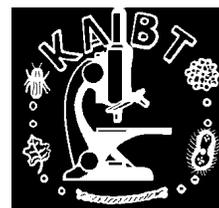


Kansas Association of Biology Teachers Newsletter

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KABT Web Site

<http://kabt.org>

NABT Web Site

www.nabt.org

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Presidents Message

Harry McDonald

I had the opportunity to attend a Leadership 2001 conference at the NABT convention in Montreal. NABT is examining its structure and its ability to meet the needs of the membership in the 21st century. It has enjoyed an all-time high in membership for the last several years. Even with this evidence of vitality, the leadership worries about the future ability of the organization to attract and retain members. Several interesting ideas surfaced which I will share with our board and membership in upcoming newsletters.

As you know from previous columns, KABT is undergoing its own self-examination. As any organization ages, its very survival depends on its ability to evolve as times and needs change. KABT has served my personal and professional needs for over two decades. I don't have a need for the organization to change. The same may be true for many of our board members. They certainly have been

long-time members of KABT.

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As president though, I must worry, not about the needs of Harry McDonald, but about the your needs and, ultimately, the organizational needs of KABT. One thing I am absolutely sure of, if our membership grows old and retires without a strong base of younger members, it will fade into oblivion.

I love KABT too much to let this happen. I owe it much for the professional development opportunities it has afforded me and for the friendships it has fostered. So our board has started examining the future direction of KABT.

I have written about this subject before and probably will again. Our board meets as a whole only once a year, so change comes slowly. This is probably good as changing too quickly might cause us to "lose our rudder." One change which has occurred, in an attempt to generate more participation in our spring field trip, is that we have moved the trip to the weekend of June 8.

We will have a chance to tour the Smokey Valley Ranch in west-central Kansas. Stan Roth has agreed to lead this trip, so count on a wonder learning opportunity. In any case, our board is trying to find ways to allow more of our membership to participate in our activities. The traditional date had been on Mother's Day weekend. If this change of date doesn't help, send me other suggestions. If you have never been on one of these trips, many of us gather on Friday night for dinner and conversation. We spend all day Saturday exploring the wonder biotic diversity of Kansas. Some can enjoy another night of camping and others head home. All it costs is some gas money, grub, camping fees, and a couple days of your time. Don't fret about leaving the family. If your kids are old enough to be respectful of nature and your fellow campers, bring them along.

To wrap this up, one of the ideas that surfaced in Montreal is the need for any ongoing organization to provide regular, two-way communication with its members. Over the last six months, I have passed out membership surveys to those who attended KATS Kamp, our spring field trip, and our fall conference. Many of you have returned these. If you have not had the opportunity, you will find a survey enclosed in the newsletter. Please fill it out and return it to the address on the survey, or send your opinions as an email. Our board will be examining the results of these surveys in January, so please send them back at your earliest convenience.

WGBH Evolution Resources

Harry McDonald has been named one of the lead teachers for the WGBH Evolution series. Hopefully you all got a chance to watch the series. It did a lot to provided classroom teachers with a video resource for teaching evolution and for dealing with the potential controversy.

WGBH has made a long-term commitment to supporting teachers over this issue. They are of course making the entire series available on video and DVD (\$99.95). They also provide an educational set with the 8-hour series, a one hour 35 minute video that highlights the

teaching of evolution in classrooms, and a teacher's guide with activities to enhance the teaching of evolution (\$129.95).

They also, and this may be the best part, maintain a website (<http://www.pbs.org/wgbh/evolution/>) which features online student lessons, a teacher's course (very good and free), a comprehensive evolution library (you have to check this out) and interactive games and activities.

Harry will be offering a 6-hour workshop over these materials, and other evolution resources, at KATS Kamp. One of the door prizes will be one of the educational sets. He will also be offering an additional opportunity if KATS doesn't work out for you. He hasn't set a date or location yet, so let him know if you have any suggestions.

WGBH is offering any of the items above, as well as anything purchased from their larger catalog, at a 25% discount if ordered by September 30, 2002. Put the key code, "NABT," on your order. FAX orders to 802-864-9846 or phone at 800-949-8670. Remember to mention NABT.

Kansas Statistics

Kansas Population, 2000:2,688,418
KS Population without H.S. diploma, 2000:12.3%
US Population without H.S. diploma, 2000:18.4%
Number of students K-12, 1999:..... 469,850
Number of Teachers, 1999:..... 31,493
2001*2002 KS H.S. graduates: 31,024
1997*1999 KS HS dropout rate: 7%
1997*1999 U.S. HS dropout rate: 9%
Average KS ACT Score (78% os seniors):21.6
Average U.S. ACT score:.....21.0
KS share of total U.S. college enrollment: 1.2%
data from various sources cited in The Chronicle of Higher Education Aug. 31, 2001.

BIOLOGY EDUCATION NEWS

According to a report in Veja newsmagazine from Brazil, satellite photos show the rainforests in Rio Grande do Sul state have increased by 45% over the past 17 years due to farmers abandoning fields on mountain slopes that cannot be farmed by mechanization; vegetation is undergoing succession back to rainforest. In a unanimous vote in August, the Hawaii Board of Education removed a clause in the student-performance standards that required students to be familiar with creationism and the Biblical accounts of the earth's formation (see Educ. Week, Sept. 5, 2001 page 28). The number of U.S. born students graduating from medical school is 28% short of the residencies available for new physicians with the result that we must rely on foreign-trained medical graduates for one-fourth of our future medical doctors, according to Dr. Fitzhugh Mullan in Health Affairs as reported in the August 4 Chronicle of Higher Education Canada likewise faces a shortage. The high-quality Latin America Medical School in Cuba is now training more that three

times the doctors compared to the largest U.S. medical school at the University of Illinois; viewing medicine as a humanitarian and not financial pursuit, the free medical school is now enrolling U.S. students and sends doctors to the world's poorest areas...See Chronicle of Higher Education July 20, 2001. The National Council for Research on Women has released a report [<http://ncrw.org/research/iqsci.htm>] that contends women are dropping from computer studies (37% in 1984 to 20% in 1999) and held only 12% of the private science and engineering jobs but make up 46% of the total U.S. workforce. On the other hand, women are now about 40% of the entering tenure-track undergraduate college science teachers, compared to 21% in the 1980s, according to a Research Corporation report "Academic Excellence: The Sourcebook*A Study of the Role of Research in the Natural Sciences at Undergraduate Institutions"; report available at \$50 from <http://rescorp.org/pubs.html>. According to a study by the Catholic University of America, black girls surveyed in grades 8, 10, and 12 have better attitudes about science and perform better on science assessments than white girls or African-American boys; however the interest in science in both white and black females declined in college...See Education Week Feb. 7, 2001. Schools of the future will need to switch from standardizing teaching for the average students to addressing individual students' needs, according to the report "Ten Trends: Educating Children for a Profoundly Different Future" by the Education Research Service in Arlington, VA; the report is available online at www.ers.org/whatsnew.htm. The NAEP (National Assessment of Educational Progress) "works as a barometer of student achievement because there isn't any motivation to teach to it in a direct way," according to Lauren B. Resnick of the Learning Research and Development Center at University of Pittsburgh quoted in the March 14, 2001 Education Week; however, the renewed emphasis on assessment is pressuring states to align their curricula to get scores up, which will undermine its credibility. The National Center for Education Statistics released the results of a spring 1999 survey that shows over 850,000 children or 1.7 percent of school-age children are taught at home; the report is available at <http://nces.ed.gov/>. Temple University has shut down its distance education and its president has stated that "we wouldn't expect that they will ever make a profit or even pay for themselves." Representative Todd Tiarht of Kansas was co-sponsor of a successful amendment to the Elementary and Secondary Education Act (ESEA) that imposes new parental-consent requirements when surveys are administered to students and also "includes language requiring that parents be allowed to review their children's school curricula"...See Educ. Week Sept.5, 2001, page 38. The ban on the switch-and-grade technique has gone to the U.S. Supreme Court that will decide in its next term whether the policy violates the Federal Education Rights and Privacy Act, as it currently stands under the current ruling of our Federal District Court. Four countries have now passed

the U.S. in college graduation rates: Finland, Netherlands, New Zealand, and Britain (Education at a Glance, OECD). A University of California study indicates the SAT II test that focuses on specific subjects is a better predictor of college performance than the regular SAT aptitude test; this adds fuel to the movement to align tests with specific content and further drive high school curricula... See Educ. Week Nov. 7, page 14. Over 156 million children in the world do not have access to schooling at all; most countries are improving enrollments by 5% per year but Africa, southern Asia and the Arab countries are not...See Educ. Week. Nov. 7, page 16. According to the Associated Press, more than 5,500 emergency teaching permits have been issued this year in Kansas (compared to 2,885 in the 1996-97 school year) with just under half held by persons without college degrees. The Kansas State Board of Education will soon be considering a new round of revisions to the new Licensure system that will likely include a proposal to allow a practicing Kansas teacher to add another teaching field by completing only half the coursework and then passing the content test.

