The Alberta Science Teacher

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Grade 7 students tour Frank Slide, Alberta.

From the Editor

Summer has come and gone, and fall is in full swing. Teaching Biology 20 this summer, I seemed to have lost track of time. August soon came, and with it the annual ATA Summer Conference. I sat in as president of the Science Council and learned more than I thought possible in four days. Most important was the discussion of automatic memberships and what that means for councils. Soon, our newsletter (along with those of some other specialist councils) will be leaving the print form and going electronic. In addition, decisions will be made on how to accommodate the change in membership numbers. This is the first year for automatic memberships and, as such, the trial year. It is hoped that automatic membership will be a benefit for all teachers in Alberta.

My summer was busy with science, and so is this school year. I recently went on my first overnight field trip with Grade 7 students from Westminster Junior High in Edmonton. We headed down south to the Head-Smashed-In Buffalo Jump Interpretive Centre, visited the Frank Slide Interpretive Centre, checked out the Bellevue coal mine and visited the gravesite of victims of the Hillcrest mine explosion. It was a jam-packed trip with many great sites to see, and I recommend it to any Grade 7 teacher. The trip fits into the Planet Earth unit. The cover photo in this issue is from a guided hike around Frank Slide. Turtle Mountain, where the slide occurred, is on the far right of the picture.

This issue is filled with news about great new programs and resources for the new Biology 20/30 curricula. Also in this issue is the science conference update, which is coming up November 16–18 at the Fantasyland Hotel in Edmonton. See the article for further details.

I hope you are enjoying being back in the classroom, and that the new school year fills you with great joy. Remember, if you would like to contribute to the *Alberta Science Teacher* or have any questions about the articles, please contact me at andilynn.bender@gmail.com.

Andi-Lynn Bender

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From the Council

From the President

The times they are a-changin'. *Plus ça change, plus c'est la même chose*. As a result of a resolution passed at the Alberta Teachers' Association's (ATA's) 2007 Annual Representative Assembly, active members of the ATA have the opportunity to join one specialist council of their choice each year at no charge. The Science Council is excited about this resolution, because it will increase our ability to reach out to a greater variety of teachers than we have in the past. However, it has led to some changes in the way we do regular business. Primarily, our method of sending this newsletter to you will change. After this issue, the *Alberta Science Teacher* will be sent electronically. We are excited about this format change, because in addition to receiving regular articles, you will be able to hyperlink to exciting Web resources and other technologies that have been unavailable in the past. If you have any concerns about this format change, please feel free to contact me at cyoshida@atasc.ab.ca.

On another note, the science conference is quickly approaching. Gillian Vas and her committee have been diligently putting together a fabulous schedule full of great sessions for you to partake in. This year more elementary sessions will be offered in addition to the usual secondary sessions. It will be a conference for everyone.

Council executive would like members to attend the annual general meeting, which is going to be somewhat unique because of our financial situation. The council's books are showing a profit because of the number of conferences we have had in a row. We realize that this money belongs to the members, so we would like your input on how to spend it. We have some great ideas, but we'd really like to hear from you. Come and have your say at the AGM on Saturday, November 17, from 5 to 6 PM, followed by the president's reception. I look forward to meeting you all there. Again, if you have concerns or cannot attend the AGM but have ideas to share, please feel free to e-mail me.

Looking forward to seeing everyone in West Edmonton Mall.

Colleen Yoshida

Conference 2007 Update

"Planet Earth: Ours to Understand and Cherish"

November 16–18

Fantasyland Hotel, Edmonton

A Special Conference for All Science Teachers!

Be inspired by the following keynote speakers:

- Gilles Leclerc, "Earth Observations from Space"
- David Schindler, "Climate Change and the Fresh Water Supply"
- Brian Keating, "Cold Leadership—Exploring and Understanding Antarctica"
- Andrew Nikiforuk, "Pandemonium—How Globalization Threatens Our Health"
- Bob McDonald, "Perspectives on a Planet: Discovering a Dynamic Earth"

Be motivated by great workshops and sessions that meet your classroom needs.

