

Kansas Association of Biology Teachers

Volume 37 Number 2



NEWSLETTER

Calendar & Activities

Please mail, e-mail or phone meeting dates and other items of interest to biology teachers to John Wachholz, 2311 Applewood Lane, Salina, Kansas 67401-3707, 913- 825-7742 (Home) 913 - 826-4751 (School). E-Mail: jwachholz@midkan.com

Date	Event
May 2, 1996	Kansas Junior Academy of Science Spring Meeting - WSU
May 18-19, 1996.....	KABT Spring Field Trip - Matfield Green & Z-Bar Ranch Meet At 8:45 AM At The Headquarters of Z-Bar Ranch - More Information On Page 3
May 25-26, 1996.....	Kansas Herpetological Society, Field Trip, Cheyenne County
June 7-10, 1996	KABT Special Field Trip

Pawnee National Grasslands

Colorado Highway 14
Briggsdale, Colorado

Group Departure - Possible Car Pool - 2311 Applewood Lane, Salina, KS
Departure: 11:00 AM, Friday, June 7, 1996
More Information On Page 2

September 14, 1996	KABT Fall Meeting - Emporia State University
October 16-19, 1996	NABT Convention - Charlotte, NC
November 2-3, 1996	Kansas Herpetological Society, Fall Meeting, Lawrence H.S.
Spring '97.....	KABT Spring Field Trip - Gyp Hills
Fall '97.....	KABT Fall Meeting - Fort Hays State University

Your membership **expiration date** can be found on your mailing label. All dues are now payable on September 1st of each year. If an envelope was enclosed with your newsletter your membership has expired. Please use the envelope to mail your dues and the other information requested. If you send your e-mail address, you will receive a notice that your dues and registration have been received. A registration form appears on the last page of this newsletter.

"Life is the art of
drawing sufficient
conclusions from
insufficient
evidence."

Sam Bulter



Short Notes & Topics

PUBLISHING DATES FOR NEWSLETTER

The newsletter is published during the months of September, November, February and April. Manuscripts must reach the editor by the 15th day of the previous month. The KABT Newsletter includes abbreviated minutes of the official meetings, announcements of future activities, brief news notes, and other brief items of interest to biology teachers. Send your contributions to John Wachholz, Editor, 2311 Applewood Lane, Salina, KS 67401 (913) 825-7742. You may send you information for the newsletter to jwachholz@midkan.com.

Newsletter & Journal Information Needed

Articles are needed for the newsletter. Please help with the newsletter. The most helpful occurrence would be for all individuals sending information to the newsletter to send it via PSINet, INTERNET: wachhol.ksuvm.ksu.edu or on a disk. If you send it on a disk, any format is acceptable. ASCII text is easy for me to work with. Your help is appreciated. (PC, Mac, Apple - just send it!) Articles for the Kansas Biology Teacher should be sent to John Richard Schrock, editor KBT, Division of Biology, Box 50, Emporia State University, Emporia, KS 66801-5087. If your dues are not up to date you will no longer receive the Kansas Biology Teacher.

Outstanding Biology Student Certificates

These are available for students who you feel have completed a biology course under you and have shown ding achievement. Send your name and address to KABT Student Certificates, 2311 Applewood Lane, Salina, KS 67401-3707.

Please use these certificates as valuable awards for outstanding students.

NABT Contact Information

Address: 11250 Roger Bacon Drive #19, Reston, VA 22090-5202
Phones: 703-471-1134; 800-406-0775
Fax: 703-435-5582
E-mail: NABTer@aol.com

KATS now has presence on the World

KATS Web Site!

The Kansas Association of Science Teachers have established a web site for KATS at the following URL address: 199.201.192.20/ugd500/kats.htm.

Proposed Constitutional Changes

The Board of directors of KABT would like to propose the following changes to the Constitution. It is our intent to increase input and participation of the membership at this critical time for biology teaching. We will discuss these changes at a meeting during the spring field trip. Please come and join the discussion.

Article II

Section 1. The officers of the KABT shall be of two kinds, elective and appointive.

- a. The elected officers shall be President, President - elect, Vice - President, Secretary, Treasurer, six District Directors, **and two at-large Directors**

- b. The appointed officers shall include the Editor of the KABT Newsletter and the Historian.

Section 3. The terms of office for the President, President - elect, Vice - President, Secretary, Treasurer, six District Directors, and two at-large Directors shall be for two years.

Section 6

- b. The Historian shall serve as a consultant, archivist, historian, and shall assist the Executive Council as necessary.

Article III .Executive Council

Section 1. The Executive council shall consist of the President, Past President, President-elect, Vice - President, Secretary, Treasurer, six District Directors, and two at-large Directors.

Pawnee Grasslands June Trip To Colorado

On June 7, 1996 we will car pool from Salina and head out to the Pawnee National Grasslands in Northeastern Colorado. We will camp at the National Forest Campground near Briggsdale, CO.

A special thanks to Ed Butterfield, who with the Denver Audubon Society and University of Northern Colorado, sponsored a Grassland Institute. Presently Ed is setting up some events for us and also plans to be their to assist us with presentations. Ed is currently retired from the Aurora Public Schools and is past president of the Colorado Biology Teachers.

We will hike the Pawnee Buttes, observe Mountain Plovers, longspurs, falcons, study the ecology,

visit ranchers and other activities to learn first hand about the short grass prairie. Look for complete details in you April newsletter.

Following Is A Short Itinerary & Instructions:
Friday, June 7, 1996..... Depart From Salina
We will meet at 2311 Applewood, Salina, KS

All Individuals Responsible For Your Own Food!