In view of the new content and pedagogy tests being required, earlier this year the Kansas State Board of Education eliminated its requirement for the PPST test for prospective teachers but the Kansas Board of Regents voted in October (5*4) to keep the PPST; about one-fourth of Kansas teachers are trained by private schools, most of whom will no longer require the PPST, while students at the regents institutions will have to continue to take the PPST at a total cost of about one-fourth million dollars a year in Kansas.

According to a survey by Education Week:

- 97% of teachers use a computer at home and/or school for professional activities.
- -science teachers have the greatest difficulty finding software.
- rookie teachers (5 years or less) are no more likely to use digital content than veteran teachers (20+ years)
- teachers who use software for instruction cite expense as a big or moderate problem.
- half of teachers consider "amount of class time necessary" and "amount of preparation time necessary" are problems.

If I were in the classroom, this is something I would be exploring with my students...

Brad Williamson

If you've read Jonathon Weiner's, Time, Love and Memory, you know that fruit flies have provided vital evidence of the genetic influence of behavior. These are experiments that students can access. This week ScienceNOW Online reported on a paper presented by Kravitz and Bowers at November 15th meeting of the Society of Neuroscience in San Diego. The paper describes methods used to observe fighting behavior in *Drosophila melanogaster*

males. The paper documents methods for describing fruit fly aggressive behaviors. Once these behaviors are documented then the genetic components of the behavior can be explored. The abstract from the meeting follows:

FIGHTING FLIES: A NEW MODEL SYSTEM FOR THE STUDY OF AGGRESSION

E.A. Kravitz*; N.M. Bowens

Dept Neurobiology, Harvard Med Sch, Boston, MA, USA

Although mentioned originally in 1915 by Sturtevant (*J Anim Behav* 5:351-366), with the exception of Hawaiian species, it is not well known that *Drosophila* species engage in fights. A careful study of this behavior in two *Drosophila* species was made in 1987 by Hoffmann (*Anim Behav* 35:807-818), but the experimental situation was complex involving 3 mated females and 6 virgin males in the fighting arena. We simplified this experimental situation to allow construction of an ethogram of the behavior. Towards that end we have examined many variables (e.g., age, arena size, temperature, numbers of flies) to make this a robust behavior and have built a simplified chamber to observe fights. We now get reliable fighting in the Canton-S strain of *D. melanogaster* with two 3-5 day old virgin males and one mated female in the presence of a 1 cm food cup in the chamber. Videotapes have been made of the behavior and a preliminary analysis of 18 experiments has yielded the following. In a 1 hour observation period we see from 3-63 encounters (mean 20) averaging 16 sec in duration. We score 3 intensity levels (Lo-wings up, charge; Mid-lunge; Hi-boxing, tussling) and find that fights at Hi- last longer than at Lo-levels (22 vs 14 sec). It takes animals almost twice as long to return to the food surface for a next encounter after Hi- intensity fights as compared to Lo-intensity fights (91 vs. 46 sec), suggesting a long-term component to the fighting behavior. Almost all encounters are initiated by the territorial (first) male on the food surface. Mutant studies examining genes and pathways important in the behavior will follow the construction of an ethogram.

Supported by: Mind Brain Behavior grant from Harvard University

A paragraph from the ScienceNow (<http://www.aaas.org>) article provides a further description of the technique used by Kravitz and Bowens:

"To lure two solitary contestants into the fighting ring, Kravitz's team put in a headless female. Why headless? Otherwise, she might fly away before luring the combatants to the battlefield. The males skittered out of their holding tubes toward the corpse and duked it out, competing for the affection of their unimpressed audience. In all, Kravitz's team videotaped 75 fights between pairs of male fruit flies who had never seen another fly before. By pairing rookies, they were more likely to see instinctive--and genetically controlled--behaviors, rather than learned fighting form."

Kravitz's Web Page is at:

<http://www.hms.harvard.edu/bss/neuro/kravitz/gpage/krav.html>

If you decide to work on this you won't need much in the way of sophisticated equipment but your students will need to learn to prepare an ethogram that quantifies behavior. To facilitate this, a freeware program Etholog can be downloaded from:

<http://www.geocities.com/CapeCanaveral/Lab/2727/ethohome.html>

This site also has links to a number of animal behavior sites. Good luck.

Health Care issues present good examples that can be used in several areas of teaching biology.

Lisa Volland

As a part-time health care worker for the past 15 years, I have become all too familiar with the need for infection control in the hospital as well as other health care facilities that house ill patients. My job in the hospital is in the laboratory, working as a phlebotomist (check your L & G prefixes!). I draw venous, arterial and capillary blood from babies to the elderly, from those patients who are having babies to the gravely ill patients in the intensive care units. I started this job through CETA, a youth program, my senior year in high school, and continued throughout college. My first boss told me I would be taking blood and my response was, "okay, to where?" Actually, it is a job that I really love to do. Since I have been in Topeka for the last ten years, I have been lucky enough to work part-time at the local medical center where they let me pick up extra hours in the summer. I have really fine-tuned my phlebotomy skills in these past ten years, so that I am able to effectively draw good samples from anyone that I stick.

A big part of my job is safety. We are constantly reminded of safety with needles, biohazardous body fluids, and washing our hands. It certainly does serve as a reminder since we are being exposed to many bacteria types and viruses. The infection control department works year around to battle two antibiotic resistant strains of bacteria that can easily establish themselves especially with patients coming to the hospital from nursing homes or other health care facilities where these bacteria run rampant. These strains are MRSA, methicillin-resistant *Staphylococcus aureus* and VRE, vancomycin-resistant *Enterococcus*. Both cause serious bacterial infections to those who have a weakened immune system, spread easily to other patients, and are difficult to treat. All MRSA and VRE patients are put into isolation until the cultures come back negative (after antibiotic treatment). It is up to all health care workers to understand and to follow the isolation directives so that the spread of these two bacteria types is prevented.

MRSA is a common species of bacteria that populates the skin, mucous membranes, upper respiratory tract, intestinal and genital/urinary tract. It is a staph species

that has developed resistance because of transformation, that is, bacteria passing antibiotic-resistant genes from one bacterium to another. MRSA can grow in the presence of methicillin, penicillin, and other antibiotics. Vancomycin is the antibiotic needed to attack and kill the bacteria. Many patients have lowered immune defenses against infection anyway and that means they are already at risk for MRSA. Special risk factors include: Surgery, invasive devices or procedures, such as catheters or surgical drains; a stay in a burn ward or the ICU, being over 65, treatment with multiple antibiotics, severe illness or disability, and prolonged or repeated hospital stays. MRSA is spread by direct contact between health-care workers and their patients in most cases. Health care workers are the main carriers, usually found on the nasopharyngeal membranes. Unwashed hands are typical culprits as well. Early signs of infection are the same as those of other staph infections. They include drainage from a wound, fever, elevated white blood cell count and chills. The effect of MRSA is highly variable on individual patients, but common sites of infection are the respiratory tract, surgical wounds, and the skin. A serious health concern is that MRSA may become vancomycin resistant if given the opportunity. Proper antibiotic use and treatment is important as well as preventative measures in controlling the spread of MRSA.

