

News and Views

Lesson from a Hawkless Day

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Throughout the morning they came, uniformly spaced squadrons of four to six ring-billed gulls, first tacking southward toward the Milwaukee skyline then, minutes later, sailing north, exploiting the same updrafts that had earlier expedited their southerly movement. Were they patrolling with the hope of spying a surface swimming saw-belly, or were they simply out for enjoyment, flaunting their prowess over the sky to the two of us planted so firmly on the solid ground of the cliff's edge? Whatever their reasons they must have been meaningful for those knowledgeable in the ways of gulldom. Yet, something struck me as odd about their behavior of alternating directions along an invisible flow of air that marked the transition between terra firma and the waves of Lake Michigan. It was only later that I understood this feeling of oddness. If this had been June, July, or even the middle of August I was sure that I wouldn't have had a second thought about the ring-bills' comings and goings in a moderate southeast wind. I would have probably marveled at their mastery of the air. But this was Labor Day Weekend, early September. I hadn't traveled to Lake Michigan to pay homage to the skills of silvery-winged gulls. I was there, even though all of my meteorological wisdom told me otherwise, to take part in the southward fall raptor migration along the undulating, western shoreline of Lake Michigan. I was there to join the raptors in a centuries old ritual welcoming fall and winter to the upper midwest. My head, filled with the wisdom of many years of schooling and of watching migrating hawks and their kin, told me that the raptors didn't "need" to move south this early in the migration season, especially against southerly winds. They needn't feel any urgency, northwest winds would come to reduce the effort necessary to traverse hundreds, or thousands of miles (in the case of the broad-winged hawks). Yet my heart and my spirit overruled the

reasoned stance of my head. They told me that I might miss some raptors, the odd broad-wing or two, a sharp-shinned hawk or perhaps even an osprey. On this day the wisdom of schooled knowledge and experience mocked the feelings of the heart. There were no raptors where, even a week before there was a wonderful flight that brought each bird's personal and species history soaring over the Concordia University campus. Beginning with a lone osprey at noon (I can remember thinking what great luck to have arrived right then, but was it really only luck) there was a steady movement of these twice a year commuters. Broad-wings, kestrels, sharp-shins, soaring red-tails (mostly immatures) and maybe a lone peregrine falcon that snuck by hugging the lakeside. Identifying or not identifying it was the difference in the time that it took to move one's head from a migrating swarm of dragon flies to the lake where moments before we watched and noted the need to be aware of what was happening lakeside as that was where a peregrine might appear.

Yet, even without a single migrating hawk, the day couldn't be considered a loss. For me, there is always the expectation that the next speck on the far northern horizon will be the one raptor, out of step with her brethren's conservative approach to the lure of the south, that flies to the same rhythm that brought the two of us to the shore to wait in the overcast. Anticipation, whether or not rewarded is an important feature of hawk watching.

Another reason why the day was not a loss is that it prompted me to consider why my connection to raptors, especially during migration. Surely, part of the affinity stems from the realization that, less than two hours from my city surroundings, and on the grounds of a University, I can do more than just watch. Like the students who study here I too have come to learn. I learn

because, when at a migration lookout point, I am a coactor in a centuries old drama. And, there is insight, about oneself and things natural, that comes from this participation. Others, college students, their families, and perhaps even their instructors, come by for a minute or two to look at Lake Michigan, perhaps drawn by some unrealized lure of their aquatic homeland. Yet, they are unaware of the drama overhead. As each small, often noisy, group approaches, I have mixed feelings. Should I let them in on my secret, allow them to share in the elegance of the soaring buteos, the flap-flap-sail of the accipiters, or do I let them miss out? Maybe they wouldn't care anyway (I once tried telling my neighbor why I wore binoculars while mowing my lawn in the spring. He didn't get it, even when there was a kettle of 150 broad wings directly over his house). Maybe it is only me that, because of some idiosyncratic peculiarity of birth or upbringing, thinks missing a hawk migration season, or even a single migrant, leaves an unfillable void. More watchers do not, I realize, dilute the experience or alter the spectacle. Nothing seems to have a diluting effect on the experience. I've watched raptor migration amid hundreds of onlookers at Pennsylvania's Hawk Mountain Sanctuary where a few decades earlier the carcasses of the migrating birds, shot by "sportsmen," littered the ground that we watched from. And it is not the watching that affects the spectacle from the hawks' vantage point. It is the saw, the plow and the gun, wielded in the international political arena that could affect them. But maybe I need to be more active in promoting the September through November run of this performance. The youth who study so assiduously in lab and library fifty meters away also need, especially when the classroom is so close, to study nature. Learning biology should, I believe, be connected to the spirit as well as the head, and that is not easily accomplished among formalin-soaked laboratory specimens.