Plenty of space to park cars for car pooling.
Departure..... 11:00 AM
Arrival Campground 5:00 PM
(It is reserved - No hard sided campers but you can camp a short distance away. We have the educational site reserved. This will serve as our headquarters for the trip.)

Saturday June 8, 1996

Sunday June 9, 1996

The following events will take place on above dates.

Ranger Presentation

Birding - Mountain Plovers

Ecology Presentation

Drive to Buttes - Hike Up Pawnee Buttes

Evening: Story Telling - Campfire - Sharing

Visit With Rancher - Grassland Management

Geology of the Area

Early Settlers

Natural History

It is of utmost importance that you let me know if you plan to attend. You will receive a complete itinerary the last week of May. This will include maps, directions, events, and all other important information. Please contact John Wachholz at (913) 825-7742 or Email:

jwachholz@midkan.com if you plan to attend. I will then mail you final details and directions. This saves printing everything in the newsletter.

Looking forward to a great trip and time to share, learn and appreciate the short grass prairie. Ed Butterfield will make sure we have a memorable field trip.

**Z-Bar and Matfield Green
Spring Field Trip & Meeting**

Dates: May 18-19, 1996

Place:.....Z-Bar Ranch & Matfield Green

8:45 AM Saturday Meet Z-Bar Ranch

Meet At The Headquarters

10:30 AM... Tour Historic House & Barn

Cost For Tour \$4.00 / Person

Lunch..... Bring Your Own

Afternoon.....Tour Special Areas

Evening..... Camp At Chase County Lake

9:00 AM Sunday Breakfast

Served At The School In Matfield Green

10:00 AM..... Emily Hunter Presentation

11:00 AM..... Tours & Hiking

Lunch..... Bring Your Own

Afternoon..Possible More Hikes & Tours

A Walk on the Wild Side

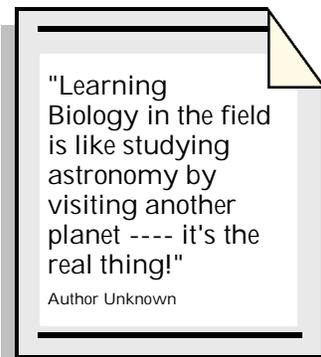
Steve Case

I have been out walking and being a nature watcher. Walking at the Prairie Center during this time of year is very exciting. There is a sense of expectancy with the coming spring. At the beginning of March you can hear the Western Chorus Frogs begin its spring chorus. Even with our confusing Kansas weather at this time of year, the male chorus frogs begin gathering at the small ponds around the Center. Calling loudly to entice the female frogs to the pool the males are signaling the beginning of this year's reproductive cycle.

As early as they are, the Chorus Frogs were not the first out. In February, smallmouth salamanders will began to gather while there is still ice on the ponds. Gathering in large numbers at several of our pools, the salamanders are also beginning the cycle of life.

Each of these species signals the awakening of the Prairie Community. Each walk along the trails will be different as the activity builds into a frenzy of activity during the spring and early summer. The warm season grasses of the prairie will be among the late comers to this annual cycle of life, getting active in June.

One other sign of spring to watch for on your walks is the arrival of the woodcocks. Each spring the Prairie Center is host to the woodcock, a small upland bird, and the rather bizarre mating flights of the male bird. The male stakes out a peenting ground in the grasslands. Just after sunset, the male bird begins calling loudly with a buzzing "peent". Every now and then the male bird flies up into the air in a spiraling upward flight, going high above the fields. The flight feathers of the bird make a most unusual whistling sound. The whistle begins on the upward spiral until at the top as the bird starts down, the whistle changes pitch and the frequency. The



bird then swoops and lands back on the same spot he started from. In his *Sand County Almanac*, Aldo Leopold describes this spring display as the "Sky Dance".

This Spring on our filed trip, KABT will be visiting Z-Bar Ranch and Matfield Green. These are great places to go exploring natural Kansas. It is even more enriching to share to with some of the best biology teachers in the State. I hope you will come and share your time and talents with us.

We will meet at the headquarters of the Z-Bar Ranch at 8:45 a.m. on Saturday May 18th. The Ranch is located about 2 miles north of Strong City on K-177. We will walk the South Wind Nature Trail and also tour the one-room Lower Fox Creek School. At 10:30 we will tour the historic house and barn. This is a guided tour and there is a cost of \$4.00 per person. Bring your own lunch and we will dine together in style on the bales of hay outside the barn. In the afternoon we have been granted permission to explore areas not ordinarily open to the public.

We will be camping at the Chase County State Fishing Lake, 2.5 miles west of cottonwood falls. There are pit toilets, but no running water at this facility.

On Sunday Morning we will journey to Matfield Green. Breakfast will be served at 9:00 AM at the school. It would be most helpful if you would make reservations by sending a card, phoning or an e-mail message to John Wachholz, 2311 Applewood Lane, Salina, KS 67401. The e-mail address is jwachholz@midkan.com. Emily Hunter, who is the Matfield Green coordinator for the Land Institute will prepare our meal. Then we will hear a presentation concerning what is happening at Matfield Green. Following her breakfast and presentation we will hike in the area and tour the town. If the weather is bad on Saturday evening at Chase County Lake we will journey to Matfield Green and stay in the school gym. You will also be able to shower at the school on Sunday morning. I hope you will join us. This is a great time and place for us to get together.

Society for the Study of Amphibians and Reptiles

Society for the Study of Amphibians and Reptiles will hold its annual meeting at the University of Kansas from 24 to 29 July 1996. Contact Cathy Dwigans (913) 864-3284 or FAX (913) 864-5074, for more information. The SSAR is the largest professional herpetological society in the world. Atten-

dance will probably be 600-700.