Be entertained at our Friday night banquet.

Take time to socialize with friends and family on Saturday evening.

Enjoy a free Sunday brunch before returning home.

Registration opens on Thursday, November 15 at 5:30 PM.

For full conference info, please go to our website: www.atasc.ab.ca/conference/.

What's Up with the ATASC Website?

As many of you know, the ATA has developed a comprehensive website for Alberta teachers called TNET (the Teacher Network project). During the past few months, Science Council (SC) members and the ATA have spent hours preparing the SC website to join the other specialist councils on TNET. If you've recently logged on to the SC website, you may have noticed a change in the location, look and feel of the site because phase one of our migration to TNET is complete.

To access information about SC, go to the TNET website at www.teachers.ab.ca. Log in to open your ATA account and to view your ATA groups. Click on the SC link to go to the new SC website (or go there directly by typing in http://sc.teachers.ab.ca/).

Please note that during this transition year, accessing information from the SC website may be complicated for the first part of this school year. We ask that members please be patient. Because we have information hosted on three different servers, three passwords are required: one for TNET, one for the SC protected area and one for the OWL resource-sharing database. Although all three passwords can be the same, this is a less-than-ideal situation. We are working as fast as we can to move the OWL resource-sharing database to TNET without losing any of the functionality of this valuable resource for science teachers. Once this move is complete, members will only require two passwords; soon after the annual conference concludes in mid-November, members will need only the TNET password to access all of the great SC resources.

We apologize for this inconvenience, but soon you will be able to access and share resources with other science teachers through a single login. We thank you in advance for your patience.

From the Division III Director

It's another year of adventure for Division III science teachers. If you're new to the profession, it might seem daunting. If you're seasoned, you might be in a rut. If you fit in either of these categories or somewhere in between, read on. That means all of you!

I want to touch on three major ideas. First, in a previous article I mentioned the virtues of www.learnalberta.ca and other websites that I use regularly. I suggest that you subscribe to learnalberta.ca's e-letter. The last one included a list of Grades 7 and 8 interactive sites. Although the sites don't cover all units, some look useful. If you've never used the site before, you'll need a login ID and password. Your librarian, administrator or teacher/techie should have it. The site is great for kids, too, so give them the login ID and password as well.

Last year, some of my students participated in the Science Alberta Foundation's Science Challenge. This year, there is a Grade 9 challenge, which focuses on space exploration. There are a variety of cash or gift certificate prizes for each challenge. If the prize structure is similar to last year's, the teacher, the school and the participants will receive prizes. Go to www.sciencealberta.org, clink on Educators and hunt for the challenge. By the time you read this, I'm hopeful that the topics for all three challenges will be posted.

In the past couple of years, I've been in a rut in terms of attitude. My assignment isn't perfect, the government doesn't care about us or the kids, kids are unruly, some colleagues aren't what I want them to be and the list goes on. This year, I've decided that teaching is fun and the best profession on earth. I've consciously discarded negative feelings about the job. I only concentrate on the good stuff. It seems that since I've made that shift in consciousness, more and more good things are happening. Maybe I'm just open to seeing them.

Being a science teacher, I find this interesting because I'm really into quantitative analysis to prove ideas. What I've just stated could have come from *The Secret*, by Rhonda Byrne. Not that I dismiss qualitative analysis, but there is no quantitative evidence in *The Secret* at all. It does seem spooky that it is working for me. Regardless, the start of the year has been fantastic for me, and the kids are responding very well. For what it's worth, try it. You have nothing to lose!

I'm but one person and have been in Division III for only three years. Hence, my tickle trunk isn't very full. If you have something valuable to share with other teachers in the province, please let me know. I will publish it so that others can benefit from your expertise and wisdom. Also, please use the online database of resources on the ATASC website. Remember that the URL has changed to http://sc.teachers.ab.ca.

I hope you all have a terrific year. It will be, if you make it so!

