

Kansas Association of Biology Teachers Newsletter

Volume 44 Number 2 - September 2003



KABT Web Site

<http://kabt.org>

NABT Web Site

<http://www.nabt.org>

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PRESIDENT'S COLUMN

By Sandy Collins

Several years ago I had the opportunity to attend the wedding of Jennifer Adams, the daughter of friends, a wonderful young woman, and a former student. Jennifer was 24, a college graduate and one who had remained close to some of her high school friends, many of whom were at the reception. As someone who teaches freshmen in a junior high it is not often that I have the opportunity to see "old students", so everything about the reception was a treat to me.

Doug and Andrew went into guffaws as they retold an event in class that had me temporarily outraged (as I entered the classroom they had tossed a rag around to each other, pretending it was Zeke, our class gerbil), Julie recounted that the recent death her dog had made her think of me (I should clarify, I am good at telling dog stories to my kids), and so the night went on. I was enjoying myself immensely - what wonderful kids I have been privileged to teach. At end of the gala affair, as we walked back to the car, Bob (my non-teacher husband) gave me

an amused look and commented "You didn't teach them much biology did you?"

I think of Bob's comment each summer as I plan for the impending school year. How successful will I be in guiding my students to a sound and lasting understanding of biology? It is an intimidating question. To begin, like many, my school's population has become increasingly heterogeneous. While I am concerned about all of my kids, the students that most trouble me are the ones whose only high school exposure to biology will be as freshmen. More than ever, everyone needs to understand basic biological and scientific concepts.

Given the fact that there is not sufficient time to teach students about every fascinating facet of biology, what knowledge do they most need so they can leave my class with a "sound and lasting" biology education? The standards do offer guidance in making these basic decisions. Where the decision making becomes more challenging is in determining the depth and degree of understanding that I should try to achieve. Do my students really need to be able to identify the enzymes involved in aerobic respiration? I do not think so, but I know many do.

Am I right in making this decision?

In providing a sound and lasting biology education for my students, some decisions I am certain of, but what is troubling is how to achieve these goals. I know that an understanding of the nature of science is crucial, but how do you truly teach this? Providing experience in designing and implementing student-generated experiments is helpful, as is reading about how science "is done". What else should I choose to include? An additional consideration is that these kinds of activities require a major commitment of class time – how can I be sure I am choosing wisely?

In planning a sound and lasting biology education, I know my students will need to see the interconnectedness of all of biology's major concepts. What can I incorporate to achieve this understanding? My students also need insights into how biological principles affect how we live our lives. How do you reveal this so they see it for themselves? A final concern (and I know I can think of more, given the time, but I will spare you) that is important to me is how can I get at least some of my students to see that knowledge of the living world can be exciting and valuable for its own sake?

I am not sure where I am going with sharing these thoughts. My thoughts ramble and meander, but sometimes that is necessary before I can find a clear path. In closing, maybe part of this perennial self-examination and thinking about what we do is also what we find exhilarating about teaching. We don't just have a job, we have a mission – and one that always provides the opportunity to be better.

Editor's Message By Harry McDonald

Thanks to Sandy Collins and Todd Carter for sharing two great ideas for labs/activities which you can find elsewhere in this newsletter.

Other labs, activities, letters to the editor, and student work are welcome. Send as an attachment to biologycctrack@hotmail.com.

• State Science Standards Update

In August, the Kansas State Board of Education voted to do a full, external review of the science standards beginning in summer, 2004. This will involve a committee of 25 looking at the entire set of standards. This committee will be appointed by the individual board members and by the Kansas State Department of Education. The signs are that this review will again involve the issues of the nature of science, long-term geologic and cosmic processes, and evolution. If Texas, Ohio, Minnesota, New Mexico, Pennsylvania, and other states are any indication, we can once again expect pressure from both creationists and the new-kid-on-the-block, Intelligent Design Creationism.

I encourage you to keep up with these issues. This newsletter will post updates. For more timely news, you are encouraged to visit www.kcfs.org.

Many of you will remember this organization from our last go-round on the standards. KCFS is a leading proponent of quality science standards for Kansas. I

encourage you to consider joining that groups efforts to coordinate our struggle to maintain quality science standards. Membership information is available on the website.

• STATE SCHOOL BOARD ELECTIONS

Speaking of the State Board of Education, with science standards again up for review, it is important that we elect board members who understand the need for quality science standards and quality science instruction. Five of the ten positions of the school board are up for election again in November of 2004. The primaries in August have proven especially important. Stay tuned in your area as to who is running and their position on science standards.