A Cooperative Era of Reform in Science Education

A Joint Statement by the National Academy of Sciences, the American Association for the Advancement of Science, and the National Science Teachers Association

More than a decade of thoughtful study and effort have culminated in a broad consensus on reform in science education. Joining in this consensus on science education reform—and in the effort to help bring it about—are thousands of individual scientists and educators and hundreds of scientific and educational organizations. Prominent among the organizations are the National Academy of Sciences' National Research Council (NRC), with its long history as advisor to the federal government on matters relating to science and technology; the National Science Teachers Association (NSTA), with its network of a broad range of science educators; and the American Association for the Advancement of Science (AAAS), with its extensive multidisciplinary network of scientists and scientific societies interested in education. Their shared vision of science education reform includes several general principles:

- The first priority of science education is basic science literacy for
- Education for universal science literacy will, in addition to enrich
- Science literacy consists of knowledge of certain important scien
- For students to have the time needed to acquire essential knowlec
- Effective education for science literacy requires that every studer

These principles provide the foundation for the reform efforts of the NRC, the NSTA, and the AAAS. Although they are but three organizations among many in the scientific community that contribute significantly to reform in science education, they have provided leadership in formulating the science education standards and fostering their implementation. Each has special—but quite different—responsibilities for the success of the effort.

The National Research Council has undertaken to establish a broad set of standards for effective science education and to secure endorsement of those standards from all major stakeholders in science education. At the request of the U.S. Department of Education, the National Science Foundation, and other science-based federal agencies, the NRC has

developed National Science Education Standards (NSES) which include recommendations concerning science content for grades K-4, 5-8, and 9-12, teaching, professional development and assessment practices, school science programs, and the overall K-12 educational system. In developing NSES, the NRC engaged many scientists, teachers and other educators, parents and other interested citizens. In the years that will follow its release, the NRC intends to monitor the reception and use of NSES, report to the nation periodically on what progress is being made toward its realization, and improve it if the need to do so becomes apparent. The NRC will also take steps to engage the nation's leading scientists and science institutions in efforts to facilitate science education reform in the nation's schools and to improve the undergraduate science education of future teachers.

The National Science Teachers Association has developed a large array of programs and materials to help science educators improve curriculum and instruction. NSTA is the world's largest association of teachers of science and is the publisher of *Science & Children*, *Science Scope*, *The Science Teacher*, and *The Journal of College Science Teaching* magazines for elementary school, middle school, high school, and college teachers, respectively, and of many other resources designed to serve science educators at every level. NSTA initiated the steps that resulted in the NRC assuming the responsibility for crafting NSES, is now preparing guidelines to help teachers put NSES into curriculum reform, and will conduct nationwide workshops that link NSES to practices in the classroom. In addition, training institutes on using NSES will be conducted for science teachers and supervisors at NSTA area and national conventions. To reach even more individual teachers, NSTA is developing new science curricula, such as "Scope, Sequence, and Coordination," and will create an Internet site for teacher-to-teacher conversation in implementing the NSES.

The American Association for the Advancement of Science has set forth a vision of what students should know and be able to do at different grade levels on the way to becoming science literate adults. As the world's largest federation of scientific and engineering societies and the publisher of *Science*, AAAS has a long history of working with schools, libraries, science museums, community organizations, and the media in behalf of science literacy. In 1985 it launched Project 2061 to help foster long-term systemic reform of science education. Project 2061's first publication, *Science for All Americans*,

should know and be able to do in science, mathematics, and technology. Four more years of work, involving hundreds of educators and scientists, led to *Benchmarks for Science Literacy* (1993), which sets out a coherent set of learning goals for students to reach by grades 2, 5, 8, and 12. Those reports are being widely used to revise state and local science-curriculum frameworks. The project is developing additional tools, such as *Resources for Science Literacy*, to help educators redesign the curriculum and restructure other aspects of the education system.

Together these three organizations play mutually supportive roles in helping the nation reform K-12 science education. The NRC, NSTA, and AAAS are already working together to that end and they will continue to do so, for there is much still to be done before reform is fully realized. Fortunately, they are joined in this by the American Association of Physics Teachers, the American Chemical Society, the Earth Sciences Coalition, the National Association of Biology Teachers, The Council of State Science Supervisors, the National Science Education Leadership Association, the National Council of Teachers of Mathematics, the National Science Resources Center, the New Standards Project and a host of other organizations and individuals who care deeply about the science education of all our children. This is truly the beginning of a cooperative era of reform in science education.

- ◆ Rodger W. Bybee, Executive Director Cent for Science, Mathematics and Engineering Education, NRC
- ◆ James Rutherford, Chief Education officer and Director, Project 2061, AAAS
- ◆ Gerald F. Wheeler, Executive Director, NSTA

In Defense of Fundamentalism

Let me state it right up front: I am a fundamentalist. Evolution is fundamental to everything I do as a biologist. The concept of evolution is not just a two-week unit in the second half of the course. It is, instead, the very fabric from which the tapestry of modern biology is woven. To deny or eliminate the teaching of evolution as fact destroys the essential content of the discipline and threatens the principles of academic freedom upon which our educational system-and indeed our larger society-is based.

A bill currently before the Tennessee Legislature would make the teaching of evolution as face a crime. The legislation, Senate Bill 3229 and House Bill 2972, states:

No teacher or administrator in a local education agency shall teach the theory of evolution except as a scientific theory. Any teacher or administrator teaching such theory as fact commits insubordination . . . and shall be dismissed or suspended. . . .

This bill is so fraught with problems that we can only say of the Tennessee Legislature what Vice President Al Gore said of the United States Congress in a recent speech:

They're approaching science with all the wisdom of a potted plant. The growing disconnect between science and democracy evidenced in this bill should send shivers up our spine.