VRE is a species of bacteria that is mainly found in the large intestine, the mouth and the vagina. These bacteria are often associated with infections of the urinary tract, surgical sites, and the bloodstream. It is potentially dangerous because it has developed a resistant gene, due to a mutation, to vancomycin. Vancomycin is one of the more powerful antibiotics that we currently have to treat strep and staph infections. Because VRE has developed this resistance to vancomycin, it is usually treated with a combination of antibiotics. It is hard to treat and hard to get rid of—preventing the spread of VRE is a far easier task. Risk factors for VRE are much like those of MRSA, especially abdominal or cardiac surgery. VRE is capable of living for weeks on surfaces, such as patient gowns, bed linens and handrails. It cannot be spread through the air, but can develop by direct contact with a VRE patient, from the contaminated hands of a health care worker or from contaminated equipment. Patients may also infect themselves, as this is a naturally occurring bacteria in a healthy digestive system as well as the female genital tract. Patients may spread these bacteria to other parts of their body where there are open wounds. Like other strep infections, signs are drainage from a wound, fever, elevated WBC count and chills. Prevention measures include washing hands, using personal protective equipment, disinfecting equipment and following directions of the isolation.

Both of these health care issues present good examples that can be used in several areas of teaching biology. First, the process of transformation can be illustrated by using the example of MRSA. The overuse and abuse of antibiotics can be discussed and related to how a benefi-

cial mutation (for the bacteria) can survive in the presence of certain antibiotics then passed on through successive generations of the bacterial strain. So, include these examples in your classroom discussions on natural selection, microbiology, and DNA technology. And always remember to wash your hands!!

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2. Young, Trudie, BN. April 6, 2000. Managing MRSA wound Infection and Colonization. *Nursing Times Plus*, vol. 96, no. 14. Pg. 14 – 16.
3. What health-care workers should know about MRSA. 1995. A Scriptographic product.
4. What health-care workers should know about VRE. 1995. A Scriptographic product.

An Idea for Student Inquiry **Brad Williamson**

Autumn is a season with a distinct feel and smell. The combination of generally comfortable temperatures, the low angle sunlight, and the odors of the newly decomposing summer accumulation of vegetation create a unique atmosphere that is uniquely stimulating. The activity of the natural world is intensified as organisms react to the changing season—reproductively and energetically. And it is easier to observe many organisms not usually seen since the vegetation is dying back. One such organism could very well serve as an inspiration for student research and inquiry.

In late October and early November, walk along the wooded edge of almost any field in the eastern two thirds of KS and you might notice small twigs lying on the ground under the overhanging tree limbs. These twigs may be from any number of trees from elm, hackberry, and honey locusts in the west to hickories, pecans and persimmons in the east. These are definitely twigs, usually no more than 15 mm in diameter at their thickest and about as long as your arm. As twigs there is not much to call your attention to them except for a couple of unusual observations. You'll notice that they still have their leaves attached. In fact they are the brown, dead leaves of branches separated from the tree while still green—not the leaves of autumn. As you pick up one of these twigs you will notice that the butt-end appears to have been cut from the tree. This is the sign of twig girdlers.

Twig girdlers (*Oncideres cingulata*) are long-horned beetles (Cerambycidae) with an interesting life cycle. In September adult females lays eggs towards the end of twigs of various hardwoods. After laying 3 or more eggs on an outer twig the female then girdles the twig by cutting about halfway through the twig with her mandibles. Later, fall winds in autumn help to separate the twigs from the tree—thus why they are found beneath trees this time of the year. The eggs are in the twig. They hatch in late fall or winter (at least in the southern

states). The larval stage is spent entirely within the twig. The twig is food source and protective shelter. The larva pupates in late summer. The adults emerge shortly after and the cycle renews.

I've introduced countless students to twig girdlers during autumn walks and fieldwork for biology classes. I've found them wherever I have taught—usually on campus or very near. In the past I've just focused on the interesting life history but recently it occurred to me that this organism might be a very fruitful and accessible organism for student-centered research.

The unique life history of this organism offers a rich source of questions for student study. They twigs are easy to find in the fall. In a very short time one student or a group of students can collect a large sample of girdled twigs from different tree species over a wide range of habitats. It's fairly simple to determine the number of eggs on each twigs and it's also easy to take measurements of the dimensions of the twigs. I expect that raising the eggs to larva to adults should be relatively easy, also. Quick, accessible questions come to mind. Is the type of tree selected as a host correlated with the size of twig selected? Eggs Laid? Pupae success? Is there a correlation between size of twig and offspring produced? What about parasitoids and parasites? What predators to the larva contend with?

If you are intrigued about twig girdlers you can learn more about them at: <http://www.ag.auburn.edu/dept/ent/bulletins/twiggirdler/twiggirdler.htm> If you find some twigs near campus take your students for a stroll and see if you can't get a good round of questions coming from your students about this interesting phenomenon. If you or your students find this organism interesting enough for further research I'd be interested to know. Good luck.

How Do You Steer a Train?

Todd Carter

I remember my dad lifting me into the metal body of the locomotive at the county fair. As it started to move around the circular track, I waved to my little brother who was in the fire engine in front of me. It never occurred to me as I spun the steering wheel that you can't turn a train. For some reason, that childhood memory came flooding back with clarity as I searched for a way to communicate my concern and my hope for this passion we call science teaching. Harry McDonald mentioned in his President's Column of the Fall KABT newsletter that he is a generalist. So am I. My first ten years were spent as a one person science department in the small rural schools of the Oklahoma Panhandle. What a great experience keeping jr. high and high school students engaged and inquiring on a daily basis! It's also hard work. And to what end? What ultimately are we trying to accomplish?

Clyde Herreid in *The Maiden and the Witch, The Crippling Undergraduate Experience* (JCST, October, 2001) states that "It had never struck me until this point that the undergraduate experience with its lectures and labs

where you are told what to do and what to learn was—there is no other way to say it—crippling". He goes on to lament the process further as an assembly line producing people who can't see the reason why they need to know this stuff and faculty unable to understand their attitude even after passing through the same assembly line themselves. What about skills like solving real-world problems or evaluating claims critically? Unfortunately, there are many K-12 teachers who passed through that undergraduate assembly line and are modeling the same teaching behaviors. My favorite part of the article relates an epiphany for the author and validates my recent crusade in the classroom. Herreid was lecturing away about temperature regulation in an animal physiology class when suddenly an older student interrupted. "I wonder if that is how the rock rabbits survive the Alaskan winters?" Herreid asked him what he meant and the student proceeded to take all of the "esoteric abstract points that I had just enumerated and relate them to his observations in the wild". Herreid comments further that "this student had just done something that I had never done—leave the world of the classroom and academic tomes and **CONNECT** (my emphasis) the concepts to his own first-hand experiences".

Making connections. What a fantastic thing to see students experience! It is not a new idea, yet it is so necessary for internalizing a concept. Over the past two years I have had excellent success with a type of written assessment I call Making Connections. Instead of traditional exams, the students have to convince me with written evidence that they have accomplished the outcomes for the course. This written evidence is actually a paper that identifies the "big picture" ideas or core concepts we have investigated AND connects our class activities, discussions, investigations, information searches, and personal experiences to those core concepts. What an eye opener for the student and teacher! I thoroughly enjoy reading about the student's sense of discovery and lament their struggles with applying a core concept. When they write about the connections to their personal life or someone in their family, the "hey, that's cool" part of science that was lost or perhaps never developed, comes through. Making Connections is a fantastic professional development tool for me, too! I find myself constantly looking for connections as I prepare class activities and investigations. My questioning techniques and summarizing activities have taken on new life as the students get into the groove. Students actually connecting concepts and helping their peers by sharing personal experiences as explanations in class? It has become the norm!

