

**Articles:**
Factors That Affect Student Attitude Toward Biology .................................................3
William D. Rogers and Robert Ford

Biodiversity Labs: Using Local Resources .................................................................6
Lynn L. Gillie

**News & Views:**

AMCBT 41st Annual Meeting at Beloit College
Penultimate Program ........................................................................................................8
Abstracts of Sessions ....................................................................................................12
Biology at Beloit College .............................................................................................17
About Beloit College ....................................................................................................20
Travel to Beloit College ...............................................................................................20
Registration Form ........................................................................................................22 and on insert

AMCBT to ACUBE? (Second Notice) .............................................................................19

Proposed Constitution Changes ....................................................................................21

Membership Application ..............................................................................................23

AMCBT on the WEB .....................................................................................................back cover

Cover Illustration: Photos by Dave Waller, Beloit College. Spring 1997. Top photo: Wood duck nesting pair; left photo: mother duck; right photo: lots of eggs laid (23 out of 26 hatched).
Please submit all manuscripts directly to the Managing Editor. We prefer receiving two printed copies and one in computer readable form. Please make sure that your manuscript includes an abstract, a list of key words, and references in appropriate format. We work with the following word processors on the following computers: Microsoft Word, ClarisWorks and WordPerfect on the Macintosh, for Windows and on IBM PC compatibles. Final copy is prepared in Adobe Pagemaker on a Macintosh 6400 PowerPC. If you can submit your manuscript only on another system, please check with us beforehand. We can receive manuscripts electronically by connecting to us via internet, where our address is HOLEVAST@BELOIT.EDU. Please address file to AMCBT. All manuscripts will be sent out to two members of the Editorial Board for review. In the case of a split decision, the manuscript will go to a third reviewer. All accepted manuscripts will also appear on the AMCBT World Wide Web Page (http://papa.indstate.edu/amcbt) when the issue is published. Advertisements appearing in Bioscience do not reflect the opinion of the Editorial Board. The next deadline in 1997 is October 15.

**Bioscience Editorial Board:**

**Term Expires 1997**  
William Brett  
Biology Department  
Indiana State University  
Terre Haute, IN 47809

Joyce Cadwallader  
Biology Department  
St. Mary-of-the-Woods College  
Terre Haute, IN 47876-0070

Buzz Hoagland  
Biology Department  
Westfield State College  
Westfield, MA 01086-1630

Malcolm P. Levin  
Biology Department  
Sangamon State University  
Springfield, IL 62708

**Term Expires 1998**  
Dave Finley  
Biology Department  
Lincoln University  
Jefferson City, MO 65101

Timothy J. Mulkey, Secretary  
Biology Department  
Indiana State University  
Terre Haute, IN 47809

Ethel Stanley, Chairperson  
Biology Department  
Beloit College  
Beloit, WI 53511

C. Robert Wikel  
Biology Department  
Doane College  
Crete, NE 68333

**Term Expires 1999**  
Charles Bicak  
Biology Department  
University of Nebraska-Kearney  
Kearney, NE 68849

Cynthia Bottrell  
Biology Department  
Scott Community College  
Bettendorf, IA 52722

Terry Derting  
Dept. of Biological Sciences  
Murray State University  
Murray, KY 42071-0009

Harold Wilkinson  
Biology Department  
Millikin University  
Decatur, IL 62522

---

**Suggestions for Manuscripts**

- Announcements
- Letters to the Editor
- Book Reviews
- Laboratories that Work
- Sources of Funding
- Sociology of Biology
- Courses that Work
- Professional School
- Biology Policy Issues
- Minority Education
- Women in Biology
- Computer Advice
- Reviews of Software/Hardware
- Philosophy of Biology
- History of Biology

---

*Bioscience is the official publication of the Association of Midwest College Biology Teachers*
Factors That Affect Student Attitude Toward Biology

William D. Rogers  
Department of Biology  
Ball State University  
Muncie, IN  47306

Robert Ford  
Frederick Community College  
Frederick, MD  21701

Abstract: The assumption that students will acquire positive attitudes toward science as they learn more science is no longer valid. This study confirmed the reliability of the Biology Attitude Scale developed by Russell and Hollander (1975). We also concluded that whether a student is a biology major or non-major in itself is not a determining factor when measuring the effect an introductory course has in changing attitude toward biology. We found a slight negative correlation between expected grade and attitude change and also a slight negative correlation between actual grade and attitude change.

Key Words: students’ attitudes; Likert scales; Cronbach Alpha Reliability Coefficients; Majors; Non-majors

Introduction

Attitudes toward biology and learning in general are areas of interest to educators past and current. The term attitude (toward science) should be used to refer to a general and enduring positive or negative feeling about science (Koballa and Crawley 1985). Instructors who are new to the study of attitudes toward learning may want to read “Developing Attitude Toward Learning” (Mager 1984). This book is an excellent source about reasons individuals may feel a certain way toward a subject and how to measure and improve these attitudes.

A number of articles have been published that have expressed different ideas about attitudes towards biology/science. All agree that it is important that college students leave our classes with as favorable an attitude toward biology as possible. The generalization that biology majors have a favorable attitude toward science is usually assumed, but not well substantiated.

Studies report that the general public (non-majors) do not necessarily have positive feelings toward science and scientists. Some students have negative stereotypes of science and scientist; they view us as “nerds” or “mad scientists” (Gardner, et al. 1989). Others describe us as hard, old, frightening, and colorless (Brush 1979). These beliefs may lead to a negative attitude toward science.

Specifically, one study reports that many students do not have a positive attitude toward biology when they enter their first college-level biology class. In this study conducted at the University of Oklahoma, three-hundred seventy students were asked to indicate on a five-point scale how important they felt biology was to their lives. The scale ranged from “extremely important” to “not important at all.” Fifty percent rated biology in the bottom three categories. The students were also asked to rank ten disciplines in order of importance to the average American citizen. Biology finished fifth out of ten. Uno (1988), who conducted these surveys, concluded that the students feel biology is not critical to their lives.

Previous science courses may affect attitudes that college students hold toward biology. In addition, the entertainment industry’s portrayal of scientists may have an effect on our students’ attitudes toward science. The media sometimes presents scientific achievements as foreboding, and the media is possibly to blame for the negative attitudes of students toward science (Sadava 1976).

It would be very unfair to place all the blame on the media or primary and secondary education systems. Frequently articles and television programs show biology in a very positive light. Certainly there are many outstanding teachers in our schools who do an excellent job in teaching biology and other sciences, which should have a positive influence on their students. Unfortunately their efforts and accomplishments are not always recognized or rewarded.

It is important that students leave our classes with a positive attitude toward biology. A phrase used frequently in discussions about higher education is “life-long learning.” It would be difficult to argue against the merits of lifelong learning, but is it realistic to expect one to independently learn more about a subject if the individual has a negative attitude toward the subject?

Russell and Hollander (1975) quoted from Mager (1968) “The likelihood of the student putting his knowledge to use is influenced by his attitude for or against the subject. Things disliked have a way of being forgotten. . . One objective toward which to strive is that of having the student leave your influence with as favorable an attitude toward your subject as possible. In this way he will remember what has been taught, and will willingly learn more about what has been taught.”

The attitudes with which our students leave our classes may have an effect on us later. Hayes (1980) wrote “Our students (non-majors) are potential lawyers and managers. As citizens, they will influence
how research and development funds are spent.” A positive attitude and appreciation of biology may have an influence on these decisions.

Many thoughts exist on why attitudes toward biology or science in general may be negative. Students’ attitudes are influenced by a host of factors: their past experiences, sense of competence, need to acquire knowledge, motivation, goals, home backgrounds, school and classroom environments, biases of peer groups, and students’ perceptions of rewards associated with learning. Science anxiety, the fear of science learning and apprehension towards scientists and science-related activities, is an attitude shaped by these factors (Gottfried, et al. 1993).

A Michigan study examined the effect that a single science course had upon attitudes toward science and scientists that are held by science-shy ninth grade students. A significant difference in attitudes toward science and scientists was found between pre- and post-measurements. However, this study found there was no significant relationship between attitudes toward science and scientists on pre-/post-measurements and their sex, socio-economic background classification, intelligence quotient, grade point average, or their attitude toward the course. No significant difference in attitudes toward science and scientists was found between three separate teacher-student groups in the pre- and post-measurements (Starring 1972).

Studies have shown a positive correlation between attitude and achievement (Russell and Hollander 1975; Schibeci and Riley 1986). Uno (1988) wrote that a negative or indifferent attitude toward science is one reason that non-science majors have difficulty in their college introductory biology classes. There is some support for the proposition that attitudes influence achievement, rather than the reverse (Schibeci and Riley 1986). Attitude is a key ingredient in how students confront educational challenges. The grades students receive also affect their feelings about their ability to understand scientific content and their attitudes toward science. High grades increase students’ self-esteem and promote academic progress. (Gottfried, et al. 1993).