• MEMBERSHIP RENEWALS

Unless you are a life member, annual dues become due at the fall conference. Anyone attending the fall conference can renew their membership at that time. All others should use the renewal form on page 11 to mail in their renewal.

Your membership says you value this organization. Please share your opinion with a colleague and encourage them to join.

- I have mentioned before, (Newsletter, Dec., 2002) the possibility that this administration is "distorting and suppressing" scientific information through pressure from its appointed heads of governmental agencies. In an article in the New York Times, June 19, 2003, Andrew C. Revkin and Katharine Q. Seelye report that this may be happening again. It seems that the EPA's report on the state of the environment has had several, White House influenced changes. References to several studies which implicated car and industrial emissions as health and environmental risks were deleted. Jeremy Symons from NWF is quoted as saying, "Political staff are becoming increasingly bold in forcing agency officials to endorse junk science." Deleted was the introductory sentence, "Climate change has global consequences for human health and the environment." Inserted was, "The complexity of the Earth system and the interconnections among its components make it a scientific challenge to document change, diagnose its causes, and develop useful projections of how natural variability and human actions may affect the global environment in the future." The cynic in me says, "No need to teach good science because we will just rewrite science to suit our political/religious beliefs and to support those businesses which contribute to our re-election." COMMENT?

KABT 2003 BUDGET

KABT has, through its officers and board of directors, maintained itself as a financially sound organization.

Nevertheless, the organization has never had a formal budget. We have had traditional expenses, a steady flow of membership dues, and numerous, timely donations. What we didn't have was an ability to plan for future expenses.

Last January, the board directed the formation of a formal budget. That budget is published below. It is hoped that, by using a regular budgeting process, KABT will face the future from a position of financial strength.

<u>Category</u>	<u>2003 Budget</u>
Journal	\$400
Newsletter	\$600
Food-Set F-Trips	\$250
Mailing	\$450
Donations	\$0
Organizational	\$100
NABT Paymt Transfer	direct offset inflow/outflow
Web Site	\$50
KACEE	\$50
Bank Charge	\$0
Other	\$250
Presidential Expenses	\$50
Total Expenses	\$2,200
Estimated Income	\$2,200

PROFESSIONAL OPPORTUNITIES

- Frontiers in Physiology Fellowship

Science teachers of grades 6-12 are invited to apply for this year-long immersion in the world of cutting-edge physiology research. Teamed with a local scientist, Fellows do hands-on research for seven-eight weeks during the summer as well as explore and practice teaching methods that integrate inquiry, equity and the Internet into their classrooms. The Fellowship concludes with a trip to a scientific conference in San Diego, CA. Awardees receive a stipend of up to \$8500 over the year that includes travel and a materials mini-grant. Applications are due January 9, 2004.

For more information about the Fellowship and to download an application, check the American Physiological Society's web site (<http://www.the-aps.org/education/frontiers/app.html>) or contact Kathleen Kelly in the Education Office.

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- **Five Weeks for Graduate Credits, CEUs...Go Back to School with Fall JASON Academy Courses**

Earn graduate credit and CEUs with the online JASON Academy science courses designed for elementary and middle school teachers. Among the 15 five-week courses offered starting September 22 are Forces and Motion, Structure of the Earth, Teaching Science Safely, and Science and Young Children. The Academy courses cover most of the life, physical, and Earth science content areas in the National Science Education Standards and state science standards. Online courses allow you to work according to your timetable and to have a one-on-one relationship with online instructors. NSTA members receive a 10 percent discount on tuition, so courses cost only \$157.50 each. Complete course descriptions and online registration are available at www.jason.org/academy, or call 1-888-527-6600 or e-mail academy@jason.org for detailed information. Course enrollment is limited, so sign up now.

- Try Seminars on Science with the American Museum of Natural History. Top scientists from the museum conduct online courses in Dinosaurs Among Us: The Link to Birds, and Genetics, Genomics, Genethics. Sessions are from Oct. 6 to Nov. 16. Register at www.amnh.org/seminarsonscience

BRIDGES TO FUTURE OPENS DOOR FOR MINORITIES IN BIOMEDICAL SCIENCE

*Kansas State University partnership program involves Kansas community colleges
Submitted by Todd Carter*

Five community colleges in Kansas will participate in a new Kansas State University grant-funded partnership program. The effort is aimed at increasing the number of underrepresented minorities seeking bachelor or higher degrees in biomedical sciences.