Do students like writing the Making Connections paper? Not much. They have to get off of the train, take a look at where they've been and see how that applies to the direction they are currently bound. No more going through the motions, memorizing, and moving on, straight down the track. However, 97% of students completing the course state that the Making Connections papers are an excellent learning tool and that they retained

the core concepts for the course as a result of writing the papers. Pre-Post testing has validated the student's claim. Another consistently frequent comment is how much they feel they have learned about the scientific process. The biggest complaint is the time involved in writing the paper. There is no opportunity for cramming on these assessments, but what a bonanza for class discussions and group interaction! "I see how evolution works as an explanation for biodiversity," one student comments, "but how is it applied in ecosystem restoration efforts (one of the core outcomes students have to address)?" Another student then suggests that the key to ecosystem restoration is getting the restored area to a point that it can function on its own. We then clarify what the student means by "function" which connects to the components of ecosystem structure and interaction. As a class, we finally end up with our own description of biointegrity; all the components, biotic and abiotic, in the right combination, allowing a system to survive disturbances through adaptation. Making Connections has provided a framework for student learning beyond what I have experienced with traditional assessment approaches.

Why do I hear so many students today, adult and traditional, complain about their science experiences from grade school through college despite reform efforts and research based pedagogy? I alluded to students having to get off of the train in order to evaluate their direction and make connections, however, the metaphor of steering a locomotive actually entered my mind as I tried to envision what it is going to take to change the current state of science education. Not to mention filling the void left by retirement and low output of qualified science teachers. As my students discovered while they made connections between the Green Revolution, Rachel Carson's Silent Spring, and the Global Earth Summit; change is slow, it requires lots of evidence to withstand scrutiny and debate, it follows a modification in behavior, and it has to start with us.

Keeping things fun teaching science

Darrin P. Wolsko

(This is a reply to an e-mail message answering the question as to how you get students interested in science and catch their attention. The author granted permission for me to publish this in this newsletter. I think you will enjoy what he has to say as much as I did. J. Wachholz, Editor.)

I've been teaching 8th grade for 5 years, and college for a year and a half. I'd like to give you my thoughts on your message, and science in general.

We who teach science often times are teaching a subject that people either hate or love - it seems to be an extreme situation. I've found that the ones who hate class have been conditioned to hate it, because most of their science "learning" took place in a lab, where the teacher gave notes, and didn't do many labs. The labs that were done were cookbook type labs, with a predict-

able ending that often times, the students could fudge if they thought about it - what would be there to catch any inquisitive minds, or even try and turn on inquisitive minds? Not too much. Now, of course we can't get everyone, and hell, they're students - sometimes learning can't always be fun - but it can most of the time, I think....

I love what I teach. I truly, truly love what I teach. My students know it. I tell them. I tell them all the time. I get so excited by what I'm doing, that I have been told by students, and other teachers have heard from students, that it is often very difficult NOT to be carried along by my enthusiasm. I don't mean to sound cocky, and apologize if I'm coming off that way - it isn't my intent (I hate talking about myself ;)). So, I would say the first critical step in catching the students is to show them you love what you do - show them not just that you like science - show them PASSION. I scream at them that science is so darn interesting, that it would be folly to sleep during my class. Let's face it - we're competing with TV and everything else - I think of my job as a bit of performer in there, too. I like to perform. Get creative. I love Spiderman - I throw a stuffed Spiderman around the room for a review. I have this zippered suit that I'm sticking Velcro all over, and I'm going to let the kids throw ping-pong balls at me - who ever sticks the most on my suit gets extra credit. I like strange, flashy gimmicks - I find it gets the kids excited simply figuring out what I'm going to do next. I know how to juggle. I've taught molecular motion juggling eggs and apples. When it's time to give homework, I write it on a piece of paper, tape it to my forehead, and run around the room yelling at the kids to obey the head. Some may think this strange, or demeaning - I truly have fun with it. Kids in my school talk about my class - I hear them in lunch. They tell other kids what goes on. They tell other teachers what goes on. They tell their parents what I do, and the parents come to back to school night to tell me they know all about what I do. Once I've caught them, the stuff I try in class seems to flow naturally - I get away with some lecture and notes. I get away with doing my job - imparting content. I get away with giving them essays to develop their critical thinking skills. I get away with getting them to keep a science journal. They find that they don't mind class so much.

Now - about the content. We're teachers, teaching a highly technical discipline, and we all want our kids to know some things. We may even have state tests to "teach to." I've found that with my state (new jersey), the standards for science are really very good, and allow a lot of freedom in the way things are covered. Make sure you find out what the kids will be required to do/ what test they will need to take, and make sure that content is covered.

Why do lab experiments have to be canned? Why not give them open ended research problems to actually USE the scientific method, and not just write down a hypothesis and a conclusion? They learn that thing every year, and it stays with them long enough to memorize 6 steps

and puke it back on a test. THAT is the scientific method? Choosing letter "C" to answer what step three of the scientific method is? NOO! Let them USE it. Let them ask a question, and guide them to setting up a situation where they can find an answer. Test the effect of different color lights on plant growth. Test suntan lotion on the leaves of plants and see if something happens. Test hairsprays - which holds best? What insects react to external stimuli? What stimuli? Can I get pinky mice, and raise them to travel a maze - can I change the conditions and make any conclusions about memory? What shampoo works the best? Have them come up with the criteria and test it - let them take actual data and report it. Let them take data, report it, and then change it into a picture (graph) - let them present it, as an actual scientific conference would. Why not? Give it a shot. It means a lot of extra work, but they will remember you. You don't need a lot of resources - these experiments can be done with coffee cans and soil - but it would be VALID, student-generated research - publish an abstract book with the language arts teacher - get the math teacher involved in data analysis and graphing - have the history teacher do research - make it multi-disciplinary. Teach them to think of science every place they are, and not just in science class. Link science to other subjects. Link science, most importantly to the students' lives! They aren't going to want to know, unless it affects them! Tell them that the phosphoric acid in coke takes the paint off cars - tell them it dissolves nails - show them it dissolves nails by putting a few nails in a bowl of coke and letting them take results as to what happens. Talk about cancer. Talk about pollution. Bring them a list of all the ingredients in cigarette smoke and tell them what they are - tell them that they are smoking the same chemical that makes plastic bags - tell them about their own physiological processes - do a lesson on allergy and asthma. Talk about diabetes. Teach digestion by having them figure out every component of their lunch and how each is absorbed and where? Do a digestion lab in class - cook hotdogs over Bunsen burners (well, maybe not that one....) Bring science to them as a vital, important part of their lives. Do science factoids on the board. Let them find science articles in the newspapers and bring them in to discuss on Fridays. My kids clip articles now and give them to me because they found it interesting, and they know I'll be interested, too. They are **READING THE PAPER. THEY ARE LOOKING FOR SCIENCE IN THE REAL WORLD.** They'll start to connect their knowledge. What does it say about science if the only way we can teach it is by lecturing and taking notes? Science is a verb - we DO science. Take chances. Get the kids involved in the verb form of science. You will teach them, I promise you. You will get the content across. You will find that these activities link to content without even trying. They'll bring things up, and you'll think of the correct vocab words to teach them. This stuff works for special education students and advanced students - can you imagine the research your advanced kids come up with when you finally

teach them how to think and not parrot back information? My "honors" caliber students are often those students who simply have parroted information back to their science teachers over the years - they aren't prepared for essay tests at the 8th grade level that require them to think - Heavens - open-ended thoughtful questions that they don't know how to answer, because they haven't yet learned to THINK!! You can be the one to open these doors for your students. You can be the one who teaches science in a context that has meaning. You must ask yourself - why bother teaching it if it's simply meaningless, transient knowledge? Why waste the time? Connect it to their lives. Make it a part of their lives. Truly teach them something.

I'm sorry that I rambled - I hope my long and winding paragraphs gave you some ideas on what to do. It won't happen overnight, and people may or may not support this - you have to gauge your situation. I say, personally - take the chance. Give your students science like they've never had before. Give them something to remember.

Thanks for listening.

Darrin P. Wolsko

Teacher of 8th Grade

Adjunct Professor of Biology

INVITATION TO TAKE PART IN THE KABT STRAND AT KATS KAMP, 2002

The early morning air is crisp and cool, beautifully colored leaves are fluttering to the ground, and insect noises are being replaced with the calls of migrating geese. Fall is here....and so is the time to start thinking about presenting with other KABT members at KATS Kamp 2002!