Even after leaving I still wondered why the connection to raptors? My first experience, at least that I can recall, with a raptor occurred when I was a teen. It was in the large weedlot/hayfield behind John McGuire's house, one of the many fields that, as the summer wore on was converted into a ballfield by a group of salt-miners' sons and daughters. This was before the days when sports were over-organized by adults. We mowed, trampled, built pitcher's mounds and makeshift

backstops, and then played baseball for hours. We didn't want adults intruding into our world, and they being smart enough to realize this, or too busy to meddle, left us to ourselves until baseballs began to land perilously close to picture windows and passing cars. An interesting feature of McGuire Field was that the belt-high grass and weeds came right up to the first and third base lines. I don't remember whether or not this cut down on foul balls and straightened out our swings. I suspect not since searching for lost balls lengthened many an inning. On a July day, after having chosen sides and decided who had first ups by throwing a bat to another kid and then marching fists to the top to see whose thumb was the first over the rounded knob of the bat handle, a red-tailed hawk, wings pressed back along its body, plummeted into the field along the first base line. I had never seen anything like this. Rather than marvel at the playing out of a food chain exchange that I might have vaguely remember from school, I hurled the bat. Like a helicopter rotor it sailed, twirling in the general direction of the red-tail. As it left my hands I realized that my aim, even though the hawk was hidden by the tall grass and weeds, might have been better than I had intended. I still can remember shaking as I waited for the bat to roost, for it was not my intent to be a killer. I really can't be sure, but a life's worth of wisdom may have come to me as the few seconds of the bat's flight passed. It landed, right where the hawk had, moments before, hoped to lunch on a meadow mouse or inattentive rabbit. As the bat disappeared from sight, the red-tail emerged, as if from a grassy chrysalis, and with a few strong wing beats (but empty talons) left me to baseball, and maybe a lifelong interest in raptors.

Following the bat incident my enthusiasm for raptors lay dormant for years. It was rekindled by trips to Derby Hill, near Mexico New York (home of Grandma Brown's Baked Beans and a bar with giant plastic palm trees out front) and Hawk Mountain Pennsylvania. The point is not to trace the ontogeny of my interest in hawks, but to share the realization that my connection to hawks, one brought about by that the hawkless week in early September, is because of what they have taught me about science education. There is a need in science education for passion, of both the intellect and the spirit.

AMCBT In Cyberspace

Links to our Past, Present, and Future

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Introduction

This February, the steering committee members agreed to support a proposal to create an electronic archive for the organization. With the help of Ed Kos, executive secretary, the archives were organized, indexed and moved temporarily from Rockhurst College to Indiana State University where they were scanned and converted to .gif files. The *Bioscene* (1975 - present), AMCBT Newsletter (1964 - 1974), and Proceedings (1957 - 1972) files were placed on a server at Indiana State University by Tim Mulkey, secretary of *Bioscene* editorial board. An AMCBT Home Page was set up with links to a table of contents for each volume. This project was introduced to the membership through the *Biology In Cyberspace* workshop at Henderson Community College in Kentucky this September. Technical support for this project as well as current management of additional features such as Home Page links for conference registration and lodging and the new list-server for members of AMCBT continues at ISU.

The AMCBT Home Page is now accessible through Internet and the World Wide Web. A brief overview of the procedures involved and sample screens showing its features follow.