It is especially ironic that I was downloading a copy of the Vice President's speech at the same time I was receiving a faxed copy of the bill, given that Mr. Gore is himself a native of and a former legislator from Tennessee.

The most obvious problem inherent in this legislation is the failure to understand both the process of science and the science of evolution. On the one hand, as McComas (1996) recently pointed out, a scientific theory is not like other theories. A scientific theory is a well-documented, well-supported, and well-accepted explanation based on a large body of experimental and experiential evidence. It is not a tentative or working idea, and it most definitely is not an "educated guess." Further, the bill confuses the fact of evolution with the theories proposing mechanisms for that evolution. Evolution is change over time. The National Association of Biology Teachers (1996) eloquently and forcefully sets out both the factual nature of evolution and the evidence for it in its recent Statement on Teaching Evolution. Any differences of opinion center on the relative importance of different mechanisms for evolution—gradual Darwinian natural selection, Eldridge and Gould's punctuated equilibria, and Kimura's neutral selection theories. These mechanistic theories are things to accept or reject. Because evolution itself is real, it makes no more sense to say, "I do (or so not) believe in evolution," than it does to say, "I do (or do not) believe in the air around us or believe in the chair I'm sitting in or believe in the hair (or lack thereof) on your head."

I was asked when discussing this bill, "Won't teachers just continue teaching from the book (a concept that deserves its own editorial!), so this law will have little real effect?" Good teachers, which I'm sure our colleagues in Tennessee are, teach from their own knowledge and understanding, not from books. Textbooks are students' guided to organizing concepts and facts. Teachers use them as pedagogical aids to plan lesson delivery. A textbook

having a chapter or a unit on evolution neither guarantees that that much (or that little) evolution will be taught, nor that it will be taught as presented in the text. Rather, the teacher, the district and state curriculum, and the local environment determine course content. Fifty pages on evolution may translate into a major theme of an introductory biology course, or into one of those topics "we just didn't have time to go into." Under Tennessee law, I suspect the latter.

A law that defines how a subject should be taught could have a chilling effect on the teaching of that subject. If a teacher is afraid to teach about the facts of evolution—the age of the earth, the fossil record, modern genetics—the student loses. The academic freedom of both the teacher and the student is compromised. Once the teacher has been bullied into not teaching evolution, any other "undesirable" topics can be removed from the curriculum by the same tactics of intimidation; indeed, so can the teacher. If this legislation truly promotes the free discussion of ideas, why does it specify only evolution? We could give a laundry list of disputed facts that should be given equal attention. For example, why not legislate teaching of the Holocaust as theory, since a vocal minority of bigots espouses that our understanding of this human horror is just a radical/religious conspiracy? The greatest challenge to education posed by this bill is not to the teaching of biology. It is to the academic freedom of our schools. And by extension, we risk the very freedom United States society is built upon. If we can legislate against educational freedom, what keeps us from trying to restrict those personal freedoms promised by the Bill of Rights? Maybe Orwell just had his dates wrong. SB 3229 is a frightening bill.

Now we come back to fundamentalism. We must add the fabric of religion to the science and education that are at stake in this law. I strongly suspect (indeed, I'm quite sure) this legislation is being promoted by proponents of "creationism" who want to force their beliefs into the science classroom but are afraid to do so openly because of recent Supreme Court rulings in Arkansas and Louisiana that clearly define the place of creationism in science education: outside. The real threat to having religion in the science classroom is to the religion, not the science. Evolution can and will stand up to scientific scrutiny over time. But the very testing of religious beliefs such as creationism in a scientific setting destroys the basis of the religion: faith. Just as evolution is fundamental to biology, faith is the very foundation of every religion. Placing a religious belief under scientific analysis, which demands physi-

cal evidence, erodes the faith that is fundamental to that belief. Even Jesus recognized this principle. When the disciple Thomas demanded to place his hands in Jesus' wounds before he would believe Jesus had risen, Jesus did not praise Thomas for his wise use of the scientific method. Rather, Jesus praised those of faith, saying, "Blessed are you who have not seen and yet have come to believe" (John 20:27, NSRV).

The Tennessee legislature must not pass this bill. It threatens everything we hold dear as biologists and teachers and United States citizens. Unfortunately, Tennessee is not waging the only battle in the war for scientific truth and religious freedom. A similar bill is pending in Georgia; the Eagle Forum has forced disclaimers about evolution into text books in Alabama; and local schools and districts from San Diego County, California, to Bellefontaine, Ohio, to Vermont are grappling with similar issues. I call upon the Tennessee Senate and General Assembly to defeat SB 3229 and HB 2972, and I call upon every one of you to work in your local, state and national communities to make sure that we preserve the fabric of biology and the academic freedom of our students by preserving the fundamental scientific truth: Evolution is a fact and we must be allowed to teach it as such. Again from Vice President Gore:

*As always in America, it's possible--but it's up to us.
As always in America, it's possible-- because
it's up to us. Let's get to work.*

References

Gore, A. (1996). *What is the role of science in American society?* Speech to Annual Meeting of the American Association for the Advancement of Science, February 12, 1996.

McComas, W. (1996). Ten myths of science: Reexamining what we think we know about the nature of science. *School Science and Mathematics*, 96 (1), 10-16.

National Association of Biology Teachers. (1996). NABT unveils new statement on teaching evolution. *The American Biology Teacher*, 58(1), 61-62.

