

Kansas Association of Biology Teachers Newsletter

Volume 43 Number 1 - April 2002



KABT Web Site

<http://kabt.org>

NABT Web Site

<http://www.nabt.org>

Newsletter Contents

Area & Topics	Page Number(s)
KABT Business	
Membership Application	19
KABT Officers-Board-Representatives Listing.....	18
KABT President's Message—Harry McDonald.....	1
Calendar.....	20
Laboratory Activities & Information	
Inquiry With Plants—Virginia Malone.....	10-12
Stressed Out Plants	13
Sustainability—Todd Carter.....	15
News	
Letter to Ohio Board of Education.....	17
Biology Education News	4
Updates	
KABT Spring Field Trip	2
KATS KAMP Presentation Schedule	14
Articles	
Book Review	6
Handful of Mud	8
Teaching Techniques and Assistance	
Evolution Workshop.....	16
KABT Reprints from Paul Jantzen.....	13

Presidents Message

Harry McDonald

April, 2002

As we speed toward the end of another school year, let me take a minute to reflect on the state of KABT and biology education in general. Elsewhere in this newsletter, the emphasis is on practical information and activities that are of direct help to you in the classroom. As you are aware, I tend to focus on a more philosophical perspective in this column. I hope you find this an interesting, if not useful, segment of this publication.

On January 19, your executive board met at Kanopolis Reservoir for our annual winter meeting. In addition to the usual business of the organization, several important decisions were made to ensure the continued economic health of KABT. Most importantly, we established a budget to guide our annual expenditures. As with our personal lives, when possible expenditures exceed income, some priorities must be established.

Among other decisions, the board decided to publish the newsletter three times annually instead of our customary four. As you can see from this newsletter, this decision allows us to focus on putting out a tremendously useful newsletter of exceptional quality.

KABT will continue its spring field trip and fall conference. Elsewhere in this newsletter you can find information on this spring's trip to the Smokey Valley Ranch. The trip is scheduled later in the spring in the hope that more of our members can participate.

I especially encourage you to put the fall conference date on your calendar as it will be a share session. This format has produced some of our best-attended conferences and has always been well received by participants.

This August will produce another round of primaries for the State Board of Education. Lest you think the issue of quality science standards is a dead issue, be aware that

Continue on page 4

Join us for the annual
KABT Spring Field Trip

at

The Kansas Chapter of the Nature Conservancy's

Smokey Valley Ranch

Saturday, June 8th, 2002, starting at 9:00 a.m.

Coordinated by Stan Roth and assistants

Check www.kabt.org for details and background

The annual KABT spring field trip will be held at the Nature Conservancy's Smokey Valley Ranch in Logan County on Saturday, June 8th, 2002. We will camp the night before at Lake Scott State Park, North of Scott City. The field trip will begin at 9:00 a.m. on Saturday morning, when we will gather at the Lake campground to caravan to the ranch. Included later in this article are instructions for driving to the field site.

The field trip is a repeat of last year's Nature Conservancy's Member Field trip led by Stan Roth, George Potts, and Alexis Powell. We will explore the diversity of the short grass prairie with moderate morning and early afternoon hikes. As long as you're going that far, you may wish to contact Stan about pre- or post- meeting activities.

The Nature Conservancy has a policy that no dogs or pets are allowed on the preserve. Collection of rocks, fossils, bones, antlers or other animals or materials is strictly prohibited.

Lunch:

Bring your own picnic lunch. The picnic area will be under the trees by the Smoky Hill River so the area is shaded. Some water will be available but it is best to supply your own. There are logs to sit on but you may want to bring along a camp chair for comfort.

Be prepared for any kind of weather—hot, cool, misty, and/or windy. Wear sturdy shoes or hiking boots. We will be in a pasture and good walking shoes are a must. Long pants are recommended. You will find that a hat and sunscreen are beneficial. Bring binoculars, bird guides, and wildflower guides. Facilities are primitive—there may be a port-a-potty at the ranch.

In case of bad weather:

The county roads can be impassable during or after a heavy rainstorm. If the

weather is bad or severe we will have to cancel the field trip to the ranch but we will still be able to work in some field work at the lake and vicinity.

See you there.

Getting there:

To Lake Scott State Park:

We will be camping in the campgrounds on the west side of the lake to the south of the shower building that is [E] across from the electrical hookup sites. There is a daily vehicle park entrance fee of \$5.00 for state parks (annual permits are \$30.00) and there is a camping fee that varies by site depending on camping mode. Lake Scott is west of Highway 83 between Oakley and Scott City, on state highway 95. For those of you with DeLorme's Kansas Atlas, it's map 42 and section C-5. For those with Family Channel [Talkaout] Walkie Talkies we'll be on 10/10.

To SVR from the Lake.

From 95/83, we'll go north on 83 about 7 miles until we reach Hunter Road (Gold Road on some maps). From there turn west and continue to bear west and north until we reach Indian road. (about 9 miles). We will travel west on Indian road for 2.5 miles and then north on 350th Road. We will travel north on 350th Road (Monument Road) for about 4 miles. Just after crossing the Smokey Hill river we will turn into the pasture gate on the east side of the road (watch for flag/sign) and follow the range trail/rut for 0.4 mi.

For those with Delorme's Kansas Atlas, the ranch is A-5 on map 42. Also if you would prefer to access Internet mapping sites or have a GPS unit set your coordinates to:

- Latitude: 38.873
- Longitude: -101.0195

For a site with maps and aerial photos go to Mapquest.com.

Select "Maps" from the black menu bar under the "Mapquest" logo

Select Lat / Long from the choices

Enter the following into the boxes using decimal values:

- Latitude: 38.873
- Longitude: -101.0195

Get the Map:

Click on big map in the upper right corner of the map. Zoom to your desire or look at the aerial photos.

three of the board members who supported our current, quality standards are up for reelection. John Bacon, a consistent critic of quality standards in the area of evolution, has his term expiring also.

The Intelligent Design Network has vowed to run candidates who will, once again, oppose our current standards, so primary challenges can be expected for all expiring seats. You may want this issue to die, but the bottom line is that Kansas can continue to focus on quality science education only if voters continue to resist the incursion of religion into our science curriculum. At this time it is unknown who will run for which position because the redistricting of the state board is not finalized yet.

KABT cannot campaign for nor endorse individual candidates, so I encourage you to follow this election and, if the board position representing you is contested this year, be sure to vote in the August primary. As candidates file, you will need to use a variety of sources to determine each candidate's stance on maintaining our science standards. As the summer progresses, try www.kcfs.org as a web site for information on candidates.

Around the nation, other states continue to face the same challenge as Kansas did, as they consider updating their state science standards. The latest state to deal with this challenge is Ohio. Their board is expected to vote on new standards by December. Elsewhere in this newsletter you can find a copy of the letter our board authorized to be sent to the Ohio State Board of Education.

As many of you know, the Senate version of the recently authorized ESEA contained what was known as the Santorum Amendment. In the form passed by the Senate, the amendment occurred in the form of "a sense of the Senate." It read, "It is the sense of the Senate that- (1) good science education should prepare students to distinguish the data or testable theories of science from philosophical or religious claims that are made in the name of science; and (2) where biological evolution is taught, the curriculum should help students to understand why this subject generates so much continuing controversy, and should prepare the students to be informed participants in public discussions regarding the subject."

Sounds innocent enough, but it was drafted by Phillip Johnson of the Discovery Institute. As his publications claim, the intent was to create a wedge to justify biology teachers introducing "intelligent design theory" into the science classroom. The wording clearly singled out evolution for attack and the Discovery Institute continues to try and paint ID as science and evolution as the religious idea that must be guarded against.

The entire science community fought the inclusion of this amendment in the compromise bill. While it was left out of the final bill, the conference committee managed to include the language in the committee report. Though clearly not part of the law, the committee report is being touted as just that. Conferees from the committee have written to the Ohio Board and expressed the sentiment

that the committee report is part of the law. They thus assert that Ohio is required by law to insert ID into their standards. Members of the Kansas Board have received the similar comments.

Keep your guard up. Keep teaching good science. If you receive a local challenge to the teaching of evolution, please feel free to contact me or KCFS. Follow the state board races and, above all, vote in August and November.

As your president, I welcome any contact or correspondence with members. I can be reached at biolgycctrack@hotmail.com.

BIOLOGY NEWS

According to an Associated Press report on Nov. 20, 2001, fourteen kindergarten students in Kingman, Kansas were exposed to a **rabid puppy** during show-and-tell that showed no signs of the disease; although no one was bitten, the 14 students underwent preventative vaccinations and the sensible take-home lesson reported was the "pets should get their shots as early as possible." Almost 30% of **students "did more sexually than they had planned"** because they were **under the influence of alcohol or drugs**, according to the Henry J. Kaiser Family Foundation report "Dangerous Liaisons: Substance Abuse and Sexual Behavior" available online at www.kaisernetwork.org/healthcase.casa/07feb2002. Alabama voted unanimously to put a new label inside biology textbooks stating that **evolution is a "controversial theory"** (see Nov. 21 Educ. Week page 14). Ritalin, with the generic name methylphenidate, may have lasting effects on brain-cell function long after its short use with ADHD children, according to Univ. of Buffalo researchers (see Nov. 14 Educ. Week page 6). Congress has blocked expansion of the Animal Welfare Act provisions to birds and rodents for one year (see Nov. 23 Chronicle or Higher Educ. page A22), and an amendment is currently being proposed to exempt them permanently, allowing research to continue on birds and rodents without imposing costly restrictions and paperwork currently required for primates, dogs, etc.