Methods

Our study had several purposes. One was to examine if biology courses designed for a specific audience (biology majors vs. non-majors) made a difference in terms of attitude change. The instrument used in this study was developed by Russell and Hollander (1975). This instrument was designed to detect and measure changes in attitude toward biology, but not intended to measure absolute attitude. This scale is divided into two portions, the first being a 14 item Likert-type scale, the second part consisting of 8 items using a semantic differential scale. However, only the Likert items were used for our purposes.

Russell and Hollander (1975) had previously reported the reliability of the Likert portion of their scale to be 0.90. In this study the Cronbach Alpha Reliability Coefficient was determined to be 0.95.

In this study, the attitude scale was administered to separate introductory biology classes at two universities (see Table 1). All responses were kept anonymous except for a code to identify to which group a student belonged. The survey was administered at the beginning of the semester (pre) and again at the end of the semester (post).

<table>
<thead>
<tr>
<th>Table 1. Description of Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1 Biology majors (N=89) (University A)</td>
</tr>
<tr>
<td>Class 2 Biology majors (N=87) (University B)</td>
</tr>
<tr>
<td>Class 3 Non-majors (N=77) (University A)</td>
</tr>
<tr>
<td>Class 4 Non-majors (N=140) (University B)</td>
</tr>
</tbody>
</table>

Results

It was determined that there was a positive change in attitude for both classes of non-majors; however, a class for biology majors at University A showed a positive change in attitude. The results for University B showed a negative response (see Table 2). All changes were determined to be significant at the 0.05 fiducial level.

| Table 2. Summary of results of biology attitude scale. |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | Pre             |                 | Post            |                 |
|                 | Mean  | S.D.  | Mean       | S.D.  | Change     |
| Class 1         | 41.84 | 8.41  | 44.04      | 7.30  | +2.20      |
| Class 2         | 40.06 | 9.25  | 36.92      | 11.18 | -3.14      |
| Class 3         | 35.77 | 10.66 | 38.82      | 10.43 | +3.05      |
| Class 4         | 35.45 | 10.37 | 37.23      | 11.15 | +1.78      |
We infer from the data presented in Table 2 that whether students are majors or non-majors is not, by itself, a determining factor in influencing students’ attitudes toward biology.

This study was continued at still another university. The subject group was a large, introductory biology class for non-majors. This group showed an increase in score of 1.4 between the pre- and post-scales. This time other factors were examined in an attempt to ascertain if they had an effect on attitude change. These factors included: class (freshman, sophomore, etc.), age of the students, the number of previous biology courses taken by the student, expected course grade, and actual course grade.

There was a negative correlation of -0.24 between expected grade and attitude gain (p<0.01). There was also a negative correlation of -0.28 between actual grade and attitude gain (p<0.01). There was a positive correlation of +0.66 between expected grade and actual grade (p<0.01). Class, age, and number of previous biology courses did not show a significant correlation.

Conclusion

This study confirmed the reliability of the Biology Attitude Scale developed by Russell and Hollander (1975). We also concluded that whether a student is a biology major or non-major in itself is not a determining factor when measuring the effect an introductory course has in changing attitude toward biology. We found a slight negative correlation between expected grade and attitude change and also a slight negative correlation between actual grade and attitude change.

Factors which affect attitudes toward biology is an area that deserves more study. Our data from these short term studies should help clarify beliefs or assumptions instructors may have about student attitudes. The issue of attitude toward a subject is complex; perhaps long term studies may generate more insights.

The assumption that students will acquire positive attitudes toward science as they learn more science is no longer valid. Planning is required to increase the probability of developing positive attitudes toward science (Koballa and Crawley 1985). Educators today need to keep aware of the changes we see in our population of students. In particular we need to be aware of our students’ attitudes toward our subject matter and of the effect we have on our students’ attitudes, whether positive or negative. Certainly not all of the factors involved with attitude formation and change are known, nor may they ever be. Nonetheless, instructors can measure the effect their courses have on attitudes, and make adjustments accordingly.

Literature Cited


Biodiversity Lab: Using Local Resources

Lynn L. Gillie*
Division of Science
 Truman State University
 Kirkville, MO 63501

Abstract: Local habitats are often overlooked as a source of biodiversity precisely because of their presumed familiarity. Examining living organisms in one's own backyard is a key first step toward appreciating the scope and importance of biological diversity throughout the world. The goals of this lab are to involve students in exploring the biodiversity around them, appreciating its scope, and asking questions of new organisms that they may never have noticed before.

Key Words: biodiversity, local habitats, species-scapes

Preservation of biodiversity is a current topic in the popular and scientific press. It is most often mentioned with regard to the tropics because most of the world's floral and faunal diversity is concentrated in equatorial regions, particularly rainforest habitats (Wilson, 1988). Thus students, including biology majors, often view preservation of biodiversity as a problem limited to a few distant, less-developed countries. Ask students why biodiversity is important, and answers will range from preventing extinction to preserving rainforests. Ask a student to name any animal and you will find that examples are limited to charismatic megafauna - cats, dogs, cheetahs, pandas, lions, eagles. People tend not to approach biodiversity as biologists, but use the term to be politically correct. Students do not feel a connection with the concept of biodiversity and may dismiss it as irrelevant to their lives.

To feel a connection with a scientific problem such as measuring biodiversity, you must do science. While students could go to the tropics and study biodiversity firsthand, travel to such locations is not practical for typical courses involving upper-level biology majors, much less the large numbers of students in non-majors' general biology courses. Local habitats are often overlooked as a source of biodiversity precisely because of their presumed familiarity. Examining living organisms in one's own backyard is a key first step toward appreciating the scope and importance of biological diversity throughout the world. Even locally, loss of biodiversity can be an indicator of larger, more widespread problems. This lab is not intended to explore the problems, but rather its goals are to involve students in exploring the biodiversity around them, appreciating its scope, and asking questions of new organisms that they may never have noticed before.

Methods
Biodiversity can be introduced in the lab with a diagram of the species-scape (Wheeler 1990; Wilson 1992). This diagram contains a drawing of one representative organism for each phylum or class; however, the size of the organism is proportional to the number of described species in that group. One can easily see that invertebrates, particularly arthropods, greatly outweigh vertebrates in terms of both species and biomass. After thinking about this representation, students may be less vertebrate-biased when they start their sampling.

Students should design their own methods for examining their surroundings either on or off campus and attempt to quantify how much biodiversity exists in different habitats. Most campus settings have some natural areas to work in and semi-natural areas such as flowerbeds will work as well. A small pond, lake, stream, or other water source is often accessible for examination. Most people identify with the common birds and mammals they encounter on a daily basis such as campus starlings, robins or squirrels. However, sampling of soil, flowerbeds, compost piles, streams or ponds is necessary to develop some appreciation for the vast number of protists and invertebrate animals that are present, yet overlooked because of their inconspicuousness. During sampling, students can quantify large vertebrates like ducks and squirrels, turn over rocks to look for invertebrates, gather leaf, water, and soil samples to examine later in the lab with dissecting scopes and compound microscopes. Please have them be responsible collectors by gathering one or two ants instead of the whole colony and then by estimating numbers observed in the field.

If more structured sampling is desired, compost piles are useful if your campus has a greenhouse with a composting area. Given appropriate tools such as metersticks, thermometers, jars and trowels, students
can design their own experiments to systematically investigate the physical and biotic factors of this small ecosystem. Once they have sampled selected areas, they can roughly quantify numbers of species and identify the various organisms back in the lab. If pre-existing piles are not available, students may start compost piles early in the season and examine them later in the semester.

Finally, each student or team of students can choose one invertebrate they collected and design an experiment to answer a question about its behavior. They could examine interspecific or intraspecific interactions, habitat preferences, or feeding methods. For example, observation of feeding structures of an organism often elicits a number of different questions from students, such as what it eats or how it handles its food.

Outcomes

Many students have not actively explored biology: this is not limited to those raised in large cities. If students see beyond the cats, dogs and squirrels to the small organisms that are part of local biodiversity, this lab is successful. Students are fascinated by the collections of organisms that they never suspected were just under their feet and usually want more time to study everything that appears. Their samples often include various species of ants, centipedes, millipedes, spiders, mites, insect larvae, earthworms, nematodes and a host of microscopic organisms in pondwater. Students tend to ask better questions about these organisms when they have collected samples themselves rather than resort to passive inspection of a specimen provided by the instructor.

Patterns of species abundance and distribution may be difficult to quantify. Based on body size, the smaller organisms tend to be more abundant, both as individuals and as species (May 1988). These patterns tend to hold true in the students' samples. Global measures of biodiversity within taxa can be useful as a basis for comparison with the student samples, if this is done with caution. Our necessarily rough estimate of the number of species on earth ranges over several orders of magnitude, from 2 million to over 50 million (May 1988). Thus, frustrations arise as students discover that they cannot identify everything, and sometimes they will realize that this is what makes this lab exciting. They may be frustrated if the instructor cannot identify everything either, which can certainly happen even to experienced biologists. Depending on the experience level of the students, organisms can be grouped into appropriate categories that range from species to kingdoms and biomass can be estimated for each category. Species richness and diversity measures can be calculated using any general ecology text (Stiling 1996) or the class can develop their own index of diversity (Magurran 1988). Pooling data from all lab groups is necessary to generate appropriate sample sizes and, in addition, helps students appreciate different approaches and ideas of other groups.