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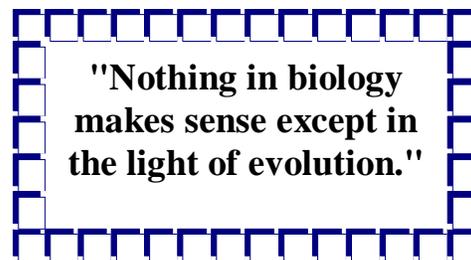
A Response To Part Of The Article
"Sustained Reform Urged for K-12 Biology Education." by Virginia Malone

Biology Education

Keeping Enrollments Up

In January issue of *The Kansas Association of Biology Teachers Newsletter* it was mentioned that science should be presented early especially in grades 3-6. The assumption seems to be that once "likes" are established you no longer need to worry about keeping students interested in science. While I agree that science needs to begin early, I find the assumption that early enthusiasm for science means a life time of enthusiasm is wrong. Children by nature are scientists. We manage to stamp out their natural curiosity and enthusiasm for understanding the natural world. How do we do this? I think part of the problem lies in the "textbook wired for sound" approach and the lack of relevance to the world they are asked to live in. Students have to **do** something with the information they learn. They can not wait for years to find out how useful the information is. Consider the following analogy. For thirteen years students read, study, drill, and even have a little practice in biology, but they do not play the games they will be asked to play as adults. Furthermore, they do not even get to see anyone else play the games. Would football be a popular college sport if students only read, studied and did skill drills for 13 years? Don't students need to play the entire game even when they don't play well? Don't they need to watch others having fun playing the game? Shouldn't preparing students to participate in society mean allowing students to participate in society now, with a coach (teacher) to guide them along?

What are the games adults are asked to play? When I am working with teachers I ask, "What are the goals for your students ten years after they gradu-



ate?" Their responses tend to include these same goals: life-long learners, productive workers, active citizens, and able parents. These are the games adults are asked to play. As we develop assessment activities we try to determine if the activities reflect the products students will have to produce in one of these roles. Most of the activities do not mirror the type of products students will have to produce outside of the school setting. Is it any wonder that the students do not see the relevance of biology?

My question as a developer and reviewer of performance assessment instruments and teacher developed activities, "Is this activity asking students to produce the type of products students should be expected to produce as functional adults?" Most of the time the answer is no. The links between what we teach, what we expect of our students in the future, and what we test do not exist. Most of the daily lessons we teach prepare the student for the next day's lesson, which prepares the student for the next day's lesson ad nauseam. This, "Learn more, so you can learn more," approach turns-off many students. Activities in science should reflect the type of products adults are ask to produce. These type of activities, like the activities of adults, require the following -

- ◆ An understanding of information and utilization of many skills to produce a product
- ◆ Information be connected in new ways
- ◆ The use of a variety of resources including textbooks
- ◆ That some of the work is done with the help of others
- ◆ The end products are valued by peers and the community

Working with science teachers throughout the United States I would have to agree with the report from the National Research Council that many teachers (especially elementary teachers) are poorly trained as far as formal education goes. However, most of the teachers I am privileged to work with have extensive knowledge of the science they teach. Rarely do I meet a science teacher, who is not devoted to their subject area and truly interested in helping students. It is the interpretation of how to help students that is seems to cause the problems. In biology, as in all of the sciences, there is the constant tension between covering the book and preparing students for their future as learners, workers, citizens, and parents. It is often easier and faster to

lecture in biology classes. We feel as if we are teaching, but we have to ask ourselves are students learning to hate biology while we are busy teaching. If we are to keep the enrollments in science high we must allow students to play the game.

Virginia Malone, Manager Educational Measurement, Harcourt Brace Educational Measurement
555 Academic Court, San Antonio, TX 78204

Goals of Science Education

Roles	Abilities	Products
Life long Learners	Explore subjects in depth Inquire scientifically Reflect on learning	Reasonable clear explanations and powerful models of the natural and social world. Rigorous proof Insights into the nature of learning
Productive Workers	Design solutions to problems Work with others Reflect on work	Elegant solutions to problems Positive work environments Insights into the nature of design and human interactions
Active Citizens	Make intelligent decisions Take action Reflect on citizenship	Logical informed decisions based on reliable information on all sides of issues Appropriate positive actions Insights into the nature of decision-making and citizenship roles
Able Parents	Support their children's efforts to understand Support their children's self-esteem Reflect on the nature of parenting	Literate children Well adjusted children Insights into the nature of child-rearing.

“I have come to a frightening conclusion.

I possess tremendous power to make
a child's life miserable or joyous.

I can be a tool of torture or an instrument of inspiration.

I can humiliate or honor, hurt or heal.

In all situations it is my response that decides whether a
crisis will be escalated or de-escalated, and a child
humanized or de-humanized.

Haim Ginott

Ant Lions and Biology

Introduction

Science is driven by questions. For students to really experience the process of science they should work on answering questions that arise from their own natural curiosity. Ant lions (Nurture) and their intriguing behaviors naturally generate student questions. Since most students are not familiar with "doodle bugs", ant lions make an effective way to open the school year. If a few students have prior experience with ant lions this only adds to the effectiveness of the activity.

Day 1 Activity

On the first day of class my students find an four ounce, low form cup of sand at their desk, one for each student. In the middle of the sand is a small conical depression. From the very beginning of class students begin to ask questions. The first questions range from: "What are we supposed to do with this?" to "How did you make that hole?" I respond by asking them to record some measurements of the pit and draw a simple sketch.

Several at this point actually end up collapsing the pit accidentally as they move the cups around to make observations. If I am patient at this point, the ant lions in the collapsed pits will begin to repair the damage after a short period of time. Once the students realize that a living organism is at the bottom of the pit the I am inundated with questions. "What is that?" "Did it make this hole?" "Why" "What does it look like?"

From this point we will bring in potential prey items such as ants or flour beetles. Once they see a pit and the ant lion in action I don't have to do much the rest of the day except turn their questions back to them in a manner that is supportive but develops question and observations skills. I ask that they record their thoughts, observations, and questions as they investigate their ant lions. When they want to use microscopes or stereoscopes I get them out so they can. We simply explore.