EDUCATION NEWS

The **effects of block scheduling are hotly debated with different research showing** contradictory results (see October 3 Educ. Week pages 38-40; Education Policy Analysis Archives of Sept. 19, 1999 and Jr. Science Teacher Education, Vol 3, 2000). The science NAEP shows essentially no progress over the last ten years in elementary and middle school, and with seniors scores slipping (see Nov. 28 Educ. Week pages 1, 14). The Commission on Instructionally Supportive Assessment, with leaders from ASSA, NAESP, NASSP, NEA, and NMSA, contends **state-mandated tests "are causing educational harm**, perhaps irreparable harm, to thousands of American children"; rather than guiding instruction, "whatever is on the assessment is what becomes important to teachers" and teachers neglect subjects not cov-

ered on the tests (see October 31 Educ. Week page 5). On the very next page, another research report finds that "it doesn't look like their tests are driving instruction all that much" and there is little match between math and science standards, state assessments, and what is taught in classrooms. A Michigan science teacher was placed on leave after 27 6th graders touched mercury during a science experiment; the classroom was temporarily closed for environmental cleanup and the students suffered to side effects (see Dec. 12 Educ. Week page 4). The September 11 attacks have curbed field trips as well as exchange programs with foreign countries, with many districts saying "we don't want to take any chances" (see Oct. 2 Educ. Week page 14). The **Supreme Court declined to review the legality of high stakes testing**, refusing to hear an appeal from Louisiana contending that the 4th and 8th grade tests that determined whether students could be promoted to the next grade were a violation of the 14th Amendment right of due process (see March 6 Educ. Week page 30). External researchers will study **whether National Board Certification makes any real difference in the classroom** (see Jan. 30 Educ. Week pages 1, 11). Nationally certified teachers in Virginia were originally to receive one-time bonuses of \$5,000 each and annual supplements of \$2,500; final amounts budgeted were \$1,632 one-time with \$816 supplements (see Nov. 28 Educ. Week page 4). **Teacher shortages are increasing far faster than new teachers are being trained**; Illinois will need to hire one-third new teachers in the next four years while teacher preparation programs have dropped by 10 percent (see Jan. 30 Educ. Week page 20). In contrast, a report by the Assoc. for School, College and University staffing contends that **demand for elementary and secondary teachers has fallen for the last two years**, although shortages in math, science, and vocational education teachers continues. (see Feb. 13 Educ. Week page 6). Due to the teacher shortage, **Kansas issued 6,538 emergency certificates** in the 2000-01 school year compared to 2,885 in 1996-97, according to an Nov. 19, 2001 Associated Press report; about 44 percent of Kansas emergency certificates have gone to persons without college degrees. Testing critic Alfie Kohn, author of *The Case Against Standardized Testing*, was "disinvited" to a Massachusetts conference after the Massachusetts Department of Education threatened to withhold \$18,000 in grant money if he spoke; MA will require students to pass high-stakes tests in English and math to graduate after 2003. **Harvard University will no longer award AP credit** to students for high school AP courses unless they score a 5, due to "significantly inferior" preparation for college-level coursework (see Mar. 20 Educ. Week page 10). Texas middle school science teachers worry that their resources will be reduced because the 8th grade science test will no longer be mandatory (see Feb. 13 Educ. Week page 24). Audiences of over 1,000 attended meetings arranged by the State Board of Education's writing committee in Ohio where

intelligent design is being debated for inclusion into the science education standards, **taking the 1999 Kansas debates to the next level** (see Mar. 20 Educ. Week pages 14, 16). California biology teacher Wendi Butler used a school-wide scenario (simulation) of a deadly viral outbreak to establish students into "task forces" to study infectious diseases (see Mar. 13 Educ. Week page 3). A survey by the NSTA has announced that the **shortage of qualified math and science teachers has reached a "crisis point."**

KABT Presentation at NABT Convention

This coming October, KABT's own Brad Williamson will preside over the NABT national convention as president. In support of Brad, KABT will, once again, present a session called "The Favorite Labs of KABT." With the loss of Eisenhower Funds, we know that attendance at such conventions will be even harder than usual.

If you plan to attend the convention in Cincinnati, and would like to present as part of our session, please inform Harry McDonald, biologyctrack@hotmail.com. Harry is coordinating the session and must notify NABT later this summer with the names of presenters and their lab titles.

Current plans call, once again, for ride sharing with several vanloads of KABT members making the trip. If you want a ride, contact Harry.

Biotechnology Conference

Virginia Tech is sponsoring a Biotechnology Conference in Blacksburg, VA, July 17 – 20, 2002. The conference is packed with sessions ranging from DNA isolation from plants, to protein fingerprinting. Registration before May 31 is \$185. Registration and information is available at www.biotech.vt.edu. For more information, contact Erin Dolan, (540) 231-2692.

GIS for Educators - Calendar of Events: <http://kangis.org/learn>

Are you interested in a summer GIS training? Have you looked at the most recent addition to KanGIS? The "GIS for Educators - Calendar of Events" is now listing over two dozen events, most of these are for the summer 2002! The events include GIS, GPS, and Remote sensing specifically for K-12 teachers and are held all over the country.

If you're even considering a GIS training opportunity, stop by KanGIS today. Many of these conferences, workshops, and institutes have fast-approaching deadlines for enrollment.

GIS for Educators - Calendar of Events: <http://kangis.org/learn>

Thomas R. Baker

PathFinder Science

tbaker@kancrn.org / tbaker@ku.edu

<http://pathfinderscience.net>

GLOBAL SCIENCE AND TECHNOLOGY WEEK

The White House Office of Science and Technology Policy (<http://www.ostp.gov/>) has joined with representatives from over 27 public and private organizations to coordinate activities for this year's Global Science and Technology Week (April 28-May 4). It is hoped that the week will ignite student interest in math and science by: drawing attention to the many ways their lives are enhanced by scientific and technological advances;

stressing the ways that young people, themselves, can apply science and technology to benefit their community, their country, and their planet;

highlighting the international nature of science, and stressing the importance of math and science education in today's era of globalization; and

emphasizing how U.S. citizens benefit from scientists of diverse backgrounds and cultures working together to solve the complex problems of today.

FOR MORE INFORMATION, PLEASE GO TO <http://www.ostp.gov/html/gstw.html>. (Note: Current events and classroom activities will be posted online starting April 3.)

Please feel free to contact the Office of Intergovernmental Affairs with any questions:

Deputy Assistant Secretary -- Linda Wilson, (202) 401-0404, <mailto:Linda.Wilson@ed.gov>

Program Analyst -- Adam Honeysett, (202) 401-3003, <mailto:Adam.Honeysett@ed.gov>

To be added or removed from distribution, or submit comments (we welcome your feedback!) **please contact Adam Honeysett. Or, visit <http://www.ed.gov/offices/OIIA/OIA/edreview/>**

Introductory Statics

At the board meeting last weekend someone asked about introducing students to statistics. I brought up box plots as a way to compare distributions. I said that I could send some helpful links. Well, here are more than you probably wanted.

Here's a Jr. High teacher's (George Radcliffe) web site to help his kids to science fair projects:

<http://www.qacps.k12.md.us/cms/sci/tools/MATHTBX.HTM>

<http://www.qacps.k12.md.us/cms/sci/FAIRCONT.HTM>
His main page:

<http://www.qacps.k12.md.us/cms/sci/RADCLIFF.HTM>
Here's a great link to learn more about box plots:

<http://www.shodor.org/interactivate/lessons/boxp.html>
more....

<http://www.itl.nist.gov/div898/handbook/eda/section3/boxplot.htm>

http://www.math.uncc.edu/~droyster/courses/spring00/maed3103/Box_Plots.htm

For Stem and Leaf Plots:

<http://www.shodor.org/interactivate/activities/stemleaf/index.html> (Click on the What? How? and Why? Buttons)

<http://research.ed.asu.edu/siip/briefs/stemandleaf.html>

For information about stats....

<http://davidmlane.com/hyperstat/index.html>

And finally. This is a great site. It is a fairly complete web-based statistics package...