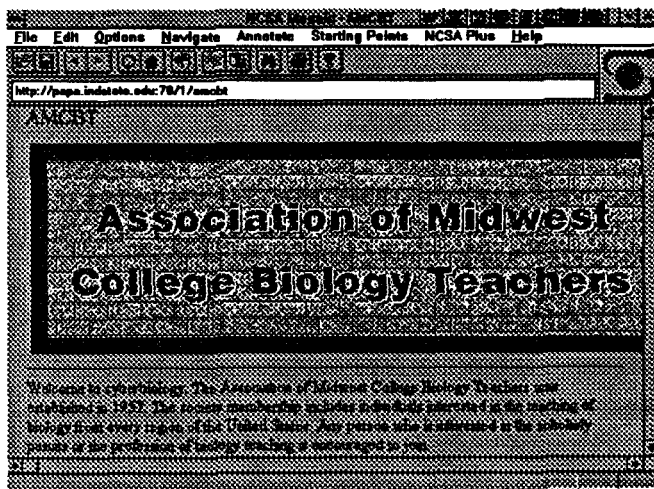
Internet is a network of computers that offers access to individuals and information throughout the world. Initially developed as part of the defense system, Internet now serves as the linking system between universities and is being developed for personal and commercial uses as well. Most of us are familiar with **e-mail** that is supported by the net, but there are other access possibilities as well. The computer that works with Internet at your institution can act as a **client** by asking for information from another computer at a different institution. The computer there acts as a **server** and will perform the actions required to get the information.

The **World Wide Web (WWW)** is a client-server system that supports many kinds of documents that include text, formatted text, pictures, and sounds. The server at Indiana State University makes the AMCBT files available through this system. Clients can use a hypertext viewer program such as **Mosaic** to more easily display and download the files (Free Mac and PC versions of Mosaic are available.) As long as you know the **URL** or **Universal Resource Locator** address, you can access the AMCBT Home Page using Mosaic as follows:

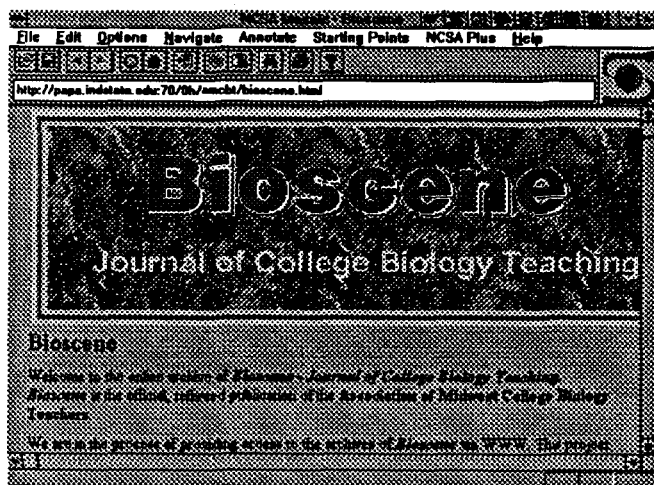
- 1.) Click on the Mosaic icon
- 2.) Under File, highlight Open URL
- 3.) Type in the URL:

<http://papa.indstate.edu:70>

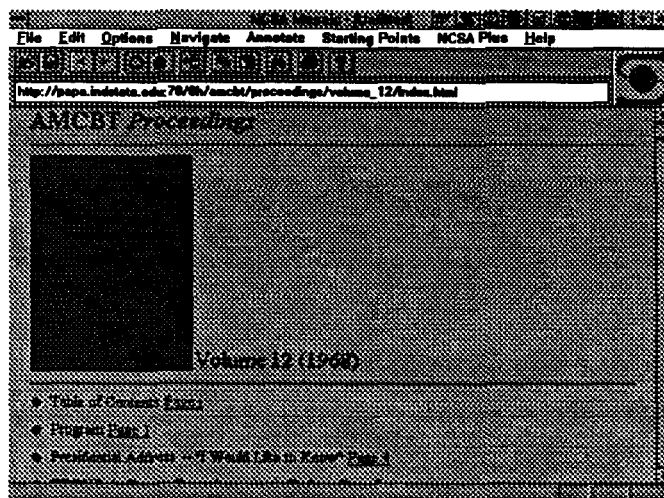
The ISU WWW/Gopher Server Home Page will come up first. Links appear as highlighted words in the text. They contain commands to produce an action such as sending you to another location. You should click on the **AMCBT** link to get to the AMCBT Home Page shown below.