The program's five partners include Seward County Community College, in addition to Garden City, Dodge City and Kansas City Kansas community colleges and Donnelly College, Kansas City.

The Kansas Bridges to the Future program is based on a three-year, \$640,000 research-training grant funded by the National Institutes of Health, according to Dennis Medeiros, head of K-State's Department of Human Nutrition. K-State will work with the five other institutions in a grassroots effort to identify, mentor and guide minority students with potential into biomedical careers, said Medeiros, who played a principal role in obtaining the grant.

"We propose a grassroots effort beginning at the community college level to develop biomedical career awareness, enhance the academic preparation skills of selected Bridges students, seek parental involvement, and devote resources to the community colleges to allow for sufficient academic advisement of these students," said Medeiros, who co-wrote the grant with John Exdell, K-State professor of philosophy. "The overall goal is to increase the number of Kansas minority

students pursuing graduate degrees in the biomedical field," he said.

CHOSEN DUE TO DIVERSITY

SCCC and the other two southwest Kansas community colleges were chosen because their campuses and communities include a high percentage of Hispanic students. Donnelly and KCKCC serve large African American populations. "Many of the community colleges are the first choice of underrepresented minorities in pursuing their higher education goals," Medeiros said. "Many are first generation college-bound students."

Individuals identified for the Bridges program are to receive dual admission into the community college and K-State. They'll also participate in a one-week summer institute to build awareness of scientific investigation and opportunities after the freshman year

After the second year, according to organizers, Bridges students will get the opportunity to work for eight weeks at K-State in the laboratory of a scientific investigator. Community college instructors will also get the chance to do eight weeks of summer lab work at the university to bridge gaps in research training and curriculum development.

The approach is designed to prepare students with a rigorous foundation of science, chemistry and math, and help assure their later success at a four-year institution. Students will also be awarded work stipends to enable them to serve as research assistants for two years under K-State's Developing Scholars Program.

According to Medeiros, the National Institutes of Health and other government agencies have recognized that not all underrepresented minority students transfer to four-year colleges or universities after entering community colleges.

PREPARATION & DEVELOPMENT

"What the National Institutes of Health are trying to do is use the community colleges as a vehicle for attracting students at that level, and getting them prepared and developing an interest in careers in biomedical research and allied sciences to transfer to four-year institutions like K-State," Medeiros said.

"The idea is to get them engaged at an early part of their college career, to not only build their interest up, but to also give them the necessary tools to become successful and give them some first-hand experience of what it's like to work in a biomedical environment," he said.

Options open to the students may range from medical schools to pharmacy schools, as well as research in biological or health related sciences.

"We want our majority students to be more engaged in other cultures, because in the real world that's what they will be working with," Medeiros said. "I think it is in their enlightened self-interest to have students from other backgrounds and themselves working side by side at the undergraduate level, and we hope to have some of our own underrepresented students stay in Kansas to work in the biomedical field," he added.

WEB OPPORTUNITIES

- **From the Texas Association of Biology Teachers: URL of the Week 6/30**

All Species Toolkit

This site can help you untwist the tangled taxonomy of some 874,000 species of animals, plants, and microbes. The search engine roots through 12 taxonomic storehouses, such as the World Spider Catalog, the Hymenoptera Name Server, and Species2000 (a growing database that aims to encompass all known organisms). Searches divulge information such as the species' classification, key references, distribution data, discarded synonyms, lists of subspecies, and sometimes photos. You can also retrieve DNA and protein sequences. Released this spring, the Toolkit is one of the first products of the All Species Foundation, a nonprofit organization that plans to compile a complete inventory of life on Earth within 25 years. <<http://www.speciestoolkit.org>>

- An organization, The Public Library of Science, has been advocating for free access to all scientific publications. (see www.plos.org) A good introduction to the concept can be found in *Bioscience*, September, 2003, Vol. 53, No. 9, page 804. The article is, "New Legislation Advocates Free Access to Scientific Publications, but at What Cost?" by Adrienne Froelich.
- Consistent with the philosophy of free access to scientific publications, try the new Journal of Biology, <http://jbiol.com/registration>. This is published by BioMed Central. Also go to www.biomedcentral.com/info/about/advocacy9 for more information on a wide variety of free, online resources.
- Try bqs.usgs.gov/acidrain. This site contains data and reports about acid rain. You can download weekly, monthly, and yearly information from 250 sites which monitor precipitation chemistry.
- Try www.science.gov. This site has 10 major science agencies providing links to technical reports, journal citations, databases, and fact sheets.