Corey Karvonen-Lee
Division III Director

Education Updates

Alberta Education Update

Curriculum and Resource Update

Elementary Science

Meetings to begin revisions to the K–6 science program of studies were held in March, May and August 2007. The working group is off to a strong start, and members have a good sense of program directions and a desire to reduce program content to give teachers more time to focus on key science skills and concepts. The group will meet again in late October to continue work on the programs.

For more information, contact Sherry Taylor at (780) 644-5296 or sherry.taylor@gov.ab.ca. For information on French language services, contact François Lizaire (780) 422-7992 or francois.lizaire@gov.ab.ca. To be connected toll free within Alberta, dial 310-0000.

Senior High Science

The Biology 20, Chemistry 20, Physics 20 and Science 30 programs of study are being provincially implemented in both English and French in September 2007. Provincial implementation of the Biology 30, Chemistry 30 and Physics 30 programs of study follows in September 2008, in both English and French.

It is important to note that implementation of these revised courses before the provincial date is not approved.

Student basic resources (texts) in both English and French for Biology 20-30, Chemistry 20-30 and Physics 20-30 programs have been approved and are available from the Learning Resources Centre (LRC).

Teacher resources in English for Biology 20-30, Chemistry 20-30 and Physics 20-30 programs have been approved and are available from the LRC.

Teacher resources for Biology 20-30, Chemistry 20-30 and Physics 20-30 programs taught in French are being translated and validated. It is anticipated that these resources will be available at the LRC in February 2008. Interim chapters of the teacher resource will be sent to schools in support of implementation during the first semester.

Biology 20, Chemistry 20 and Physics 20 online courses in English are currently being field tested and are available to all Alberta teachers through Tools4Teachers, at www.tools4teachers.ca. Fully authorized online and print versions of these courses are scheduled to be available in September 2008. Biology 30, Chemistry 30 and Physics 30 courses are currently being developed, and the field-test versions are scheduled to be available in September 2008.

Student basic resources and teacher resources in English for Science 30 have been approved and are available from the LRC. Distributed learning resources are embedded in the CD that comes with the textbook. The format is the same as the one used for Science 20.

The first diploma examinations based on the revised Science 30 program of studies will be administered in January 2008. The first diploma examinations based on the revised Biology 30, Chemistry 30 and Physics 30 programs of study will be administered in January 2009. For more information on these diploma examinations, contact Ken Marcellus, acting director of math/science diploma examinations at (780) 427-0010.

For more information, contact Curriculum Branch at (780) 427-2784. For information on French language services, contact François Lizaire at (780) 422-7992 or francois.lizaire@gov.ab.ca. To be connected toll free within Alberta, dial 310-0000.

New Biology 20/30 Resources

The first instalment of resources for Biology 20-30 is now available on LearnAlberta.ca (www.learnalberta.ca/). To access these resources, launch LearnAlberta, click on Grade 11 (or 12), then science, and finally Biology 20 (or 30).

Currently, three types of resources are posted:

- ExploreLearning Gizmos—a three-year license to use the simulated lab activities created by ExploreLearning is in place.
- Virtual Microscope—a tool that allows teachers and students to view photographs taken through a microscope at 100x, 200x and 400x. A moveable pointer and measuring tool allow teachers and students to explore, locate and measure a variety of biological structures.
- Image Collection—a variety of crown-owned digital images can be viewed directly or downloaded by teachers to incorporate into presentations, assignments and/or evaluation items.

Please feel free to send me your feedback regarding the resources themselves, any improvements to them you'd like to see or suggestions on how you're using them with your classes. Phone (780) 422-3280 or e-mail wade.strass@gov.ab.ca. Please feel free to share this information with other biology teachers.

Wade Strass
Project Coordinator
Senior High Sciences
Program Developmentand Standards
Learning Technologies Branch

Science 30 in a Rural School

Are you convinced that Science 20-30 cannot be offered in your school because it is too small? With only 70 Grades 10–12 students, St Jerome's School, in Vermilion, has offered this midstream science program since 1998. Before that year, several average students needing two Grade 12 science courses for university or college were failing in courses like Chemistry 30 or Physics 30.