You can click on the links in the AMCBT Home Page to get to specific pages such as *Bioscene* below:

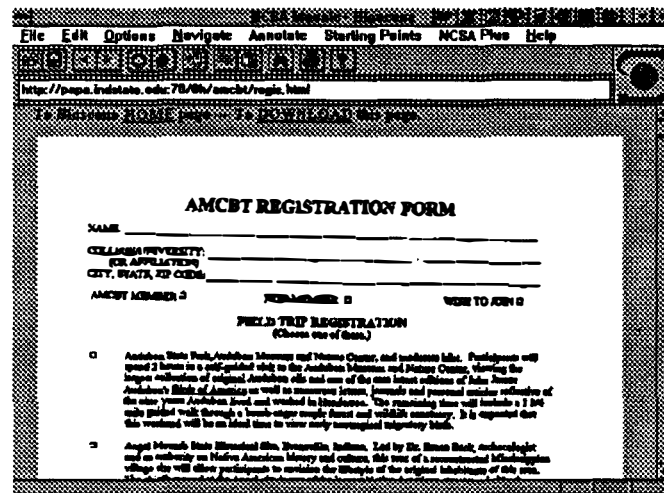


You might want to click on a link in the table of contents to get to specific information from past documents like the 1968 Proceedings:



To print a page, click on the small printer icon in the Mosaic menu bar. You could choose to **download** the file of any article or page to your own computer by using the download link just below the menu bar on the document pages. Since these are picture files, you not only get good quality printed pages, but you can easily incorporate the files into other documents.

Links on the Home Page can provide other useful information such as the registration form shown below.



Access to AMCBT documents, current information, and other members is available now. Please join us in cyberspace!

Today a Biology Course Must be More than a Biology Class

William J. Brett

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Prior to the start of the 1990-91 academic year, Indiana State University revised its general education program. Courses taken for general education credit must include significant speaking, listening, writing, and reading components. In an attempt to meet these requirements, I revised the Life Science 112 "Human Aspects of Biology" course. The course was designed to present five major topics or problems of concern to humans. The biological material was chosen to help the student consider these problems. Eight tasks, in addition to standard exams, were required for students' course evaluation.

Problems:

- environment and pollution
- populations
- food supply
- genetics and genetic engineering
- diseases and new methods of treatment.

Tasks:

- submitting pertinent newspaper articles with the students' comments
- summarizing articles from scientific journals
- attending departmental seminars
- presenting seminars
- evaluating the student seminars
- preparing and presenting library research project
- evaluating the research projects
- preparing test questions.

The syllabus informed the students that about 36% of the grade would be determined by completion of material outside formal examinations. This method of evaluation required the student to become involved in the course and to remain

involved for the entire semester, rather than just three or four times a semester when exams are given. The main objective of this type of course presentation was to relate biology to every day life and to provide experiences which would permit, in fact encourage, the student to maintain a life-long interest and participation in matters of a biological nature.

The students' response to the course can be summarized by three general statements: 1) they found the course interesting; 2) they were able to participate more than in other courses; and 3) they thought there was too much work.

An evaluation of the record of work completed for the course and students' comments resulted in a reduction of the required material; the departmental seminars and summaries of scientific articles were dropped. Whereas both of these items worked well with students in the biology majors' course, they did not seem to be as valuable in a general education course.

In the Fall, 1992, I was asked to teach a L. Sci. 112 course for Honors. To retrogress, Dr. Mulkey and I had directed NSF Young Scholars programs during the summers of 1989, 1990, and 1992. Ethical and social aspects of the biological material were included in the material for the Young Scholars programs. Dr. David Johnson, a faculty member in the Department of Humanities, had participated in the program. This interdisciplinary approach was well received by the Young Scholars; therefore, we thought we would try a similar approach in the Human Biology course for Honors students. The course was well received and Dr. Johnson and I offered it again in the Fall of 1993 and are presently offering it during the Fall semester, 1994. In addition to four exams presented during the course, the students are required to submit a minimum of 10 newspaper or popular magazine articles with a brief report explaining the significance of the article to them, two 500 word essays covering some aspect of the course, and a written essay selected from three possible

LIFE SCIENCES 112H "HUMAN ASPECTS OF BIOLOGY"