Strengths and weaknesses of the sampling methods should be discussed: try to elicit the reasons for taking random samples and why the students probably did not sample in this way. Most students have a haphazard sampling scheme where each lab group samples “at least 5 different habitats.” Sometimes students sample every 10 meters along a transect that coincides with a streambed or other boundary. Even with planned sampling techniques, some species are certain to be overlooked: discuss why. What general patterns are noticed in species composition and diversity for the different habitats? Why?

Strengths of this lab are that it is student-directed and driven by their questions. They are actively involved with exploring areas that they may walk through every day. Biodiversity is demystified and made more relevant, especially when students consider what might happen if any of these species were to disappear from the habitat they sampled. If this is the students’ first open-ended inquiry, expect frustrations with not knowing exactly what to do and how to interpret results, although most will welcome the varied challenges that this field biology experience provides.

Acknowledgments

I would like to thank Marc Roy and Ethel Stanley for helpful discussions about interactive zoology teaching and my enthusiastic zoology students who have participated in this lab.

Literature Cited


AMCBT 41st Annual Meeting

Beloit College
Beloit, Wisconsin

October 16-18, 1997

Penultimate Program

Constructing Coherent Curricula: Pushing the Boundaries

Thursday, October 16th

6:00 PM - Registration and Reception
Logan Anthropology Museum

8:00 PM Tour of museums: Both museums have been rebuilt since the last AMCBT meeting at Beloit College and they have won architectural awards
Wright Art Museum

8:00 PM Opening Session
Dining Room
Welcome for AMCBT
Pearsons Hall
AMCBT President: Leona Truchan, Alverno College
Welcome to Beloit College: David Burrows, Vice President
for Academic Affairs and Dean of the College
Program Chair: Nancy Sanders, Truman State University
Local Arrangements Chair: John R. Jungck, Beloit College

OPENING ADDRESS (Public Welcome to Attend)
Is There Light in a Black Hole? Fast Plants and Film Cannery
Paul Williams, University of Wisconsin-Madison

9:30 PM Executive Committee Meeting
Cafe Bio
Chamberlin Hall

9:30 PM - 11:59 PM Open Labs: Student facilitators
Chamberlin Hall
1. Real Time Data Acquisition
204
2. Internet: Web Page Development
202
3. Computer Simulations and Tools
218
4. Digital Video Microscopy
208

Friday, October 17th

7:00 AM - Registration table will be open all day
Foyer
5:00 PM Please check your membership; inquire about audiovisual needs; general information.
Pearsons Hall
7:00 AM - Buffet Breakfast Dining Room
8:00 AM by Interest Group Pearson's Hall
8:00 AM Resources for Curriculum Construction Dining Room
8:30 AM

8:45 AM - CONCURRENT FIELD TRIP/WORKSHOP SESSIONS I
12:00 PM

1. Sugar River Canoe Trip (Limit 10)
   Dave Waller, Beloit College
2. Fossil Hunt (Limit 10)
   Carl Mendelson, Beloit College
3. Prairie Field Trip/Mini Workshop (Limit 10)
   Yaffa Grossman, Beloit College
4. DNA Labs - A Multi-Course Perspective
   Karen Klyczek, University of Wisconsin-River Falls
5. Internet and the Curriculum
   Tim Mulkey, Indiana State University
6. ChemLinks
   Sharon Anthony and Heather Mernitz, Beloit College

FIELD TRIPS:

WORKSHOPS:

9:45 AM - Morning Break (Refreshments) Cafe Bio
10:15 AM Chamberlin Hall

12:00 PM - Luncheon with Keynote Address Dining Room
1:45 PM KEYNOTE ADDRESS:
   Jeanne Narum, Project Kaleidoscope (PKAL)

2:00 PM - CONCURRENT FIELD TRIP/WORKSHOP SESSIONS II
4:00 PM

1. Case Writing I
   Margaret Waterman, Southeast Missouri State University
2. Computerized Lab Practicals using Digital Chisel & Connectex Color---Quick Cam by
   Harold Wilkinson, Millikin University
3. Case It! Update
   Mark Bergland, University of Wisconsin - River Falls
   Karen Klyczek, University of Wisconsin - River Falls
4. Potential Exhibitor Workshop
   Ed Sachs, MacLab, ADInstruments

WORKSHOPS:

FIELD TRIPS:

5. Dairyland Seed Tour: Evolutionary Biology in Agriculture (Limit 10)
   John R. Jungck, Beloit College
6. Wisconsin Fermentation Tour (Limit 10)
   Marion Fass, Beloit College

4:00 PM - Afternoon Break (Refreshments) Cafe Bio, Chamberlin Hall
4:15 PM

4:15 PM - CONCURRENT PAPER SESSIONS I
5:00 PM

1. Capstone Courses in Biology
   Dick Wilson and Kevin Williams, Rockhurst College
2. Galapagos data: Variety is the spice of life for Evolutionary Biology
   Sam Donovan and Jim Stewart, U. of Wisconsin-Madison, Frank Price,
   Hamilton College, and B. Williamson, Olathe High School, Kansas
3. Students Teaching Students: Habitat Tours, An Outdoor Lab Exercise
   Tom Davis, Loras College
4. Ethnobotany of Coastal Native Americans
   Austin Brooks, Wabash College
5. The Role of Computers in a Project Based Biology Curriculum
   Presley Martin, Hamline College
6. Chlamydomonas: a Useful Model System for Undergraduate
   Instruction and Research
   Steve Daggett, Avila College

5:00 PM - Writing for Bioscene: All presenters please attend! Upper Floor
5:45 PM  New Co-editors of Bioscene: Ethel Stanley and Tim Mulkey Pearson Hall

5:30 PM - Posters, Exhibits, and Social Pearson Hall
7:00 PM

7:00 PM  BANQUET (Prime Rib; Carved Turkey; Vegetarian) Pearson Hall
8:00 PM  BANQUET ADDRESS
   **TBA**

9:30 PM - Curricular Issues Discussion Upper Floor
10:45 PM Pearson Hall
9:30 PM - Bioscene Editorial Board Mead Conference Room
10:30 PM Pearson Hall

Saturday, October 15th
8:00 AM - Breakfast Buffet Dining Room
9:15 AM  by Interest Groups Pearson Hall
8:30 AM - ***Open Balloting*** Foyer, Pearson Hall
10:30 AM

9:00 AM - CONCURRENT WORKSHOP SESSIONS III
11:00 AM  1. Case Writing II
   Margaret Waterman, Southeast Missouri State University

   2. Internet Friendly or Internet Phobic?
      Uses of the Internet in College Biology
      Marion Fass, Beloit College

   3. Workshop Evolution: Using a BioQUEST simulation (EVOLVE) and
      the JMP statistical package to examine Fisher's Fundamental
      Theorem of Natural Selection.
      Frank Price, Hamilton College

9:00 AM - CONCURRENT PAPER SESSIONS II
9:45 AM  1. Freshman in Science Seminar
   Ed Kos, Dick Wilson, Anita Salem and Jim Dronberger,
   Rockhurst College

   2. The Largest Microorganism
      Austin Brooks, Wabash College

   3. Educational Forum I: Building Learning Communities
      Ann Larson, University of Illinois -Springfield
      Buzz Hoagland, Westfield State College
4. What? A Facilitated Conversation on Curricular Reform  
   CELS: Coalition for Education in the Life Sciences  
   Louise Liao, *University of Wisconsin - Madison*
5. Student Project Studies  
   Gopal Krishna and Suzanne Martin,  
   *Moberly Area Community College*
6. ...and undergraduate research for all.  
   Cynthia J. Horst and Susan E. Lewis, *Carroll College*

9:45 AM - **Morning Break** Pearson's Hall
10:15 AM  Posters, Exhibits, Refreshments  
           ***Balloting Closes at 10:30 AM***

**10:15 AM - CONCURRENT PAPER SESSIONS III**
11:00 AM  1. Commonalities in Biology  
           Bill Brett, *Indiana State University*
  2. Proposal Preparation Seminar for Biology Majors  
     Charles Bicak, *University of Nebraska - Kearney*
  3. Educational Forum II: What is a Biology Major?  
     Leona Truchan, *Alverno College*; Buzz Hoagland, *Westfield State College*  
     Rob Wikel, *Doane College*
  4. Including Invertebrates  
     Bob Wallace, *Ripon College*
  5. Visual Learning in the Curriculum  
     Ethel Stanley, *Beloit College*

11:00 AM - Luncheon with Business Meeting Dining Room
12:30 PM  **BUSINESS MEETING** Pearson's Hall

President: Leona Truchan, *Alverno College*

Election Results: Dick Wilson, *Rockhurst College*
Bioscience: John R. Jungck and Ethel Stanley, *Beloit College*  
           Tim Mulkey, *Indiana State University*  
Executive Secretary Report: Marc Roy, *Beloit College*

==========ADJOURNMENT OF REGULAR MEETING==========

12:35 PM - Executive Committee Meeting Conference Room
1:15 PM  Includes newly elected Exec. Comm. members! Pearson's Hall

If you have specific questions about the program, please contact:

Program Chair: Nancy Sanders  
Truman State University  
Kirksville, MO 63501-0828  
nsanders@truman.edu

If you have specific questions about the local arrangements, please contact:

Local Arrangements Chair: John R. Jungck  
Beloit College  
Beloit, WI 53511  
jungck@beloit.edu
Abstracts of Sessions

Concurrent Paper Sessions:

P.I.1.  Capstone Courses in Biology
Richard Wilson and K. Williams, Rockhurst College

Capstone courses are relatively uncommon in undergraduate biology curricula. Rockhurst College requires biology majors to take Advanced Principles of Biology during their senior year. Many upper level biology courses concentrate on narrow sub-fields of biology (such as genetics, evolution or immunology) in contrast this course is broad and integrative. We will describe the history, implementation, design and goals of our capstone course. The current format, testing procedures and student surveys of the course will also be discussed.