As most of you know, over the last few years KABT members have presented at KATS Kamp in what we have referred to as a "Biology Strand". Last year we teamed with members of KCFS (Kansas Citizens for Science). The result was very exciting - for both those that participated and I think for all the teachers who were able to attend our sessions. Our day-long strand included presentations of labs where teachers could become familiar with labs on everything from how to collect macro invertebrates to how to use protein electrophoresis. Our strand also included several papers to update us on current research and a presentation on how to use mini-posters for lab reports.

Do you have a lab or an idea that you would like to share? As you can tell from the preceding paragraph, any idea you would like to present would be welcome: it can be old, new, original, or borrowed. KATS Kamp is a great way to share your ideas with colleagues. The format is informal and it is about the least intimidating conference to present at that I can think of.

The reasons for presenting are obvious, but after years of teaching I find that I can't refrain from stating the obvious (usually several or more times). Presenting to colleagues forces you to evaluate what you do with your

students. What labs or teaching ideas do you and your students find effective? Sharing an idea or lab is a great way to get helpful feedback as other teachers listen, ask questions and usually offer suggestions. Finally, sharing at a conference is what we as professionals do.

Please help to make the 2002 KABT strand at KATS Kamp another good experience for everyone. If you have any kind of idea at all, just contact me by phone or Email. I am looking forward to hearing from many of you.

Sandy Collins

Email: scollins@usd497.org

Home: 785 841-2375

Work: 785 832-5500

Helpful information regarding KATS Kamp

KAT Kamp, 2002

April 26-28, 2002

Rock Springs 4-H Center

Website: <http://kats.org>

WHY DID MY PLANT DIE?

Here is an outline for an entire botany course....

You walked too close. You trod on it. You dropped a piece of sod on it.

You hoed it down. You weeded it. You planted it the wrong way up. You grew it in a yogurt cup, but you forgot to make a hole; the soggy compost took it's toll.

September storm. November drought. It heaved in March, the roots popped out. You watered it with herbicide. You scattered bone meal far and wide, attracting local omnivores, who ate your plant and stayed for more.

You left it baking in the sun while you departed at a run to find a spade, perhaps a trowel, meanwhile the plant threw in the towel.

You planted it with crown too high, the soil washed off, that explains why. Too high pH. It hated lime. Alas, it needs a gentler clime. You left the root ball wrapped in plastic, you broke the roots. They're not elastic.

You walked too close. You trod on it. You dropped a piece of sod on it.

You splashed the plant with motor oil. You should do something to your soil. Too rich. Too poor. Such wretched tilth. Your soil is clay. Your soil is filth.

Your plant was eaten by a slug. The growing point contained a bug. These aphids are controlled by ants, who milk the juice, it kills the plant.

In early spring your garden's mud. You walked around. That's not much good. With heat and light you hurried it. You buried it. The poor plant missed the mountain air. No heat, no summer muggs up there.

You overfed it 10-10-10. Forgot to water it again. You hit it sharply with the hose. You used a can without a rose. Perhaps you sprinkled from above. You should

have talked to it with love. The nursery mailed it without roots. You killed it with those gardening boots. You walked too close. You trod on it. You dropped a piece of sod on it.

Gerffrey Charlesworth

Dates For Christmas Bird Counts

These are the dates for the CBC's that I compiled:

Quivira NWR 12/14

Waconda Lake 12/15

Wichita 12/15

Marion Reservoir 12/16

Olathe 12/16

Wakefield 12/16

Wilson Lake 12/16

Arkansas City 12/22

Junction City 12/22

Webster Reservoir 12/22

Cimarron National Grasslands 12/29

El Dorado Lake 12/29

Kenton (Black Mesa) Okalahoma 12/30

Liberal 12/31

Red Hills/ Medicine Lodge 1/5/02

Kanopolis Lake 1/6/02

Blackwolf 1/12/02

The Great Books

Foundation has just published their newest series, entitled "The Nature of Life, Readings in Biology."

It includes readings from Aristotle, Lucretius, Bacon, Darwin, Mendel, Bernard, Rachel Carson, Konrad Lorenz, J Watson, Richard Dawkins, Gould, and others. If you are not familiar with the Great Books, each reading includes easy questions, conceptual questions, and application questions which are thought and discussion provoking questions (usually with no one right answer).

Great Books can be reached at:

35 East Wacker Dr, suite 2300

Chicago, IL 60601-2298

www.greatbooks.org

There are two types of amylase:

alpha-amylase (as in saliva, ginger root and many flower petals!) is an endo-enzyme, meaning that it makes cuts at random all throughout the length of the amylose chain. It is a very rapid destroyer of starch and of its iodine reaction.

beta-amylase (as in diastase) is an exo-enzyme, meaning that it is like a Pacman that chews its way in from the non-reducing end of amylose and releasing maltose units (disaccharide of glucose).

Our mouths crunch up food and mix in alpha-amylase to start the digestion of starches (with the concomitant productions of increasing numbers of non-reducing ends. In our stomachs, beta-amylases are added and start chewing on all those new non-reducing ends.

Amylase tip:

Use bean juice as a source of amylase. Just soak

beans in water overnight...save the water and discard the beans. The water is quite brown and will last weeks if refrigerated. Students can use a starch solution (about 12 starch packing pellets/liter) mixed with a few drops of Lugol's and then titrate with the "bean juice" until cleared.

Great Article

In this month's Nov/Dec 2001 American Biology Teacher is a great activity by Caroline A. Maier, "Investigating Polar Bear and Giant Panda Ancestry" using the Internet WEB and DNA Sequence Data.

KanCRN Project Information

The KanCRN project is located at <http://kancrn.org>

The Lichen and SO₂ project is located at <http://www.kancrn.org/so2/>

One of the research areas of the KanCRN Pathfinder Project is to survey lichen coverage on trees across the United States. Data from this survey will allow us to look for patterns in large data sets. Research indicates that lichens (and the tardigrades living on them) can be used to assess atmospheric levels of sulfur dioxide, SO₂. The data needed to create this base map of coverage is easy to collect and each November - February we try do a lichen survey. The protocol for how you do the lichen survey is <http://www.kancrn.org/so2/cproto1.cfm> If this is all you want to do then you can stop here. The survey used to take me one class period. I had several groups of students measuring and taking data in each hour during the school day.

We have all the information online for how to sample, report the data, and we now working to implement new mapping technologies that will help all of us look for patterns. These new internet based mapping technologies will be available shortly but in the meantime, we need researchers in the field collecting data. We're working on two different interactive maps displaying lichen/SO₂ data. The first map will be intended for more general use, allowing students to basically identify data points on a world map immediately upon submitting. The second interactive map will be released later this fall, using special Java components. This high-tech mapping system will actually allow students to do reasonably-sophisticated geographic analysis, all via the web.

The Lichen and SO₂ project is located at <http://www.kancrn.org/so2/>

BTW: It is not necessary to do the Tardigrade part of this project if all you want to do is the lichen coverage. If you want to do more great, I would love to see some student research grow out of the collaboratively collected data but first.....We need to generate the data on lichen coverage through your submissions.

If you have not uploaded data before you will need to register your classroom - there is not cost or commitment to registration. We just want to know where the data is coming from for the mapping information! Registration

for the project is at <http://kancrn.org/teachers/registration/>

Students should begin the project by looking at the research focus. Background information is located at <http://www.kancrn.org/so2/cbackground.cfm>. Lots of good information on lichens and tardigrades with lots links from here.

Data is submitted online at http://www.kancrn.org/so2/cdata_sub.cfm

All of the data that has been submitted or any newly submitted data is always available to participants at: http://www.kancrn.org/so2/cdata_results.cfm

You can explore that in different ways through this page.....

If this is all you want to do then you can stop here. The survey used to take me one class period. I had several groups of students measuring and taking data in each hour.