NEWS RELEASE

The Center for North American Herpetology,
Lawrence, Kansas
23 July 2003

KANSAS FROGS & TOADS MONITORED

Kansas is home to 22 kinds of frogs, treefrogs, spadefoots, and toads (known collectively to science as anurans), and we don't know nearly enough about them -- where they live, how many there are, and whether they are doing well, or poorly. But they are important animals in the natural ecosystem of our state, and their well-being is a compelling indicator of the health of their

living space, an environment that they share with the citizens of Kansas.

The Kansas Department of Wildlife and Parks (Pratt), in cooperation with the Sternberg Museum of Natural History, Fort Hays State University (Hays), and The Center for North American Herpetology (Lawrence), is pleased to announce the launching of the KANSAS ANURAN MONITORING PROGRAM (KAMP) web site, effectively immediately at

<http://www.cnah.org/kamp/>

KAMP was established in 1998 by the Kansas Department of Wildlife & Parks (KDWP) through a grant from their Chickadee Checkoff funds to Joseph T. Collins of The Center for North American Herpetology in Lawrence, Kansas. With the encouragement, cooperation, and advice of Ken Brunson (KDWP), Collins organized and operated a volunteer effort of over 50-75 individuals, who monitored the choruses of Kansas frogs, treefrogs, spadefoots, and toads over 45-50 routes across Kansas each spring and summer from 1998 through 2002.

The extensive data accumulated during those five years will eventually appear in its entirety on the KAMP web site; currently, data entry is complete for 2001 and 2002, and work on 2000 is underway. In addition to graphs showing chorusing strength and annual time span for singing activity for all 22 species, the web site features color images by noted wildlife photographer Suzanne L. Collins, call recordings compliments of Keith Coleman, Lawrence, Kansas, and a map by species of each site monitored, as well as access to information about routes and volunteers that ran them.

Earlier this year, KDWP approached Travis Taggart (Sternberg Museum of Natural History at Fort Hays State University) and requested that he organize and display the KAMP data online; the results of his excellent effort can be viewed at the above web site.

And this is just the beginning. Travis Taggart is currently developing an interactive component to the KAMP web site that will permit past volunteers to log on and continue to monitor these interesting amphibians, starting in January 2004. In addition, Kansans interested in joining the volunteer effort will be permitted to acquire a new route of their own. Each individual will be able to enter her or his data online, and watch as the information on their route (and all the other KAMP

routes) accumulates and builds through time.

Why? Because we have no idea whether Kansas amphibian populations are growing, declining, or holding steady. Eventually, because of KAMP, we will get a handle on the status of these semi-aquatic creatures, and plan accordingly for their future, and possibly ours.

For more information and confirmation of this release, contact:

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NEWS FLASH

KABT's own, **Pat Lamb**, has just been named as the Region 2, secondary, Kansas Teacher of the Year Nominee. Pat received a \$2000 honorarium with this award. He will be one of four finalists for the statewide secondary nominee. The state secondary finalist is, of course, in the running for The Kansas Teacher of the Year recognition.

CONGRATULATIONS PAT!!!!!!!!!!

MORE X CHROMOSOMES AMONG KANSAS BIOLOGY TEACHERS

The 2002-2003 KSDE listings of biology teachers (599) plus all advanced biologies, life science (mostly middle school) and horticulture where tallied for male and female first names. Of the total 910 teachers on this merged-purged list, 384 (42.19%) were women, 521 (57.25%) were men, and 5 (0.5%) had only initials and could not be categorized. Over half the middle school teachers are women, while the horticulture teachers are primarily

Kansas Association of Biology Teachers
Fall 2003 Conference
September 20, 2003
Barton County Community College
Great Bend, Kansas

Wetlands in Western Kansas to be Focus of Fall Conference

Overview

The annual fall conference will be held on the campus of Barton County Community College in Great Bend, KS Saturday, September 20, 2003. The campus is located north of Great Bend at 245 NE 30th road. Wetlands have been described as one of the most productive ecosystems in the world, comparable to rain forests and coral reefs. An incredible diversity of microbes, plants, insects, amphibians, reptiles, birds, fish, and mammals can be part of a wetland ecosystem. Physical and chemical features such as climate, landscape, geology, and the movement and abundance of water determine the types of organisms and their life history. Human impact also plays a significant role in wetland dynamics making them good systems for biocomplexity studies.

