree" experiment, sometimes hailed as the origin of experimental plant physiology. As many well know, van Helmont weighed a willow sapling along with a 200-lb. potful of soil, planted the tree, and 5 years later weighed the two again: the tree had grown a substantial 164 pounds, while virtually all the soil remained. Students are to see how elegantly van Helmont had shown how the matter of the tree had not come from the soil, but instead from a gas, a term which van Helmont himself had coined. Here, van Helmont is not the fool, but the hero. And from his example, we can draw the deeper lesson: construct a test, quantify, measure—and be prepared in some cases to be very patient for the data.

Contemporary students are sometimes even guided to repeat this lesson for themselves, albeit on a smaller scale, using radish plants whose weight change can be observed in weeks rather than years. Follow the correct procedure and the right answer will inevitably follow.

The example is outlandish, of course, because van Helmont is praised and ridiculed as a scientist in the same text: he is portrayed as both hero and fool (see also Gould 1974). Now, one might take this as a lesson about the nature of science—that scientists are textured individuals, rarely having all the right answers: even Darwin, we know, made gross errors with inheritance, and his explanation that the "parallel roads of Glen Roy" represented receding coastlines was ultimate-
ly ill-founded. But the message about the richly complex human dimension of science was clearly not the intent. Rather, the context was a more simplistic, moralistic one: the right answers of today come from the right methods, the wrong answers from the wrong methods. Scientific method is algorithmic and thereby triumphs with the truth.

The pair of examples is even more striking, however, because they grossly misrepresent van Helmont, the conclusions he drew, and what we might want to convey about the nature of science historically. In the willow tree case, for example, van Helmont concluded that the bulk of the mass of the tree had come—not from carbon dioxide, a substance wholly outside his conception—but from from the water that had been added to the pot. Van Helmont had a rather elaborate world view which included the notion that there was only one primal element—water—from which all other forms of matter were derived. In this, he challenged the existing Aristotelian doctrines that there were four elements: water, earth, fire and air; and an alternative view that the basic elements were “principles” of salt, mercury and sulfur. The tree experiment was essentially designed to show, then, that the belief that the tree was earth mixed with some fire, say (according to the antecedent system of thought), was misconceived. Van Helmont provided an alternative explanation more consistent with observations: namely, our “common sense” notion (formalized through experiment) that plants need water to grow. In its intended role, the experiment was dramatically successful—especially in provoking others to think about the problem and in some cases to repeat the experiment.

In a recent critique of how we use the van Helmont experiment in the classroom, Hershey (1991) also challenges the easy historical interpretations of van Helmont’s achievement. Yet at the same time, he views the experiment almost exclusively retrospectively, and in terms of what students can learn about experimental design, execution and analysis based on what we know today. He claims, for instance, that students can understand how van Helmont performed the “wrong” experiment. To assess his hypothesis about the role of water, he should have grown the willow hydroponically—that is, by water alone. And he should have used distilled water, so as to exclude the role of minerals in the water. If he had done this, Hershey notes, van Helmont would have observed that, to paraphrase a more familiar notion, “wil-lows do not live by water alone.” Here, the motivation is to go back and “correct” the history and make it come out “right.” The effort is to restore truth following the rule, “right method, right answer.”

But Hershey does not fully respect the context of Helmont’s work. Concerns about distilled water in the context of an experiment done centuries before anyone understood the concept seem slightly misplaced. More deeply, van Helmont was probably well aware that plants do not grow outside soil. He even buried the pot in the earth, as if the location was a significant parameter not to disturb. That is, in our framework, he included it among the “controlled” conditions. There was certainly no existing evidence to suggest that the substrate of the soil was not relevant in some respect. Indeed, the lack of substantial soil loss even though the soil was present, was integral to showing that it was not the decisive factor in the weight gain of the tree. One may instead interpret van Helmont as rather clever in devising a technique for isolating the relevant soil system within the boundaries of a pot.

Hershey also notes that van Helmont failed to replicate his findings. Again, one may ask whether one ought to assess the original experiment by importing standards of experimental design developed only later. More significantly, Hershey neglects the role of demonstration as an effective form of experiment, one that gives initial warrant to a particular hypothesis before one applies
additional resources, time, etc., to explore it in more detail. Not all experiments follow the model of the controlled experiment. In the view which Hershey merely epitomizes, one assesses Van Helmont's experiment or other historical scientific work for its flaws. In a more sensitive historical view, however, van Helmont's work exemplifies an experiment designed and interpreted appropriately in context, yielding a clear result, but which nonetheless was later construed as "wrong." One need not always get the "right" answer to see an experiment as valuable or appropriately assembled. How much more would a student learn about the nature of reliability and fallibility in science by seeing how we can construct "wrong" answers using the "right" methods?

In the same way, we must view the "experiment" on the mice in its historical context. In a more sympathetic, contextualized interpretation, it is difficult to conclude that van Helmont would interpret this case as an example of what we would call (and ridicule) today as "spontaneous generation." Nor would such an idea of transforming matter have been that ill-conceived in van Helmont's late Renaissance setting. Van Helmont was fascinated by the problem of transformation. He wanted to understand and explain digestion—the magical transformation of food into flesh. Like others at the time, he saw it as similar to the fermentation of grapes on the vine and off, akin to the transformation of bread rising with yeast. Van Helmont conceived form as generated not from chaos—that would be absurd—but from a form-giving element—what he called at times a ferment, a seed, a leaven, an archenius or miniature workman embodied in matter and which could be recaptured in the gas given off when things burn. Disease, in van Helmont's view was similarly due to external causative or form-changing agents that occupied specific organs in the body—what we may recognize as a rudimentary correlate of the germ theory of disease. As a physician, then, Helmont sought to remove the cause of the illness, not merely treat its symptoms; remedies were thus to be disease-specific: a revolutionary idea for the time. For van Helmont then, the transformation of wheat or barley into a mouse was not literal but it was very real nonetheless: today, we would interpret his concerns in terms of metabolism and enzymes. Once again, an idea that seems patently "wrong" on the surface, gains a substantially different meaning in its proper historical context. And an effort to draw a lesson merely from our current scientific understanding seems misguided.

In an effort to reveal the process of science, this text I have nominated as "Most Outlandish" actually obscures an honest or genuine view of that process. The intent is admirable—and surely we can benefit from more excursions into history while teaching biology. But one can be misled by the impulse to judge and "fix" the past ("scientifically"), rather than to listen to it (historically). To the extent that we borrow from history to teach about the nature of science as a process and as a social and human endeavor, to give a broader sense of institutions, instruments and ideologies, as well as ideas, we must be sensitive to the history, else we risk betraying the very subject we hope to portray.

Literature Cited


See Page 30 in this issue for reviewers' comments in response to this article.
Alternate Teaching Methods in Vertebrate Physiology Lab:
Time to STOP and Learn It Again For the First Time

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Introduction

Most of us who teach biology labs and, especially, upper level physiology labs know that the semester can turn into a rat race. Just thinking of all the neat experiments we can do to illustrate skeletal muscle contraction or nerve impulse conduction or heart function presents the problem of which ones to chose. However, the semester is never long enough to do all the exciting, hands-on, awe-inspiring physiological experiments and write and grade all the detailed lab reports so that all the fabulous concepts presented in lecture can be illustrated in lab and etched permanently in the student’s minds. Afterall, the purpose of the lab component of any course is to illustrate the concepts presented in lecture and to involve the students in the scientific method directly.

Being a relatively new “doc on the block” and having taught several semesters where each week the students had a new lab experiment to perform and a companion lab report due for that lab the following week, I began to sense that a vital part of the learning process was missing. The lab reports were satisfactory in telling me how each student interpreted the results, but I was not able to involve as much critical thinking, problem solving, basic data and statistical interpretation or discussion of current issues in physiology that I thought were necessary components of a majors’ physiology course. The purpose of this paper is to present a discussion lab period as a break in the action and as a valuable time for dialogue, review and experimental analysis.

In an effort to integrate knowledge that biology students have learned in my courses and in other courses, I added 4 discussion periods to my majors physiology course in place of several labs that I and past students thought were expendable. These 2 hour discussion sessions provide opportunities to do several things that I was unable to do previously in this course. I usually use each one of the following examples at least once in these discussion sessions each semester.