P.I.2.  Galapagos data: Variety is the spice of life for Evolutionary Biology
Sam Donovan, University of Wisconsin-Madison, Frank Price, Hamilton College, Jim Stewart, University of Wisconsin-Madison, B. Williamson, Olathe High School, Kansas

Evolutionary theory is the conceptual center of biological science; despite the broad range of phenomena biologists study, they all share as part of their “consensus practice” the principle of descent with modification. Understanding evolution is central to biological literacy, but providing an environment where beginning students can learn to understand the nature of evolutionary biology is difficult.

Part of the difficulty is that study of evolution requires generalization from numerous, diverse types of data. Presently, there are few satisfactory tools or practices to help students explore evolutionary hypotheses as biologists do. Instruction in evolution is typically limited to reading about the products of evolution. Even when data are examined in labs, data sets are small and limited in variety. Moreover, the activities are also not true to the types of reasoning that biologists use -- they are not conducive to realistic problem posing, exploration and explanation.

We attempt to address this gap with data sets and software that allow students in introductory biology to experience what it is like to “think evolutionarily”. We compiled diverse data on Darwin’s finches and on the Galapagos Islands from a variety of sources into a collection of electronic data sets. Example of data include: maps of vegetation, geology, weather, distribution of finches, morphological measures, foraging data, food availability, songs, and more.

Database software makes it easy for students to extract data of their choice. This allows students to move chosen data to a variety of software tools (e.g., spreadsheet and statistical packages, MacClade) for analysis. Students are encouraged to work in groups to use the data and their own knowledge to formulate questions, extract other data to answer those questions, and present their answers to others. Students using different data invariably come up with a variety of questions and hypotheses, just as scientists do. Our talk will examine the data, software tools, and pedagogical lessons of this project.

P.I.3.  Students Teaching Students: Habitat Tours, An Outdoor Lab Exercise
Tom Davis, Loras College

I have used habitat tours successfully in several of my outdoor class sessions ranging from Introductory Biology for non-majors to my Mountain Ecology course in Wyoming. Students first get a short introductory talk from me about the biogeography of an area. They are then assigned to 2 or 3 person teams and given a sheet of general questions on plants or animals to investigate. Students are released for 30-45 minutes to discover, identify, investigate, question and learn about the plant or animal components that they encounter. The groups come back, pick up the other groups and the instructor(s) and take them on a tour of the habitat.

The objectives of this kind of exercise are 1) to introduce students to the major plant and animal components of a specific habitat, and 2) to use this awareness to reduce anxiety, stimulate appreciation and foster the ability to ask questions about the environment on their own. This exercise also reduces the time spent in lecture format and gets the students personally involved in the learning process. I think that the learned information is retained longer and can be applied and compared later.

This session will first outline the process of habitat tours, discuss strengths and weaknesses and then put session attendees into groups and go on a few short outdoor tours.

P.I.4.  Ethnobotany of Coastal Native American Tribes
Austin Brooks, Wabash College

Native Americans of the Northeast and Northwest coasts used hundreds of plants for food, fuel, transportation, shelter, medicines and clothing. Among the most important plants in traditional Native American culture were trees. For many of Indian tribes of the East coast, birch was a particularly important species, while the West coast tribes used cedar in a great variety of ways.

P.I.5.  The Role of Computers in a Project-based Biology Curriculum
Presley F. Martin, Hamline University, St. Paul, MN

The Biology Department at Hamline University is in the process of revising its curriculum with the goal of placing more emphasis on active student engage-
ment, a research orientation, and independent thinking and learning.

A key element in our plan is the integration of computers into the curriculum. We have found that the computers are providing valuable support for our goals that go well beyond computer use per se. Areas of greatest support include support for group collaboration, facilitation of independent thinking, encouragement of high standards and professionalism, and intellectual growth and critical thinking. Our approach to computer integration, examples of student projects and presentations, and student evaluation of the role of computers in the curriculum will be presented.

P.I.6. Chlamydomonas: a Useful Model System for Undergraduate Instruction and Research
Steve Daggett, Avila College

Members of the genus Chlamydomonas are unicellular, eukaryotic, green algae. They are motile, photosynthetic, and are found in a variety of habitats. We have found that Chlamydomonas sp. provide excellent model systems for undergraduate senior research projects. There are a variety of problems that can be addressed using Chlamydomonas and they are relatively inexpensive to work with and easy to maintain. In addition, they can be incorporated into the laboratories of a number of courses including general biology, genetics, and cell biology. They can be used either to demonstrate specific phenomena or as models for short, independent research projects. Examples of how Chlamydomonas sp. can be used for each of these applications will be discussed.

P.II.1. Freshman in Science Program
Anita Salem, Jim Dronberger, Edward Kos, and Richard Wilson, Rockhurst College

Much has been written about the lack of student interest and abilities in the area of mathematics and science. Too often students rule out careers in these areas before they ever reach college. A variety of programs has been established to encourage pre-college students to become more involved and interested in science and mathematics. Of equal concern are those students who come to college eager and ready to concentrate on their studies in science and mathematics only to drop out by the end of their first year.

In 1990 the science and mathematics faculty at Rockhurst College entered into a planning process to address attrition problems. A year of biweekly meetings resulted in a November, 1991 proposal for a Freshman in Science, (FIS) program. The goal of the project was to build a support system for the curriculum that would encourage students to put forth their best effort. This paper will describe the planning process, program and results from a six year effort to keep students interested in science-related careers.

P.II.1. The Largest Bacterium
Austin Brooks, Wabash College

The largest known prokaryote (up to 600 µm in length), *Epulopiscium fishelsonia*, first was described in the mid 1980's as a prostist. It is found in the gut of herbivorous reef fishes and has not been cultured. Using small subunit ribosomal RNA gene sequence analysis, the phylogenetic position of this unique organism has been determined. It is a member of the low-(G+C) Gram positive group of bacteria. A bacterium isolated from the gut of guinea pigs, *Metabacterium polyspora*, has been shown to be closely related to *Epulopiscium* and may help to explain the unique method of replication seen in *Epulopiscium*.

P.II.3. Educational Forum I:

Building Learning Communities
Ann Larson, University of Illinois-Springfield
Buzz Hoagland, Westfield State College

NO ABSTRACT

P.II.4. What? A Facilitated Conversation on Curricular Reform
Louise Liao, Ph.D., Program Director
CELS, the Coalition for Education in the Life Sciences
http://www.wisc.edu/cels

In this session, participants are invited to join an open conversation about the culture of widespread curricular reform. Can we be clear about the critical components of "what" the students are expected to learn? While many of us have reflected on effective approaches to teaching/learning and on assessment/evaluation of student learning, it seems that we have yet to adopt guideposts regarding the diverse array of topics that comprise the life sciences curriculum. Moreover, if we have a collective responsibility for widespread reform, how should responsible curricular reform come about?

P.II.5. Student Project Studies
Gopal Krishna and Suzanne Martin, Moberly Area Community College

NO ABSTRACT

P.II.6. ...and undergraduate research for all.
Cynthia J. Horst and Susan E. Lewis, Carroll College

Several years ago the Biology Department at Carroll College instituted a student research program for all Bachelor of Science degree students. This program consists of a three-semester series of courses that introduces students to designing and carrying out a research project based on their own interests. This program functions both to allow students an opportunity to apply what they have learned in their course work to a project of their interest, and to build organizational, time-management, and personal responsibility skills. During the first semester of the program students are guided through the process of identifying and planning a research project, as they write a research proposal. During the second semester students gather the necessary equipment, learn the appropriate techniques, and complete a pilot study. During the final semester, they complete the research, write a final report and produce a poster to present at the annual sci-
ence symposium held on campus. We will be present-
ing the strengths of the program and its benefits to
students. We will also discuss challenges we are work-
ing to overcome such as how a small faculty can ac-
commodate large numbers of students who have a
wide variety of research interests.

**************

P.III.1. Commonalities in Biology
Bill Brett, Indiana State University

Earnest L. Boyer, in a report in Rethinking the Cur-
riculum entitled "Making the Connection: The Search
for Our Common Humanity," states that an under-
graduate curriculum should be based on what he calls
the human commonalities—those universal human ex-
periences that are found among all people and all cul-
tures on the planet. I believe that Boyer's proposal
can be extended to all living things, not just to humans.
This semester I am attempting to apply these "com-
monalities" to the material covered in both an Intro-
ductive Biology course for majors and a Human As-
pects of Biology course for general education students.
Hopefully this approach will require and stimulate
more critical thinking and relating of all organisms.