<http://www.stat.sc.edu/webstat/version2.0/>

Book Review

"The Secret Knowledge of Water", by Craig Childs, Little, Brown and Company NY 2000

By Dru Clarke

Who would ever think that a book about water in the desert would be one almost impossible to put down? And when put aside for more immediate demands, draw you back, like a water witch's magical divining rods, dipping and bobbing toward the source? For this book is a source... of delightful (and horrific) surprise, little known facts, remarkable journeys, and unpretentious but gifted prose. Childs is known as an instructor of natural history, an adventurer and a river guide, but his legacy will be his intimate portrayal of the role of water in the desert, for he shows it to us through his experiences and senses. He went after water, its very rarity, by seeking out tinajas or water holes, marked on primitive maps, to verify their contemporary existence. His campsites often placed him near the routes of illegals who trudged through the desert night, gallon containers of drinking water tied around their wrists: sometimes he found the bones of those who ran out of both water and luck. Water's availability in the desert defies logic. Although water runs downhill, it is uphill that it is found in the desert, in the impermeable rock of the mountains, in the hidden clefts that shield water from the evaporative effects of the unrelenting sun. He and a friend find one such pool that winds deep into a mountain and they explore it together in total darkness - perhaps the first ever to do so. He mistakenly finds water in his own backyard in Phoenix after hurling an ax that cleaves the ground. "Clean water suddenly bulged from the earth. Water sprung to either side of the blade, the way the sea splits around a driving bow." Childs goes after water in its abundance, after the "chubasco" (erroneously called "monsoons") of summer deluge segments of the desert and flash floods roar through canyons, dissipating only after their awful load finds unresistant, flat ground. (He categorizes floods as: Ornamental; Powerful; or Fear of God.) He reads the skies' turbulent clouds, tracks their trajectory, then follows them to their bursting, often finding in the wake of their fluid malevolence, entire displaced ecosystems. And more: "I know a woman who has, as a forensic scientist, dealt with the bodies of flood victims. She told me of the face of a six-year-old girl. Surgically removed from the girl's head by a flood, there

were no bones or teeth attached. It was only a face, limp as a rubber mask... the rest of the body had been unharmed...water was too powerful for life to withstand, and within that power was precision, as if choices were being made...the final word of water had been revealed by its own fierceness."

Childs' premise is that there are two easy ways to die in the desert: thirst and drowning. It is the custom of the Tohono O'odham people (and of the nomadic people of the Altai Mountains in Russia, too) that water not be taken boastfully. That you treat it with humility and respect, that you drink sparingly and reside away from its potentially raging path. You do this to avoid both thirst and drowning.

The finding of water turns out to be intrinsic, stored in our desires that push us out looking even in the most hostile of places." After reading Craig Childs' "The Secret Knowledge of Water", I will never look at the desert, or water, with the same eyes again.

Dru Clarke, reviewer (Dru is on the NMEA Board and teaches at Kansas State University)

Evolution Sources

Two of the best sources for evolution activities are <http://www.pbs.org/wgbh/evolution/index.html> and <http://www.indiana.edu/~ensiweb/home.html>

EVOLUTION SERIES BROADCAST CHANGE

Evolution, the critically-acclaimed 8-hour, 7-part series originally broadcast in September 2001, will enjoy an encore presentation starting May 14. Dates and times of the broadcast will vary by local market. To find the schedule for your area, check local listings or log on to pbs.org/stationfinder/index.html to find your local station's Web site. We apologize for any inconvenience.

As a reminder, the Evolution Web site at pbs.org/evolution is available at your fingertips to provide accurate, educational, and engaging resources for teaching and learning. The Web site will be active for at least ten years, so you can feel confident building it into your current and future curriculum planning.

Good Web Sites

http://www.slic.wsc.edu/bios/biol_103.html Washington State university Biology website

<http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/index.html>

<http://molecularworkshop.com/programs/inchworm.html>

<http://www.crandell.com/users/megan/> (Drosophila)

<http://www.biozone.co.nz/links.html> (great for links on everything)

<http://www.horton.ednet.ns.ca/staff/selig/AP/labs/Corn.htm> corn genetics

<http://www.guilford.k12.ct.us/~faitschb> another teachers website for ap.

<http://www.ornl.gov/hgmis/publicat/primer2001/index.html> human genome

http://www.brown.edu/Courses/BI0020_Miller/Bio20_2001/index.html Brown university biology home page

<http://www.biology.arizona.edu/> The biology project
<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?CMD=Text&DB=PubMed> embryonic tail

<http://apbio.biosci.uga.edu/exam/Essays/html/questions/genetics.html>
essays

Frog Dissection on the Web

This is part of the original posting for the frog dissection website.

In order for the website to work, you will need to install Flash. Here is the link for the FREE download:

<http://www.macromedia.com/software/flashplayer/>

Here is the main page to Froguts:

<http://www.froguts.com/>

This the organ observations sheet (pdf)

<http://www.froguts.com/downloads/fobserve.pdf>

This is the Frog Quiz (pdf)

<http://www.froguts.com/downloads/frogtest.pdf>

This is the score sheet for the online quizzes and tests (pdf)

<http://www.froguts.com/downloads/frogscore.pdf>

Build a paper frog model (pdf)

<http://www.froguts.com/downloads/frogmodel.pdf>

Virtual Pig Dissection

Someone asked about virtual pig dissections. It is a good supplement to the actual class dissection although with the cost of pigs these days the virtual route may be a good alternative. The best one I have found is at:

http://www.whitman.edu/offices_departments/biology/vpd/main.html

Teaching Forensics In The High School

<http://www4.d25.k12.id.us/phs/biology/forensics.html>

IMPORTANT!

Your membership **expiration date** can be found on your mailing label. All dues received before June 30th will be applied to the current year if you are past due. If your dues are current, they will apply for the extended year of your current due date. Dues received and postmarked between June 30th and September 30th will be applied to the next year of membership. The membership list was last updated on **November 22, 2001**.

Outstanding Biology Student Certificates

These are available for students who have completed a biology course under you and have shown outstanding achievement. Send your name and ad-

dress 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: 12030 Sunrise Valle Drive, Suite 110
Reston, VA 20191-3409

Web Site: <http://www.nabt.org>

Phones: 703-264-9696 or 800-406-0775

Fax: 703-264-7778

E-mail: office@nabt.org

Publishing Dates For Newsletter

This newsletter is published during the months of September, November, February and April. Manuscripts must reach the editor by the 1st day of the publication month. Send your contributions to John Wachholz, Editor, 2311 Applewood Lane, Salina, KS 67401-3707. Phone: 785-825-7742. You may e-mail your contributions and information to < wachholz@swbell.net >.

One More Newsletter

After considerable thought I have decided to end my term as editor of the KABT Newsletter. I will publish one more in August.

While working all Sunday on this publication I kept getting e-mails telling me about all the good birding. I feel it is time I get on the real side of biology and get out in the field. The classroom will seem better upon my return. I have been there for over forty years. The computer screen is getting a little old. Especially when my heart is not in what I am doing.

My apologies for not really doing a good job of editing. It seems I spend so much time on getting it together, printed, labeled and ready for mailing that I don't have time to read it well. It has been a long and busy journey and is now open to some other ambitious biology teacher. I will be spending more Sundays out in the field where I find myself and real biology. You will also find me on my bicycle filled with life and dealing with nutrition and wellness which is my main avocation. I will also be spending more time with Bette Sue. She gets a little tired of me working at the computer and running to the bank all the time.

I will also be dropping my duties as Treasurer. I think I know everyone in the bank personally.

It's been a good ride!

Following is one of my favorite articles I have students read and react. It was previously published in the KABT newsletter in September 1992 Volume 33, No. 3. It was given to me by the librarian.

"A handful of mud "

by Paul Brand

Soil is life. Can we preserve it for future generations?
Christianity Today - April 19, 1985

I grew up in the mountains of South India. My parents

were missionaries to the tribal people of the hills, and our lives were about as simple as they could be---and as happy.

There were no roads. (We never saw a wheeled vehicle except on our annual visit to the plains.) There were no stores, no electricity, no plumbing. My sister and I ran barefoot, and we made our own games from the trees, sticks, and stones around us. Our playmates were the Indian boys and girls, and our lives were much the same as theirs.

Rice was an important food for all of us. And since there was no level ground for wet cultivation, it was grown all along the streams that ran down the land's gentle slopes. These slopes had been patiently terraced hundreds of years before; and now every one was perfectly level, and bordered at its lower margin by an earthen dam covered by grass. Each narrow dam served as a footpath across the line of terraces, with a level field of mud and water six inches below its upped edge and another level terrace two feet below. There were no steep or high drop-offs, so there was little danger of collapse.

Those rice patties were a rich soup of life. When there was plenty of water there would be a lot of frogs and little fish. Egrets would stalk through the paddy fields on their long legs and enjoy the feast. Kingfishers would swoop down with a flash of color and carry off a fish from under the beak of a heron. And it was here I learned my first lesson on conservation.

I was playing in the mud of a rice field with a half-dozen other little boys. We were racing to see who would be the first to catch three frogs. It was a wonderful way to get dirty from head to foot in the shortest possible time. Suddenly, we were all scrambling to get out of the paddy. One of the boys had spotted an old man walking across the path toward us. We all knew him as "Tata," or "Grandpa." He was the keeper of the dams. He walked slowly, and was stooped over a bit as though he were always looking at the ground. Old age is very much respected in India, and we boys shuffled our feet and waited in silence for what we knew would be a rebuke.

He came over to us and asked us what we were doing. "Catching frogs," we answered. He stared down at the churned-up mud and flattened young rice plants in the corner where we had been playing. I was expecting him to talk about the rice seedlings we had just spoiled. Instead, the elder stooped down and scooped up a handful of mud. "What is this?" he asked. The biggest boy took the responsibility of answering for us all.

"It's mud, Tata," he replied.

"Whose mud is it?" the old man asked.

"It's your mud, Tata, this is your field."

Then the old man turned and looked at the nearest of the little channels across the dam. "What do you see there, in that channel?"

"That is water, running over into the lower field."

For the first time Tata looked angry. "Come with me

and I will show you water." A few steps along the dam he pointed to the nest channel, where clear water was running, "That is what water looks like," he said. Then we came back to our nearest channel, and he said again "Is that water?"