The site also includes suggestions for research that your students might want to take on. The survey work and collaborative data collection is designed to lead to better research questions for your students. If you want to do more there is much more available to you at the site, but I and the KanCRN community really needs you to take these measurements and upload them. This can be done any time during the winter. Do not forget to have students leave some tracks in our discussion area <http://kancrn.org/forums/webx.dll?> or A Lichens/SO₂ bio-monitoring listserv for casual discussion about lichens, SO₂, and protocols for measuring and analysis. This will be a fairly small, exclusive list intended to allow teachers the opportunity to ask and answer

questions as they wish. Quick sign up for this list at: <http://kancrn.org/so2/listserv/>

Steven B. Case Ph.D.

KU Center for Science Education

KanCRN Collaborative Research Network

Joseph R. Pearson Hall

1122 West Campus Road, Room 702A

Lawrence, KS 66045-3101

Office - 785-864-4471

Cell Phone - 913-634-8796

FAX 785-864-4149

Sordardia asci Observation Site

www.science.lander.edu/flux/Sordardia%20Tetrad%20Examples.htm

UNIVERSITY OF CALIFORNIA MUSEUM OF PALEONTOLOGY EVOLUTION WEBSITE PROJECT

Interested in having an impact on the development of a teacher resource website on evolution?

UCMP (University of California Museum of Paleontology) is creating a website focused on the teaching of evolution. It aims to meet the needs of all K-12 teachers so everyone's input is wanted and welcomed!

If you are interested in participating in the study, please go online to the sign up survey at <http://survey.rockman.com/ucmp/ucmpsurvey2.htm>. By completing this brief initial survey, you will be eligible to participate in future activities related to evolution website project.

Incentives will be offered to those who go on to evaluate the website. The study is completely confidential and is being conducted by Rockman et al, an independent research and consulting firm with headquarters in San Francisco. If you have any questions, you may email nicole@rockman.com. We look forward to your involvement!

AP Biology Information

For anyone interested in the 2001 - 1998 Free-response Questions and answers they are posted on the College Board site for AP Biology. Also, lots of other information. www.collegeboard.org/ap/biology/index/html

Mitosis—Meiosis

Check this out:

<http://www.pbs.org/wgbh/nova/miracle/divide.html#>

It's a side-by-side animation of mitosis and meiosis.

The flash version is really cool!

A KABT Friend

Lisa Volland's Dad died suddenly on Halloween day of a massive heart attack. He was a friend of KABT (actually of anything his kids and grandkids were involved in.) He was a regular on KABT field trips. Our thoughts are with Lisa and her family.

Population Labs

There are a number of good labs on population designed to be used in the classroom at the following site: www.facingthefuture.org. Ernie Brown has printed off a couple that he plans to use later in the year in his population unit. He likes the one on "Population Trivia" They also have a lot of stuff that goes well in a study of population. He discovered their materials down in Orlando last fall at the NABT convention.

PREFIXES, SUFFIXES, AND STEMS

The following list gives the meaning of prefixes, suffixes, and stems that are commonly used to form scientific terms. Whenever you encounter a new term in your study of biology, break it apart and try to find the parts in this list. Such a habit will greatly simplify your mastery of biological vocabulary.

As an example, you might take the word nephrology. The stem nephro- is derived from the Greek word nephros, meaning kidney, while the stem log- is derived from the Greek word Logos, meaning thought or study of. You might later encounter the word nephrolith, and you would then only have to determine the meaning of the suffix -lith since you would already know the meaning of the first part of the word. Or when you ran across such words as bacteriology and zoology,

you would probably have a good idea of what they mean. After some practice, you will be surprised how many new words you can define without looking them up.

It has often been necessary to add a vowel to combining forms for pleasing pronunciation. For example, bacteri- + -logy becomes bacteriology. For the same reason it has been necessary, at times, to drop or change a vowel in a prefix, suffix, or stem. For example, gastro- becomes gastric, the adjective pertaining to the stomach.

Most scientific terms are derived from either the ancient Greek or the Latin because neither of these languages is in use now so that they are unchanging, and also they are studied universally. As a result, you will find that Latin noun endings are often used in biology. Following is a list of terms that might be helpful. You could give them as seven quizzes as they are listed.:

QUIZ 1

a-, an-no; lacking; none
ab-away from; out from
ac-to; toward
-aceus; -aceous.....of or pertaining to
acou-hearing
acr-; acro-extreme; peak
ad-to; toward
adeno-gland
agri-field, soil
-alhaving character of
alb-white
-algiapain
alto-high
ameb-change; alternation
amphibi-leading a double life
ampho-; amb-both
an-not; without
ana-up
andro-masculine; man
anemo-wind
angio-vessel
ante-before; ahead of time
antero-front
antho-flower
anti-against
anthropo-man
ap-to; toward
aqu-water
archaeo-primitive; ancient
arthro-joint
aster-; astr-stars
-ateused in forming verbs from nouns
-ationused in forming nouns from verbs
atom-vapor
audi-hear
auto-self
bactr-stick; club
barb-beard
baro-weight
bath-depth; height
bene-well; good
bi-two; twice; double
bio-; bi-life; living

-blast sprout; germ
 brachi-..... having arms
 branchi-..... having fins
 brev-..... short
 bronch- windpipe
 calor- heat
 carb- coal; carbon
 cardi- heart
 carn- meat
 carp- fruit
 carpal-..... wrist
 caud- tail

QUIZ 2

cell- storeroom; chamber
 -cene new; recent
 centi- hundredth
 centr- center
 cephal- head
 cervic- neck
 chem- referring to chemistry
 chlor- green
 chrom-; -chrome.... color
 chym- juice
 -cide killing
 circum- around; about
 cirru- hairlike curls
 co- with; together
 cocc- seed
 coel- hollow
 coll- glue
 com- with; together
 con- with; together
 coni- cone
 contra- against
 corp- body
 cosmo- world; order; form
 cotyl- cup
 counter- against
 crypt- hidden; covered
 -cule; -culus added to nouns to form diminutive
 cucmul- heaped
 cuti- skin
 cyan- dark blue
 -cycle; cycli- ring; circle
 cyst- bladder; pouch
 cyt-; -cyte cell; receptacle
 dactyl- finger
 deca- ten
 deci- tenth
 deliquesc- become fluid
 demi- half
 dendr- tree
 dent- tooth
 derm- skin
 di- two; double
 dia- through; across
 digit finger; tow
 din- terrible
 dis- apart; out
 dorm- sleep
 dors- back
 du-; duo two
 -duct lead
 dynam- power

dys-.....ill; bad
 ec-out of; outside
 echin-spiny; prickly
 eco-.....house

QUIZ 3

ect-outside; without
 electro-electric; electricity
 en-in; into
 -enmade of
 encephal-brain
 end-; ent-.....within; in
 enter-intestines
 -eousnature of; like
 epi-on; above
 -errwander; go astray
 erythro-red
 ethno-.....race; people
 eu-well; good
 extra-beyond; outside of
 ex-out of
 -ferbear; carry; produce
 ferro-iron
 fibr-fiber; thread
 -fid; fis-divided into; split
 -flect; -flexbend
 flor-flower
 fluor-fluorine
 foli-leaf
 fract-break
 galact-; galax-milk; milky fluid
 gastro-stomach
 geo-land; earth
 -gen; -gineproducer; former
 -gene; gene-origin
 -gestcarry; produce
 glob-ball; round
 glottismouth of windpipe
 -gonangle; corner
 -gonyoffspring; generation; coming into being
 -gradestep; division
 -gramwriting; record
 -graphy; -graphwriting; record
 grav-heavy
 grossthick
 gymno-naked
 gyn-female
 gyr-ring; circle; spiral
 haem-; hem-blood
 hepat-liver
 herb-grass
 hetero-different; other
 hex-six
 hibern-winter