My evaluation of the students and their evalua-
tion of the course will provide some indication of the
success of this method of presentation. My presenta-
tion will include greater detail of the commonalities,
examples of how they were presented to the students,
and a comparison of student participation and reten-
tion of concepts in the course this semester with pre-
vious semesters.

P.III.2. Proposal Preparation and Research
Experience for the Biology Major
Charles Bicak, University of Nebraska-Kearney

Writing is an essential skill for the biology student.
As a tool, writing affords the student an opportunity
to learn; to assess how well biological concepts are un-
derstood. I will describe a two course sequence that
immerses undergraduate students in the process of
developing a proposal to design, conduct, and
complete scientific work. The first course (1 semester
hour) emphasizes the literature search and experimen-
tal design while the second course (2 semester hours)
focuses on the conduction of the research. This sec-
ond course culminates with a paper written in the con-
ventional format; introduction, materials and meth-
ods, results, discussion, and literature citations. In ad-
dition, students discuss their work in a 15 minute oral
presentation and submit a posterboard.

The two course sequence emphasizes written com-
munication yet is unlike a typical "writing intensive"
course. Both the proposal and final paper are often
short...perhaps 6-8 pages. Emphasis is directed toward
student understanding of the fluid nature of science.
That is, experimental designs often must be modified
as a study progresses, the relevance of literature var-
ies as data are acquired and analyzed, and the at-
tributes of the good scientist and writer are under-
scored. These include flexibility, persistence, the ca-
pability to be self-critical, and the dedication to dis-
covery or new ideas.

P.III.3. Educational Forum II:
What is a Biology Major?
Leona Truchan, Alverno College; Buzz Hoagland,
Westfield State College and Rob Wikel, Doane College

NO ABSTRACT

P.III.4. Evolution Towards an Open-ended
Teaching Strategy in Invertebrate Zoology
Robert L. Wallace, Ripon College

"If, as Louis Pasteur said, only prepared minds
make discoveries, science educators must ask who
prepares those minds and how is that preparation best
accomplished?"

I have been employing the precepts implicit in this
quote to establish new directions in my teaching. Here
I present a synopsis of my struggles to do this in my
favorite discipline, invertebrate zoology. No doubt
these explorations are no different from others, but the
progress I've made in reinventing my teaching may
be of interest to members of the AMCBI.

Over the past two decades at Ripon College my
exploration have moved me from a tell-'em-what-they-
need-to-know philosophy to a more open-ended teach-
ing strategy. This strategy holds that under many cir-
cumstances providing less information in the class-
room setting actually provides more learning (i.e.,
knowledge and insight). It certainly can provide much
more enthusiasm and it often reaches the disengaged
student, without isolating those already engaged. To
adopt this sort of teaching strategy I have had to aban-
don several notions, chief among these are you-need-
to-know-this and the-problems-I-cause-to-you-are-the-
most-important. With that in mind I have attempted
to develop a learning atmosphere that encourages stu-
dents to explore questions that are meaningful to them.

In my presentation, I will discuss the current struc-
ture and operation of my invertebrate zoology course,
offering examples of how I attempt to engage the stu-
dents, present specific in-class/lab questions that are
meant to stimulate discussion, and provide sample
problems that my students have explored in recent
years.

P.III.5. Visual Learning in the Curriculum
Ethel Stanley, Beloit College

Have you considered the use of biological images
as populations to be sampled? Visual datasets allow
students to practice necessary visual skills and explore
visual approaches to problem solving within specific
areas of biology. New visual datasets are presented
with an introduction to some of the visual learning
strategies along with their use in undergraduate
courses. Proactive design of visual learning experi-
ences within the biology curriculum is urged.
Concurrent Field Trip and Workshop Sessions:

W.1.1. Sugar River Canoe Trip, Dave Waller, Beloit College
A canoe trip down one of the small rivers between Brodhead and Monroe. Assemble at the west entrance of Pearson's Hall. (Limit 10 people)

W.1.2. Fossil Hunt, Carl Mendelson, Dept. of Geology, Beloit College
Several back road quarries waiting to show their treasures to you! Assemble on the first floor of Chamberlin Hall and see our fabulous fossil crinoid collection which is displayed there. (Limit 10 people)

W.1.3. Prairie Field Trip, Yaffa Grossman, Beloit College
Newark Road Prairie is a 32.5 acre wet-mesic prairie that is owned and maintained by Beloit College. It is a remnant of a larger grassland system that occupied portions of southern Wisconsin prior to European settlement. Prairie ecosystems are distinguished by the dominance of a diverse array of herbaceous (non-woody) plants and the low abundance of woody plants. They occur in areas where rainfall is not sufficient to support forest trees, especially in areas with frequent fires. When fire is excluded, prairies may develop into woodlands and forest.

The Newark Road Prairie was never plowed, but it was mowed in the past. Current management includes prescribed burning to limit the development of woody plants and retain habitat suitable for herbaceous species. Participants in the field trip will examine the biological diversity at the prairie using several measures of plant species diversity. The development of woody vegetation on parts of the prairie will also be investigated.

W.1.4. DNA Labs - A Multi-Course Perspective, Karen Klyczek, University of Wisconsin-River Falls
Labs involving DNA isolation and analysis are appropriate for almost any biology course. Several hands-on activities that can be adapted to a variety of course settings will be demonstrated, including:
1. OK, I've spooled DNA, now what? - an investigation into DNA isolation from various organisms and methods for determining whether the material isolated is actually DNA
2. Beyond OJ - forensic DNA analysis applications and case studies in medicine and ecology
3. Digital DNA - using readily available computer software to analyze DNA sequences obtained from the Internet

W.1.5. Internet and the Curriculum, Tim Mulkey, Indiana State University
NO ABSTRACT

W.1.6. ChemLinks: Revitalizing the Chemistry Curriculum
Sharon Anthony and Heather Merntz, Beloit College
The ChemLinks Coalition is a 5-year curriculum development project funded by the National Science Foundation's Division of Undergraduate Education as part of its "systemic change initiative" in undergraduate chemistry education. We are developing and testing modular materials about chemistry and the environment, chemistry and technology in society, and the molecular basis of life. With these modules, designed for students and faculty to use in a variety of institutional settings, we change the way students learn chemistry by challenging them to formulate and solve real problems using active and collaborative learning strategies. By starting with questions and developing the concepts and methodologies to answer them, we model how science is actually done. Treating real, interdisciplinary problems of interest to students, we promote scientific literacy for all students (both science and non-science majors) and demonstrate the importance of science to society.

To introduce you to the ChemLinks philosophy we will do an activity from the module "What should we do about global warming?". In this module, students investigate properties of greenhouse gases and their potential link to global temperature changes. Emphasis is placed on understanding the chemical reactions that influence greenhouse gas concentrations, and in particular, determining which of our daily activities contribute significantly to rising greenhouse gas concentrations. Your task will be to determine whether your breathing or your car release more carbon dioxide into the atmosphere in a year.

W.II.1 Case Writing I, Margaret A. Waterman, Southeast Missouri State Univ.
The use of realistic, complex problems can provide students with a way to bring meaningful connections to related science concepts. Because this approach uses complex, ill-defined problems, case-based learning can promote integration of content across several disciplines. As students explore the scenarios and suggest courses of action, they see a need for integrated and useful scientific knowledge.

This is designed as a two-part workshop. In part I, participants will see examples of cases used for undergraduate biology teaching, may experience learning with a case, and then they will begin to draft a case. In part II, a group case review approach will be used to help case authors plan further work on their cases. Discussion in part II will depend on participants' interests, and may touch on assessment, teaching approaches, integration of material across disciplines, and other topics.

W.II.2 Computerized Lab Practicals using Digital Chisel & Connectex Color---Quick Cam by Harold L. Wilkinson, Millikin University
Have you ever had to give a make-up for a lab practical? Maybe your students need a little practice before taking the actual practical exam. This workshop will inform you about an alternative that may save you some time and complaints. Using the Digital Chisel computer software for the Macintosh and the Connectex Color Quick Cam, you will learn how to construct computerized lab practicals with relative ease. Ability to use the Macintosh computer desired but not necessary.
W.II.3. Case It! - A Collaborative, Web-Based BioQUEST Project to Integrate Case-based Learning into National Biology Curricula Using Molecular Biology Simulations
Mark Bergland and Kim Mogen, UW-River Falls
This workshop will provide updated information on the status of the Case It! project first conceived at the 1995 BioQUEST Summer Workshop. Results of class-testing of the "DNA electrophoresis module for Case It!" will be discussed, and participants will be able to use the module to analyze existing cases or build their own case using internet resources such as Genbank.