Date	Topic	Instructor	Date	Topic	Instructor
Aug. 24	Introduction	Brett/Johnson	14	Human Food Supply	Brett/Johnson
26	Moral Principles & the Life Sciences	Johnson	17	EXAM II	
29	Energy and Nutrients in Ecosystems	Brett	19	Cells & Energy	Brett
31	The Cycling of Nutrients	Brett	21	Photosynthesis	Brett
Sept. 2	Human Ecology	Brett	24	Cell Organization	Brett
5	LABOR DAY NO CLASSES		26	Cell Reproduction	Brett
7	Human Ecology	Brett	28	Chromosomal Inheritance	Brett
9	Human Ecology	Johnson	31	Science Will/Will Not Produce the Ideal World	Johnson
12	Population Growth & Control	Brett	Nov. 2	Human Genetics	Brett
14	Population & Moral Responsibility	Johnson	4	Genetic Disorders	Brett
16	EXAM I		7	Biotechnology	Brett
19, 21	Structure & Function of Reproductive System	Brett	9	Moral Issues in Biotechnology (Genetic Engineering)	Johnson
23	AMCBT MEETING NO CLASS		11	EXAM III	
26	Fertilization & Development	Brett	14	Homeostasis	Brett
28	Contraception	Brett	16, 18	Immunity & Diseases	Brett
30	Moral Problems with Reproductive Technologies	Johnson	21, 23	Sexually Transmitted Diseases	Brett
Oct. 3	Aging	Brett	25	THANKSGIVING BREAK	NO CLASSES
5	Moral Problems with Aging	Johnson	28	Moral Implications of Sexually Transmitted Diseases	Johnson
7	Nutrition and Digestion	Brett	30	Major Killers of Today	Brett
10	FALL BREAK NO CLASSES		Dec. 2	New Methods of Disease Treatment	Brett
12	Nutrition and Digestion	Brett	5	Moral Issues in Tissue & Organ Transplants	Johnson
			7	EXAM IV	

topics which serves as the final exam. Examples of essay topics include: (1) Does the type of life style we now practice make it possible or impossible to maintain a "healthy" environment; (2) What methods could or should be employed to reduce cases of STD?; and (3) What are the social and moral issues associated with: 1) population growth, 2) reproductive technologies, or 3) aging. That is, they took one issue to indicate what makes the issue problematic and to suggest a solution or answer (by making use of a "duty" approach or a "consequentialist" approach).

The schedule is arranged so that Dr. Johnson offers about 26% of the material. An outline of the schedule is included to illustrate how this is done.

Team teaching a course with a professor from the Humanities Department makes the course more interesting, pertinent, and challenging. The risk of indoctrinating rather than educating is always present. A report from the Hastings Center "Values on Campus—Ethics and Values Program—siln the Undergraduate Curriculum" by Bruce Jennings, James Lindemann Nelson, and Erick Parens was helpful to us in considering this prob-

lem. A few quotes from the article seem apropos. "What is the role of education in inculcating values that are essential to social cohesion?" "How should the distinction between values education and indoctrination be understood?" "Are there 'fundamental moral propositions' or 'core values' that we ought to teach?" "One participant suggested that a distinction can be defensibly drawn between (a) fundamental propositions or values that higher education should inculcate (such as academic integrity, honesty, nondiscrimination, and respect of persons); and (2) various positions on moral controversies (such as abortion or foreign policy) that colleges should equip students to think critically about without insisting on a particular position or view." "Do institutions and faculty have an obligation to model 'moral behavior'?" Dr. Johnson and I do not have answers to these questions, but our awareness of them influences how we present certain topics.

Most teachers are painfully aware that it is difficult to determine the value of their course for the students. An exam usually tests for what the instructor emphasized to the students. And that

value may be relatively short-lived as later tests over the same material have indicated. Many schools, including our own, use Student Evaluation Forms. Positive results mainly indicate whether the student did or did not enjoy the course. This enjoyment is often based upon the grade the student anticipates or how entertaining the instructor is. The students' evaluation of this course were relatively high. The students enjoyed the presentations from two instructors; additionally, they had gained a significant amount of information. But how does one determine the long term value(s) of a course? This is particularly important in the case of General Education courses. Whereas biology majors will get many more exposures to similar material, General Education students usually get only one shot at science, hopefully biology, at the college level. Their decisions as voting, working, and consuming adults will be influenced by their scientific background or lack of such.

Dr. David Johnson and I believe that there are advantages to a combined Biology/Humanities course. Can we substantiate this belief? Maybe the following items will help provide an answer.