QUIZ 4

hipp-horse
 hist-tissue
 holo-entire; whole
 homo-man
 homo-same; alike
 hort-garden
 hybridmongrel
 hydr-water

hydr-..... wet; moist
 hypo-..... beneath; under; less
 hyper-..... above; beyond; over
 hypno-..... weaving
 hypno-..... sleep
 -ic..... added to nouns to form adjectives
 ichthy-..... fish
 ign-..... fire
 im-..... not
 in-..... to; toward; into
 in-..... not
 -ine..... of or pertaining to
 infro-..... below, beneath
 inter-..... between
 intra-..... within; inside
 -ion..... go; come
 -ism..... a state or condition
 iso-..... equal; same
 -itis..... inflammation; disease
 kilo-..... thousand
 lachry-..... tear
 lact-..... milk
 lat-..... side; flank
 -less..... without
 leuc-..... white; bright; light
 lign-..... wood
 lin-..... line
 lingu-..... tongue
 liqu-..... become fluid, liquid
 lip-..... fat
 lith-; -lite..... stone; petrifying
 loc-..... place
 -logy..... study
 -lysis; -lyte; -lyst..... dissolve; decompose
 macr-..... large
 mal-..... bad; evil
 malle-..... hammer
 mamm-..... breast
 marg-..... border; edge
 mast-..... breast
 med-..... middle
 meg-..... great; million
 mela-; melan-..... black; dark
 mes-..... middle; half; intermediate
 met-; meta-..... between; along; after
 meteor-..... lofty, high, in air
 -meter; -metry..... way of measuring, instrument for measuring
 metro-..... uterus

QUIZ 5

micro-..... small
 milli-..... thousandth
 mis-..... wrong; incorrect
 mito-..... thread; filament
 mole-..... mass
 mono-..... one; single
 mont-..... mountain
 mort-..... death
 mov-; -mot..... move
 morph-..... shape; form
 multi-..... many
 mycel-..... threadlike
 mycet-..... fungus
 myria-..... many

moll-.....soft
 nas-.....nose
 nemat-.....thread
 neo-.....new; recent
 nephro-.....kidney
 -ner-.....moist; liquid
 neur-; nerv-.....nerve; tendon
 noct-; nox-.....night
 -node.....knot
 -nomy; -nome.....distribute; arrange; law
 non-.....not
 not-.....back
 nuc-.....center
 ob-.....against
 ocul-.....eye
 oct-.....eight
 odont-.....tooth
 -oid.....like in form or shape
 olf-.....smell
 omni-.....all
 oo-.....egg
 opthal-.....eye
 opt-; opsy.....eye; vision
 orb-.....circle; round; ring
 orth-.....straight; correct; right
 oscu-.....mouth
 oste-.....bone
 -ous.....full of; abounding in
 ov-.....egg
 oxy-.....sharp; acid; oxygen
 pachy-.....thick
 paleo-.....old; ancient
 palm-.....broad; flat
 pan-.....all
 par-.....beside; near; equal; bring forth
 path-; -pathy.....disease; suffering
 -ped.....foot
 pent-.....five

QUIZ 6

per-.....through
 permea-.....pass; go
 phag-.....eat
 pheno-.....show
 phil-.....living; fond of
 phon-; -phone.....sound
 -phore.....bearer
 photo-.....light
 phyc-.....seaweed; algae
 -phyll.....leaf
 physi-.....nature; natural qualities
 -phte; phyt-.....plant
 plan-.....roaming; wandering
 plasm-; -plast.....form; formed into
 pleur-.....rib; lung
 pneumo-.....lungs; air
 -pod.....foot
 poly-.....many; several
 por-.....opening
 port-.....carry
 post-.....after; behind
 pom-.....fruit
 pre-.....before; ahead of time
 pro-.....forward; favoring
 procto-.....rectum; anus

proto-..... first; primary
 pseud-..... false; deceptive
 pter- having wings or fins
 pulmo- lung
 puls- drive; push
 pyr- heat; fire
 quadr- four; four-fold
 quin- five
 radi-..... ray; spoke of a wheel; energy in rays
 re- again; back
 rect-..... correct; right
 ren- kidney
 ret- net; made like a net
 rhin-..... nose
 rhiz- root
 rubr- red
 saccharo-..... sugar
 sapr- rotten
 saur- lizard
 scler-..... hard
 sci- know
 scope look; observe
 -scribe; script write
 semi-..... half; partly

QUIZ 7

sept- partition; seven
 septic..... putrefaction; infection
 sex- six
 -sis condition; state
 sol- sun
 solv-..... loosen; free
 somn- sleep
 son- sound
 spec-; spic- look at
 sperm- seed
 spher- ball
 -spire breathe
 spore seed
 stat-..... standing; placed
 stell- stars
 stern- breast; chest
 stom-; -stome..... mouth
 strat-..... layer
 stereo- solid; three dimensions
 strict- drawn tight
 styl- pillar
 sub- under; below
 super- over; above; on top
 sur-..... over; above; on top
 sym-; syn- together
 tachy- quick; swift
 tarso- ankle
 tax-..... arrangement
 tele-..... far off; at a distance
 terr- earth
 tetr- four
 thall young shoot
 therm-..... heat
 -tom..... cut; slice
 toxico-..... poison
 top- place
 trans- across
 tri- three
 trich- hair

troph-one who feeds; well fed
 trop-turning; changing
 -ulediminutive
 ultra-beyond
 ur-.....urine
 vas-.....vessel
 vect-.....carry
 ven-; vent-come
 ventr-belly
 vice-in place of
 vig-strong
 vit-; viv-life
 volv-roll; wander
 vor-devour; eat
 xanthin-yellow
 zo-; -zoa animal
 zyg-.....yolk
 zym-.....yeast

If you would like this list in Word format send an e-mail to John Wachholz < wachholz@swbell.net > with your request.

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 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

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Phones: 703-264-9696 or 800-406-0775
Fax: 703-264-7778
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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 >.

AN INVESTIGATION OF THE “EXPECTANCY EFFECT”

Sandy Collins, West Junior High, Lawrence, KS, scollins@usd497.org

I. BACKGROUND

This summer I was intrigued by an article that appeared in *The American Biology Teacher* (April) entitled “The Expectancy Effect in Secondary School Biology Laboratory Instruction”. (The authors are William F. McComas and Lisa S. Moore.) The expectancy effect was explained as what happens when investigators unintentionally see what they expect to see instead of what they actually see. This phenomenon has obvious implications for both scientists’ and students’ ability to obtain valid data.

The purpose of the investigation presented by the authors was to study the role played by prior conceptions on students’ ability to observe scientific phenomena. In the investigation students were told they would be investigating the effects of stimulants and depressants by comparing the heart rate of *Daphnia* under these different conditions. The students were being “set-up” as the stimulants and depressants were actually the same water in which the animals were normally maintained.

It was clear that this investigation could easily be adapted and used with my students. It struck me as a great investigation to undertake in those first few days of school. In this lab, students could work with animals that have instant appeal, they could learn about the nature of science, work on observational skills, and as a bonus the lab would generate data that could be used to teach them how to construct box plots. My only, but serious, apprehension in undertaking this investigation was that my students might feel that I had maliciously tricked them. If this were the case, I might be jeopardizing our working relationship.

As my students worked through the lab, I experienced mixed emotions about what they would think when I explained the truth about the “stimulants” and “depressants” they thought they were testing. The comments I heard confirmed the value of us discussing the difficulty of making objective observations and the implications it has for how science “gets done”. For example, one group didn’t want to be assigned to count the heart rate of the animals in the stimulant because they knew the rate would be impossibly rapid and difficult to count. Another group was throwing out some of the data they collected for the animals tested in the depressant because the rates did not differ as much from the “normal” heart rates as they expected.

After all the data was collected, we constructed our box plots, analyzed our data and saw no difference between the groups of animals. They were puzzled! I initiated my explanation of the truth of the matter by posing a question something to the effect of can you ever observe an event without some expectation of what you will see? After this discussion, I began to explain what they had experienced in the lab. Before I had completed the explanation, some of them were smiling and by the end of the explanation, all of them were laughing.

Their laughter and the ensuing discussion confirmed the value of this unique investigation. There is a further valuable lesson that I learned about my students. Many of us worry about “hurting” our students. In the case of this lab, would I incur their anger and lose their trust? Many of us worry about the risk involved in undertaking investigations that are bit different from what we usually do with our students. This investigation taught me in fact to trust my students more and to know that without risks, I would not be able to expand my students and my own learning.