Playa lakes are unique, freshwater wetlands found in the High Plains region. The Playa Lakes Region includes approximately 89.5 million acres of southwest Kansas, southeastern Colorado, the Panhandle of Oklahoma, eastern New Mexico, and the panhandle of Texas. Estimates of the number of playas range from 25,000 to 37,000. Playas provide more than 395,000 acres of wetland habitat but they occupy only 2% of the total landscape. Playas are the principle native habitat for wildlife in the region because of the intensive agriculture surrounding them (Haukos and Smith 1994). The Playa Lakes Area in western Kansas is part of the Playa Lakes Joint Venture (PLJV) with the North American Waterfowl Management Plan. Dr. Dave Haukos, wildlife biologist, and Dr. Julie Thomas, College of Education, both at Texas Tech University, have developed a research and educational outreach program based on playa lakes ecology. Their presentation will address the biology of playa lakes, current research, and the opportunities for students and teachers in the classroom. They will share their experiences with *Math the Science Way: High Plains Ecology*, a year long project with Lubbock Independent School District classroom teachers who studied playa ecology and explored the activities in the Playa Teaching Trunks (developed by the PLJV). Supported by Eisenhower Professional Development Funds, this integrated math, science, and technology project helped teachers and their students identify the mathematics applications in regional ecological concepts.

Another wetland activity at the conference will be an afternoon field trip to the 7300 acre Cheyenne Bottoms Preserve about 5 minutes northeast of the Barton County Community College campus. Nearly one-half of all North American shorebirds migrating east of the Rocky Mountains and up to one-quarter million waterfowl stop at Cheyenne Bottoms to rest and feed during seasonal migrations. The shallow marshes averaging less than one foot deep are ideal habitats for wading shorebirds. More bird species are seen here than anywhere else in the state. Of the 415 bird species known to Kansas, 320 species have been observed at Cheyenne Bottoms. Tens of thousands of common shorebirds like sandpipers, plovers, phalaropes, avocets, godwits and dowitchers stop at the Bottoms to feed on the mud flats. Waterfowl can be seen throughout the year. During migration, numbers can climb to 250,000 ducks and geese.

In addition to wetland biology, there will be one session dealing with articulation between high school, community college, and university biology courses. Michelle Schoon, Natural Science Chair at Cowley County Community College, Brad Williamson, Olathe High School, and Todd Carter, Math and Science Chair at Seward County Community College will be panel members for a discussion exploring how educational institutions at all levels (K-16) might cooperate in ways that increase student success and student learning in biology. Michelle is the coordinator for the Kansas Undergraduate Biology Outcomes Project, a partnership between community colleges and Regent's Universities, which has developed core outcomes for non-majors biology and is currently working on core outcomes for majors courses. Brad Williamson is currently a biology teacher at Olathe High School and was a member of the Kansas Science Standards committee. Todd Carter also worked on the Undergraduate Biology Outcomes Project and is the President-Elect for KABT. The purpose of this session is primarily informational and to evaluate whether KABT can serve as an organizational model for K-16 articulation in Kansas.

Wetlands Resources

Playa Lakes Joint Venture. <http://www.pljv.org/> The sight has background and current project information. Also an aerial photo of wet playas in the Kismet, KS area after 8 inches of rainfall on May 17th, 2003.

U.S. Fish and Wildlife Service five wetland joint venture projects in the Mountain-Prairie region. <http://www.r6.fws.gov/nawm/nawmp.html>

Common Flora of the Playa Lakes by David A. Haukos and Loren M. Smith

Kansas Wetlands, A Wildlife Treasury by Joseph T. Collins, Suzanne L. Collins, and Bob Gress

Cheyenne Bottoms: Wetland in Jeopardy by John L. Zimmerman

Proposed Agenda

8:30 – 9:00 AM Registration

9:00 – 10:30 AM Session 1 – Playa Lakes

10:30 - 11:00 AM Intermission

11:00 - 12:00 PM Session 2 – Articulation
12:00 – 1:00 PM Introductions, Lunch, Presentations
1:00 - 1:30 PM KABT General Session
1:30 – 2:00 PM Cheyenne Bottoms Presentation
2:00 – 3:30 PM Cheyenne Bottoms Field Trip

Food and Accommodations

Friday night lodging is available at Camp Aldrich Conference Center at no charge to registered participants (RSVP required). Camp Aldrich is located two miles north of Highway 156 between Claflin, Kansas and the Cheyenne Bottoms Preserve. This area is the most comprehensively developed camp-site in Kansas. The 290 acres of rolling sand dunes and 40 acres of heavily wooded preserve have 70 species of wild flowers and grasses, 57 species of birds, plus native reptile, amphibian, and mammal species. Martin and Trails End lodges are reserved for KABT use. The lodges have central heat and air, restroom and shower, kitchen facilities, and a fireplace with a sleeping capacity of 40 each. Linens and towels are not provided.