Review of Lecture and Lab Concepts

First, these sessions allow both the instructor and students to stop and take a breath, to look back on what has been covered, to look ahead to see what is coming and to discuss the implications and significance of each topic. Second, it allows me to question each student in an informal setting about their interpretation of data or concepts. This time lets me gauge whether all these marvelous, intricate experiments were illustrating the concepts that I thought they were. I ask the students directly what they thought of the procedure and to suggest improvements for future labs. Without exception, I get feedback about the beneficial and problematic aspects of each lab. Many of these I have used successfully in subsequent labs. We discuss the main concepts and trends that the experiment revealed and, often we try to explain logically some unusual data or “points that don’t fit on the curve, Dr. Davis”. We also talk about similar data presented in published reports and why our
data may be the same or different. These exercises foster critical thinking, data interpretation and personalized communication not only between the instructor and the student but among students. It not only provides me with useful feedback from students, but also lets students hear how other students understand a concept or an experimental result rather than the almighty instructor’s “words written in stone”.

Another outcome of these discussions is the opportunity for students to put this information into other, more applied or personal situations. For example, if this frog muscle contracted with this rate and showed this much fatigue, how will my leg muscle respond at track practice or what internal physiological and external environmental conditions are present in my leg that may produce different results? How does an injured muscle respond to similar stimulation?

**Suddenly, the purpose of the whole exercise becomes obvious - just what the doctor ordered!**

**Critical Analysis of a Published Article**

Another exercise that I have used successfully in these discussion sections is the critical analysis of a published article. I try to choose articles that involve a specific concept that was mentioned in lecture or in lab previously. Sometimes I give the article to the students several days in advance or sometimes they get a paper to analyze without prior exposure to its contents. Since lab reports follow a similar structure, we first look at the overall format of the paper. What is included in the introduction? How does the author get the reader interested in the topic and encourage the reader to continue? Is the purpose or hypothesis stated clearly? Are the hypotheses really tested? Are the figures and tables presented clearly? What do you see as unclear or confusing? How could it be adjusted or presented better? What are the author’s conclusions? Do you agree with them? Does the article present new and useful information? Was the money spent in doing the research used successfully in your opinion? An example of an article that I have used is one on autoregulation in the kidney and the effects of dietary protein (Murray and Brown, 1990). I also use reprints of my own publications in this exercise. It seems to bring the whole experimental and writing process closer to home. Does Dr. Davis indeed practice what he preaches?

**Design An Experiment**

We get a chance in these discussion groups to go another step further. I ask the students to design experiments that will test some lecture concept or add to results that were obtained in a previous lab. I think it is useful also to present some hypothetical circumstances and design an experiment around them. One of my favorite examples is the Weekend Protein (WP) experiment. First, we reveal what we know about WP. It appears in the blood on Friday afternoon. It definitely influences many bodily functions while it is present and yet it is definitely gone by Monday morning. How do we measure it? Where is it made? What is its stimulus for production? What happens on Sunday? What do we investigate first? What is the simplest experiment to do first? What is a well-designed experiment? What hypothesis is being tested? This always generates much student enthusiasm and gets them to use their imaginations a bit also.

Another example that I have used is further investigation of kidney function. I propose that a small steroid molecule has been isolated that delays or reduces muscle fatigue by 25%! (All the weightlifters and athletes in class prick up their ears.) However, the molecule is cleared by the kidney in one pass very quickly. What can we do to try to get it to stay in the body longer from what we know about kidney function? What are some in vitro tests we could do to help us further understand its potency or its specific tissue effects? I have small groups work on these experimental proposals and then in the large group they present their experiments and their justifications for choosing their approach. Roaring, somewhat-combative verbal exchanges have resulted several times in the large group session as several sets of students argue for the benefits of their approach. Suddenly, the instructor realizes that critical thinking, the scientific method,
physiological concepts and experimental designs are flying around the room simultaneously. Suddenly, the purpose of the whole exercise becomes obvious - just what the doctor ordered! These types of exchanges do not occur every time but they do occur quite frequently and they make the effort of teaching quite rewarding.

Discussion of Controversial Current Issues
Another exercise that has been very successful is discussion of current controversial topics in physiology, medicine or public health that I have mentioned or that students have interest in. Again, as we rush through the semester to cover as much physiology as possible, we may briefly mention fetal tissue research or the use of anabolic steroids in athletics or spinal cord injury research (see Table 1 for a list of other topics) but we usually do not get a chance to ask the quietest member of the class how he or she feels about the problem. It is in these sessions that I get a much clearer picture of which students are thinking, what they are thinking about, how they are thinking and what some of the more reserved students’ opinions are in an informal setting. In these sessions not only do students get a chance to express their opinions, they get feedback from other students which shapes their final overall knowledge of the topic at hand. Also, if they have not yet formed an opinion, they can listen to others, mold their opinion and eventually argue for it. Most of the students in my classes participate actively in these discussions. Topics start out physiologically oriented, but many times branch into moral and religious decision-making discussions. I usually let these tangents develop for a while, but try to summarize what has been said and refocus the discussion. I feel that discussions of moral and religious implications of these topics are valuable because here the students have the opportunity to express themselves in a group that has a common background of biology and general education. As biology majors, exposure to these controversial topics is essential. They will be faced with many similar situations and questions in their own lives. Through this experience they may be able to make a sound, logical decision or educate someone else about a specific topic.

My role as the discussion moderator is very important and must be emphasized here. I feel the moderator should be a neutral party, who, despite having his own opinions, controls the breadth of the discussion without forcing his/her opinion upon the students. All sides of the topic can be addressed this way and the students are free to accept the side that they agree with. Many times during these discussions many new questions are asked and I purposely encourage the students to answer them themselves by further investigation if they so desire.

<table>
<thead>
<tr>
<th>Table 1. Controversial Topics For Discussion</th>
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<tr>
<td>Use of Animals in Research</td>
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<td>Spinal Cord Injury Research</td>
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<td>Fetal Tissue Transplant Research</td>
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<td>Use of Anabolic Steroids</td>
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<td>Abortion - New Methods/New Problems</td>
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<tr>
<td>Birth Control - What Event Signifies the Beginning of Human Life?</td>
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<tr>
<td>Euthanasia - What Event Signifies the End of Human Life?</td>
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<tr>
<td>Use of Cell Culture as Experimental Alternative</td>
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</tbody>
</table>
Figure 1. An Outline of Questions to be Raised during Discussion of Euthanasia

Initial Question to Students: What are two distinguishing, physically measurable events that signify the end of human life?

Discussion of the following responses to initial question:
-no brain waves but a pumping heart from life support machine?
-length of time heart pumps or breathing continues or brain waves are measurable after life support machine is disconnected?
-irreversibly unconscious but brainstem still stimulating breathing rhythm?
-functioning brainstem?
-beating heart?
-breathing?
-warm skin?
-ability to feel - anything?
-ability to move eyeballs?
-presence of basic reactive reflexes?
-measurable pulse?
-every last brain cell “dead”?
-some areas of the brain more important or vital than others?
(from Rosenthal, 1992)

Case Histories in Human Physiology
I also use examples of human case histories that give an added dimension to learning about physiological processes. After I have spent some time in lecture and lab presenting and discussing normal physiological function, both the students and the instructor have found it beneficial to examine abnormal physiological circumstances. A good series of human case histories is presented by Van Wynsberghe and Cooley (1990). These are arranged by organ system and are followed by a set of questions about the patient’s condition. An answer key is also available from the publisher. The students get acquainted with medical terminology, units of measurement and different methods of detecting abnormal physiological function. Some of the students that are medically oriented enjoy “playing doctor,” but others have mentioned that this exercise is beyond the scope of the course. I remind them that they may be on the receiving end of this information some day and a little time spent here trying to understand the situation may aid in their future decisions.