Scheduling the program has not always been easy, yet the school's efforts provide big dividends for the students. Because the Science 30 classes are usually small, ranging from 5 to 10 students, Science 20 is usually offered in the same room. Because both courses can have project components, such a scenario can work without an undue burden placed on the teacher.

Over the years, St Jerome found that two types of students take Science 30—students who have difficulties at the 20 or 30 level with the discipline sciences, or students who are capable of achieving honour marks to improve their average for college admission or scholarships.

In the next school year, St Jerome will be offering the program through videoconferencing so that even smaller schools in the area can take advantage of this course also.

If you are an administrator, teacher or counsellor at a small school and still doubt whether you can offer this program or if the scheduling is worth the extra effort, call Derek Collins, vice-principal, St Jerome's School at (780) 853-5251, or e-mail dcollins@stj.ecacs16.ab.ca. With the recent development of a revised program of studies as well as new resources, the time to get into the Science 20-30 program is better than ever.

NSTA Update

The National Science Teachers Association (NSTA) consists of over 300,000 members in 18 districts across North America and publishes four peer-reviewed magazines: *Science and Children* (Grades K–6), *The Science Teacher* (Grades 9–12), *Science Scope* (Grades 6–9) and *Journal of College Science Teaching*. *NSTA Reports*, a monthly newspaper mailed to all members, contains useful features and articles related to teaching science. The NSTA website provides support in all aspects of science education. A wide variety of membership types are available and information can be accessed online. Check out www.nsta.org.

ExploraVision Competition

ExploraVision, one of the world's largest K–12 science and technology competitions, encourages students to envision a better future by combining their imagination with the tools of science to conceptualize solutions to current world and societal problems and quality-of-life issues. The program allows students to combine, use and develop knowledge and abilities in various subject areas—science and technology, mathematics, language arts, computer, artwork and social studies—while developing presentation and teamwork skills through collaborative efforts simulating real-world research and development teams.

The Toshiba/NSTA ExploraVision Awards Program is calling young scientists to enter its 2008 challenge. Now in its 16th season, ExploraVision will again award up to $240,000 in savings bonds this year, along with a host of other prizes, to student team members for the most innovative ideas that project technology 20 years into the future. Entries in all K–12 grade levels are being accepted now through January 29, 2008. Visit www.exploravision.org to download your awards entry kit and competition rules and gain access to participation tips and other resources!

Once again Canadian students have come out as winners. The 2006 first-place winners for Grades 1–3, four students from southern Ontario, each received $5,000 Canada Savings Bonds. This year's second-place winners from Vancouver will receive $2,500 each. It would be great to see Alberta represented in the 2008 awards!

Please e-mail me at marymcdougall@shaw.ca if you have any questions. I have judged the competition in Washington for several years and can help with any questions.

Annual Conference

The NSTA annual conference is being held in Boston on March 27–30, 2008. Check out the website (www.nsta.org) for registration forms and updates.

Mary McDougall
Director, District XVIII (Canada)

SDWF Update

The Safe Drinking Water Foundation (SDWF) has exciting, hands-on, cooperative learning activities for students to begin the school year in a motivating and interesting way. Please see the following descriptions of the environmental education programs:

Operation Water Drop (OWD) is SDWF's longest standing education program, distributed to over 700 schools last year and rated highly by educators. Elementary teachers demonstrate to students how to test their community drinking water for seven different parameters included in the Canadian drinking water guidelines. High school students conduct hands-on tests for 13 parameters and compare their results to other urban and rural treated-drinking-water supplies as well as to a raw source water sample. OWD kits are sent out on specific dates. Please contact SDWF for information (see below).

Operation Water Flow (OWF) is available free of charge and gives students a greater understanding of economic, social and environmental concerns surrounding water issues in Canada. OWF can be taught in math, biology, chemistry, science and social studies. Each lesson leads naturally into the many other SDWF programs.