All conference activities on Saturday will be held in the Math and Science Building on the Barton County Community College campus. Fresh fruit, danish, and drinks will be provided during registration and breaks. The noon meal is also included in the registration fee.

Registration

Members: \$15.00
Non-members: \$25.00
Conference plus 1 year KABT membership: \$30.00

We need to have a head count for food and beverages so RSVP by September 12, 2003 to Todd Carter at Seward County Community College. Email: tcarter@sccc.edu Phone: 800-373-9951 ext. 643. Please indicate if you will be spending Friday night at Camp Aldrich.

How do I get there?

Barton County Community College

A map with all highways leading to the campus is available at http://www.barton.cc.ks.us/maps/images/hiwaymap_web.pdf.

Campus Map - <http://www.barton.cc.ks.us/maps/images/campusmap.pdf>

The Math and Science Building is #7 located in the northeast corner of campus.

Camp Aldrich Convention Center

From US 56 turn north on KS 156 10.3 miles to NE 110 Ave. Turn left on NE 110 Ave. 0.7 miles to Camp Aldrich. From KS 4 turn south on KS 156 for 4.6 miles. Bear right on NE 80 RD for 0.3 miles. Turn right on NE 110 Ave 0.4 miles to Camp Aldrich.

RoadKill 2003

By Todd Carter

I ran across this project the other day and thought that the suggested activities would be great short-term class projects or long-term research projects for biology classes at any level. The RoadKill project started several years ago as part of a National Science Foundation teacher enhancement grant called Environet, awarded to Simmons College in Boston. Over the past few years the RoadKill project lost its technical support and the submission of data to an online database was no longer possible. RoadKill has now moved to the CommunityNet < <http://www.edutel.org/> > server of Edutel Communications, Inc. Listed below are suggested activities and research projects that I found interesting, creative, and best of all, easily adaptable for classroom use or for science fair projects.

Activities

- ◆ Predict which type of animals will be most often and least often killed by motor vehicles in certain geographic areas.
- ◆ Estimate populations of the types of animals in the area based on roadkill data.

- ◆ Create maps related to the project.
- ◆ Graphing of weekly road kill data.
- ◆ Use data to formulate plans for wildlife corridors in your community.
- ◆ Use simple statistics to analyze the roadkill data.
- ◆ Share data with other classes and schools.
- ◆ Investigate the habitats and life histories of the animals.

Research Projects

◆ Explore the relationship between the change to daylight savings time and the number of roadkills.

- ◆ See what observable effect extreme changes in temperature and weather patterns have on the number of roadkills.
- ◆ Compare differences in the number of roadkills on an urban road versus rural roads.
- ◆ Compare roads with different speed limits and the amount of roadkills.
- ◆ Compare the effects of moon phases on the number of roadkills.
- ◆ Compare number and types of roadkills in different habitats or weather conditions.
- ◆ Analyze the effect of animal diseases on the number of roadkills.

As you can see, there are a number of open-ended investigations that could be done. More opportunities for observing nature in our mobile society!!

SPECIATION ACTIVITY

Sandy Collins, West Junior High, Lawrence
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Teacher Background

My students seem to understand how natural selection, mutation and drift can lead to changes (in allele frequencies) within a species. The stumbling block for me has been in guiding them towards an understanding of how these changes can lead to the formation of new species. The activity that I describe below is one that I have used for the past two years with my freshmen biology students.

Teacher preparation is minimal: colored markers/pencils, poster paper for each group; large poster for the class; student direction sheets; rubric for written components of activity and team process behaviors. (If anyone is interested in the rubric, please email me.) For the class poster, I make an outline of the west coast of Africa, drawing in the island on which the ancestral species resides and then as many islands as there are groups in the class. At the end of the activity, have each group post their species and island descriptions on the class poster. Then each group can share with the class the evolutionary history they have constructed for their species. The ensuing class discussion has always been rewarding.