Possible Drawbacks and Disadvantages
I have conducted these 2 hour discussion sessions very successfully with a maximum of 20 students and a minimum of eight students per session. I would predict that the effectiveness of these sessions will decline as the number of students increases beyond 20 or drops below 5. If you think lecture is taxing or organizing the equipment and procedures for the weekly lab is a major aerobic exercise, preparing for and conducting these discussion sessions is equally energy consuming. One difference between lecture and lab is the element of the unpredictable or unknown that is always present in these discussions. In lecture or lab the instructor has a planned set of notes or procedural steps that are covered and a relatively narrow path is followed. In these discussions, each group of students respond differently and the path of discussions or questions will go in opposite directions. The instructor must simply go with the flow, be flexible and try to focus the discussions as is necessary. This unpredictability may be a problem for some instructors. I have found it to be a stimulating and fun experience.
Conclusions
The introduction of discussion lab sessions into my majors physiology course has been beneficial for the instructor as well as for the students. The most important aspect of these periods is the increased level of bidirectional communication between students and instructor. I usually use questioning and short written quizzes in lecture. Now I can get much more thorough information on each student and how they are doing in the course in general. As a result, this information permits me to evaluate student performance much more accurately. These sessions establish a breathing period for students and professor. Through these sessions a much more complete, interactive learning process for the students and instructor can occur.

Literature Cited


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*Populus*, an NSF-sponsored package of teaching software for courses in ecology and evolution, is available by anonymous FTP on the Minnesota ecology server, ecology.ecology.umn.edu (134.84.102.1), in the directory /pub/populus. The package runs under DOS on Intel-compatible computers and contains 50 simulation models central to a contemporary understanding of ecology and evolution. Each model includes a narrative introduction, context-sensitive help, an input screen that allows students to manipulate the values of model parameters, and graphical outputs. The software can be duplicated without charge for students and colleagues. Users who lack the internet access required to obtain a free copy by FTP can acquire the program on disk for $10, payable to the University of Minnesota, from:

**Don Alstad, Ecology, Evolution & Behavior,**
University of Minnesota
1987 Upper Buford Circle
St. Paul, MN 55108

"Any instructor who feels that demonstration programs have a place in instruction should acquire this essentially free package. The level of programming is outstanding and the coverage broad. Several curricula could be designed around it, or it could be used as an adjunct to established courses. The presentation for the most part parallels the 'standard' textbook approaches and notations. *Populus* is so friendly and nonterrorizing that it should be quite appealing to students."

"If you are interested in teaching ecology and/or evolution at any level, *Populus* is indispensable!" Aaron M. Ellison, Bulletin of the Ecological Society of America 72:186-89.

"This program is directed at senior undergraduate and graduate students. However, inspired and highly motivated novices might also be seduced by *Populus*’ magnificent graphics and simplicity of use, and in so doing gain great appreciation of a few of the fundamental processes in biology."
Hey, Fred. Someone asked: Why are there not a lot more young faculty joining and attending AMCBT? You have been at Big U for a couple of years, a fish person, right? So, what do you think about that question?

I don't know, Sue. Some think that with the big emphasis lately on teaching *per se* and the focus of AMCBT on teaching excellence, that there would be a big increase in numbers, especially of young faculty. I'm not sure about that, though. You are at Little Liberal, Sue, and perhaps professional rewards, like tenure, promotion, salaries and peer recognition are more closely tied to teaching *per se*.

Perhaps, Fred, but I'm not sure what teaching *per se* means, anyway. What if you asked young colleagues like yourself what they want most to list on their annual activity reports? If meetings were important, would they list attendance at AMCBT or prefer to list attendance at the 100th annual meeting of the Great Lakes International Bass Society? That they presented a teaching method talk at the AMCBT or a field research paper at GLIBS? Or, could they just list, uh, teaching *per se*? At Little Liberal, AMCBT might be fine, paper or no, but I'm not sure about, uh, teaching *per se*.

Yeah, right, Sue. You're saying that at Little Lib, they get evaluated for teaching, right? Then, why list anything at all? At your place, you teach kids to think so they can be versatile, appreciate life, and generally cope, right? So, how do the administrators get a handle on that? You know, so you got Joe to think this semester. Do you list his name in your annual activity report? Does he submit an evidence letter for your portfolio? I mean, how do you personalize this thing? Do you track Joe after he graduates to see if he makes a lot of money and if he goes to operas and takes time to smell roses and then ask for that letter from him? Another thing, how do you know it wasn't the philosophy prof that turned him on and the kid actually thought you were a fluff? You probably put him down for making him think, and he gave you a big terrible on teaching style on your annual student evaluation.

But, you trust your administrators to judge your performance, Fred.

Give me a break. I mean, get real, Sue. What hard evidence do these Juniors actually include on their annual activity reports, anyway? I'll bet you'll find any meeting they attended listed, including the one with
the parents of their favorite senior; they'll indicate whether they presented a paper or talk, solo or as coauthor, even if a friend put their name on there undeservedly. I bet they'll even put down whether they chaired some session at the meeting or would be eager to chair a session for that purpose. Now, if they are evaluated on their teaching, then why list these things at all? It's immaterial, isn't it? I know some faculty that are real paranoid about these things, so it must somehow be important to someone.

Listing things like that is evidence of professional development and even service, Fred. These things are important, too. But, your point is that you have to show some kind of tangible product, right? Straight forward teaching only won't do the trick?

We're not talking about professional development. We're talking about a connection between teaching and the reward system. Let's look at it professionally, Sue. More than one function is involved. Take a professional, like a lawyer. You ask him to make up a will. He does so and you pay him for what you expect to be a good product. Now, if he had a law school assistant working for him, would you be paying him for training that assistant? Does the lawyer not have a primary obligation to his profession such that the better he is professionally at lawyering, the better he will be at apprenticing? So, can a faculty build professional credibility with teaching-only activities?

Well, maybe that lawyer can't teach his way out of a paper bag. Then what? Suffer the students, right?

I hear you, Sue. We've got 'em at Big U and undoubtedly you do, too. I guess we'll have to define what a university is, what a college is, what these places are all about and so on like that. Then, define our roles or professional obligations accordingly and let the administration connect us to the reward system defined upon our defined roles.

I'm real impressed with your originality, Fred. But, I'm not convinced that faculty will ever do this, especially the part where faculty would let the administrators connect them with anything. Are you looking over a list of meetings there, Fred?

Yeah, Sue. Because of budget cuts, I get to pick out one meeting to go to in 1993.

So, are you going to AMCBT?

Get serious, Sue. I'm going to the GLIBS meeting and presenting a paper on my field research on the Little Stinker Fish. I have to keep my priorities straight, you know. Next year I'm up for the tenure vote.
COMMUNICATIONS AND TECHNOLOGY IN BIOLOGY

AMCBT 1993 ANNUAL MEETING TENTATIVE SCHEDULE
MILLIKIN UNIVERSITY
OCTOBER 28-30, 1993

THURSDAY, OCTOBER 28
6:00-8:00 p.m.  REGISTRATION RECEPTION  LOCATION
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8:00 p.m.  OPENING SESSION  ALBERT TAYLOR HALL
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Speaker: Tom Turpin

9:30 p.m.  EXECUTIVE COMMITTEE MEETING  STALEY LIBRARY

FRIDAY, OCTOBER 29
7:00 a.m.  REGISTRATION

7:00-8:10 a.m.  BUFFET BREAKFAST  RICHARD TREATS
(price included in registration)
UNIVERSITY CENTER
Interest Groups by Discipline

8:10-8:55 a.m.  CONCURRENT SESSION I  STALEY LIBRARY
1. TEACHING INFECTIOUS DISEASE BY THE CASE METHOD
   Cathy Hunt and Mary Ann Mc Murray, Henderson Community College, Henderson  KY
2. DEVELOPING AND IMPLEMENTING AN INSERVICE PROGRAM IN
   BIOTECHNOLOGY FOR SECONDARY SCIENCE TEACHERS
   Karen Klyczek, Biology Department, University of Wisconsin, River Falls  WI
3. ORGANIZING A TROPICAL ECOLOGY COURSE
   David J. Hicks, Biology Department, Manchester College, N. Manchester  IN
4. HOW TO WIN AT SCIENCE FAIRS
   Rudolph Prins, Department of Biology, Western Kentucky University, Bowling Green  KY

9:05-9:50 a.m.  CONCURRENT SESSION II
1. REGIONAL SCIENCE FAIRS
   Ray Reed, Department of Biology, Jefferson Community College, Louisville  KY
2. MOUNTAIN ECOLOGY: A NEW FIELD COURSE AT LORAS
   Tom Davis, Department of Biology, Loras College, Dubuque IA
3. INTERACTIONS OF ACTIVATED MACROPHAGES WITH
   MALIGNANT TUMOR CELLS
   David Thomasson, Biological and Physical Sciences, Fontbonne College, St. Louis MO
4. TO BE ANNOUNCED