Operation Water Spirit (OWS) is available to all schools across Canada for free. It supports and encourages a greater understanding of Aboriginal culture and beliefs related to water issues. A teacher resource has been added this year to encourage and support teachers to introduce Aboriginal culture into their classrooms. An Aboriginal journalist summer student, Avis Pratt, from Gordon First Nation, has created a mini-documentary titled "Water Moccasin"—it is to water what an environmental footprint is to the

environment. Many stories are included in all grade levels and are now available in Cree, in both written and audio versions, and many of the OWS lessons are being translated into Cree.

Operation Water Health (OWH) is a new program introduced this year and is available free of charge. It is also the first program to be available in Cree. OWH provides an opportunity to investigate health issues, such as waterborne illnesses and contaminated water, and encourages students to do their part to "make a difference."

Operation Water Pollution (OWP) is another new program. It is funded by Green Street, so schools are not required to pay the $100 value for this kit. OWP is taught in science and social studies, and educates students about the various forms of water pollution, how water pollution affects the world, how it is cleaned up and what students can do to help. Total dissolved solids (TDS) and pH meters are included in the kit. Students learn why it is important to monitor pollution levels and why pollution levels should be kept to a minimum. Both meters are reusable.

Students and teachers who have experienced any of the above education programs are encouraged to participate in the SDWF youth initiative, "Community Champions," funded by Green Street. The competition invites students to share their newfound knowledge from the SDWF programs with their local and or surrounding communities to empower people to gain a better understanding of issues surrounding drinking water. Students must submit a presentation of their chosen initiative to be posted online and judged. $1,000 will be awarded to three groups of students from schools submitting the best initiative. If your school intends to participate, please e-mail info@safewater.org, and you will receive a Template for Change Program ($75 value) free while supplies last.

For information about any of the programs or the youth initiative, please visit www.safewater.org. E-mail info@safewater.org, phone (306) 934-0389 or fax (306) 934-5289.

Science Alberta Foundation Update

Science Challenges

Science Challenges can be integrated into the classroom and provide a curriculum-linked activity that allows students to work interactively. Students compete and share their solutions with other students provincewide. Go to wonderville.ca for Science Challenge registration dates.

Teacher Support Site

The Wonderville Support Site, at wonderville.ca, provides teachers with strategies for how to use Wonderville activities in the classroom. It features a new video series with case studies on how other teachers have integrated wonderville.ca into their teaching practice.

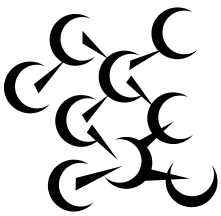
Let's Do Science

Let's Do Science is an elementary school teacher guide that offers a framework to plan, implement and evaluate hands-on science programs in the classroom. It provides information by grade linked to the Alberta elementary science curriculum. A printed copy or searchable CD can be found in your school library. Go to www.sciencealberta.org and click on the Educator's menu to print or view a PDF copy.

Classroom-Ready Resources

AICCS Project

Jane Dyke, from Ross Sheppard High School, and Mark Haak, from W P Wagner High School, both in Edmonton, spent their summer working with researchers from the Alberta Ingenuity Centre for Carbohydrate Science (AICCS), in the Faculty of Science, and the Centre for Mathematics, Science and Technology Education (CMASTE), in the Faculty of Education at the University of Alberta, to develop individual lessons on carbohydrate chemistry for high school students. The lessons were developed for students in Chemistry 30 (Unit C: Chemical Changes of Organic Compounds) and Biology 20 (Unit C: Human Physiology). Ten student lessons were developed along with teacher notes. Student lessons included laboratory investigations, case studies, profiles of scientists and the exploration of science-related social issues. Because the student activities were written by teachers under the guidance of research scientists, the activities are scientifically accurate and reflect many of the latest advances in carbohydrate research while being sensitive to classroom time and student prerequisite knowledge. By design, teachers may choose one or a number of lessons in any order to best enhance their program as they see fit. The lessons are being field tested in fall 2007, and the first drafts will be presented at the ATASC conference in November. Following the conference, the student activities will be posted on the CMASTE website at www.cmaste.ca. Look for the CMASTE booth at the conference.