W.II.4 Dairyland Seed Tour: Evolutionary Biology in Agriculture
John R. Jungck, Beloit College
Students often presume that "Evolution" as a class is highly philosophical, historical, literary, conceptual, and mathematical. My "Evolution" class is all that, but it is a laboratory and field course as well. One field trip that better helps them understand the commercial utility of a deep understanding of evolutionary biology is to Dairyland Seed International in Clinton, WI. The researchers at this company regularly do mass selection on hundreds of thousands to millions of plants in order produce a new commercial variety. They select for resistance to insects, bacteria, and fungi, for durability in cold, wet, hot, and windy conditions, and for low use of fertilizer. The intensity of the breeding and selection programs as well as the scientific background of the staff in population genetics, plant pathology, agronomy, soil science, and statistics unfailingly impresses many students who, though they have a strong love for working "outdoors," have never even considered agriculture as a potential scientific career, much less as an important area of evolutionary biology.

W.II.5. Wisconsin Fermentation Tour, Marion Fass, Beloit College
Beloit is a regional center for food processing, and now the home of Gray's Ale, an excellent microbrew. Join us for a tour of Gray's Brewery led by founder, Fred Gray, to discuss the role of microorganisms in food production.

*******************************

W.III.1. Case Writing II, Margaret A. Waterman, Southeast Missouri State Univ.
The use of realistic, complex problems can provide science faculty a way to bring meaningful connections to related science concepts. Because this approach uses complex, ill-defined problems, case-based learning can promote integration of content across several disciplines. As students explore the scenarios and suggest courses of action, they see a need for integrated and useful scientific knowledge.

This is designed as a two-part workshop. In part I, participants will see examples of cases used for undergraduate biology teaching, may experience learning with a case, and then they will begin to draft a case. In part II, a group case review approach will be used to help case authors plan further work on their cases. Discussion in part II will depend on participants' interests, and may touch on assessment, teaching approaches, integration of material across disciplines, and other topics.

W.III.2. Internet Friendly or Internet Phobic? Uses of the Internet in College Biology
Marion Fass, Beloit College
While I think that there are a variety of people who can address this -- Ann Larson from UIS is developing data sharing for student analysis, John Jungck uses genetic sequences from the web for between-species comparisons, I simply use disease surveillance information for my emerging diseases course and am working with students to assess credibility of web resources.

This will become critical as more of our students come to campus with internet experience, but not the skills to discern credibility or to find scientifically-important data. We will be challenged both to keep up with them and to guide them. We need to begin discussions on the best ways to benefit from these new technologies in the classroom and the lab.

W.III.3 Workshop Evolution: Using a BioQUEST Simulation (EVOLVE) and the JMP Statistical Package to Examine Fisher's Fundamental Theorem of Natural Selection
Frank Price, Hamilton College
This hands-on workshop aims to give participants experience with how software can be used to enhance students understanding of evolution, of experimental design, and of the value of examining multiple, diverse, rich and dynamic visual displays of quantitative information.

We will briefly introduce participants to EVOLVE, a BioQUEST simulation of microevolution. The program allows students to use demographic rates of survival, reproduction and migration of three genotypes to ask and answer questions about natural selection, genetic drift and gene flow. Importantly for students' learning, EVOLVE allows them to overlay graphs of data on any combination of nine different population parameters over time. However, students often progress beyond these basic graphs and ask questions that suggest more abstract representations of data, such as rates of change vs time, or vs allele frequency. Fortunately, EVOLVE results can be imported into other software tools that enable students to answer those additional questions.

The majority of the workshop will give participants experience with the JMP statistical package (SAS Institute) and how it can enhance students understanding of evolution, of data manipulation, and of the value of examining multiple representations of data. Compared to other software (e.g., spreadsheets), JMP is unusually easy to use, yet provides extraordinarily powerful data manipulation and rich and dynamic visual displays of data. Participants will use JMP and EVOLVE data to examine a variety of displays such as change in allele frequency vs frequency, and ternary plots of genotype frequencies. Finally, we will compute and graph mean and variance of population fitness to examine Fisher's fundamental theorem of natural selection, which states that the rate of increase in fitness of a population is equal to its genetic variance in fitness.
Biology at Beloit College

Biology is an extremely diverse field that has changed greatly from descriptive natural history to a quantitative, analytical science during the past century. Biology is now one of the most rapidly developing sciences, with an explosion of knowledge, techniques, and applications. Evolution, genetics, development, physiology, molecular and cellular biology, ethology, ecology, and many other subareas have been examined intensively. Results have been used to propose completely new answers to many of the traditional questions in biology.

The Majors
Biology students at Beloit enjoy the advantages of small classes, generous laboratory space, and state-of-the-art equipment. They are encouraged to interact extensively with their professors and with each other in an atmosphere of cooperative and collaborative learning. Most upper division biology majors have office space in the department, which gives them easy access to faculty, facilities, and friends. Students are encouraged to grow in their scientific thinking and to begin independent scholarly investigation as soon as possible. Most classes include laboratories, where students can learn the tools of the trade as well as the concepts, problem-solving techniques, and research strategies of the professions. In addition to their regular class work, many biology majors conduct independent research, participate in professional internships, and serve as teaching assistants.

Biology majors at Beloit are knowledgeable in their respective fields, and are keenly aware of their responsibilities as biologists and citizens.

It's nice to have an office to dump all your stuff, nice to have people around you who are in the same pit as you—even a professor at 12:00 midnight.

—Marianne Pedersen
Cali, Columbia
Molecular biology

Students interested in biology choose one of eight departmental majors:

Behavioral Biology,
Biology (Education),
Environmental Biology,
Integrative Biology,
Mathematical Biology,
Medical Biology,
Molecular Biology, and
Organismal Biology.

Students may also major in Biochemistry, an interdisciplinary major with courses in both the Biology and Chemistry Departments.

Each option includes a basic core of common courses in organismal biology, genetics, and biometrics, and concludes with the Biology Senior Seminar in which each biology major contributes to the production of a biological journal, The Beloit Biologist. Each option is designed to emphasize a particular area of biology by asking the student to choose from a coherent set of courses in biology, chemistry, mathematics, computer science, physics, geology, social sciences, arts, and humanities.

The Broader Context
The Biology Department offers a balanced curriculum with courses that provide a solid background for a variety of student interests. Our courses are designed to teach specific techniques, skills, approaches and basic information, while showing some of the beauty and intrigue inherent in biological investigation. Full-unit courses consist of four hours of lecture and a minimum of three hours of laboratory per week, and include zoology, botany, micro-biology, marine biology, biological issues, environmental biology, natural history, genetics, molecular biology and biotechnology, biochemistry, evolution, ecology, ethology, population biology, neurobiology, developmental biology, behavioral ecology, paleobiology, physiology and cellular and molecular biophysics. Other full-unit courses such as human biology and biometrics are offered in the "workshop" format in which lectures and laboratory activities are combined in three class periods per week. Each of the two-hour workshops is organized around activities or hands-on exercises designed to demonstrate specific principles or methods.

The department also offers half-unit courses on topics chosen according to student interest and faculty expertise. Previous topics include:

- histology,
- ornithology,
- immunology,
- bioethics,
- women in science, and
- history, philosophy and sociology of science.

As a student progresses through the biology curriculum, he or she develops the critical skills and confidence necessary for success after Beloit.

The sense of community on the biology floor is incredible.

—Laurel Clair
Maple Grove, Minnesota
Molecular biology

Finally, at the end of the biology experience at Beloit, each senior biology major presents a seminar and writes a critical review of a research area or a report of original research for publication in The Beloit Biologist. Each senior also reviews papers submitted for publication by other seniors to provide these other authors with constructive criticism. Each senior then revises his or her own paper in response to the comments and suggestions of the reviewers, and the papers are printed, bound, and distributed at commencement. The opportunity to analyze a particular topic...
of interest in depth, and to write for publication, offers a unique capstone experience for Beloit biology majors.

Internships and field experiences are important parts of the biology program at Beloit. Each year internships at research facilities such as Argonne Laboratories, Roswell Park Biomedical Research Institute, and the University of Chi-cago, as well as others in the Beloit area, are available to Beloit biology majors. Opportunities are also available through the Associated Colleges of the Midwest, which supports a Wilderness Field Station near the Canadian border in Minnesota, and a program in Costa Rica. These programs offer field courses that many biology majors find extremely rewarding.

Biology majors are also encouraged to conduct independent research, and such research is required for departmental honors. Many research projects are initiated each year under the direction of Beloit faculty, but the research itself need not be carried out on the Beloit College campus. Beloit biology majors have conducted research at many other venues, such as Albert Einstein College of Medicine, Mayo Clinic, Harvard University, Northwestern University, University of Wisconsin, Washington University, San-doz (Switzerland), Lincoln Park Zoo, and Wolf Park. Among the topics studied in student research projects are:

- the evolution of genetic codes,
- estrus termination in guinea pigs,
- parental care in red-winged blackbirds,
- the inheritance of coat color in pine voles,
- environmental impact of proposed highway corridors,
- immunofluorescent labeling of the cytoskeleton of rat hepatocytes,
- replication intermediates in the OriP region of the Epstein-Barr virus genome,
- gene cloning in maize.

Many of our students present their research at national annual meetings, such as the Eureka National Conference on Undergraduate Research, the American Ornithologists' Union, and the National Athletic Trainers Association.