We hung our heads. "No, Tata, that is mud." The older boy had heard all this before and did not want to prolong the question-and-answer session, so he hurried on. "And the mud from your field is being carried away to the field below, and it will never come back, because mud always runs downhill, never up again. We are sorry, Tata, and we will never do this again."

Tata was not ready to stop his lesson as quickly as that, however. He went on to tell us that just one handful of mud would grow enough rice for one meal for one person, and it would do it twice every year for years and years into the future. "That mud flowing over the dam has given my family food since before I was born, and before my grandfather was born. It would have given my grandchildren and their grandchildren food forever. Now it will never feed us again. Then you see mud in the channels of water, you know that life is flowing away from the mountains."

The old man walked slowly back across the path, pausing a moment to adjust with his foot the grass clod in our muddy channel so that no more water flowed through it. We were silent and uncomfortable as we went off to find some other place to play. I had experienced a dose of traditional Indian folk education that would remain with me as long as I lived. Soil is life, and every generation is responsible for all generations to come.

The Hand Of Man

I have been back to my childhood home several times. There have been changes. A road now links the hill people with the plains folk, but traditional ways still go on. The terraced paddy fields still hold back the mud. Rice still grows. And the old man the boys call "Tata" is now one of the boys I used to play with 65 years ago. I am sure he lays down the law when he catches someone churning up the mud, and I hope the system holds for years to come. I have seen what happens when it doesn't.

The Nilgiri hills, or Blue Mountains, were a favorite resort in the hot season for missionaries from the plains. They were steep and thickly forested, with few areas level enough for cultivation, even with terraces. The forestry service allowed no clearing of the trees except where tea, coffee, or fruit trees were to be planted. These bushes and trees, in turn, held the soil---and all was well.

Thirty years after my encounter with "Tata" I was back in India, a doctor and a missionary myself, with a wife and growing family. We began going to the Nilgiris for every summer holiday, and our children reveled in the cool air and lush forests. But something was different, or soon became so.

A new breed of land owners had begun to take possession of the land. These new "farmers"---former political prisoners who, following India's independence, were given tracts of land---had not farmed before. They had never been exposed to a Tata teaching them the value of mud. They wanted to make money, and make it fast. They knew the climate was ideal for potatoes, and that there was a market for such a crop. Forests were thus cleared on sloping land, and potatoes planted. Two and even three crops could be harvested per year, and money flowed freely into their purse.

But harvesting potatoes involves turning over the soil, and monsoon rains often came before a new crop could hold that soil. Not surprisingly then, as my family and I returned to those mountains of boyhood memory, the water now looked like chocolate syrup. It oozed rather than flowed. We were seeing rivers of mud. I felt sick.

I went over to ask old Mr. Fritschi and his wife, a dear Swiss couple living in Coonoor on the Nilgiri hills, about the havoc that was being wrought and to find out if there was anything we could do. They had been missionaries of the Basel Mission but were long retired and now owned a nursery of young plants and trees. They loved to help and advise farmers and gardeners about ways to improve their crops. It seemed to me that these devoted people would know if there was some way to advise the landowners about ways to save their soil.

Mr. Fritschi's eyes were moist as he told me, "I have tried, but it is no use. They have no love of the land, only of money. They are making a lot of money, and they do not worry about the loss of soil, because they think it is away in the future, and they will have money to buy more." Besides, he continued, they can deduct the loss of land from their income tax as business depreciation.

Thirty more years have passed and we have left India. But every year I go back to visit Vellore Christian Medical College and take part in the leprosy work there. I do not, however, enjoy going back to the Nilgiri hills. I look up to those slopes and see large areas of bare rock of no use to anybody. Those deforested areas that still have some soil look like gravel. And the clear streams and springs that ran off from these areas 60 years earlier are dry today. When the rains come they rush in torrents and flood, then they go dry.

Oh Tata! Where have you gone? You have been replaced by businessmen and accountants who have degrees in commerce and who know how to manipulate tax laws. You have been replaced by farmers who know about pesticides and chemical fertilizers, but who care nothing about leaving soil for their great-grandchildren.

A Worldwide Drama

Outside of India I have seen another drama involving trees, soil, water, and human starvation working its tragic sequence. The place is Ethiopia.

I first came to Ethiopia in the early 1960s when I went

to Addis Ababa on behalf of the International Society for the Rehabilitation of the Disabled. My task was to negotiate the establishment of an all-Africa training center for leprosy workers, with an emphasis on rehabilitation. I met Emperor Haile Selassie and his minister of health, as well the ministers of agriculture and commerce, the dean of the then-new University Medical College, and representatives of American Aid and the Rockefeller foundation. Later I went to work in the new training center as a surgeon, teaching reconstruction of the hand and foot. But, as had happened so often in my life, it was the land that caught my attention. Most of our leprosy patients were farmers, and their future had to be in farming if they were not to be dislocated from their families and villages.

The emperor was very gracious as we talked about the problem. He gave us the use of tracts of the royal lands to farm. The Swedish churches had sent farmers into Ethiopia to teach the patients how to farm more efficiently; and it was a joy to see acres of tef, the local food grain, growing to harvest. Patients with leprosy were learning how to work without doing damage to their insensitive hands. We were grateful to the benevolent old emperor, and all seemed to be going well. Gradually, however, we began to see the real problems of the tragic country.

Camping out in the countryside, while visiting distant treatment centers, we were impressed with the way the countryside was fissured with deep canyons where streams had eroded the soil on their way to join the Blue Nile. Farms on the edges of these canyons were having to retreat year by year as their soil slipped away into the rivers. There had once been trees and forests on this land, but the trees had been felled for timber and firewood, and also to make way for grazing and cultivation.

What impressed me most, however, were the poor crops and stony fields that were cultivated by the peasant farmers. Every field seemed to be covered with great stones and boulders. Many of these stones were of a size that could have easily been levered up and rolled away to the edges of the fields where they would have made useful walls to hold the soil in and keep marauders out. As it was, it must have been a constant irritation to have to till and harvest between these rocks.

It did not take much inquiry to find out why such simple improvements had never been made. The peasants knew, and were frank to tell us, that if ever they made their fields look good they would lose them. The ruling race of Amharas, based in the capital city, contained all the lawyers and leaders of the country. Any good piece of land could be claimed by one of the city-dwelling Amharas simply by stating that it had belonged to his ancestors. Supporting documents were easy to obtain. In court the peasant had no chance. His only hope of being allowed to continue farming his land was to make it appear worthless.

Both the Ford foundation and the Rockefeller foundation had considered sending help to teach good farming

methods and to halt erosion, but both insisted to the emperor that land reform had to come first. Only if the land were owned by the people who farmed it would it be taken care of in a way that would preserve it for generations to come. The peasants had to have confidence that their handful of mud would still be there for their children. If not, why not let it go down the river?

I believe the emperor wanted to introduce land reform; but if he tried, he failed. The Amharas were too strong for him. The established church, the old Ethiopian Orthodox church of which the emperor was head, had vested interest in the status quo, and was on the wrong side of real justice. This has happened so often in the past, when churches got comfortable and wealthy. We need to be watchful and aware today.

On a state visit to Egypt, Emperor Haile Selassie walked down to the river Nile and kneeled to scoop up two handfuls of the rich fertile mud on its bank. Raising his hands, he said, "My country." The Blue Nile had carried Ethiopia to Egypt, and the old emperor knew it. He could not send the mud upstream again and he did not have the courage to make the changes that would have arrested further loss.

Today the emperor is dead. Every cabinet minister with whom I negotiated for our training center is dead---they were killed by the firing squads of the revolution. There might not have been a famine today if the trees had not all been cut, if the land had not eroded away, if the absentee landlords of Ethiopia had not been so greedy, and if the church had insisted that justice should prevail.

I did not like the revolution or the foreign invaders who brought it about, but they would never have succeeded if the people had not been laboring under a sense of injustice. The new Marxist government has not succeeded in bringing back the trees or the land, and it has spent its energy in war. But the roots of Ethiopia's problems stem from generations ago---even before the leaders who have now died for their collective sins.

Kindred sins

Today I live in Louisiana. I have no soil or water problems. In fact, my topsoil is so deep and so rich that I would not even try to plumb its depth. And the land is so flat that even when it floods my soil stays where it is.

But I cannot be at peace. My home is right beside the Mississippi River. I could probably throw a stone into the water from my roof. My house is an old one and built up on piles. At the time it was built, the occupants would expect to sit on their porch and watch the muddy waters of the Mississippi swirl under the house for a few days each year. If I were to analyze my garden soil, I would find that most of it came from Kansas and Ohio and Iowa and other states upriver. A farmer from Iowa could come to my garden, as the emperor of Ethiopia did in Egypt, scoop up a handful of mud, and say, "My farm!"

But no mud comes from Iowa to my garden now. The

corps of engineers has built a dam, or levee, all along the bank of the river, so the mud runs straight out to sea. During the spring floods, I walk along the levee and look at that mud. They tell me that many whole farms flow past my house every hour. I know that Iowa has lost more than half its topsoil just in the hundred or so years since Americans started farming that land.