9:50-10:40 a.m. COFFEE, EXHIBITORS INDEPENDENT STUDY
INFOSHARE: POSTERS, SOFTWARE, VIDEO

1. PROBLEM SOLVING SETS AND CLINICAL CASE STUDIES: A NONTRADITION
AL EXPERIENCE TO THE UNDERGRADUATE BIOCHEMISTRY
   Kaleta, Rose Thomasino, Vought, Walker and Wilson, Biological and Chemistry Section,
   Purdue University North Central, Westville IN

2. USING "ON-HAND" TRANSDUCERS WITH THE MACSCOPE ANALOG-TO-
   DIGITAL MICROCOM-PUTER INTERFACE FOR PHYSIOLOGICAL EXERCISES
   Steven H. Mills, Department of Biology, Central Missouri State University, Warrensburg, MO

10:45-11:45 a.m. KEYNOTE ADDRESS ALBERT TAYLOR HALL
   Title: BIOLOGICAL VISUALIZATION in SCHILLING HALL
   Speaker: Robert V. Blystone, Trinity University, San Antonio TX

12:00-1:30 p.m. OPEN LUNCH, EXHIBITS, INFOSHARE

1:30-5:00 p.m. FIELD TRIPS
   1. Illinois Power Field Station
   2. ADM Hydroponics and MariMann Herbs
   3. Sports Medicine Clinic of Macon County
   4. Rock Springs Environmental Center

1:30-4:00 p.m. WORKSHOP SESSIONS
   1. FAST PLANTS FOR SLOW BIOLOGISTS
      Tim Mulkey, Indiana State University, Terre Haute IN

   2. USING HUMAN TO TEACH HUMAN PHYSIOLOGY
      Pat Bowne, Alverno College, Milwaukee WI

   3. SO YOU WANT TO USE MULTIMEDIA? HANDS ON WORKSHOP
      Claire A. Rinehart, Western Kentucky University, Bowling Green KY

   4. DIGITAL VIDEO MICROSCOPY
      Robert V. Blystone, Trinity University, San Antonio TX

6:00-7:00 p.m. SOCIAL HOUR RICHARD TREATS UNIVERSITY CENTER

7:00 p.m. BANQUET (price included in registration)
8:30 p.m. BANQUET SPEAKER
   Title: FUTURE OF SIMULATIONS
   Speaker: Dennis Defensor, President and CEO ICOM Simulations Wheeling, IL
SATURDAY, OCTOBER 30
7:30-8:30 a.m. BALLOTTING FROM 7:30-9:45 STALEY LIBRARY
CONTINENTAL BREAKFAST
Interest Groups by Discipline

8:30-9:15 a.m. CONCURRENT SESSION III
1. REPORT ON CELS III: COALITION FOR EDUCATION
   IN THE LIFE SCIENCES
   Leona Truchan, Alverno College, Milwaukee, WI and John Jungck, Beloit College, Beloit, WI
2. COMPARING THE SCOPES TRIAL OF 1925 WITH THE LITTLE
   ROCK “BALANCED TREATMENT” TRIAL OF 1981
   Neil M. Baird, Department of Biology, Millikin University, Decatur IL
3. HYPERMEDIA IN BIOLOGY EDUCATION
   Mark Bergland, Department of Biology, Univ. of Wisconsin-River Falls, River Falls WI
4. THE TEACHING OF READING AND STUDYING BIOLOGY TEXTBOOKS
   Rodney Foth, Department of Biology, University of Dubuque, Dubuque, IA

9:15-9:45 a.m. COFFEE
BALLOTTING CLOSED

9:45-10:45 a.m. CONCURRENT SESSION IV
1. “PASS THE VIDEOCAM, PLEASE”
   Ethel Stanley, Millikin University, Decatur, IL
2. METHODS OF DEVELOPING STUDENT AWARENESS OF ETHICS AND THEIR ROLE IN DECISION MAKING IN BIOLOGY
   Terry L. Detting, Department of Biology, Murray State University, Murray, KY
3. SCIENCE AS A WAY OF KNOWING: AN INTERDISCIPLINARY COURSE
   Eugene Braun, Department of Biology, Univ. of Wisconsin-Waukesha, Waukesha, WI
4. TO BE ANNOUNCED

11:00-12:30 p.m. BRUNCH (price included in registration fee) RCTU
BUSINESS MEETING

Reports:
Presidential Address: Sister Marion Johnson, St. Xavier College, Chicago IL
Election Results: Malcolm Levin, Sangamon State University, Springfield IL
BIOSCIENCE: John R. Jungck, Beloit College, Beloit WI
Susan Speece, Anderson University, Anderson IN
Executive Secretary Report: Ed Kos, Rockhurst College, Kansas City MO

12:35-1:15 pm EXECUTIVE COMMITTEE MEETING STALEY LIBRARY 21

1:30-4:30 pm BioQUEST WORKSHOP SCOVILL
(see next page for more information)
BioQUEST Workshop

Tools for learning science ...
... as a way of knowing.

BioQUEST Library

Interested in gaining hands-on experience with BioQUEST software? Sign-up for the four part workshop to be offered at the AMCBT meeting at Millikin University in Decatur, Illinois October 28-30, 1993. Previous experience with BioQUEST software or Macintosh computers is not necessary. BioQUEST simulations and the problem-solving approach can be a powerful tool in helping students think like scientists. You will have the opportunity to pose and solve research problems as you might have your students do when using the BioQUEST simulations. The sessions will include a discussion of the role of problem posing, problem solving and persuasion of peers with explicit concern for how student learning in biology can become more meaningful when student thinking parallels the processes of science. The workshops will enable you to gain experience with some of the BioQUEST simulations from within The BioQUEST Library as well as some new modules that are being nominated for inclusion on the next CD. The BioQUEST workshops will be held on Saturday, October 30th, directly after the formal meeting of the AMCBT meeting at Millikin University in Decatur, Illinois.


Patti Soderberg, Director, BioQUEST, Beloit College and the University of Wisconsin–Madison
John R. Jungck, Editor, The BioQUEST Library, Beloit College

2:00 - 3:00PM Six simultaneous mini-workshops (Please choose one for the full period and then switch groups at the break):

1) Patti Soderberg, Beloit College and the University of Wisconsin–Madison

Workshop One will feature the Genetics Construction Kit, a module on Mendelian Genetics. For anyone who has never tried a BioQUEST module, this session is highly recommended.

2) John R. Jungck, Beloit College

Workshop Two will feature the Microbial Genetics Construction Kit, a module on replica plating, serial dilution, auxanography, complementation, and conjugation.

3) Marc Roy, Beloit College and Richard S. Manalis, IUPUI (Indiana University - Purdue University - Fort Wayne)

Workshop Three will explore ways in which computerized data acquisition systems can be used to encourage problem posing and problem solving by students in biology laboratories. The features of two data acquisition systems, MacScope and MacLab will be demonstrated. When used in conjunction with classical experiments and open-ended, student driven experiments, students rapidly progress to the point where they are doing science rather than simply completing mundane exercises with predictable results.

4) Ray Russo, IUPUI (Indiana University - Purdue University - Indianapolis)

Workshop Four will feature A Trip to a Rocky Tidal Shore. This module is centered on a field trip investigatory experience at a northwestern U.S. marine biology field station. While this module has not been submitted to the BioQUEST Library, Ray has submitted an earlier software package, A Trip to a Forest which is currently being considered for field testing.

5) Ethel Stanley, Millikin University and Benjamin Jones, Beloit College

Workshop Five will feature Biota as it might
be used in a botanist's classroom. Biota is a simulation based module that is useful to explore population dynamics.

(6) Terry Derting, Murray State University

Workshop Six will feature several BioQUEST modules on physiology such as the Isolated Heart Lab, Cardiovascular Construction Kit, and Axon. Terry will focus on one of these as an introduction and then will have participants explore one of these simulations.

3:00 - 4:00PM Six simultaneous mini-workshops:

(7) Patti Soderberg, Beloit College and the University of Wisconsin - Madison and Ben Jones, Beloit College

Workshop Seven will feature the Pedigree Construction Kit, a forthcoming BioQUEST module which has been designed to be conducive to exploring issues in genetic counseling.

(8) John R. Jungck, Beloit College

Workshop Eight will feature SequenceIt!, a module on sequencing proteins.