Time Engineers

Unique and highly interactive, Time Engineers is educational software that allows students to learn about how science and engineering principles have helped people through the ages. Students travel in a cool time machine to three different eras and encounter typical engineering problems of that time.

Software Kids is giving away free CD-ROMS of their award-winning Time Engineers game (home edition) to the first 10 ATASC members to contact them. After that, they will give out the standard demo version of the game.

Made in conjunction with the University of Valparaiso's College of Engineering and Science, this terrific program lets Grades 6–9 students travel back in time to build pyramids, irrigate farmland, command a World War II submarine, raise and lower medieval drawbridges and much more. For information about Time Engineers software, go to www.software-kids.com or contact Ray Shingler at (219) 548-7566.

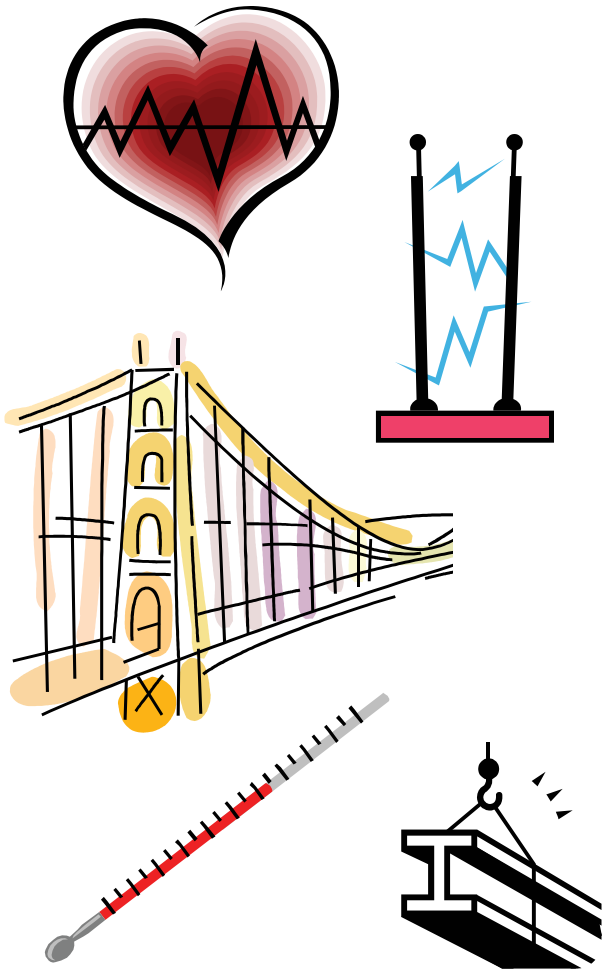
Vernier Software Update

Vernier Software and Technology is providing educators with a website featuring lab activities, such as investigating how concrete cures, writing a program to control an RC Servo motor and providing an LED alarm when a force threshold is surpassed. These free activities at http://engineering.vernier.com involve data acquisition and control using Vernier sensors.

In addition to videos demonstrating cool projects that use Vernier sensors with LEGO's NXT robot, the site provides 10 ready-to-use experiments that use the company's SensorDAQTM data-acquisition interface with National Instruments' LabVIEW software. These experiments focus on introductory engineering concepts from the major engineering disciplines, such as the following:

- Electrical engineering—Measure the current and voltage of a solar cell to investigate the effect of irradiance angle on the total power output.
- Mechanical engineering—Create a Wheatstone half-bridge circuit with two strain gauges, and measure the strain on an aluminum cantilever beam as a load is applied.
- Civil engineering—Investigate the tensile and compressive forces in truss bridge components, and build a truss bridge out of manila file folders and load it to failure.
- Chemical engineering—Build a virtual thermometer to learn the basics of LabVIEW programming with step-by-step programming instructions.
- Biomedical engineering—Visually track the status of your heart rate with output from an LED wired in an open-drain circuit.