This opening day activity serves two purposes. One, it jump starts the students into inquiry based science and two, it helps me to establish appropriate questioning skills as I help the students develop their general, curiosity-based questions into questions and hypotheses that are suitable for scientific investigation.

Day 2 Activity

The next day we bring out the ant lions again, feed them and then begin to explore the notes and observations made the day before. I select some questions and observations that seem to be particularly promising and ask questions of the students to direct them toward a working hypothesis that is suitable for experimental design. For instance, invariably the students notice that the pits are of different sizes and ask the question "Why?" If I wait long enough a student will usually speculate that the size of ant lions might have something to do with the size of the pit. I focus on this and ask for suggestions on how we might examine this idea. What kind of predictions can we make? How can we limit the scope of our question so that we can satisfactorily answer them. Of course, we are working on hypothesis formation but they aren't aware of this just yet. Soon we have developed a method of investigating this question and start collecting data. We work on this methodology so that students can start to work on focusing their own, personal questions about ant lions into working hypotheses.

Each student is then assigned at least one ant lion to care for and serve as a focus for student research. Students are given the option of taking the ant lions home and share the activity with their parents. This past year students investigated questions about habitat preference, substrate effects on pits, effect of rainfall on pit construction, effect of temperature on pit construction and others. Students are required to maintain a laboratory notebook record their research. At parent conferences I heard from several parents about the effectiveness of this activity.

About Ant Lions

Acquiring ant lions is the limiting factor for this activity. As far as I know ant lions are not available commercially so I have always collected my own. This is not as difficult as it may sound since once suitable habitat is located several dozen can be collected in a just minutes. Ant lions range throughout the United States. Ant lion larvae prefer dry, sandy or loose soils that are sheltered from the weather. Under the eaves of my house is just such a location and every summer I have about one hundred ant lion pits along the bare, loose dirt next to the foundation.

Other local sites that I can count on include the dry duff beneath juniper trees and along the sand bars along the river. You just has to keep an eye out for these intriguing insects and mark down locations so you can return later. Collecting involves using a spoon or similar instrument to scoop 1/2 inch of soil

from the bottom of the pit. The ant lion should be in the sample and can be transferred to a tray, pan or cup. Several can be held, temporarily, in a large 44 ounce, plastic drink cup (I've had up to 36 in one cup) with minimal loss. You'll have to look hard because they like to freeze and become very difficult to see. Once you've developed a search image you'll be able to make hem out in the soil debris in the cup. By the way, about one half of my students usually can't find their ant lion. They are sure that they have escaped. I like to collect about 2 ant lions per student before school starts.

Caring for the critters couldn't be much easier. They can survive quite nicely without any food or water for more than a week at a time. Feeding them small ants, fruit flies, house flies, flour beetles, etc. works nicely.

Holding containers such as cottage cheese containers, small cups, trays are all suitable. A proper substrate of sand is best to work with. Even if you caught your ant lions from dry soil you'll find that they are easier to work with in a sand substrate. If your sand has variable grain size this is a productive area of investigation. Fill whatever container you use with about 1.5 to 2.5 inches of sand. There is no need to cover the container. Don't water the sand (unless you wish to investigate the effects of rain) the ant lions will get enough water from their prey. Adapt with whatever you have available. Just get the ant lions and you'll find that this is truly worthwhile activity.

Resources

Bernd Heinrich, "In a Patch of Fireweed", pp 141-151

Sally Stenhouse Kneidel, "Creepy Crawlies and the Scientific Method", chapter 10. Though this is targeted to an elementary teacher audience I highly recommend it for high school biology teachers that are looking for creative ways to incorporate insects as vehicles for scientific inquiry.

Brad Williamson

Olathe East High School

Most Worthless Class I Ever Took!

Wisdom comes easy when you're young. At 22, I knew what I wanted and what I liked. And after a couple of years in the Army, I knew I'd had enough of the outdoors to last a lifetime. Others could rhapsodize about the glories of nature, I resolved as I

duffel-bagged back to college for my last two years at Bowling Green State University in Ohio. I would get no closer to the wilds than a golf-course rough.

Then suddenly, heading into my last semester, I discovered that I was one science course short of graduation. "How about a course in ornithology?" my academic adviser suggested. "Insects?" I queried. "Birds," he answered. "I understand the class is a lark." It turned out to be more like a full-scale jungle maneuver. "Here's your reading list, schedule of tests and field trips," the rotund professor, Everett Myers, announced. I studied the paper, stunned. There were weekly tests, more than a dozen books to read and field trips to every lake, swamp, slough and sanctuary within a hundred miles. The clincher: All buses leave at 5 a.m. "In the middle of the night!" I wailed to a classmate. "We'll need miners' lamps."

I found the course mind-numbing. Who, I wondered, could possibly care that a Cooper's hawk and a sharp-shinned hawk are dead ringers for each other? Professor Myers cared passionately. Who cared that a Carolina wren has a white eyebrow stripe and sings Tea kettle, tea kettle, tea kettle, and an ordinary house wren has a muted eye ring and sings with a scratchy gargle? Professor Myers played a recording of its voice and tried to imitate it, falling just a thimble of Listerine flat.

He'd go to any length to transfuse his love of nature to his students. Illustrating the sing beat of a mallard, he flailed his short, stubby arms like a windmill in a hurricane. To remind us that the osprey usually builds elaborate nests high in trees or on top of poles, he hopped up on a chair and rendered its loud squawking song. And one day, trying to portray a kingfisher diving for a catch, he folded his hands in front of his face, ran across the room, kamikazied toward the wastebasket--then did a miraculous flyby and segued into the mating dance of whooping cranes.