(9) Marc Roy, Beloit College and Richard S. Manalis, IUPUIFW

REPEAT OF Workshop Three will feature a new module on Real-Time Data Acquisition, employing MacScope and MacLab for physiological experiments.

(10) Ray Russo, IUPUI

REPEAT OF Workshop Four will feature A Trip to a Rocky Tidal Shore. This module is centered on a field trip investigatory experience at a northwestern U.S. marine biology field station.

(11) Ethel Stanley, Millikin University

Workshop Eleven will feature Environmental Decision Making as might be used in ecologist classrooms. Environmental Decision Making is a simulation based module that has four ecosystems: pond life with fishing, forest with logging, grasslands, and "pickle jars."

(12) Terry Derting, Murray State University

Workshop twelve will focus on Terry’s plans to develop a module on field labs and how they can be made into more open-ended investigations.

4:00 - 4:30PM General session on impact of the use of these BioQUEST materials on biology teaching and curriculum.

You may register for the workshops when you complete your AMCBT registration forms.

The BioQUEST Library is a compendium of computer-based tools, simulations, and texts to support research-like investigations in your biology classroom. These resources, authored by more than 30 bio-science educators across the country, have been designed for use in cooperative learning environments that emphasize the scientific processes of problem-posing, problem-solving, and peer persuasion. The core of the Library is the BioQUEST Collection, a set of peer-reviewed, field-tested modules addressing issues in evolution, genetics, ecology, molecular biology, and physiology. Nine modules are currently included in the Collection. Six additional modules are included in the Library as Collection Candidates.

For information on The BioQUEST Library:
Academic Software Development Group
Computer Science Center
University of Maryland
College Park, MD 20742
301-405-7600
asdg@umdd.umd.edu

To receive BioQUEST Notes 3(2) contact:
BioQUEST
Beloit College
700 College Street
Beloit, WI 53511
608-363-4723
BioQUEST@beloit.edu

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The Annenberg Fund /Corporation for Public Broadcasting,
the National Science Foundation-Division of Undergraduate Education,
Apple Computer,
the Foundation for Microbiology,
the Howard Hughes Medical Institute
and others.
I.1. Teaching Infectious Disease by the Case Method
Cathy Hunt and Mary Ann McMurray, Dept. of Biology, Henderson Community College, Henderson, KY 42420
Students in allied health care come to medical microbiology with one very usable resource—a very keen interest in the infectious diseases. In an effort to tap this interest early in the semester, use it to teach key microbiology concepts, and avoid the endless teacher-centered presentation, we have developed and implemented a series of 25 case studies. Students “solve” these cases in small groups and present their solution to the class. The cases are written to introduce concepts of pathogenesis, epidemiology and laboratory diagnosis. Critical questions which accompany each case allow students to begin to learn concepts which are usually not dealt with until late in the semester. We will share results of this approach and present sample cases. We welcome others to bring and share their uses of cases or other problem solving techniques in the teaching of biology.

I.2. Developing and Implementing an Inservice Program in Biotechnology for Secondary Science Teachers
Karen Klyczek, Biology Department, University of Wisconsin, River Falls, WI 54022
The results of a three year, National Science Foundation sponsored project to conduct inservice programs in biotechnology for secondary science teachers will be presented. The project involved a three week summer workshop designed to enhance the teachers’ backgrounds in biotechnology and to provide them with the time and resources to develop new classroom activities. We will share tips on planning, including conducting needs assessment and forming alliances between school districts and local colleges, and discuss the impact of such projects on the teachers, their students, and the college faculty involved.

I.3. Organizing a Tropical Ecology Course
David J. Hicks, Biology Department, Manchester College, N. Manchester, IN 46962
Students are strongly interested in the biology and environmental problems of the tropics. This presentation will describe the development and structure of a tropical ecology course taught in Costa Rica, Central America. Tips on getting started in tropical biology, finances, logistics, and course structure and activities will be included.

II.1. Regional Science Fairs
Ray Reed, Department of Biology, Jefferson Community College, Louisville, KY 40201
Interest in science can be developed in students at an early age. Science teachers in institutions of higher education should maintain a liaison with teachers in the elementary and high schools within the community. Regional science fairs provide a means whereby precollege students, under the guidance of their teachers, can develop science projects during the academic year with an emphasis on scientific methods and principles. Students later exhibit their projects and compete for prizes and scholarships. Much work is involved in developing and conducting science fairs but the benefits can be measured.

II.2. Mountain Ecology: A New Field Course at Loras
Tom Davis, Department of Biology, Loras College Dubuque, IA 52004
A successful field ecology course for upper division students at Loras will be presented.
Logistics, student activities, methods of evaluation, altitudinal adaptations and general discussion of field courses will be included. This course included 10 undergraduates, 1 instructor and several guest lecturers along the way to investigate the effects of altitude, temperature, soil, geology and wind on plants and animals in six different mountain ranges in Wyoming and South Dakota.

II.3. Interaction of Mouse Peritoneal Macrophages with Malignant Tumor Cells
David Thomason, Biological and Physical Sciences, Fontbonne College, St. Louis, MO 63105
While research by several laboratories has examined various lymphokine-mediated macrophage functions, little is known about the interaction between these lymphocyte-derived products and their macrophage targets. We have explored the interaction between one of these products, macrophage activating factor (MAF), and murine peritoneal macrophages. Results from our laboratory, and previously shown by others, indicated that non-tumoricidal macrophages obtained from thiglycollate-injected mice can be activated to a tumoricidal function by pulse-incubation in lymphokine-enriched medium. However, we have shown that his activation mechanism is inhibited by 0.1 M concentrations of the amino sugar, N-acetyl-D-galactosamine. No decrease in viability was noted among macrophages which were pulse-activated in the presence of the inhibitory sugar. Further, long-term cultivation of macrophage colonies was not affected by N-acetyl-D-galactosamine. The addition of N-acetyl-D-galactosamine to cultures of previously activated macrophages and tumor cells had no effect on macrophage-induced tumoricidal actions. A 0.1 M solution of the structurally-related saccharide, N-acetyl-D-glucosamine, did not prevent activation of these cells. Also not inhibitory were L-fucose and L-rhamnose, previously shown to inhibit guinea pig and human migration inhibition factor (MIF) which several believe to be identical with MAF.

III.2. Comparing the Scopes Trial of 1925 with the Little Rock “Balanced Treatment” Trial of 1981
Neil M. Baird, Department of Biology, Millikin University, Decatur, IL 62522
The Scopes trial, held in the little town of Dayton, TN, brought world-wide attention to the issue of creationism/evolution. Discussion of scientific and constitutional issues was not allowed at Dayton. It seemed to be a matter of science on one side and religion on the other side of the issue. Years later at Little Rock, a thorough analysis of the interacting scientific, religious, constitutional, and educational issues was permitted. Although most laypersons (and science teachers) are not aware of the expert testimony presented at the trial, knowledge of these arguments provides an excellent opportunity to better understand the issue today.

III.3. Hypermedia in Biology Education
Mark Bergland, Department of Biology, UW-River Falls, River Falls, WI 54022
Information will be provided on how to develop hypermedia software for use both inside and outside the classroom, with emphasis on biological examples. Hypermedia computer simulations
give students instant access to a variety of electronic information including computer animation, written text, and video, all accessed by “clicking” or “dragging” screen icons with the computer’s mouse.

A hypermedia simulation of plant cell division was developed at UW-River Falls and evaluated by Introductory Biology students and Cell Biology students. This highly interactive program, developed using Macromind Director authoring software, enables students to guide a plant cell through the stages of cell division. Corresponding video footage of division in an actual plant cell is available at any time via a laserdisc player interfaced with the computer. Student reaction has been very favorable, and a proposal to develop experimental simulations for use in cell biology and biotechnology courses has been funded by the National Science Foundation. Some of these new simulations, including patch-clamp studies of ion channel function, will also be demonstrated. These programs develop critical thinking skills by enabling students to collect data and test hypotheses.

Video compression/playback software (such as QuickTime) will also be discussed, along with a comparison of the CAV and less expensive CLV videodisc formats. For example, Voyager Videostack software has been used to easily incorporate CLV laserdisc control into Hypercard stacks for use in ornithology lectures and quizzes.