Because I am haunted by the mountains of India and by the erosion of Ethiopia, I have to ask why American farmers still lose soil. They tell me they know all about contour plowing, but say modern farming machinery is so big that it is impossible or uneconomic to plow around contours. So they just go straight up and down. They get it done faster---and lose the soil faster. This all gives better returned to the shareholders, and improves all the market indicators. Shareholders and members of the board are today's absentee landlords of the farm. They are not farmers. They tell me that only small family farms still do contour plowing, but they are going out of business. Big companies are buying them up, so they can use "efficient" methods.

They tell me that the American forests are replanted when they are cut, and I think that is probably true. But I also understand that wide clear-cutting is practiced even on steep slopes. It is a matter of pride that every part of every tree is used for timber or pulp or chipboard when it is cut. But then, nothing goes back into the land. There is no building of the soil, just depletion. Kindred Sins

My Mississippi River is also the site now of scores of petrochemical plants and herbicide factories. I have chemical plants to my right and industrial plants to my left. (The proximity of the river is convenient for getting water to cooling towers and receiving effluents.) All the trees downwind have turned white and died. They tell me it was fluorides, but it could have been any one of the effluents that have given parts of Louisiana the highest incidence of cancer in the country. Ten years ago all the cattle in this area were declared unfit to sell for beef because of unacceptable levels of tetrachlormethane in their fat. I wonder what the levels are in me and my family.

I look at the great Mississippi and think back to the days of Huckleberry Finn and his raft, when the river was largely water and fish. I look down now at the swirling mud and see it as no better than the Blue Nile, or the Cauvery River in India that carries mud from the Nilgiri Hills. Is there a common thread? It is not ignorance in all cases. Nor is it dire poverty (although that sometimes leads to the cutting of the trees for fuel). No, there would be enough for all if it were not for greed. More profit. Faster return on investment. A bigger share for me of what is available now, but may not be available tomorrow.

God has something to say to us about this. And he said it repeatedly by his prophets. Moses described in detail the care of the land in Leviticus 25. It was to be nurtured and given a regular sabbath year of rest. It was

never to be sold on a permanent basis but regarded as a trust from the Lord. "The earth is (the Lord's), and you are sojourners". Later Isaiah pronounces God's judgment; "The earth dries up and withers, the whole earth grows sick; the earth itself is desecrated by the feet of those who live in it, because they have broken the laws, and violated the eternal covenant: "Because of this the land mourns, and all who live in it waste away; the beasts of the field and the birds of the air and the fish of the sea are dying." God is concerned about his creation and looks to us whom he put in charge of it. We are to share in its redemption, not to be agents of its destruction.

My Legacy

I would gladly give up medicine tomorrow if by so doing I could have some influence on policy with regard to mud and soil. The world will die from lack of pure water and soil long before it will die from a lack of antibiotics or surgical skill and knowledge. But what can be done if the destroyers of our earth know what they are doing and do it still? What can be done if people really believe that free enterprise has to mean absolute lack of restraint on those who have no care for the future?

I cannot, however, conclude without a small balance of joy and an indication that God still has a church that produces people who care. In the final analysis it is not knowledge or lack of it that makes a difference, but concerned people. The sense of concern for the earth is still transmitted by person-to-person communication and by personal example better than by any other method. Old Tata still lives on. He lives in the boys who played in the mud, and they will pass on his concern for the soil and his sense of its importance to future generations.

Old Mr. Fritschi still lives on through his son. The love of trees he tried to promote in the Nilgiri hills is now being promoted by his son on the plains of Karigiri. A single dedicated person giving a good example is better than a lot of ringing of hands and prophecies of doom.

Ernest Fritschi was born in India and lived there long enough to love it, take Indian nationality, and marry a lovely Indian wife. He studied in Madras University, became a doctor, and then an orthopedic surgeon. Working with leprosy patients, he joined the leprosy Mission and worked in many countries, including Ethiopia, and then became director of the Schieffel in Research and training center at Karigiri near Vellore.

The land for the center had been barren gravel with not a tree any where, and water had been hard to locate. I remember walking over the large acreage before we started to build and thinking that it was no surprise the government had donated it so freely. It was good for nothing else.

Ernest, however, had faith in the land and was determined to prove that it could be productive of more than buildings and a hospital. Other directors had made a good start, but Ernest made a rule for himself that every

year he would plant trees. He collected seeds and seedlings from everywhere and nourished them in his own garden until they were strong. Then he would plant them out just before the rains, and have them watered by staff and patients until they had root systems deep enough to survive. The hill that formed one border of the Karigiri land was bare and rocky, and the rains would send a rushing flood of water over the gravel of the hospital grounds. So Ernest built contour ridges of gravel and soil to hold the water long enough for it to soak in.

I remember the hospital and its surrounding staff houses and chapel as they grew. They were gray and white and stood out on the skyline. They could be seen for miles as the only structures breaking the monotony of the gravel slopes. Today, as I approach that hospital, it is hidden in a forest with trees higher than the tallest buildings. The place has been declared a sanctuary by the environmental department of the state government in recognition of what already exists. The whole area is full of birds; we counted and identified over 40 species in one afternoon. The water table, falling in most places, was rising last year under the gravel at Karigiri. Soil is building, not being lost.

What is a few acres among the millions where the reverse is true? It is important to me because it sounds a message. One man can make a difference. Dedication is what is needed. And faith. It is important, too, because the man who made this little revolution is not a professional farmer or a government official. He is a doctor who loves trees, soil, and water. He was sometimes criticized by his board of governors who said his goals and objectives should be to treat and rehabilitate leprosy patients. Money, they argued, should not be diverted to other goals, like farming and reforestation. But he proved that concern for soil and trees benefits patients too. Buildings do not need air conditioning when they are shaded by trees. Patients who see and participate in good practices on the land learn to reproduce the same when they go home.

Not far from there is the Christian Medical College, founded by the beloved American doctor Ida Scudder. She insisted on building the college on an extensive piece of land where there would be room for gardens and trees. She was followed by others who had the same view, including the first Indian director, Dr. Hilda Lazarus, who doubtless had claims to fame in her own medical specialty but whom I remember for her love for trees.

Dr. Lazarus is long gone, but her trees and philosophy remain. In my day we used to get excited and concerned about new drugs and new diagnostic equipment, but today when I visit the Christian Medical College, I find the director more likely to be excited about preserving the water table, and growing the still life in the land, and God still blesses those who recognize "the earth is the Lord's."

I am a grandfather now. My grandchildren do not call me Tata, but I rather wish they would. It would not mean much to them, but it would remind me that, in ad-

dition to the immortality of our spirit, we all have a sort of immortality of our flesh. If the kids called me Tata, it would remind me that, down the centuries, there may be many generations of people who will bear my humanity, who will enjoy life or who will suffer in proportion to the care that I now take to preserve the good gifts that God has given us. Part of that care is in teaching and in example.

My grandson is called Daniel, and the next time he comes to visit me I shall take him out into my garden and scoop up a handful of mud. I shall ask him, "Daniel, what is this?"

Sense of Wonder

"If a child is to keep alive his inborn sense of wonder . . . he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in."

Rachel Carson

If I only had more time.....

If you had a bank that credited your account each morning with \$86,400 that carried over no balance from day to day, allowed you to keep no cash in account, and every evening cancelled whatever part of the amount you failed to use during the day, just what would you do? Draw out every cent, of course!

Well, you have such a bank, and its name is TIME. Every morning it credits you with 86,400 seconds. Every night it rules off, as lost, whatever part of this sum you have failed to invest to good purposes. It allows no overdrafts. Each day it opens a new account for you; each night it burns the record of the day. If you fail to use the day's deposits, the loss is yours. There's no drawing against tomorrow. You must live in the present...on today's deposits. Invest it so as to get from it the utmost in health, happiness, and success.

(author unknown)

Reprints of these biology teaching articles are available from Paul Jantzen, 107 North Madison, Hillsboro, KS 57063. Please enclose art estimated amount; for postage. Indicate by capital letter which articles you want. For A, E, H, and I, only single copies are available. You may ask for multiple copies of the others.

A

Canopy Coverage Compares Pasture and Prairie
American Biology Teacher 35(6):322-325. September 1973

B

Investigating Paleontological Succession
American Biology Teacher 37(4):219-219. April 1975

C

Investigating the Ecological Role of Weeds
American Biology Teacher 38(3):157-159. March 1976

D

An Ecological Look at Weeds
Kansas School Naturalist; 23(2):3-15. December 1976

E

Investigating Factors that Affect Dissolved Oxygen Concentration in Water
American Biology Teacher 40(6):346-352. September 1978

F

The Origin and Nature of Race: A Value Clarification Lesson
American Biology Teacher 40(6):532-544. December 1978

G

A Beetle, a Bur, and the Potato: An Introduction to Ecology
American Biology Teacher 45(8):424-427. December 1983

H

Plant; a Bur Oak as a Living Legacy
KABT Newsletter 29(1):21-23. February 1988

I

Cottonwood Leaves as Toys
On T.R.A.C.K.S. 3(3):11 Spring 1992

"The Big Rocks & The Jar"

A high school science teacher wanted to demonstrate a concept to his students. He takes a large-mouth jar and placed several large rocks in it. He then asks the class, "Is it full?" Unanimously the class replies, "YES!"

The teacher then takes a bucket of gravel and pours it into the jar. The small rocks settle into the spaces between the big rocks. He then asks the class, "Is it full?" this time there are some students holding back, but most reply, "Yes!"