NOTE: Brad Williamson suggested that the reason the heart rate for the groups of animals showed no difference was not as a result of the “testing” solutions being identical but a result of difficulty of reliably counting the very rapid heart rate of these animals. His suggestion was to videotape the animals and then count the heart rate by decreasing the speed of the tape.

I. TEACHER PREPARATION

- 1 A sufficient number of *Daphnia* should be available so that the sample size for each treatment group is adequate. I prefer not to have students test the same animals. To conserve animals, each student group counted the heart rate under normal conditions and then student groups were assigned to count the heart rate under one other experimental condition. The data was posted and shared. Two aquaria should be prepared: one in which the “untested animals” are maintained and one in which the “tested animals” can be placed.
- 2 Each student group was provided with a set of containers with the three solutions in which the animals were to be tested, a container for “waste solutions”, and a set of pipets. A reminder: In spite of the containers being identified as a stimulant, etc. the containers should all contain the normal water in which the animals are maintained.
- 3 My students had not worked with *Daphnia* previously, so before starting the lab I used the video-flex camera to help them identify the heart.

II. STUDENT INSTRUCTIONS/ HAND-OUT

THE NATURE OF SCIENCE

Heart rate of Daphnia

Our purpose today is to continue our study of the nature of science. It will be important for you to record the data that you obtain, regardless of what you expect to find.

A. PROCEDURE

1. Obtain one Daphnia. To do this, use a pipette to remove one animal from the aquarium labeled "Untested Animals". Carefully suck the animal into the pipette. Place the animal in a depression slide.
2. Locate the heart. Count the heart rate for 15 seconds, multiply the number by 4 and record this number on the Data Table. (This is the heart rate for a "resting animal".)
3. Return the animal to the aquarium that is labeled "Tested Animals".
4. Repeat this procedure for two new animals so that you have counted the heart rate under normal conditions for a total of three animals.
5. Now you can count the heart rate of the Daphnia under different conditions. After you have obtained an animal, replace the water in the depression slide with a drop of the solution from one of the other bottles: stimulant, depressant, and unknown. (Put the water that has been removed from the slide in the container labeled "waste".)
6. Give the animal a minute to acclimate to its new environment. Now count the heart rate as you did for the resting animal. Record your answer. Return this animal. Repeat the procedure for two new animals so that you have counted the heart rate under the same condition for a total of three animals. (Before you return the animal to the "tested" aquarium, try to remove as much of the testing solution as possible.)
7. If possible, follow the procedure outlined above to count the heart rate of three new animals under a different condition. (That is, if you counted heart rates of animals in the stimulant, now count the heart rate of three new animals in the depressant.)

Data Table.

| HEART RATE Per Minute | Animal #1 | Animal #2 | Animal #3 |
|--------------------------|-----------|-----------|-----------|
| Resting Rate | | | |
| "Stimulant Rate" | | | |
| "Depressant" Rate | | | |

B. DISPLAYING THE DATA

- 1 Each group should post their data so that all of the data can be used.
- 2 Construct a box plot for each set of data. Include labels so that the information is useable.
- 3 Construct a bar graph for the data. Include appropriate labels.

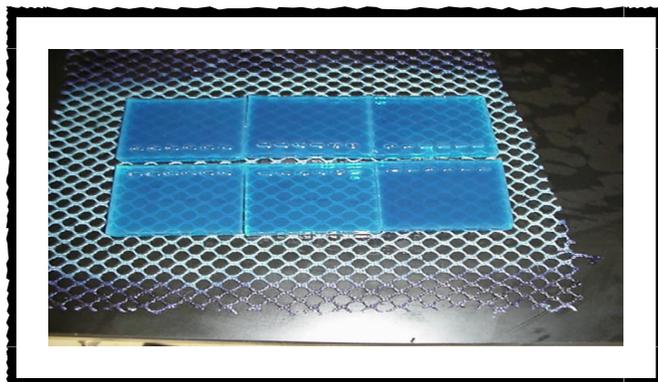
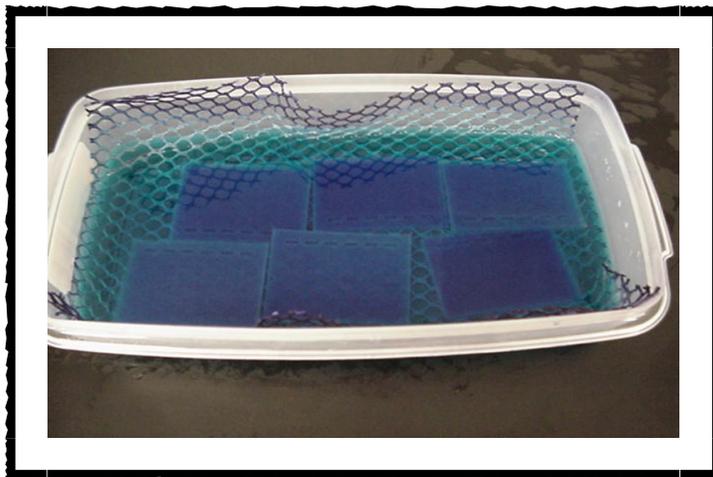
C. DATA DISCUSSION

- 1 Discuss the data displayed in the bar graph. What does the data seem to tell you about the heart rate of the animals under different conditions? Remember to summarize patterns and then defend your summary with specific data.
- 2 Discuss new data that the box plots give us. If you think the plots do not give more information, you need to defend your position. Be specific.
- 3 Answer one of the following questions.
 - a Is it possible to observe a phenomenon or event without expectation? Give examples to defend your answer.
 - b Prior knowledge before observing a phenomenon or event can both hinder and help our understanding of what we observe. Explain what these means. Use examples in your explanation.
- 4 Explain what you learned from this investigation.

No Mess Electrophoresis Gel Staining

Todd Carter—Seward County Community College

Staining, destaining, and caring for agarose gels can be a messy, slippery, and frustrating experience at times. Particularly if the instructor is handling multiple gels for multiple lab sections. One way I have found to eliminate part of the hassle is not to use official gel staining trays and spatulas. Instead, I purchased 9" X 13" plastic food storage containers (the ones I use are about 2" deep) with a sealable/airtight lid. I then cut a laundry bag (1/4" mesh nylon net) into pieces 3/4" shorter than the length of the food storage container and 3" wider than the container. Place the cut piece of 1/4" mesh laundry bag into the food storage container, place the gels on the mesh, and cover them with staining solution. To destain, pick up the edges of the mesh extending above the sides of the food storage container, let the excess stain drip off, and place the mesh/gels in a second food storage container of water. If you need to replace the destaining water with fresh water, pick up the net, let the excess destaining solution drip off, and set the mesh/gels on the counter while you pour off the used destaining water. This avoids having to hold the gels in the destaining tray while pouring off the destaining solution. I have lost a few gels (seems the gels exhibit fishlike qualities at this point in the procedure) into the sink prior to using the mesh transfer method. The gels can be stored in the containers at 4 degrees C for extended periods if needed. I have stored methylene blue based DNA stain for 9 months in a food storage container at room temperature with no loss in staining activity. Clean up is a breeze. Pour off the liquid, rinse, and air dry. You can then use the food storage container to store the mesh, micropipetors, gel beds, dams, micropipetor tips, and anything else that will fit. They stack nicely in the cabinet, also. Total cost per gel staining container is about \$2.25. That includes the cost of the 1/4" nylon mesh. Happy DNA fragment separation and visualization!



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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 **August 18, 2001**.

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

Jan. 16, 2002.....Baldwin Bird Club: Nesting Ferruginous Hawks in Kansas, @ Baldwin City

Jan. 19, 2002 .KABT Executive Board Meeting @ Williamson Cabin, Lake Kanopolis

Feb. 2, 2002 ... Nature Based Tourism Alliance, Meeting @ Rolling Hills Wildlife Refuge, Salina

Mar. 18-22, 2002Spring Recess for Kansas Regents Schools :& Many Public Schools

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, 2002Spring 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, 2002NABT Annual Convention - Cincinnati, Ohio

Brad Williamson will be President during this convention so help out by attending and presenting!

October 8-11, 2003NABT 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