1. Student evaluation forms indicate that students, almost unanimously, found the course interesting. Realizing that learning is an active process, students' interest is conducive to learning.
2. Attendance in this course is much better than in the other biology courses, both General Education courses and under-division Life Science majors' courses.
3. The written essays display a greater understanding of the implications of biological information and manifestations than is found on short essay questions in other classes.
4. There is considerably more class discussion than in "similar" classes. The department offers 8 Life Science 112 classes.
5. The comments accompanying the newspaper articles give evidence that the students examine the material from both biological and ethical/social aspects. The ultimate answer to these questions will only be provided in the future when these students make decisions as citizens in an ever warming, more diverse and crowded, and more electronically communicating world. One thing we are sure of, both Dr. Johnson and I enjoy this class very much and our attendance is almost perfect.

Congratulations to the newly elected officers:

Tim Mulkey, Indiana State University: President

Norman Woldow, Maryville College: Steering Committee

Bill Brett, Indiana State University: Steering Committee

Breaking Through Technological Barriers
1995 AMCBT Annual Meeting
ALVERNO COLLEGE, Milwaukee, Wisconsin
September 28-30, 1995
Call for Papers/Presenters

Some implications of this theme include: How do we make effective instructional use of new technology? Where is the on-ramp to the information highway, and how do we access it? How do we encourage greater use of new technology? How do we acquire resources for the purchase of new technology? How do we enable our colleagues to share the benefits of new technology with their students?

We invite you to become actively involved in next year's meeting. Please complete the remainder of this form and return it to Buzz Hoagland, next year's Program Chair.

Name _____ Title _____
 Dept. _____ Institution _____
 Address _____
 City _____ State _____ Zip _____
 Phone _____ Fax _____ E-mail _____

Do you have any suggestions regarding topics that could be presented at the Fall 1995 meeting?

Do you have any speakers in mind for the Fall 1995 meeting? If so, who?

Please check any or all of the following that you would be willing to do regarding the Fall 1995 AMCBT meeting:

- | | |
|--|--|
| <input type="checkbox"/> Chair a session | <input type="checkbox"/> Serve as a session recorder |
| <input type="checkbox"/> Present a session | <input type="checkbox"/> Share a lab or procedure |
| <input type="checkbox"/> Run for an AMCBT Office | <input type="checkbox"/> Present a workshop |

If you checked "Present a paper" or "Present a workshop," do you have a tentative title?

Brief description of the proposed presentation:

What theme would you like to see adopted for the Fall 1996 meeting?

Please return form and pass along program ideas to Buzz Hoagland at
 Department of Biology, Westfield State College, Westfield, MA 01086-1630. Telephone:
 413-572-5308,; FAX: 413-562-3613; E-mail: D_HOAGLAND@OWL.WSC.MASS.EDU

Association of Midwest College Biology Teachers LIST SERVER

What is a list server? A list server is an automated E-Mail service. Materials which are sent to the list are distributed to all members of the list.

What is the purpose of a list server? A list server allows information to be distributed to a large group of people in a simple and timely fashion. You can mail a message to a list and all participants receive the message. Any participant can respond to the message by mailing a reply to the list; the reply is distributed to all members of the list. Thus, sending one message allows a person to reach everyone who is interested in the topic of the list.

What are the uses of a list? Persons can mail information which may be of interest to the group so that everyone will receive it. Information can include meeting information, job announcements, questions, requests for materials, software programs you have developed ... your imagination is the only limitation. The advantage of a list server is one mailing of your material reaches everyone!

Who can subscribe to the AMCBT List Server? Anyone who has access to E-Mail can subscribe to the AMCBT List Server. No restrictions exist for membership to a list on Internet. Anyone who is interested in the AMCBT, its programs and goals are encouraged to subscribe.

How do I subscribe to the AMCBT List Server? It is very simple. An E-Mail message is sent to the List Administrator; the List Administrator is an automated program. To subscribe to the AMCBT list, send a message to:

list-admin@mama.indstate.edu

You do not need to place a subject line on the message; the subject line is ignored. The text of the message should be two simple words:

subscribe AMCBT

Nothing else is required. The List Server program looks at the "From:" line of your message and places your address on the list. If other information is included in the message it will be ignored. Actually, the list administrator program will send back a message which tells you what material in the message that the program couldn't understand. Remember that the computer cannot understand anything else you include in a message to the list-admin address. If you need help, send a message to the above address with the word help as the message; the server will send you a message which includes a list of current mailing lists to which you can subscribe on the list server and other general information. When you subscribe to the list, you

will receive two messages back from the list-admin program. The first message will have a subject of "Majordomo Results;" this message is from the majordomo listserver program stating that you were successfully subscribed to the list. The second message is a "Welcome to AMCBT" message which provides general information.