When Professor Myers wasn't imitating birds, he was waxing poetic about them. "Their songs have inspired symphonies, their beauty sonnets," he declared. "And if you watch them for only a season, study them for only a semester, they will steal your heart away and give you a lifetime of enjoyment."

Drawing on his encyclopedic knowledge, he would constantly quiz us about things we came upon while moving through woods, marshes and meadows. "What bird uses this plant to line its nests?" he would ask, pointing out a prickly thistle. An-

swer: a goldfinch likes thistledown. Or upon seeing a tree's bark perforated by the bill of a bird, he would want to know the name of the tree, the bird that turned it into a punchboard and what the bird was drilling for.

Amazingly, I passed the course and graduated--finally packing away my bird guide and binoculars. The only good I seemed to get out of Professor Myers's course was a trove of stories about his antics and what I joked was "the most worthless class I ever took." My tales never failed to amuse friends and associates.

Then time brought marriage and kids and camping trips to the outdoors I had vowed to detour forever. With my family, I discovered a world I had missed before. Together we learned to identify plants, insects, fossils, flowers, stars, trees and, yes, even birds. Professor Myers's lessons, cast away for years, returned like bread on water.

At a mountainside campsite, my wife, Shirley, our four children and I were entertained one evening by an acrobatic bird vacuuming insects like an airborne sweeper. "It's an Acadian flycatcher," I told them, surprising even myself. The kids were impressed.

And once on a hiking foray in the South, when the children worried over a bird that seemed to be struggling along the ground with an injured wing, I explained, "She's not hurt. It's a mother killdeer trying to decoy us away from her nest." Eventually, I took my field guide and binoculars out of mothballs and put them in my knapsack.

In our travels around the country, I could differentiate between the scrub jays we saw in Florida and the Steller's jays we came upon in California--all because of birding with Professor Myers. Trips out of the country were enriched by sightings of caracaras in the Amazon, blue-footed boobies in the Galapagos Islands and wading flamingos so numerous that they painted African lakes pink.

However, it was daily encounters with birds at our feeder and at the edge of our woods that convinced me of my debt to Everett Myers. One day a rufous-sided towhee showed up in the yard, and I scrambled to get my binoculars. As I focused on the beautiful tri-colored bird, it began singing in three-note trills, and suddenly I recalled Professor Myers's description of its song, Drink your tea, and I was overcome with the urge to thank the man who prophetically said, "Birds will steal your heart away and give you a lifetime of enjoyment."

So I called my alma mater from my home in Princeton, N.J., to inquire about him. He had died, I

learned, ten years earlier. Just before I hung up I asked: did he have any survivors? Yes, two daughters, one in Iowa and one in Maryland. Call them, an inner voice prompted. And I did.

"I wish I could thank your dad," I said, "but it took me a long time to appreciate him and what he taught me. So telling you is the best thing I can do. He showed me that the closer you look at the world, the more beauty and wonder you see."

He also helped me understand that nature has some important things to teach us if we pay attention. One day when I saw finches fighting over a place on my bird feeder, I squirmed to think I might resemble them vying with other commuters for a train seat. I vowed to be less finch-like. Another time when I observed a pair of Canada geese tending their goslings, I recalled how they mate for life, and I wondered what secrets they might share about long-run marriages--if we could only read their honking. Or more to the point, how I could be more caring in my own long-run marriage. Another day when I craned at migrating ducks flying in a cooperative V, I was reminded that helping others is the best way for all of us to achieve our destination. And I vowed to be less self-serving and reach out a little more to those around me.

"Do you see it?" I whisper to granddaughters Jessica and Ashley.

"Yes," they answer. "What kind is it?"

"Let me get a closer look," I reply, raising my binoculars. Then I describe the little yellow bird with reddish-brown rivulets down its chest. "I'd say it's a warbler," I venture, "but we'll have to look it up." In a minute I find a picture of a male yellow warbler in my field guide and ask the girls if they think it looks like our colorful friend in the bush.

"That's it exactly!" exclaims Ashley. Jessica moves closer to this sunbeam on a branch. Unfrightened, he begins singing a one-on-one concert to her: Sweet, sweet, sweet, I'm so sweet.

The warm light filtering through the trees frames the two of them in a still portrait of beauty, the kind I suspect God snaps especially for parents and grandparents.

When the warbler moves on, so do we. Talking as we walk down the trail, we look for more feathered delights.

"Tell me, Grandpa," Ashley asks, taking my hand, "how do you know so much about birds?"

"I really know very little," I answer, "but most of what I do know I owe to a college teacher." Then I

tell the girls about Professor Myers and "the most worthless class I ever took."

10 TIPS

For Safer Eating

- 1) Eating these *raw* foods may be dangerous: oysters, clams, eggs (homemade a egg nog, Caesar salad dressing, soft-boiled eggs, etc.), milk, or cheese!
- 2) Choose organically grown foods whenever possible to avoid pesticides and protect the environment.
- 3) Assume that raw poultry and meat are contaminated with bacteria—wash your hands and implements carefully after touching them and before touching anything else. Never put cooked meat or poultry back on a plate that contains raw juices.
- 4) Be sure your refrigerator is clean and 40 F or less and your freezer is 0 F or less.
- 5) Moldy bread or soft cheese? Toss it. Mold on hard cheese? Cut it off. Never eat moldy or discolored peanuts.
- 6) Fish for dinner? Make sure it's fresh and from the deep blue sea (cod, haddock, pollock), not the Great Lakes or polluted rivers. Eat swordfish and bluefish rarely, and not at all if you are pregnant.
- 7) Wash and scrub your fruit and veggies to remove surface pesticides and bacteria. A few drops of dish soap in a pint of water will remove more pesticides.
- 8) Avoid food stored in lead-soldered cans, lead crystal, or ceramics that leach lead.
- 9) Cut all the fat off meat to protect your heart and waistline and to minimize your intake of pesticides. Cook meat thoroughly, but don't over-do (char) it.
- 10) Avoid unsafe and poorly tested additives: acesulfame-K, artificial colorings, *aspartame*, BHA, BHT, *caffeine*, *MSG* and *HVP*, propyl gallate, saccharin, sodium nitrite, *sulfites*. (Italicized ones may affect only sensitive individuals.)