III.4. The Teaching of Reading and Studying Biology Textbooks
Rosie Foth, Department of Biology, University of Dubuque, Dubuque, IA 52001

College biology students require special skills to acquire and retain information presented to them through textbooks; unfortunately, many students to not adequately possess these skills. Instructors of college biology courses may be frustrated with students lacking these skills and uncertain as to how to remedy this. They may also assume incorrectly that including information for assisting students in correcting this problem will decrease time for traditional course content. This presentation demonstrates how to teach students to read and study biology textbooks while not losing content presentation time for the instructor.

IV.1. “Pass the Videocam, Please”
Ethel Stanley, Department of Biology, Millikin University, Decatur, IL 62522.
Extending video technology to students in the classroom, lab and field has some surprising results. From video specimen collection in field biology to student generated “commercials” during lecture, there are a 1001 uses for this remarkable tool. Share ideas with us as we offer samples of our favorite video projects!

IV.2. Methods of developing student awareness of ethics and their role in decision-making biology
Terry L. Derle, Department of Biology, Murray State University, Murray, KY 42071

Students are well aware of a multitude of controversial biological issues in today’s society. Students are also well aware that they have a personal view with respect to most of these issues. However, a surprisingly small number of students can identify the fundamental ethics upon which their views and actions are based. Most frequently, the concept of an ethic is confused with opinions that vary from situation to situation. I will discuss methods of assisting students in developing an awareness of their fundamental ethics, which are non-situational, and how these ethics relate to an individual’s situational opinions and actions. Specifically, I will present the various “stages of ethical development” that most students progress through as they consider bioethical issues and their personal views and ethics. Knowledge and recognition of these stages can enhance a teacher’s ability to assist each other in a manner that is best suited to that stage of a student’s ethical development. Methods whereby specific bioethical issues can be examined by students will also be discussed.

WORKSHOPS

W.1. Fast Plants for Slow Biologists
Timothy Mulkey, Department of Life Sciences, Indiana State University, Terre Haute, IN 47809

During the past seven years, rapid cycling Brassica plants (RCB) have been introduced as a model plant in botany teaching laboratories. RCB seed to
seed generation time is 28 days. Thus this plant provides an ideal tool for the study of plant growth, development, anatomy, genetics, and embryology. Hands-on use of fast plants in the teaching laboratory will be explored. Participants will perform a series of experiments to explore the range of laboratory experiences available with RCB. Sample laboratory exercises, hand-outs, and a variety of take-home materials will be provided.

W.2. Using HUMAN to Teach Human Physiology
Pat Bouwe, Department of Biology, Alverno College, Milwaukee, WI 53215
HUMAN is a computer program (Coleman and Randall) which simulates changes in over 200 physiological variables when the human's system is perturbed by exercise or disease. With this program, students can perform experiments ranging from exercise physiology to long-term renal or cardiac disease, observing compensatory changes and administering treatment. I will present several laboratories and an assessment based on this program.

W.3. So You Want to Use Multimedia?
Hands-on Workshop
Claire A. Rinchart, Department of Biology, Western Kentucky University, Bowling Green, KY 42101
A demonstration of the various sources that can be included in a multimedia presentation will be followed by hands on development and presentation of multimedia projects by small groups of participants. Sources of material will be drawn from video, laserdisc, CD-ROM, sound, animations, and QuickTime movies.

W.4. Digital Video Microscopy
Robert Bystance, Department of Biology, Trinity University, San Antonio, TX 78212
At Trinity University students are employing digital video microscopy in what were traditional microscopy courses: Developmental Biology and Microanatomy. This technique allows students to turn descriptive microscope laboratory exercises into interactive inquiry-based investigations. The workshop will demonstrate examples of student activities involving low-cost digital video microscopy. Activities include image capture, image enhancement, image quantification, statistical evaluation, and question development. A hands-on, three-dimensional reconstruction will be performed using public domain software. The goal of the workshop is to provide the attendees with applications for their own instructional environment.

POSTER SESSION

P.1. Problem Solving Sets and Clinical Case Studies: A Nontraditional Approach to the Undergraduate Biochemistry Experience
Kaela, Rose Thomasino, Vought, Walker and Wilson, Biological and Chemistry Section, Purdue University North Central, Westville IN 46391
A nontraditional education approach to an undergraduate biochemistry course has been initiated on an experimental basis at PU/NC. This approach utilizes problem solving sets and clinical case studies as the central learning tool for evaluating biochemical phenomena, as opposed to the traditional pursuit of memorizing biochemical structures and pathways for purpose of examination. Under the direction of and with assistance from the instructor, students work on and discuss the problem sets and case studies, enhancing their understanding of biochemical concepts and applications, while fostering problem solving and critical thinking skills. The process and outcome assessment of this educational endeavor are presented by the undergraduates involved.

P.2. Using "On-Hand" Transducers with the Maccscope Analog-to-Digital Microcomputer Interface for Physiological Exercises
Steven H. Mills, Department of Biology, Central Missouri State University, Warrensburg, MO 64093
Chart recorders are rapidly becoming obsolete in the physiology laboratory due to the limited graphical and analysis possibilities with chart recorder output. A multi-channel analog-to-digital converter used with a microcomputer permits data to be transferred directly to the computer. Undergraduates using the "Maccscope system" during physiological exercises found it to be easier to use, more precise for measurements and review of specific portions of the waveform, able to print out sections of the waveform, better able to eliminate noise in signals, and able to transfer data to graphical and analysis software.
CANDIDATES FOR PRESIDENT-ELECT

HAROLD WILKINSON

OFFICE ADDRESS: Department of Biology
Millikin University
Decatur, IL

EDUCATION:
1966 B.S., Brigham Young University
1970 M.S., Michigan Technological University
1976 Ph.D., University of Illinois
1978 Post Doctorate, University of Kansas Medical School

PROFESSIONAL EXPERIENCE:
1978-present Associate Professor, Department of Biology, Millikin University
1983-1986(Summers) Instructor, Biology, Richland Community College

COURSES TAUGHT:
Anatomy and Physiology, Cell Biology, General Physiology, and/or General Biology.

RESEARCH:
Cellular Physiology - Membrane Transport, Renal Physiology
Human Anatomy and Physiology
Comparative Biochemistry and Physiology

MEMBERSHIPS:
Association of Midwestern College Biology Teachers, American Physiological Society.

HONOR SOCIETIES:
Phi Kappa Phi, Honorary Scholastic Society; Sigma Xi, Research Society; Sigma Zeta, National Science Honorary Society.

AMCBT ACTIVITIES:
1980 Became an active member and assisted Norm Jensen in his efforts as Local
Arrangement Chairman for the convention at Millikin.
1984 Appointed 1st Vice President for the 1985 annual meeting by Ray Reed
1985 Served as Program Chairman for the annual meeting at Augustana College
1986 Presented paper "Measuring Common Biological Potentials" at Sangamon State
University
1987 Nominated to run for President of the organization.
   Appointed Chairman of the committee to develop Curriculum guidelines for Biology.
1988 Elected Secretary to the organization
   Presented workshop "Respiratory Assessment Labs" at Beloit College
1989 Re-elected Secretary to the organization
   Presented paper "Introducing Clearance Concepts to the Renal Physiology
   Laboratory" at Quincy College.
1991 Re-elected Secretary to the organization
CANDIDATES FOR PRESIDENT-ELECT

MARVIN C. WILLIAMS

OFFICE ADDRESS: Department of Biology
Department Chairman and Graduate Faculty Fellow
University of Nebraska at Kearney
Kearney, NE

EDUCATION:
1959 B.S. Ed., Western Illinois University, Macomb, IL
1966 M.S., Western Illinois University, Macomb, IL
1971 University of Kansas, Lawrence, Kansas

PROFESSIONAL EXPERIENCE:
1992-Present Professor of Biology and Chair, Department of Biology, University of Nebraska at Kearney, Kearney, NE
1984-1991 Professor of Biology, Kearney State College, Kearney, NE
1978-1984 Professor of Biology & Department Chairman, Kearney State College, Kearney, NE
1974-1978 Associate Professor of Biology, & Department Chairman, Kearney State College, Kearney, NE
1971-1973 Assistant Professor of Biology, Kearney State College, Kearney, NE
1966-1969 Instructor of Biology, Kearney State College, Kearney, NE
1960-1965 Science and Math Teaching, Assistant Principal (63-65), Malden High School, Illinois