The teacher then produces a large can of sand and proceeds to pour it into the jar. The sand fills up the spaces between the gravel. For the third time, the teacher asks, "Is it full?" Now most of the students are wary of answering, but again, many reply, "Yes!"

Then the teacher brings out a pitcher of water and pours it into the jar. The water saturates the sand. At this point the teacher asks the class, "What is the point of this demonstration?"

One bright young student raises his hand and then responds, "No matter how full one's schedule is in life, he can always squeeze in more things!"

"No" replies the teacher, "The point is that unless you first place the big rocks into the jar, you are never going to get them in. The big rocks are the important things in your life - your family, your friends, your personal growth. If you fill your life with small things - as demonstrated by the gravel, the sand, and the water - you will never have the time for the important things.

So, what are the "Big Rocks" in your life? Spending time with your children, your parents or your spouse? Taking the seminar or class to get the information and perspective you need to succeed? Making the time to set goals, plan or evaluate your progress? When you are hassled because there is no time, remember the story about The Big Rocks and the Jar"!!

INQUIRY WITH PLANTS

By Virginia Malone

When do students start working on a long-term science project? Most of my students started and finished it the night before it was due. My solution to this was to break the task down in parts, requiring that they complete each part by a given date. My rather elaborate scheme paid off. Students would provide a topic by the end of the first two weeks of school, the next two weeks their hypothesis or question, etc. by the end of the first semester they were through. When did most of them actually do the project? The night before, of course. After 20 years in the classroom, I came to realize that I must devise a way for students to complete their projects in an evening. At least it would be a complete project and they could see the process as a whole rather than disassociated pieces. Those students who became engaged could take the project further.

My goal was to develop an activity to be completed in a short time frame. The activity had to be able to cover different concepts. It had to cover content as well as process. It had to enable students to develop their own unique investigations with simple materials. The following is the technique I developed to meet these criteria. Since plants are often forgotten in modern biology courses, I first focused my efforts on plants. They are readily available in large quantities at little or no expense.

After some trial and error I developed the following steps to use with the class. After completing two or three similar activities in class the students were ready to tackle their own project with just about anything they can find. I like to start with "Devil's claws." These are seed pods that bear a faint resemblance to a skull with long horns. Many students believe they are skulls. I have used butterfly vine seed pods, sweet gum balls, pine cones and other plant parts with equal success. I like the dry parts because they are easy to keep.

1. **Present any phenomenon or peculiar object** to the students. The key is to have enough materials for every student to investigate. The stranger the object or phenomenon the easier it is to engage the students. The student's first question is "what is it" or "why does it..." I do not answer these questions, because the instant I do the student's minds seem to click off.
2. In groups of two or three, **the students ask as many questions** as they can about the object or phenomenon. I allow about 2 minutes for this. Remember I want to get this all done in a very short time frame.
3. **Make a master list** of student questions on a transparency. Each group adds one question to the master list until every group has presented at least one question. I allow about 4 minutes, it is not necessary to list every single question, just enough for variety.
4. **Group the questions** into those that can be answered by looking in a book or asking an expert, and those they can only be answered by experimentation. I just put a "B" by those that can be answered by looking in a book or asking an expert. I put an "E" by those that can be answered by experimentation.
5. Students **look for commonalities** in the way questions are phrased. All of the questions that can be answered only by experimenting tend to fall into certain patterns. This takes about 3 to 5 minutes.

If students do not come up with these questions I give them some question starters, for example will it...; what will happen if I ...; how will it react to ...; what are the effects of; how many; how much.... I have students complete a few of these orally. For example: "What will happen if I put this in the water." With immature students the starters with the personal pronoun "I" seem to work best.

Recall in journalism students are taught to ask who, what, where, when, and why. In science the question starters are a little more complex, but the starters can be taught. When students ask, "why" or "how does it..." I congratulate them. These are the questions that scientists really want to answer. However, only rarely can these questions be answered by a single experiment. It may take 100s or even 1000s of experiments and many years to find these answers. These are the great questions, but I want the students to ask questions that can be answered by experimenting.

4. Have students make a **master list of "Question Starters"** for experimentation in their journals. They should add to this list through out the year. This takes about 3 to 5 minutes.
5. Students return to their groups. Using these question starters they generate a whole **new set of questions** that can be answered by experimentation. I usually give them only 2 or 3 minutes. Remember, everything is to move quickly so students can see the whole.
6. The student groups (I prefer groups of two) **chose one question** that they can answer using the available equipment in one class period. (I usually have water, a few beakers, dissecting equipment, a balance and a few spring scales.) It does not matter than some groups are asking the same question. This takes about 1 or 2 minutes. For safety reasons I approve their procedure before they can proceed. I can do this as they are choosing since some students choose more quickly than others.
7. Each group **completes the investigation**. As they are completing the experiments I move around the room asking, how the experiment is related to the concept I am trying to teach.

I mentally prepare my content questions prior to the activity. For example if I am working with "Devil's claws" my goal may be to focus on adaptations so I have my own question starters in my mind. "How does this (whatever it is the students find) help the plant survive. . Some students will ask, "**Will it float if I** put it in water." If they find it floats(it usually does), I ask how this helps the plant. If they find that the seed pod will always falls with its "horn" up, I ask how this would be advantageous to the plant. Thinking of the questions ahead of time will enables me to relate what the students find to what I want them to learn. This is the hardest part of the activity for me.

8. **Each group reports** on the results of their experiment. They include how their results are related to the content being studied. I may need to prompt them with my own questions. For the seed pods, how do your results relate to the survival of this species? These reports generally last only a minute or two and are oral. If some student's present the same experiment with the same results, I ask if this happens in science. Most students will know it does and that this is a way to validates the results of others. If some student's present the same experiment with different results, I ask if this happens in science. Most students will realize that it does. I ask what would scientists do about this situation. Most students realize they need to do more experiments, or have better con-

trols. With seed pods this often happens when the question investigated is how many seeds does the pod have.

9. Individual students **reflect on the steps** they took to in this investigation in their journal. They write the steps followed during this investigation and compare their own steps with the steps of other students.

In order to get students started I ask them, what is the first thing we did today. What did we do next? I prefer that students do this independently and in writing. (Students should come up with a list of steps that are essentially the same as the "scientific method." The difference is these steps and "the method" is that the steps are theirs, not something they have memorized.) I consider this the most important part of the investigation. Each time we have an open inquiry we complete this reflection. Somehow students begin to see that science is all around them and can be investigated using the simplest of materials.

10. Make a **master list of steps** on a transparency asking different students to add to the list of steps. I like to let my weakest students go first so they will have something to contribute. I write the list on a transparency. I will add steps or draw arrows to move steps. This will look very messy, but I use this to show students that everyone sees the process differently.

Students usually say something like, I did this first Another might say , that was not what I did first. That was the second thing I did. This shows students that each person can view the process as they see it. There is no set of steps that is the "correct" way.

This type of quick open-ended inquiry can be used anytime you have enough materials for students to use. Be sure to approve all procedures before students begin their investigations. The demands on the students can be increased so you are leading students wherever they are ready to go. You might say, "You can chose only questions that produce quantifiable results." You might require more and more controls, more precise measurements, graphing, statistical analysis of data to determine reliability, or anything else that is appropriate for your students. For more complex projects you can have the students write out their procedures requiring your sign off before they begin. You can add in a research component requiring the students to find the explanation for the phenomena in books prior to or after the investigation. No matter what they find, they should be able to supply some reasonable connection to their own experiment.

If you have simple procedure activities like testing for pH, simple sugars, proteins, etc, you can have students ask and answer their own questions using the procedures they have learned in the traditional laboratory activity. No matter how trivial an investigation appears to be it can added to the whole.

Time for the science projects again, students should be able to come-up with investigations that are real investigations in one evening. They may not be the greatest, but they will certainly be less painful to the biology teacher who is trying to motivate 150 secondary school students to produce an original science investigation.

If you have, any questions about this process feel free to contact me.

Virginia Malone

Biology teacher, retired

1791 US Hwy 90 East, Hondo, TX 78861, Virginia_Malone@Juno.com, 830-741-2500

STRESSED OUT PLANTS

In this investigation, students can learn about the effects of stress on plants.

The idea for this investigation came from an unpublished collection of experiments sponsored by the National Association of Biology Teachers and entitled "Encouraging Student Research".

A. INTRODUCTION

To introduce the idea of plant stress to your students, you may try taking a walk around the school campus, observing trees and looking for evidence of stress and possible causes. Or you may want them to read a current article from "Natural History", "Science News", or "Discover" that discusses plant adaptations and relate that to how plants respond to their environment. (Fortuitously, as we were beginning our study of plants this year, the local paper ran an article about the occurrence of Scotch Pine Disease in Lawrence!)

B. STUDENT GROUPS GENERATE HYPOTHESES

Before you actually have students generate hypotheses, you may want to have them brainstorm a list of possible stresses. Brainstorming what they could measure if in fact the plant was under stress might also be helpful. I have each group present their hypothesis to the class with a few ideas about how they would mimic the stress and why they think their proposal is a legitimate investigation. Because of the need for an adequate sample size I ask the class to come to a consensus as to which hypothesis they want to investigate. (Here are a few ideas my students have investigated over the last few years: wind, insect damage, acid rain, flood/drought, fertilizer, rubbing, temperature, sunlight, detergents.)