Center for Science in the Public Interest

"Articles on Thinking About Environmental Problems"

"Some years ago the World Health Organization launched a mosquito control program in Borneo and

sprayed large quantities of DDT, which had proved to be a very effective means in controlling the mosquito. But, shortly thereafter, the roofs of the natives' houses began to fall because they were being eaten by caterpillars, which because of their particular habits, had not absorbed very much of the DDT themselves. A certain predatory wasp, however, which had been keeping the caterpillars under control, had been killed off in large numbers by the DDT. But the story does not end there, because they brought the spraying indoors to control houseflies. Up to that time the control of houseflies was largely the job of the little lizard, the gecko, that inhabits houses. Well, the geckos continued their job of eating flies, now heavily dosed with DDT, and the geckos began to die. Then the geckos were eaten by the house cats. The poor house cats at the end of this food chain had concentrated this material, and they began to die. And they died in such numbers that rats began to invade the houses and consume the food. But, more important, the rats were potential plague carriers. This situation became so alarming that they finally resorted to parachuting fresh cats into Borneo to try to restore the balance of populations that the people, trigger-happy with spray guns, had destroyed."

There is a story about one of our great atomic physicists--a story for whose authenticity I cannot vouch, and therefore I will not mention his name. I hope, however, with all my heart that it is true. If it is not, then it ought to be, for it illustrates well what I mean by a growing self-awareness, a sense of responsibility about the universe.

This man, one of the chief architects of the atomic bomb, so the story runs, was out wandering in the woods one day with a friend when he came upon a small tortoise. Overcome with pleasurable excitement, he took the tortoise and started home, thinking to surprise his children with it. After a few steps he paused and surveyed the tortoise doubtfully.

"What's the matter?" asked his friend.

Without responding, the great scientist slowly retraced his steps as precisely as possible, and gently set the turtle down upon the exact spot from which he had taken him up.

Then he turned solemnly to his friend. "It just struck me," he said, "that perhaps for one man, I have tampered enough with the universe." He turned and left the turtle to wander on its way.

Now look here at this. The picture of our district as it was fifty years ago. The dark green and light green colors are forests; half of the whole area is forests. The red cross lines on the green show where elks and goats use to be--I am showing here both flora and fauna. On this lake used to live swans, geese, ducks, and as the old men say, a powerful lot of all kinds of birds; you saw nothing but birds. They floated like a cloud. Besides the villages and small towns, you see various settlements were scattered, farms, monasteries, water mills. . . There were a great many cattle and horses; you can tell by the blue color. For example, in this district the blue is thick; whole herds were there, and each farm owned three horses. (A pause). Now we'll look lower down. What there was twenty-five years ago. Only a third of the whole area is woodland. There are no longer any goats, but there are elks. The green and the blue colors are already paler. And so on, and so forth. Now here's the third part: a picture of the district today. The green comes here and there, but not solid, only in spots; the elks have disappeared, the swans, and the grouse. . . . Of the villages, settlements, monasteries and mills, there is not even a trace. On the whole a picture of gradual, plain degeneration, which apparently needs only some ten or fifteen years more to be complete. You will say that there are cultural influences at work here, that the old life must naturally have yielded place to the new. Yes, I understand that if in place of these destroyed forests, roads were laid out, railroads, if there were mills, factories, schools--people would become healthier, richer more intelligent; but there is nothing of the kind? In the district the same swamps, mosquitoes, the same absence of roads, poverty, typhus, diphtheria, fires. . . . We have here a case of degeneration that results from a struggle that's beyond men's strength for existence; degeneration caused by sloth, by ignorance, by the complete absence of any conscience, when a cod, hungry, sick man to save what life he has left, for his children, instinctively, subconsciously grabs at everything that might satisfy his hunger, or warm him, destroys everything, without a thought of tomorrow. Nearly everything is already destroyed and in its place there is nothing created. (Coldly) I can see by your face that this is not interesting to you.

Glenn C. Stone, A New Ethic For A New Earth, 1971

Earth's Birthday Pledge

Because the Earth is my home

and needs my help to survive,

I will try my best

to respect the Earth at all times
by recycling, conserving energy, and
buying and using products that are
least harmful to the environment.

I also promise to remind my friends
and

family to care for the Earth in the
same way.

Give us this day our daily calcium propionate (spoilage retarder), sodium diacetate (mold inhibitor), monoglyceride (emulsifier), potassium bromate (maturing agent), calcium phosphate monobasic (dough conditioner), chloramine T (flour bleach), aluminum potassium sulfate acid (baking powder ingredient), sodium benzoate (preservative), butylated hydroxyanisole (antioxidant), mono-isopropyl citrate (sequestrant); plus vitamins A and D.

Forgive us, O Lord, for calling this stuff
BREAD.

J. H. Reed

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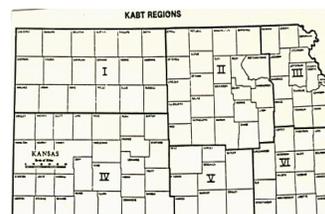
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