COURSES TAUGHT:
- Plant Physiology
- General Botany
- Developmental Biology
- Mycology
- Classroom Teaching Techniques
- General Biology
- Biology Problems
- Biological Research
- Plants and Animals
- Biology Internship Methods of Teaching

MEMBERSHIPS:
- Association of Midwestern College Biology Teachers
- National Association of Biology Teachers (Life Member)
- Nebraska Academy of Sciences
- Mycological Society of America
- National Science Teachers Association (Awards & Recognition Committee 1978 & 1979)
- Nebraska Statewide Arboretum, Sigma Xi

RECOGNITION AND AWARDS:
1991 Selected as a Graduate College Faculty Fellow of the University of Nebraska
1987 Pratt-Heins Award recipient (Scholarship, Research, Kearney State College)
1984 Deans Award (Kearney State College) Scholarship
1975 Selected as an Outstanding Educator of America for 1975 by Outstanding Educators of America, Washington, D.C.
1967 Colorado State Univ., National Science Foundation Institute Participant-Radiation Biology
1962 Iowa State Univ., National Science Foundation Summer Institute Participant-Chemistry

AMCBT ACTIVITIES:
- Member 20 plus years, elected steering committee member, 1987-90; Chair Resolutions Committee 1988; presented several papers at meetings.

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CANDIDATES FOR SECRETARY

TIMOTHY J. MULKEY

OFFICE ADDRESS: Department of Life Sciences
Indiana State University
Terre Haute, Indiana 47809

EDUCATION:
1977  B.S., Univ. of Arkansas, Fayetteville, AR., Botany.
1979  M.S., Botany Dept., Univ. of Arkansas, Fayetteville, Botany.
1983  Ph.D., Botany Dept., The Ohio State Univ., Columbus, Plant Physiology.

PROFESSIONAL EXPERIENCE
1981 - present  Associate Professor, Dept. of Life Sciences, Indiana State Univ., Terre Haute, IN.
1983 - 1991  Assistant Professor, Dept. of Life Sciences, Indiana State Univ., Terre Haute, IN.
1979 - 1983  Research and Teaching Associate, Dept. of Botany, The Ohio State Univ.,
Columbus, OH.
1977 - 1979  Research and Teaching Assistant, Dept. of Botany and Bact., Univ. of Arkansas,
Fayetteville, AR.

COURSES TAUGHT:

- Plant Physiology: Survey of the Plant Kingdom (non-majors botany course); Plant Growth
  and Development; Collecting and Analyzing Biological Data; Computer Applications in
  Graduate Research; Morphology of Vascular Plants; Plant Anatomy; Experimental
  Morphogenesis of Vascular Plants; Advanced Plant Physiology

COURSE DEVELOPMENT:

- Collecting and Analyzing Biological Data; Collecting and Analyzing Biological Data Lab;
- Plant Growth and Development; Experimental Morphogenesis of Vascular Plants; Plant
  Anatomy; Advanced Plant Physiology; Advanced Plant Physiology Laboratory; Survey of the
  Plant Kingdom (developed course proposal which was accepted as a General Education Course
  offering under the new General Education/Liberal Studies Guidelines); Computer Applications
  in Graduate Research (developed course for School of Graduate Studies to teach computer
  skills as a research tool)

MEMBERSHIPS:

- American Society for Gravitational and Space Biology; American Society of Plant
  Physiologists; Association of Midwestern College Biology Teachers; British Plant Growth
  Regulator Group; Commission on Gravitational Physiology; International Society for
  Gravitational Physiology; International Plant Growth Substances Association; Midwest Section
  of the American Society of Plant Physiologists; Sigma Xi

AMCBT ACTIVITIES:

- Served as Cohost for Fall 1990 meeting at Indiana State University
- Served on Executive Committee 1990-1993
- Served as Secretary of Editorial Board for Bioscience - Journal of College Biology Teaching,
  February 1991 to present
CANDIDATES FOR SECRETARY

DOROTHY GRACE KELLY MAY

OFFICE ADDRESS: Biology Department
Park College
Parkville, MO

EDUCATION:
1970 Ph.D., Entomology, University of Kansas, Lawrence, KS
1965 B.S., Ed., Science Education, University of Kansas, Lawrence, KS
1964 B.A., Zoology and Chemistry, University of Kansas, Lawrence, KS

PROFESSIONAL EXPERIENCE:
Present position: Associate Professor of Biology, Park College, Parkville, MO
Teaching experience: 8 years full-time college teaching, plus 12 years college teaching as an adjunct, usually teaching 9 credit hours or more.

COURSES TAUGHT:
General biology, Human Anatomy and Physiology, Cell Biology, Human Physiology, Zoology, Genetics, Mammalian Physiology, General and Comparative Physiology, Medical Terminology, Microbiology, Biochemistry, Biological Bibliography, Research Seminar, Animal Behavior, Honors Seminar, Human Nutrition.

HONORS/HONOR SOCIETIES:
AAUW Dissertation Fellow
Listed in 18th and 19th editions of Who's Who in the Midwest
Listed in 16th and 17th editions of Who's Who of American Women
Park Family Award, Spring 1991
Sigma Xi
Sigma Delta Epsilon (Graduate Women in Science) past president of KC chapter (1973-74)

MEMBERSHIPS:
Association of Midwestern College Biology Teachers (since 1986)
National Association of Biology Teachers
Association of Biology Laboratory Educator

CANDIDATES FOR MEMBERS-AT-LARGE

PHYLLIS JEAN KINGSBURY

OFFICE ADDRESS: Drake University
Des Moines, Iowa 50311

EDUCATION:
1960 B.S., Educ/Soc. Sci/Biology, Emporia State University, KS
1963 M.S., Biology, Emporia State University, KS
1969 M.S., Science Education, University of Texas
1968 Ph.D., Zoology, University of Oklahoma
CANDIDATES FOR MEMBERS-AT-LARGE

PROFESSIONAL EXPERIENCE:
1974-present  Associate Professor, Drake University
1968-1974     Assistant Professor, Drake University
1967-1968     Special Instructor, University of Oklahoma
1960-1962     Junior High School Science Teacher, Valley Center, KS

COURSES TAUGHT:

HONOR SOCIETIES:
Sigma Xi

MEMBERSHIPS:
American Institute of Biological Sciences, American Society of Limnology and Oceanography, Association of Midwestern College Biology Teachers, Ecological Society of America, Iowa Academy of Science, Iowa Science Teachers Association, Iowa Women in Natural Resources, National Association of Biology Teachers, Water Pollution Control Federation

MARC M. ROY

OFFICE ADDRESS:  Beloit College
                 Department of Biology
                 700 College Street
                 Beloit, Wisconsin

EDUCATION:
1982     B.A., Biology, Lawrence University, Appleton, Wisconsin
1989     Ph.D., Neuroscience, University of Wisconsin, Madison, Wisconsin

PROFESSIONAL EXPERIENCE:
August 1989-present  Assistant Professor of Biology, Beloit College
1987-1988     Teaching Assistant, University of Wisconsin
Hormones and Behavior, Organismal Biology, Cellular Biology

COURSES TAUGHT:
Human Biology, Neurobiology, Physiology, Ethology, Biology Senior Seminar, Sexual Differentiation of Behavior and Performance (First Year Initiatives Program)

RESEARCH INTERESTS:
Neuroendocrinology of reproductive behavior. Influences of gonadal steroids on the development of reproductive behavior and physiology in guinea pigs.

MEMBERSHIPS:
American Association for the Advancement of Science, Animal Behavior Society,
Association of Midwestern College Biology Teachers, Society of Neuroscience, National Association of Advisors for the Health Professions, NSF Grant Review Panel, Instrumentation and Laboratory Improvement Program.
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KAREN K. KLYCZEK

OFFICE ADDRESS:  Biology Department
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EDUCATION:
1980  B.A., Biology and Chemistry, Augustana College, Rock Island, IL
1984  Ph.D., Biochemistry, University of Wisconsin, Madison, WI

PROFESSIONAL EXPERIENCE:
1989-present  Assistant Professor, Biology Department, University of Wisconsin-River Falls,
River Falls, WI
1987-1989  Research Assistant Professor, Department of Microbiology and Immunology,
Temple University School of Medicine, Philadelphia, PA
1984-1989  Postdoctoral Fellow, Department of Pathology and Laboratory Medicine,
University of Pennsylvania School of Medicine, Philadelphia, PA
1980-1984  Graduate Student, Department of Biochemistry, University of Wisconsin,
Madison, WI

COURSES TAUGHT:
  Cell Biology, Bacteriology, Virology, Animal Cell Culture, Biotechnology, Molecular Biology,
  Fundamental Immunology, Medical Microbiology and Immunology, Immunogenetics, Basic
  Immunology.