Finally, many biology majors serve in the Peace Corps as teachers or specialists (e.g., Public Health, Fisheries, Forestry). In fact, Beloit is a per capita leader in producing Peace Corps Volunteers, and biology majors are the largest group from Beloit.

The Faculty

Marion Field Fass, associate professor of biology, earned a B.A. at the University of Pennsylvania and an Sc.D. at the Johns Hopkins School of Public Health. Her post-doc was at Harvard University. Fass teaches human biology, biological issues and courses on health, medical care and society, and serves as chair of the Health Care Studies Minor.

Yaffa Grossman, assistant professor of biology, earned a B.A. at Amherst College, an M.S. at the University of Massachusetts at Amherst, and a Ph.D. and post-doctorate at the University of California at Davis. She teaches botany, ecology, and environmental biology.

John R. Jungck, professor of biology and Med Chair of the Sciences, holds a B.S. and an M.S. from the University of Minnesota, and a Ph.D. from the University of Miami. He regularly teaches genetics, evolution, cellular and molecular biophysics, developmental biology, and biological issues, and has also taught mathematical biology, and history, philosophy and sociology of biology.

Carol Mankiewicz, associate professor of biology and geology, received her B.S. and M.S. from the University of California Los Angeles, and her Ph.D. from the University of Wisconsin. Mankiewicz teaches marine biology and natural history for the biology department.

Richard D. Newsome, emeritus professor of biology, received his B.S. from Western Michigan University and his M.S. and Ph.D. from the University of Saskatchewan.

I will remember most the friends I have made, both students and faculty.
—Eric Beck, Woodstock, Illinois
Environmental biology

Newsome teaches botany, environmental biology, and systematics, as well as interdisciplinary courses in agriculture and other aspects of applied botany and ecology.

Marc M. Roy, associate professor of biology, holds a B.A. from Lawrence University and a Ph.D. from the University of Wisconsin. Roy teaches human biology, physiology, neurobiology, and ethology, and is the chair of the Health Professions Advisory Committee, which helps students prepare for careers in health care.

Ethel Stanley, assistant professor of biology, taught botany and environmental studies for eleven years at Millikin University before joining Beloit as Director of Field testing and Editor, BioQUEST.org for the BioQUEST Curriculum Consortium which makes its home in our department.

Ken Yasukawa, professor of biology and chair of the department, received his B.S. from the State University of New York at Stony Brook. After receiving his M.A. and Ph.D. from Indiana University, Yasukawa was a post-doctoral fellow at the Rockefeller University, Field Research Center. Yasukawa teaches zoology, biometrics, population biology, behavioral ecology, and biological issues.

The Facilities

The biology department occupies one full floor and parts of two others in Chamberlin Hall of Science—a spacious, well-equipped and air-conditioned building completed in 1967. Six large laboratories (botany, zoology, biochemistry, physiology, genetics/microbiology, and general biology) are designed for class use, and many smaller laboratories house specialized, state-of-the-art equipment used primarily for advanced laboratory exercises, and stu-
dent and faculty research. Over three dozen students have office space in the department, with priority given to those conducting individual research, serving as teaching assistants, or working for the department.

Support facilities include a seminar room, a student lounge, an herbarium, a greenhouse with three temperature-controlled areas and a growth chamber, an animal room, a microtechnique laboratory, a sound-analysis laboratory, a tissue-preparation laboratory, a tissue-culture clean room, and a bacteriology laboratory with walk-in cold room and freezer. Virtually all of the department's facilities have been renovated over the past five years with funds provided by the National Science Foundation, the Kresge Foundation, and other external granting agencies. In addition, field exercises and research projects are conducted at the Smith Linnology Laboratory on the Rock River, the 32.5-acre Newark Road Prairie, and the 45-acre Chamberlin Springs Woods.

In addition to a complete complement of standard laboratory and field equipment, the department also has highly specialized equipment available for student use. For example, a real-time sound spectrograph, field recording equipment, and sound analysis computer programs have been used in classes and individual research projects to study the structure and function of bird song. A high-speed centrifuge, lyophilizer, electrophoresis equipment, growth chambers and laminar flow hood have been used to culture chick fibroblast cells and to clone DNA fragments. A Macintosh Quadra computer, a phase-contrast microscope, a TV camera, a digital still camera and high-speed image processing software enable biology students and faculty members to measure, store and manipulate virtually any macroscopic or microscopic image that can be observed. Biology students also have free access to two computer labs and other computers, which can be used to collect, store, and analyze data, to support advanced statistical software, and to run simulations of biological phenomena from the molecular to population levels of organization.

The renovations and equipment purchases that have occurred over the past few years were all undertaken with one goal in mind: to provide biology majors at Beloit the best possible learning environment. The biology department believes that its facilities and programs are second to none, and the success of our students testifies to our commitment to undergraduate education.

To Beloit College, I thank you for making me into who I am today.... When I leave, I will not forget you, Beloit, for you will be in my dreams always.
—Chanta Williams
Nassau, Bahamas
Medical biology

SECOND NOTICE TO ALL VOTING MEMBERS:
After forty years, a second name change is suggested:

AMCBT to ACUBE?

At the Steering Committee meeting in Beloit we addressed the issue of renewing our papers filed officially in the state of Iowa because they told us that we needed an official representative for the organization in the state. We elected Tom Davis to serve in this capacity. However, while we were on the discussion of these filed papers, many of us learned for the first time that the papers listed us as AMBT (note: no C). Many university members of the committee felt that if we had to change names officially that they would like to see U (university) in our acronym. After much discussion, the Steering Committee unanimously approved a name change to ACUBE (Association of College and University Biology Educators). Many felt that the name change better reflected the membership of the organization, would be more conducive towards attracting new members, and would be easier to remember. Such an action needs to be announced twice and then voted on at the annual meeting. Hence, this is the first announcement. A near duplicate of this announcement will appear in the July issue. The final announcement will be made prior to voting at the October annual meeting.

The second item for action (besides the constitution changes suggested later in this issue) is the classification of members. Heretofore, we will recognize five types of members: regular, honorary life, graduate student, retired, and sustaining. This simply clarifies a practice that we have been observing for some time.
About Beloit College...

Beloit College is Wisconsin’s first institution of higher learning, a place where the liberal arts tradition meets 21st Century challenges. Beloit College was founded in 1846 by a group of Yale graduates and Congregationalists. The college is located on wooded high ground above the Rock River, among two-dozen effigy mounds dating back to A.D. 700; the legacy of ancestors of the Winnebago tribes. Its 150 years of history has seen it grow to become a national college of international acclaim.

Beloit’s academic campus, which was modeled after those of New England colleges, now enjoys National Landmark status. Among its attractions are Middle College, the oldest building still in academic use northwest of Chicago; the spectacularly renovated Logan Museum of Anthropology and the Wright Museum of Art; and the historic Jeffris-Wood Campus Center (Pearsall Hall), a late-Victorian gem designed by the masterful Chicoanos Burnham and Root. The two-dozen effigy mounds on the campus lawn are the legacy of ancestors of the Winnebago tribes.

A coeducational and residential college for 1,100 students from around the world, Beloit takes pride in its membership in three influential consortia of 50 colleges that have led nation in the education of future scientists, business leaders, and international leaders. The World Affairs Center is the home of one of the most active student abroad programs in the country, and it honors students from over 40 countries by flying the flags of their countries in its lobby. Beloit is also the headquarters of the prestigious BioQUEST and ChemLinks science education consortia, located in the Chamberlin Science building.

You may want to take a virtual tour for an advance look at Beloit’s picturesque campus (http://www.beloit.edu).

The Beloit Community, along with the College, also contains programs for Beloit youth, the most notable of which is the Help Yourself Program, which provides an early intervention intercultural program to help students become interested in acquiring a disciplined curiosity and to understand the larger context of the world they live in.

The Center for Language Studies (CLS) Program brings students from all over the world to Beloit during the summer months, to provide instruction in a multitude of foreign languages.

TRAVELING TO BELOIT COLLEGE
Beloit, Wisconsin is conveniently located on Interstate 90, between Seattle and Boston ... seriously, we are on the Illinois-Wisconsin stateline, ninety miles northwest of Chicago and fifty miles south of Madison. Interstate 43 provides direct access to Milwaukee (70 miles) and Green Bay (another two hours north).

BY CAR: If you’re arriving via the I-90, take exit 185A and go west. This puts you at the end of I-43, which becomes Milwaukee Road in Beloit. Approximately 1.5 miles west on Milwaukee Road, you will pass over a railroad crossing. Remain on Milwaukee Road by following the overhead left-turn sign. At Chapin Street, turn right and follow it to College Street, where you will see Middle College directly in front of you. (City markers will guide you along this route.)

AIR & PUBLIC TRANSPORTATION: When arriving by air, we recommend flying into Chicago’s O’Hare International Airport. Beloit is less than 90 minutes from O’Hare, and the Van Galder Bus Company provides frequent limousine-bus service between O’Hare Airport and Beloit (the buses continue on to the University of Wisconsin-Madison). Van Galder buses pick up passengers at both the International Terminal and at the airport Bus/ Shuttle Center. Van Galder buses stop at the South Beloit Holiday Inn, which is about a mile from campus. The Van Galder bus schedule is printed on the insert.