The SensorDAQ experiments are designed for advanced high school and early university-level engineering courses. They consist of a brief explanation of the concept, the objective of the specific activity and a listing of required material. A PDF and Word document are provided, allowing the user to modify the experiment as needed. In addition, a LabVIEW Virtual Instrument (VI) to run the experiments is included with all 10 experiments. For educators who wish to teach programming as part of the project, Vernier has included step-by-step instructions with illustrations for building a LabVIEW VI in several of the experiments.



Designed specifically for engineering education, the Vernier SensorDAQ is the result of collaboration between Vernier Software and Technology and National Instruments. The interface's three analog channels accommodate more than 50 different Vernier sensors, including temperature, dissolved oxygen, gas pressure, pH and force. A digital channel is available for motion detectors, photogates, radiation monitors, rotary motion sensors and drop counters. The interface also has built-in USB connectivity and automatically identifies and calibrates Vernier sensors. A screw terminal connector provides versatility to build circuits, create custom sensors, control RC servo motors, turn on electronic devices and more.

"SensorDAQ was created to help instructors design custom content to help engineering students understand the concepts and principles being presented," said David Vernier, co-founder of Vernier and former physics teacher. "Now we've taken the extra step and provided ready-made activities to save teachers the time and effort of devising their own activities. It is a great way to get students started in using this high-end, yet affordable tool in engineering."

Vernier Software and Technology has been an innovator of data-collection technology for 25 years. Creating easy-to-use and affordable engineering interfaces, sensors, probes and software, their products can be found in education from elementary school to college in more than 123 countries. Vernier helps teachers enhance their STEM curriculum, increase learning and build students' critical thinking skills. For more information, visit www.vernier.com.

Pseudoscience Resources from CMASTE

Separating true science from pseudoscience remains a challenge for all students who confront claims. The challenge for elementary school students is even greater because critical thinking skills are just beginning to take shape. Unlike true science, pseudoscience does not follow the same principles of experimentation and peer review in developing claims. True science relies on an expectation of reproducibility of data under similar conditions and intersubjective verifiability, which is the capacity of a concept to be readily and accurately communicated between different individuals. It is expected that bias will be controlled or eliminated by a double-blind study or statistically through fair sampling procedures. All gathered data, including experimental/environmental conditions, are expected to be documented for scrutiny and made available to other researchers, thereby allowing further experimentation to be conducted to confirm or refute the results. Pseudoscience may be characterized by the use of vague, exaggerated or untestable claims, over-reliance on confirmation rather than refutation, lack of openness to testing by other experts, and a lack of progress in theory development. Astrology, elements of advertising and new-age medicine can come under the heading of new pseudoscience, not necessarily because they are untrue, but because they fail to follow the rigours of science methodology in supporting findings. A collection of resources on pseudoscience is available for both preservice and experienced teachers at the University of Alberta in room 382 Education South. Alternatively, you can obtain a bibliography online at www.cmaste.ca.

CRYSTAL-Alberta Classroom Resources

The CRYSTAL Outreach website was launched in September 2007 as www.crystalalberta.ca. The University of Alberta and the King's University College lead a group of partners in this Centre for Research in Youth Science Teaching and Learning. This is one of five centres across Canada funded by NSERC (the Natural Sciences and Engineering Research Council) in recognition of the importance of K–12 education to research and economic growth in Canada.

CRYSTAL-Alberta is conducting research and development (R&D) projects related to the use of text and visuals to present math and science reasoning in the classroom. A secondary purpose for the resources being developed from the research is to promote deep understanding (as opposed to memorizing or superficial understanding) of concepts in math and science.

The website is organized backwards to a typical academic site; that is, the classroom resources are presented upfront with support links to the classroom research that empirically and/or conceptually validate the use of these resources. Teachers can drill down to the academic, empirical and theoretical conceptualization of these resources.