How do I send messages to the AMCBT list? Address your message to:

amcbt@mama.indstate.edu

The message will go to the list server and be distributed to everyone who has subscribed to the list. If you reply to a message sent to the list, your E-Mail program should automatically transcribe the above address to the "Send To:" line of the response you are writing.

How to I unsubscribe to the AMCBT List Server? If you decide that you do not want to continue participating in the list, you can unsubscribe by sending a message to the original address you used to subscribe:

list-admin@mama.indstate.edu

Again, you do not need to place a subject line on the message; the subject line is ignored. The text of the message should be two simple words:

unsubscribe AMCBT

All automated processing of subscribing, unsubscribing and requesting help with these processes require messages sent to the list-admin address. Messages which are to be sent to all members of the list are sent to the amcbt@mama.indstate.edu address.

What is the future of the AMCBT List? Since the AMCBT List Server is new, there are a variety of uses and enhancements which may be implemented. If there is interest in specific subtopics, we may provide separate Lists for these topics. For example, a job announcement or grant opportunity list may be provided; the possibilities are endless and will depend upon the users of the list. In addition, the messages to the list will be archived and placed on the AMCBT gopher/ WWW server. This will allow people to have access to correspondence which occurred on the list before they joined the service or find messages which they may have deleted from their personal E-Mail files.

If there are other services which you would like to see implemented, contact any Board Member of the AMCBT; every effort will be made to provide services which are requested by our membership.

Abstracts of Poster/Workshop Sessions

Included here are previously unpublished abstracts for 8 poster sessions and one workshop session presented at the AMCBT meeting in Henderson, KY, September 22 - 24, 1994.

P1. TESTOSTERONE RELEASE AND HEAVY RESISTANCE EXERCISE

Cameron Tremain, Park College, Parkville, MO

The human body's response to exercise is directly linked to the type of stress placed upon it. The endocrine system plays an important part in the way we adapt to heavy resistance exercise. Hormonal responses, primarily testosterone, can be dramatically increased utilizing high intensity training targeting large muscle groups. Programs using large muscle masses and enough stimulation will cause the release of testosterone into the bloodstream. Testosterone will directly target the muscle tissues that are being worked. The results are size and functional adaptations: growth and performance enhancement.

P2. EVOLUTION AND FUNCTIONAL ANATOMY OF THE STAY-APPARATUS OF THE HORSE

Lesly Taherzadeh, Park College, Parkville, MO

The limbs of the domestic horse, *Equus caballus*, are automatically unique. Members of the equine family control their resting posture by locking their limbs in a stance using a system of muscles, ligaments and tendons known as the passive stay-apparatus. The stay-apparatus is an energy saving adaptation that first appeared in *Dinohippus* between 2 and 5 million years ago. In fossil horses, the stay-apparatus is identified by the presence of an intermediate tubercle on the proximal end of the humerus.

P3. A COMPARATIVE STUDY OF THE DIGESTIVE SYSTEM OF OPISTHOCARNUS HOAZIN, THE HOATZIN, A "FLYING COW"

Rebecca Potter, Park College, Parkville, MO

In form and function, the digestive system of the hoatzin resembles that of a mammalian ruminant more than that of a bird. The hoatzin is unique as the only

bird with foregut fermentation.

The microbial action in the hoatzin's crop and caudal esophagus not only physiologically resembles that of a cow, but it also produces the odor usually associated with cows. Because of this odor, the hoatzin has variously been referred to as a stink bird, stinking pheasant, avian cattle, cow bird, and flying cow.

P4. POSSIBLE ANCESTORS OF THE MODERN WHALE

Michelle Affolter, Park College, Parkville, MO

Modern whales are thought to have evolved from four-legged terrestrial animals. Fossil evidence to support this theory is provided by three major fossil findings. *Mesonychid* is thought to be the first ancestor to the modern whale. It lived completely on land and only ventured into the water to eat. The *Abulocetus* lived its life half in and half out of the water. It probably came back to land to breed, but spent most of its time in the water. The *Basilosaurus* is by far the most important fossil found because it has remnants of hind limbs present with the fossil. These very small hind limbs were thought to be used as copulatory guides for the animal. From the pattern of the digits, it has been inferred that *Basilosaurus* and modern whales, descended from even-toed ungulates.