C. STUDENT GROUPS DESIGN THE EXPERIMENT

Again, I have each group write a proposal. The general steps are usually sound, but we always have to discuss and agree upon details. (For example, if the class is investigating insect damage, how will we mimic the damage to the plants and/or how frequently.) Note: you may need to stress that each student understand how the plants will be measured. Once we agree upon a method I usually ask them to consider measuring each plant several times until they get a consistent measurement.

D. EXPERIMENT

These experiments usually need to run about 14 days. Each student keeps track of their group's data. Measuring the plants two to three times a week is appropriate. I require that the students be responsible for the "treatment" schedule (that is, they have to remember what days they planned to water, add fertilizer, rub plants, etc.)

E. MATERIALS FOR CORE EXPERIMENT PER GROUP

This list of materials may help you plan for the basic set-up.

4 tomato plants (about 3-cm in height is good)

potting soil or mix of potting soil and top soil (the mix is cheaper)

4 pots (6-cm is a good size)

masking tape for labels and permanent markers

rulers

assortment of graduated cylinders, beakers, etc. to measure water or other solutions

newspapers to cover the desk when they are potting the plants is helpful

trays may be helpful to catch the run-off and to keep different plant treatments separated

KATS KAMP Presentations

KABT

PROPOSED SESSION TIMES FOR KABT PRESENTATIONS

8:00 - 8:20 An Open-ended Lab to Investigate Fermentation
Sandy Collins, West Junior High School, Lawrence, KS

8:25 - 8:50 Paleontology of Plants and Insects: an Unthreatening Introduction to Evolution
Paula Donham, Olathe East High School, Olathe, KS

9:00 - 9:50 Want to be a Sewer Detective?
Pat Wakeman, Tonganoxie High School, Tonganoxie, KS

Low-tech Taxonomy

John Tollefson, Highland Park High School, Topeka, KS

NOTE: We will have two concurrent sessions; we had one too many volunteers when I found out that there were to be no 1:00 sessions scheduled. Pat and John, I will get back to you.

10:00 - 12:00 Living Invertebrates in the Classroom
Charles Drewes, Iowa State University, Ames, IA
Randy Dix, Olathe North High School, Olathe, KS

1:00-1:50 NO KABT SESSION – regional meetings.

2:00- 2:50 Reading History from DNA
Robert Hagan, University of Kansas, Lawrence, KS

3:00- 3:50 Diffusion Confusion
Todd Carter, Seward County Community College

4:00-4:20 Invertebrate Biology Toolbox
Charles Drewes, Iowa State University, Ames, IA

4:25 - 4:50 Virtual Prairie
John Wachholz, Salina Central High School, Salina, KS
Judd Patterson, Kansas State University Freshman, Manhattan, KS

5:00- 5:50 Open Forum: the State of Science Education in Kansas
Harry McDonald, Blue Valley High School, Stilwell, KS

SUSTAINABILITY

Todd Carter

One method we use to get students to recognize the multidimensional nature of issues of global, national, and local importance is to have them identify those dimensions while examining the pro and con view points. In fact, one of the outcomes for our general biology course includes the ability to identify, report, and come up with solutions for each of the dimensions of an issue. At the end of our Human Impact on the Biosphere unit, students are asked to locate an environmental problem and identify the scientific, technological, political, economic, social/cultural, and ethical dimensions of both the pro and the con viewpoints. Two sets of books, Environmental Issues and Taking Sides are put on reserve in the library to assist students. They are also to read the Smithsonian article, "Down on the Farm, The Times They are a Changin'" which gives an account of a sustainable agriculture operation in Virginia. A handout and a detailed list of the references are available for this assignment by request from tcarter@sccc.net.

Instructor Notes

Students work in groups of 4 or 5 and share the dimensions of the pro and con sides to their environmental issue. They are then asked to list similarities in each dimension they find between all of the different environmental issues, both pro and con, in the group. Ask them to generalize. For example, were the scientific dimensions on both sides of the issue backed by credible evidence? Was there technology involved and did it have a helpful or detrimental effect?

List the dimensions in a column on one end of the board and have two columns (pro, con) for students to write their group results into.

Compare the similarities. Economics is usually identified as one that transcends all of the dimensions. Politically, laws and regulations are a part of the issue, intergenerational equity or the intentional mismanagement of resources is usually a common part of the ethical dimension. The lack of perceived need to change or to do something different is usually the social/cultural dimension. Jevon's Paradox may also be applicable here.

Summarize by asking the class to come up with the components of a sustainable system that would be acceptable to everyone. Point out it has to be acceptable or no one will use the system. I usually bring up the "Times They are a Changin'" article at this time. Students have been identifying the following components of a sustainable system:

1. Economically feasible; affordable plus the ability to make money using the system
2. Resilient; ability to withstand changes, can adapt to changes
3. Does not deplete resources
4. Uses appropriate technology

In addition to addressing outcomes, students have indicated on post activity assessments that it clarifies what is meant by sustainable and how difficult it is to have a sustainable system that everyone will support. It is at this point that we begin making connections to the difficulties faced by the countries involved in the earth summits as they attempt to implement Agenda 21. This format is easily adaptable to any type of issue.

Todd Carter, Chair
Math and Science Division
Seward County Community College
1801 N. Kansas Ave
Liberal, KS 67905
800-373-9951 ext.643
FAX 316-629-2725

Evolution Workshop

Presented by: Ken Bingman and Harry McDonald

Date: Thursday, June 6, 2002

Where: Blue Valley West High School, 16200 Antioch, Overland Park, KS
Room 364

Time: 9:00 AM – 4:00 PM

COST: Free

Presenters: Ken and Harry are both lead teachers with the Evolution series produced by WGBH, Boston.

The topic of evolution continues to occupy standards and curriculum discussion at the state and local district level. We experience challenges in our own communities and classrooms. In this climate, it is incumbent on us all to do two things, 1) continue to improve our understanding of evolutionary theory and 2) continue to improve our teaching of evolution. This workshop is designed to do both.

Highlights

- **A complete set of the eight-hour Evolution series produced by WGBH, including the teacher video, will be awarded as a door prize.**
- **One hour of graduate credit is available from Baker University for the course EDC 5933, Teaching of Evolution. Tuition is \$50.**

Workshop Description: Teachers will be introduced to the free, online tools provided by WGBH, Boston, in support of the improvement of classroom instruction covering evolution. Teachers will be engaged in using the wide range of materials provided by the Evolution Project. Topics will include some lecture, selected video content, and other activities designed to increase the teacher's understanding of the fundamental concepts of evolution as well as providing an opportunity for teachers to try many student activities designed to improve the teaching of evolution.

For Additional Information, Contact: Harry McDonald, Blue Valley High School, 6001 159th St., Stilwell, KS 66085. 913 – 239-4965 (school), 913-897-9630 (home), **biologyctrack@hotmail.com**

Registration (There is no cost, but advanced registration is required)

Name _____ Phone _____

Address _____ email _____

Mail to: Harry McDonald

Blue Valley High School, 6001 W. 159th St., Stilwell, KS 66085

Or send the above information to : biologyctrack@hotmail.com

Harry McDonald
President, Kansas Association of Biology Teachers
11917 W. 143rd St.
Olathe, Kansas 66062

April, 10, 2002

Ohio State Board of Education

Dear Board of Education Member:

My name is Harry McDonald. I am the President of the Kansas Association of Biology Teachers. The Board of KABT has directed me to express our concern as you consider incorporating intelligent design ideas into your new science standards.

I have been following your deliberations, and am aware you have received considerable comment and testimony. I will thus choose not to repeat the technical arguments you have received from other scientists and science organizations.

Instead, let me focus on sharing Kansas' experience as we faced this same issue. Rest assured that the controversy you are currently experiencing is not a science controversy. The attempt to include intelligent design into your science standards is definitely religiously motivated. This point became clear to us as our struggle unfolded.

Kansas received so much negative publicity because our previous board voted to ignore the overwhelming advice of the science community. Our board president even remarked that she wasn't going to follow the advice of intellectual, national experts. This isn't a quote, as I don't remember her exact words, but her meaning was clear. She spoke with derision about the attempt of learned people to presume to give the Kansas Board advice. At that time Kansas was represented by board members who didn't respect the overwhelming advice of people who spent their life studying and researching science. They choose, instead, to accept the fringe ideas of a few, religiously motivated individuals. I encourage you not to make the same mistake.

If you listen to the consensus view of science, to the numerous organizations and individuals who have earned the privilege of being called science experts, you will not include ID in your standards.

Rest assured, even if you vote to include ID in your standards, that won't make it science. Such action will only succeed in giving your state a poor set of standards and will lead to substandard education for your students. As has been previously established by our national courts, science is what science does. Science does not do ID. You may include it in your standards, but that doesn't make it science. Good science is established by a consensus of the science community and is not subject to a vote of the members of any state board of education. Nor does good science education place students in the position of making up their own mind about central science theories. There are those who still think the earth is flat and the sun orbits the Earth. We don't present these as competing science ideas and let children judge their merit. The citizens of Kansas have shown an understanding of this as we replaced our 1999 board with one that voted to follow the recommendations of the science community.

KABT encourages you to follow the consensus recommendation of the science community and leave ID out of your science standards.