GROUND TRANSPORTATION: The Van Galder Bus Company also services the Chicago Amtrak Station, and Greyhound Bus Lines serve Beloit with buses from Chicago going to Madison, Green Bay, and Minneapolis. Greyhound buses stop at the company’s station in downtown Beloit.
Proposed Constitution Changes
by
Ann Larson

During the past year the organization has been smoothly shifting the executive secretary’s duties and data from Ed Kos at Rockhurst to Marc Roy at Beloit. The plan for the transition engendered last year’s constitutional changes. In the process, it became apparent that the constitution had last been reviewed in the mid 1980s and that there was a need for it to be generally revisited and updated by recommendations that are presented to the membership. In this issue we present to you the routine changes in language and our reasons for them. In the issue before the fall meeting, they will be presented again in ballot form.

At the executive board meeting a subgroup reviewed the constitution, the bylaws and their appendices. The constitution is in good shape. In the By-laws, the description of the duties and terms of office are not written in a consistent manner and the appendices that present in detail the duties of each office definitely need to be updated. After a full discussion, we recommend to you that the by-laws should indicate that attendance at the meetings is expected, that positions be generally defined and that the terms of office be specified and that the executive board prepare a handbook of more detailed duties that can be updated without going through the process of amending the constitution. Below is the proposed new language of our bylaws. The changes involve: 1. defining the terms of all officers in SECTION 1 by adding the term description of the executive secretary, 2. the expectation of participation, the generalized description of primary duties and the reference to more detailed duties for each office in SECTIONS 4 - 11. Suggested changes are in italics.

By-Laws

ARTICLE 1. TERMS & DUTIES OF OFFICERS

SECTION 1. The term of office . . . . . The executive secretary shall serve for a minimum of three years and a maximum of five years at the discretion of the Steering Committee.

SECTION 3. The president-elect, in the absence or at the request of president, shall perform all duties of the president, recommend ...(rewritten to eliminate the "assumed" he)

SECTION 4. The first vice-president is expected to attend the executive board meetings, be the fall program chair and fulfill duties as outlined in the Executive Board Handbook.

SECTION 5. The second vice-president elect is expected to attend the executive board meetings and will be responsible for the program the following year and fulfill duties as outlined in the Executive Board Handbook.

SECTION 6. The second vice-president is expected to attend the executive board meetings, serve as the local arrangements at the host institution and fulfill duties as outlined in the Executive Board Handbook.

SECTION 7. The secretary is expected to attend the executive board meetings, keep minutes of the Association and Steering Committee and fulfill duties as outlined in the Executive Board Handbook.

SECTION 8. The executive secretary is expected to attend the executive board meetings, provide information about the state of the organization and fulfill duties as outlined in the Executive Board Handbook. The executive secretary is a non-voting member of the Executive Board.

SECTION 9. The past president is expected to attend the executive board meetings, evaluate the currency of the constitution and fulfill duties as outlined in the Executive Board Handbook.

SECTION 11. The association historian shall maintain a permanent archive of Association publications, minutes and other memorabilia. The historian is a non-voting member of the Executive Board.

As chair of the constitution committee, I will be contacting past officers to ask for their help in preparing the new handbook and making sure that all of our expectations can continue to be met. We hope to have a draft of the handbook ready for next fall so that past practitioners can edit it at the fall meeting. The Steering Committee to would like to approve the handbook at its next spring meeting with the stipulation that it be reviewed every five years.

In addition we will be asking your permission for the Steering Committee to appoint a Web Master to maintain our Web Site as an extension of our authority to appoint a print editor of Bioscience. Last year’s addition of an Association Historian reflects our respect for our past and the addition of an Association Web Master reflects our readiness to participate in the technology of the future.

VOL 23(2): August 1997

BIOSCENE 21
AMCBT 41st Annual Meeting Registration
October 16-18, 1997
Beloit College       Beloit, WI

Name:__________________________________________
Work Address:____________________________________

City:_________________________________________ State:_________ Zip:________________________
Office Phone:__(_____)____________________ FAX:__(_____)____________________
Email Address:________________________________________
Are you an AMCBT member?   Yes______________ No______________ Wish to join?__________
Name (to appear on name tag):___________________________
Institution or Company (to appear on name tag):___________________________

<table>
<thead>
<tr>
<th>Fee Description</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Registration* and Fees (LATE registration after September 15)</td>
<td>$78.00</td>
</tr>
<tr>
<td>Regular Member Registration*</td>
<td>$68.00</td>
</tr>
<tr>
<td>High School Teacher, College Student, Grad Student Registration*</td>
<td>$25.00</td>
</tr>
<tr>
<td>Guest Banquet Fee†</td>
<td>$20.00</td>
</tr>
</tbody>
</table>

Meeting registration fees include all meals (including a Prime Rib and Carved Turkey Buffet Banquet), refreshments at breaks, a reusable mug, and cost of field trips.
†Guest Banquet Fee includes the Prime Rib and Carved Turkey Buffet

Please check the field trips and activities in which you would like to participate on the list below. Indicate 1st and 2nd choice for Friday morning trips. If more than one person will be participating (i.e., spouses, friends), please note in second column.

Morning Workshops and Field Trips:
Sugar River Canoe Trip  ____________________________  ______
Fossil Hunt  ____________________________  ______
Prairie Field Trip  ____________________________  ______
DNA Labs Workshop  ____________________________  ______
Internet and the Curriculum Workshop  ____________________________  ______
ChemLinks Workshop  ____________________________  ______

Afternoon Workshops and Field Trips
Dairyland Seed Tour  ____________________________  ______
Wisconsin Fermentation Tour  ____________________________  ______
Case Writing I Workshop  ____________________________  ______
Computerized Lab Practicals Workshop  ____________________________  ______
Caselt! Update Workshop  ____________________________  ______
Maclab Demonstration  ____________________________  ______

Please make checks payable to AMCBT

Total Payment Enclosed________

To help us plan for receptions and meals, please estimate your arrival and departure times:

Arriving:_______________    Departing:_______________

Mail this form and check by SEPT. 15 to:
AMCBT
Department of Biology
Beloit College
700 College Street
Beloit WI 53511

News and Notes
ASSOCIATION OF MIDWESTERN COLLEGE BIOLOGY TEACHERS

NAME: ___________________________________________________ DATE: ______________________

TITLE: ______________________________________________________________________________

DEPARTMENT: __________________________________________________________________________

INSTITUTION: __________________________________________________________________________

STREET ADDRESS: _______________________________________________________________________

CITY: _______________ STATE: __________ ZIP CODE: ______________

ADDRESS PREFERRED FOR MAILING: __________________________________________________________________________

CITY: _______________ STATE: __________ ZIP CODE: ______________

WORK PHONE: ___________________ FAX NUMBER: ___________________

HOME PHONE: ___________________ EMAIL ADDRESS: ___________________

MAJOR INTERESTS:                                                               SUB DISCIPLINES: (Mark as many as apply)
( ) 1. Biology                                                           ( ) A. Ecology      ( ) H. Molecular
( ) 2. Botany                                                           ( ) B. Evolution    ( ) I. Developmental
( ) 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:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

RESEARCH AREAS:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

How did you find out about AMCBT? ______________________________________________________

Have you been a member before: ___________ If so, when? ________________________________
PLEASE MAIL
MEMBERSHIP APPLICATION
FORM TO:

Dr. Marc M. Roy
Executive Secretary, AMCBT
AMCBT Central Office
Department of Biology
Beloit College
700 College Street
Beloit WI 53511

Phone: 608-363-2429—FAX: 608-363-2052 or 2718
email: roym@beloit.edu

CURRENT DUES ARE $25.00
$15.00 for Graduate Students
Welcome to the ACUBE Home Page:

URL: http://papa.indstate.edu/amcbt

Featuring the online ACUBE archive for:

Bioscene: Journal of College Biology Teaching (1975 - present)
AMCBT Newsletter (1964 - 1974)
AMCBT Proceedings (1957 - 1972)

Other useful ACUBE information includes:

- ACUBE Executive Committee
- Editorial Board of Bioscene
- 1997 Annual Meeting of ACUBE
- Searchable Membership Database (coming soon)
- Online Membership Application
- Archive of the ACUBE (AMCBT) ListServer
- Scientific Meetings of Interest to Membership
- Position Announcements
- ACUBE in the News

The Association of College Biology and University Educators (ACUBE, formerly AMCBT) has developed its own list server to facilitate communication between its members. The purpose of the ACUBE mailing list is to provide announcements, information and discussion of a wide variety of topics.

Information mailed to:

amcbt-l@biology.indstate.edu

will be sent to all members of the list.

To subscribe/unsubscribe to the list, send email to:

list-admin@biology.indstate.edu

To subscribe, send this message line:

subscribe amcbt

To unsubscribe, send this message line:

unsubscribe amcbt

If you have any questions about AMCBT-L, contact Tim Mulkey at mulkey@biology.indstate.edu