There are many ways in which this activity can be improved and modified. For example, to save class time, in place of having students generate all the species and island information, the teacher could provide data to each group. (I let students generate the information: this approach forces them think more carefully about if the species they are creating is realistic – and I think they enjoy creating their island and species.) Ideally, in executing this activity, each group would only develop their species as they received information from the group that was responsible for the island from which their species ancestors migrated. This can create a management problem as there will always be some groups with nothing to do. To remedy this, I set up the migration pattern so that the species spread from the “ancestral island” to several islands and then from one of these to the remaining islands. Surprisingly, this approach seems to be satisfactory.

Even “as is” I have found this activity to be successful in helping students understand the process of speciation. I think this is largely because the activity provides the opportunity for the teacher to provide instant feedback to students as they are working through these concepts and also provides students with the opportunity to teach each other. Their final essay (#3, “Process of Speciation”) and species and island descriptions are collected and evaluated (using the rubric distributed at the start of the activity).

Student Directions

Background

Islands have always been a prime target for the study of evolution. Islands are isolated, and therefore are essentially a living laboratory for the study of evolution. In this activity we will use our knowledge of Natural Selection and isolating mechanisms to devise a realistic scheme to explain how a genus of lizards developed on a group of islands off the west coast of Africa.

Preparation

This is both a class and a group project. To be successful, it will take a great deal of cooperation. As you complete your assigned task, you will need to help the class and your group with the remaining tasks. Each task must be completed within the allotted time.

- Group member #1. On your group’s poster paper, copy the series of islands from the large class poster. Make the islands large enough so that your group can record information as the class develops our speciation story. The island closest to the African coast is Terra Firma. The #1’s from each group should get together to give names to each of the remaining islands. Transfer this information to the class poster and to your group poster.
- Group member #2. The “2’s” from each group will meet together to describe a realistic habitat for the island that is closest to Africa. This island is Terra Firma. It is the island that was colonized by a species of lizards that is common on the west coast of Africa. The “#2 group” will need to briefly describe the *climate, geography, one carnivore, several kinds of small herbivores* and *major types of vegetation*. Make sure you keep the carnivore small and list a variety of types of vegetation. Record this information on the class poster. When you are done, return to your individual groups and transfer all the information to your group’s poster.

- Group member #3. Lead your group in describing the habitat of your island. Consider the location of the island in relation to Terra Firma. Your island needs to be somewhat distinct from Terra Firma but not in an unrealistic or drastic manner. Your group will need to describe the following: *climate, geography, one carnivore, several kinds of small herbivore animals and major types of vegetation*. Make sure you keep the carnivore small and list many kinds of vegetation. See to it that this information is transferred to both your group poster and the class poster.
- Group member #4. Record the class discussion notes on the ancestral species (that is, the lizard species that resides on the island of Terra Firma). As a class, we will need to describe the species in terms of *morphology (physical appearance and size), a few major adaptations for eating, for avoiding predators and for being “successful” on Terra Firma*. We will give this lizard species a scientific name. You will be responsible for transferring the notes to your group’s poster. Include a drawing of the lizard species: you may complete this task or you may assign this task to another group member.
- Group member #___. Listen in class to the path the lizard populations have taken as they have spread out over the islands. Make arrows on your poster to reflect this information.

Process of Speciation

You now have information on the ancestral species, its habitat (the island of Terra Firma) and the habitat of your group’s island. The next step is to use this information to demonstrate your understanding of evolution and speciation!

1. Describe the species on your island that is related to - has descended - from the ancestral species. The species should be “appropriate” knowing the habitat of the island, the ancestral species characteristics, and how natural selection and evolution operate. **Remember, we are predicting very small changes, since these animals are still in the same genus.** In your species description include: **morphology (physical appearance and size), a few major adaptations for eating, for avoiding predators and for being “successful”** on your island. Your group will be asked to explain how your species is adapted to your island AND how it is similar to the ancestral species. It should also be similar to the lizard species on the other islands. Your description should be written on a notecard that can then be taped to your poster (or the class poster, depending on how we proceed).
1. Draw a picture of your lizard species. Make the drawing on a notecard. Give your lizard species a scientific name. Remember, it is in the same genus as the ancestral species.
1. Explain the evolutionary history of your species. How did this species come to be distinct from the ancestral species? The evolutionary history of your species should include examples/descriptions of how the concepts listed below interacted to produce this new lizard species. The evolutionary history should be written in essay form.
 - Founder effect
 - Geographic Barriers.
 - Natural Selection. Be sure to include all components in your explanation: competition, adaptation, “over reproduction”, etc.
 - Reproductive isolation: temporal and behavioral
1. After each group has completed their work, we will share our ideas and try to construct an evolutionary history for the entire genus!