Sincerely,

Harry McDonald
Biologyctrack@hotmail.com

The Kansas Association of Biology Teachers Officers - Representatives - Board Members

President

Harry McDonald
11917 W 143rd
Olathe, KS 66062
(913) 897-9630
Blue Valley High School
6001 W. 159th Street
Stilwell, KS 66085
(913) 681-4200
biologycctrack@hotmail.com

President Elect

Sandy Collins
2444 Wellman Road
Lawrence, KS 66044
(785)-841-2375
West Junior High School
2700 Harvard
Lawrence, KS 66049
1-785-832-5500

scollins@usd497.org

Vice-President

Nathan Brown
412 Easter Street
WaKeeney, KS 67672-1836
1-785-743-5268 (H)
ntbrown@ruraltel.net

Past President

Lisa Volland
2609 SW Morningside Dr
Topeka, KS 66614
(785) 273-1810
Topeka West High School
2001 SW Fairlawn
Topeka, KS 66604
(785) 271-3529
lvolland@topeka.k12.ks.us

Treasurer and Newsletter Editor

John Wachholz
2311 Applewood Lane
Salina, KS 67401-3707
(785) 825-7742
Salina High School Central
650 E. Crawford Street
Salina, KS 67401-5119
(785) 826-4751
FAX (785) 826-4740
wachholz@swbell.net

Secretary and

KACEE Representative

Pat Wakeman
24549 Sandusky Rd.
Tonganoxie, KS 66086
(913) 845-3208
Tonganoxie High School
Box 179 24-40 Highway
Tonganoxie, KS 66086
(913) 845-2654
FAX (913) 845-3716
wakeman@idir.net

Region 1 Representative

Ernie L. Brown
825 Main
WaKeeney, KS 67672
(785) 743-2972
Trego Community High
School
1200 Russell Avenue
WaKeeney, KS 67672
(785) 743-2061
FAX (785) 743-2449
ebrown@ruraltel.net

Region 2 Representative

Pat Lamb
3014 Sunnyside
Manhattan, KS 66502
(785) 776-1438
Manhattan High School
2100 Poyntz
Manhattan, KS 66502
(785) 587-2100 Ext. 802
plamb@kansas.net

Region 3 Representative

John Tollefsen
24015 Loring Road
Lawrence, KS 66044
(785) 749-3280
Highland Park High School
2424 California Avenue
Topeka, KS 66605
(785) 266-7616
jtollfsn@falcon.cc.ukans.edu

Region 4 Representative

Todd Carter
Box 346
Forgar, OK 73938
(405) 487-3547

Seward County Community
College
Box 1137
Liberal, KS 67905-1137
(620) 629-2643
FAX (620) 629-2725
tcarter@sccc.net

Region 5 Representative

Mike Fell
14354 US 77
Winfield, KS 67156
(620) 221-1136 H
(620) 221-5160 W
Michael_fell@usd465.com

Region 6 Representative

Jim Foresman
306 Park
Pittsburg, KS 66672
Pittsburg High School
(620) 235-3200 W
jforesma@usd250.k12.ks.us

Representative At Large

Donna Cooper
2906 Walnut
Hays, KS 67601
Hays High School
2300 E. 13th
Hays, KS 67601
(785) 623-2600
cooper@eaglecom.net

Representative At Large

Randy Dix
12115 S. Walnut St.
Olathe, KS 66061
(913) 782-2984
Olathe North High School
(913) 780-7140

rdixon@mail.olathe.k12.ks.us

Journal Editor

John Richard Schrock
1101 W. 18th Avenue
Emporia, KS 66801
(620) 342-3879
Emporia State University
Dept. of Biological Sciences
Box 4050
Emporia, KS 66801
(620) 341-5614
FAX (620) 341-5997
ksnaturl@emporia.edu

NABT President

Brad Williamson
President Elect—NABT
Olathe, KS 66061
(913) 764-6036
bwilliam@sound.net

KABT Historian

Stan Roth
532 Oklahoma St.
Lawrence, KS 66046
(785) 843-4764
jroth@falcon.cc.ukans.edu



KABT Regions

Cheyenne	Rawlins	Decatur	Norton	Phillips	Smith	Jewell	Republic	Washington	Marshall	Nemaha	Brown	Doniphan		
Sherman	Thomas	Sheridan	Graham	Rooks	Osborne	Mitchell	Cloud	Clay	Riley	Pottawatomie	Jackson	Atchison		
Wallace	Logan	Gove	Trego	Ellis	Russell	Lincoln	Ottawa	Clay	Geary	Wabaunsee	Shawnee	Franklin	Johnson	
Greeley	Wichita	Scott	Lane	Ness	Rush	Barton	Ellsworth	Saline	Dickinson	Morris	Lyon	Osage	Franklin	Miami
Hamilton	Kearny	Finney	Hodgeman	Paunee	Stafford	Reno	Harvey	Butler	Greenwood	Woodson	Allen	Bourbon		
Stanton	Grant	Haskell	Gray	Ford	Kiowa	Pratt	Kingman	Sedgwick	Butler	Elk	Wilson	Neosho	Crawford	
Morton	Stevens	Seward	Meade	Clark	Comanche	Barber	Harper	Sumner	Cowley	Chautauque	Montgomery	Lafayette	Cherokee	

Counties In Region 1

Cheyenne, Decatur, Ellis, Gove, Graham, Logan, Norton, Osborne, Phillips, Rawlins, Rooks, Russell, Sheridan, Sherman, Smith, Thomas, Trego, Wallace

Counties, In Region 2

Chase, Clay, Cloud, Dickinson, Ellsworth, Geary, Jewell, Lincoln, Lyon, Marion, Marshall, McPherson, Mitchell, Morris, Ottawa, Pottawatomie, Republic, Rice, Riley, Saline, Shawnee, Wabaunsee, Washington

Counties In Region 3

Atchinson, Brown, Doniphan, Douglas, Franklin, Jackson, Jefferson, Johnson, Leavenworth, Miami, Nemaha, Osage, Wyandotte

Counties In Region 4

Barber, Barton, Clark, Comanche, Edwards, Finney, Ford, Grant, Gray, Greeley, Hamilton, Haskell, Hodgeman, Kearny, Kiowa, Lane, Meade, Morton, Ness, Pawnee, Pratt, Rush, Scott, Seward, Stafford, Stanton, Stevens

Counties In Region 5

Butler, Coffey, Cowley, Harper, Harvey, Kingman, Reno, Sedgwick, Sumner

Counties In Region 6

Allen, Anderson, Bourbon, Chautauqua, Cherokee, Crawford, Elk, Greenwood, Labette, Linn, Montgomery, Neosho, Wilson, Woodson

Your membership **expiration date** can be found on your mailing label. Starting immediately, all dues received before June 30th will be applied to the current year if you are past due. If your dues are current, they will apply for the extended year of your current due date. Dues received and postmarked between June 30th and September 30th will be applied to the next year of membership. The membership list was last updated on **April 18, 2002**.

KABT Membership Application or Renewal Form—ONLY USE CURRENT NEWSLETTER FORM!

Name: _____
(Mr.-Mrs.-Ms.-Dr.-Miss) First Name Last Name

Mailing Address: _____

City: _____ State: _____ Zip: _____ - _____

School/Institution: _____

Position: _____

City: _____ State: _____ Zip: _____ - _____

Phone: Work (____) _____ - _____ Home: (____) _____ - _____

FAX: (____) ____ - _____ Internet Address: _____@_____

Enclosed Dues For KABT **\$15 / Year**—Life Membership Available For **\$300**

National Association of Biology Teacher Dues: **\$65.00 / Year**

Dues Payment For Next Year Must Be Received Between Dates Of June 1st to September 30th

Dues Received On Dates Preceding June 1st Or After September 30th Will Be Applied To Current Year

Make Check Payable To KABT - Tax ID #: 48-0945206

Send Dues & Information To:

Kansas Association of Biology Teachers

2311 Applewood Lane

Salina, KS 67401 - 3707



Kansas Association of Biology Teachers

EVENT CALENDAR

Date

Event

April 26-28, 2002	KATS KAMP (Special KABT Presentations)
May 3-5, 2002.....	K.O.S. Spring Meeting @ Junction City
May 3-5, 2002.....	Second Annual Great Bend Birding Festival @ Great Bend
June 1, 2002	KS Herpetological Society Spring Field Trip @ Cimarron Natl. Grasslands, Elkhart
June 8, 2002	Spring Field Trip-Smoky Valley Ranch, Logan Co. S.W. of Oakley
Sept. 14, 2002.....	Fall Meeting-Biology Teacher Share-A-Thon @ Site TBA
Oct. 5, 2002.....	K.O.S. Fall Field Trip & Meeting @ Meade
Oct. 30-Nov. 2, 2002	NABT Annual Convention - Cincinnati, Ohio Brad Williamson will be President during this convention so help out by attending and presenting!
October 8-11, 2003	NABT Annual Convention - Portland, Oregon
Nov. 1-2, 2002.....	Fourth Annual KACEE Meeting @ Atchison
Nov. 2-3, 2002.....	KS Herpetological Society Annual Meeting @ Lawrence

Please send meeting dates and other items of interest to biology teachers to: John Wachholz, 2311 Applewood Lane, Salina, Kansas 67401-3707, 913- 825-7742 - E-mail: wachholz@swbell.net