P5. THE FAMILY CROCODYLIDAE

Robby Gardner, Park College, Parkville, MO

Today's crocodiles all belong to the order Eusuchia. Out of the twenty species, they can be grouped into a single family, the Crocodylidae. This family is then subdivided into three subfamilies according to the appearance of the snout. The snout sets up a unique breathing apparatus that separates the oral cavity from the nasal passage. This allows the animal to breathe while its mouth is open under water.

P6. PACK BEHAVIOR IN WOLVES

Bonna Holladay, Park College, Parkville, MO

Pack structure and dominance order are probably the most significant aspects of wolf behavior and survival. The mainte-

nance of social order governs essentially all aspects of a wolf's life from when and how much it will eat, to with whom and if, it will reproduce. From the beginning of their lives, the wolf's behavior is geared toward teaching the social signals needed to communicate status and rank with the least amount of dissension and energy expenditure by the group.

P7. AN EFFECTIVE WAY TO LEARN/TEACH ABOUT DNA FINGERPRINTING

Ruth A. Dyure, Edgewood College, Madison, WI

Instructors of genetics often find that many concepts do not lend themselves to a simple lecture explanation. Audio-visual aids help of course, but I have found that well-designed interactive exercises can greatly help in engaging students in really trying to understand a difficult concept. Here I present an example of an exercise I designed to help students learn about DNA fingerprinting. While DNA fingerprinting is something that is talked about in the media all the time, few people really understand it. Therefore, I felt that a good classroom explanation of it was essential for any genetics course. I believe there are three basic elements of the exercise which make it successful: 1) it builds upon simple concepts that students should feel confident about (simple Mendelian inheritance, chromosomal recombination, and the technique of gel electrophoresis); 2) the exercise is very interactive, not a lecture at all, and as such the class moves very quickly (there is some class discussions to fill in worksheets); and 3) the exercise is "fun" and involves measuring, counting, and coloring, and is a bit like puzzlesolving. After doing this exercise, I suggest that the next topic discussed should be PCR as a technique for increasing the quantity of a minute DNA sample. . .but that's the subject for another poster!

P8. RAPID ISOLATION AND PURIFICATION OF PLANT DNA FROM ROOTS

Zeung K. Cho & Timothy J. Mulkey, Life Science Dept., Indiana State University, Terre Haute, IN

Isolation of plant DNA is known to be difficult because of the presence of high concentration of polysaccharide. DNA isolation from roots is especially difficult due to high concentrations of nuclease as

well as polysaccharides; roots typically have less DNA when compared to other plant parts. There are various standard methods of preparations of plant DNA which include the CTAB (hexadecyltrimethyl ammonium bromide) procedure, Polyethylene Glycol procedure, and Phenol/SDS (sodium dodecyl sulfate) procedure. These procedures are time-consuming, expensive, and even dangerous due to the use liquid nitrogen. We have modified the procedures of several protocols in which plant DNA isolation and purification are performed through grinding plant cells without liquid nitrogen. We have compared our new procedure of plant DNA preparation with traditional methods. We have found that this modified procedure is more rapid, less expensive, and results in purity and yield of DNA which compare favorably to other traditional methods. The advantages of this procedure over other standard methods include: (1) increased speed of isolation, (2) use of a microcentrifuge instead of an ultracentrifuge, (3) use of inexpensive chemicals, and (4) high yield of large fragments of high purity DNA. We have isolated DNA from maize and soybean roots by this method; we will report on the size and quality of the DNA isolated by this method as analyzed by various restriction enzyme digestions.

W1. ROLE PLAYING AND CLASSROOM THEATER IN TEACHING BIOLOGY

Pat Bowne and David Ferris, Alverno College, Milwaukee, WI

Role-playing and classroom theater are teaching methods in which students play the parts of molecules, cells, or tissues and re-enact a physiological process. They are particularly useful strategies for reviewing processes in which different parts of the body must cooperate and communicate. Topics especially suited to role-playing include Hydrogen Bonding, Oxygen Dissociation Curve, Digestion, and Blood Glucose Regulation. Role-playing is also useful for students who have learning differences or experiential learning styles.

Workshop participants will run through classroom theater exercises suited for small-group, laboratory, and whole-class formats.

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