Biology News By JR Schrock Two Indiana State University researchers have found that **rattlesnake pits** not only detect the heat of warm prey but also **cool places to hide in a hot desert**, and this body-temperature control may have been the first selection factor for pit evolution (see August, 2003 *Journal of Experimental Biology*). Subjects who previous had not drunk tea were given 20 ounces of **black tea daily for two week resulting in higher levels of T cells that produce interferon**; the tea chemical L-theanine boosts these levels according to research by Arati B. Kamath in the April 28 *Proceedings of the National Academy of Science*. The **gene for sensing bitterness** (the common PTC test that detects the 70% who can detect it) has finally been located by NIH researcher Dennis Drayna (February 21 *Science*) who notes its value in avoiding toxic plants. The December 19/26, 2002 issue of **Nature** carries two investigations showing the small **spines on neuron dendrites** appear and disappear more rapidly in young mice than in older mice; this may relate to learning and memory. A Federal judge has reversed the government ruling by former Interior Secretary Bruce Babbitt that would have returned the “Kennewick man” 9,300 year-old skeletal remains to American Indiana tribes for reburial; lack of a “cultural relationship” between the remains and current tribes was critical in allowing scientists to continue to study the archeological find (see *Chron. Higher Educ.* Sept. 13 p. 18). Many biology teachers simplify rarity of species to habitat-limited species, rare because their habitat is rare; however **many species are dispersal-limited, rare because they lag behind disturbance-forced turnover of their habitat** (see *Science Findings* Issue 35, July). The February issue of *Nature Medicine* carries research that shows **sperm move toward the fallopian tubes that are warmer**; when closer to the egg, chemotaxis takes over. **Sperm latch together in packs to improve their chances of fertilizing the egg**, in the European wood mouse, according to research headed by English scientists Harry Moore in the July 2002 issue of *Nature*. The **lung organ waiting list stands at 81,139**, transplants so far are 2,188, and **available donors are 1,116** as of April 2003 according to the Spring 2003 *Bioethics Examiner*. The November *Journal of Zoology* reports that naked mole rats live far longer than most rodents, and research in an earlier issue of *Experimental Gerontology* indicates that **Blanding’s turtles may not age at all**. More teenage boys than girls feel pressured to have sex and **three-fourths of sexually active teenagers engage in oral sex** according to the report “National Survey of Adolescents and Young Adults: Sexual Health Attitudes and Experiences by the Kaiser Family Foundation at www.kff.org/content/2003/3218/. Researchers have finally identified the **larvae of sea lilies** (living relatives of Kansas crinoids), the primitive echinoderms that live in the deep ocean (see January 9, 2003 *Nature*). The May issue of *American Journal of Public Health* reports a study that finds Massachusetts **teenagers at high schools that distribute condoms are no more likely to have sex** or engage in sex earlier than other students; see www.ajph.org for the report

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Send Dues & Information To:

Kansas Association of Biology Teachers

18258 W. 157th Terrace

Olathe, KS 66062



Kansas Association of Biology Teachers

CALENDAR

20 Sept. 2003	KABT fall meeting, BCCC, Gt. Bend
27 Sept. 2003	KAS fall field trip, Z-Bar Ranch, Strong City
26-27 Sept. 2003	Cent. Plains Soc. of Mammalogists @ Bull Shoals Lake, MO
3-4 October 2003	KOS fall meeting, Winfield
8-11 October 2003	N.A. Symposium on Bat Research, Lincoln NB
8-11 October 2003	NABT annual convention, Portland OR
6 November 2003	KNBTA meeting, Ft. Leavenworth
7-8 Nov. 2003	KACEE annual meeting, Manhattan
8-9 Nov. 2003	KHS annual meeting, ESU - Emporia
13-15 Nov. 2003	NSTA area convention, KC MO
17 January 2004	KABT winter BOD meeting, Camp Williamson
21-27 Mar. 2004	KS Regents schools <u>spring break</u>
16-17 April 2004	KAS/MAS joint annual meeting, Rockhurst College, K.C.
5 June 2004	KABT spring field trip meeting, Ft. Leavenworth
18 Sept. 2004	KAS fall field trip, Schermerhorn Park
25 Sept. 2004	KABT fall meeting, Wichita? @ WSU?
20-23 Oct. 2004	NABT annual convention, Orlando FL