MEMBERSHIPS:
  American Association for the Advancement of Science, since 1984
  American Institutes of Biological Sciences, since 1992
  Association of Midwestern College Biology Teachers, since 1990
  National Science Teachers Association, since 1992
  Sigma Xi, since 1984
  Wisconsin Society of Science Teachers, since 1991

HONORS AND AWARDS:
1985-1988  Cancer Research Institute Fellowship
1984-1985  NIH Postdoctoral Traineeship in Immunobiology
1983-1984  Wharton Research Fellowship
1981-1983  NIH Predoctoral Traineeship in Cellular and Molecular Biology
1980-1981  Wisconsin Alumni Research Foundation Fellowship

WALLACE WEBER

OFFICE ADDRESS:  Professor of Biology
Department of Biology
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EDUCATION:
1956  B.A., Southern Illinois University
1959  M.A., Southern Illinois University
1968  Ph.D., Ohio State University

PROFESSIONAL EXPERIENCE:
1978-Present  Southwest Missouri State University: Professor of Biology
1971-1978  Southern Illinois University, Carbondale, IL: Adjunct Professor of Botany
Fall, 1982  Southwest Missouri State University: Associate Professor of Biology
1967-1971  Assistant Professor of Biology
1962-1967  Ohio State University, Columbus, OH: Teaching Associate in Botany
1962  Graduate Teaching Assistant in Botany
1960  Ohio University, Athens, OH: Instructor in Summer Science Training Program
       for high school students (summer)
1959-1962  Otterbein College, Westerville, OH: Instructor in Biology
1956-1959  Southern Illinois University, Carbondale, IL: Graduate Teaching Assistant in
       Botany

RESEARCH INTERESTS:
Flora of Missouri, Atlas Project on Missouri Flora Distribution, Biosystematics of Siphiwm
asteriscus complex, Ecophysiology of Geocarpon minimum
Ongoing project of manual writing for use in Local Flora courses ("Missouri's Spring Flora"
and "Woody Plants of Missouri")

MEMBERSHIPS:
Society of Sigma Xi; Gamma Sigma Delta (agr. Honorary); Tri-Beta Biological Society;
Missouri Academy of Science; Botanical Society of America; American Society of Plant
Taxonomists; International Society for Taxonomy; Missouri Prairie Foundation; Missouri Native
Plant Society; Ozark Society; Nature Conservancy; National Audubon Society; Sierra Club;
National Association of Biology Teachers; Association of Midwestern College Biology Teachers
Mr. Defensor is spearheading the company's efforts in multimedia and CD-ROM entertainment software in both the U.S., Japan, and European markets. ICOM has produced the first interactive software and CD-ROM in the world, Sherlock Holmes Consulting Detective: Volume I, and this product is probably the most successful CD-ROM game to date. The product uses 90 minutes of full-motion video with new adventures. Volume II was released in April of 1992, and Volume III is in the top 100 selling computer games. In 1992, Mr. Defensor was one of the top-selling computer games. Prior to joining ICOM in 1990, Mr. Defensor was a Senior Project Manager for Falcon Microsystems, Incorporated, from 1989 to 1990, and was Project Manager for Falcon Microsystems, Incorporated, from 1984 to 1989. At Falcon, he was responsible for designing several multi-CD-ROM systems and networking systems. From 1989 to 1994, Mr. Defensor was a Senior Project Manager for Falcon Microsystems, Incorporated. Between 1989 and 1994, he was also a member of the technical staff at Smith's Laboratory, Inc., a manufacturer of consumer electronics. Between 1989 and 1994, he was a Senior Project Manager for Falcon Microsystems, Incorporated. He has also worked as a software engineer for the National Science Foundation, Northwest University, Medical School, and as a software engineer for the National Science Foundation, Northwest University, Medical School. From his computer-related experience, Mr. Defensor is also an attorney and he has clerked for the University of Texas and the University of Arizona. Mr. Defensor holds a J.D. from the University of Texas School of Law and a B.S. in Biology from Beloit College.

Extraordinary views of biological structures are now possible with microcomputer generated graphics, animations, and three-dimensional reconstructions. These views allow biologists to see structural data in ways that were not previously possible. This presentation will survey some of the best biological visualizations now available. Aggressive approaches to visualization carry additional burdens including the level of visual literacy of the viewer. Four and five dimensional data sets require careful presentation. Incorporation of the new visualizations into teaching strategies is also a difficult process. Careful attention must be paid to how students can learn with these new technologies. Computer-based biological visualization opens up new doors to how students can think about traditional material and at the same time provides means for addressing new topics.
Editor's Note: The following comments are being shared with our readers because the editor felt that they represent legitimate differences of opinion and offer the opportunity to our readers to witness professional disagreements about subtleties. While the two reviewers strongly appreciate the author's perspective and desire it to be shared with the readers of Bioscience, they also felt that the readers should be aware of other interpretations as well.

Anonymous Reviewers' Comments on
Reassessing Van Helmont, Reassessing History

by Douglas Allchin

In addition to the author's list about the uses of history of science in science education (page 3), history also serves as an occasion to organize the serial development of concepts, and, as a comparative tool useful for forcing students (and teachers) to think critically about their own ideas and methods. Perhaps one might think of "homologies," analogies," and differences between past and present science.

While the author correctly infers that Hershey "does not fully respect the context of Helmont's work" (page 4), a very real problem with how history is used by Hershey (1991) is not so much abuse of history as very incomplete use of history. Shouldn't we be able to do both:

1) present science in its historical context, and
2) use this history to challenge students to think about how early science is similar to and different from modern science?

The author states: "Again, one may ask whether one ought to assess the original experiment by importing standards of experimental design developed only later. More significantly, Hershey neglects the role of demonstration as an effective form of experiment, ..." (page 4).

Reviewer: A very good point, but can't we use the case to stimulate class discussion about how modern scientists—or the students themselves—might design experiments?

This is a very well-written critique of how historical cases studies have been used by science teachers. But, given his criticism, shouldn't the author provide us with a discussion about how to actually use his richer historical perspective in a real classroom situation? What lessons about the nature of science will the students take away from the experience? It seems that a few concrete suggestions would be helpful. In addition, the article might better serve the readers if references to professional history of biology literature were given on van Helmont (especially "the belief that the tree was earth mixed with some fire"), on Darwin's mistaken beliefs on the "parallel roads of Glen Roy," probably other references to histories of botany, and uses of history, philosophy, and social studies of biology in biology education (BSCS and SSEC, 1992).

References:

Application For Membership

ASSOCIATION OF MIDWESTERN COLLEGE BIOLOGY TEACHERS

NAME: ___________________________ DATE: ________________

TITLE: ___________________________

DEPARTMENT: ______________________

INSTITUTION: ______________________

STREET ADDRESS: ______________________

CITY: ___________________________ STATE: __________

ZIP CODE: _______________________

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WORK PHONE: ______________________ FAX NUMBER: __________

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MAJOR INTERESTS: SUB DISCIPLINES:

( ) 1. Biology ( ) A. Ecology ( ) H. Molecular
( ) 2. Botany ( ) B. Evolution ( ) I. Development
( ) 3. Zoology ( ) C. Physiology ( ) J. Cellular
( ) 4. Microbiology ( ) D. Anatomy ( ) K. Genetics
( ) 5. Pre-professional ( ) E. History ( ) L. Ethology
( ) 6. Teacher Education ( ) F. Philosophy ( ) M. Neuroscience
( ) 7. Other ______________ ( ) G. Systematics ( ) N. Other ______________

RESOURCE AREAS:

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RESEARCH AREAS:

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Have you been a member before? ____________ If so, when? ________________
PLEASE MAIL

MEMBERSHIP APPLICATION

FORMS TO:

Edward S. Kos
Executive Secretary, AMCBT
AMCBT Central Office
Department of Biology
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Kansas City, MO 64110

CURRENT DUES ARE $25.00