Classroom resources include, for example, visual resources created for CRYSTAL-Alberta at the King's Centre for Visualization in Science (www.kcvs.ca):

- The interaction between mosquitoes and crows that leads to the spread of the West Nile virus
- Mathematical modelling of global climate change (Grade 10)
- Chemical modelling of interactions and reactions in the atmosphere
- Stereochemistry models (Chemistry 20 and 30)
- Many physics applets and lessons for modern physics experiments (Physics 30)
- Particulate nature of matter (Grade 5)

These computer visual-resources are available for direct use on the Internet and for download for use on your classroom or home computer.

Text resources are also being created for classroom use. The goal of these text-resources (for students and teachers) is that they are to be used as prototypes (examples) for teachers to build their own resources for promoting math and science reasoning. Some examples of the topics for the lessons (including exercises and answers) are

- the nature of scientific research (for citizenry),
- scientific attitudes (predispositions to act),
- scientific language (for use in the classroom),
- scientific knowledge (categories),
- creating and evaluating scientific theories,
- life cycle of scientific theories and
- scientific laboratory reports.

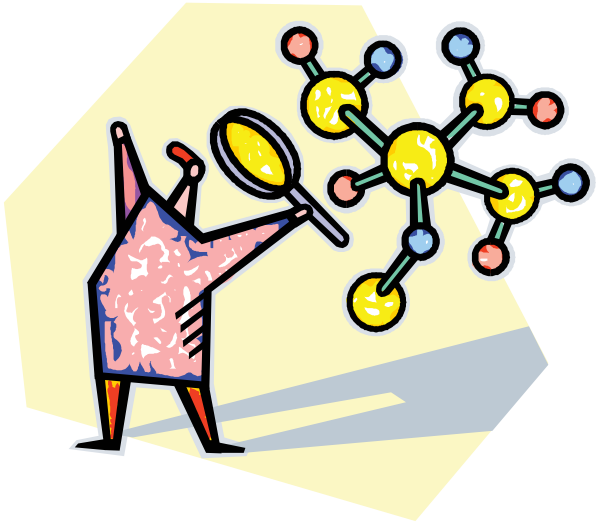
The text and visual classroom-resources being produced by the R&D process of CRYSTAL-Alberta are to serve as prototypes for others to copy, enhance and expand upon. At a time when science and mathematics are not, in general, understood well at either a conceptual or a methodological level, these types of resources are important interventions into curriculum, instruction and assessment. Please use these classroom resources and, more important, create your own. Let us know about your successes (and failures) in this regard. Join our mission to promote math and science reasoning inside and outside the classroom.

Frank Jenkins
Outreach Coordinator
CRYSTAL-Alberta: www.crystalalberta.ca

Chemistry Freebies for All

I am always on the lookout for free resources, ideas and experiments that make my job as a high school chemistry teacher that much more effective. I am also Scottish, so I cannot deny the thrifty aspect of my genetic makeup. Most of the resources I have found here are from the Royal Society of Chemistry (RSC).

Chemistry Teachers.org (www.rsc.org/education/chemistryteachers/) is a resource database that, while it does have a British perspective on some topics, includes all the usual topics that we teach in Alberta. This is a new RSC database of chemistry resources for schools and colleges. The resources available cover all age ranges, 5–11, 11–14, 14–16 and post-16, and there are links to external websites. Some search links in this developing resource occasionally yield few or no results. The layout of the curriculum keyword search is user friendly, thus making it easy to check regularly for updates.



The search function provided makes it possible to access resources based on three criteria:

1. Curriculum, free text or chemical key words
2. Age range
3. Resource format (for example, Word or PDF files, Excel spreadsheets, PowerPoint presentations, video clips, animations and so on)

A search of documents on equilibrium for students 16 and up gave a variety of text document and video resources of great utility. One of the finds gave instructions on how to prepare and manipulate $N_2O_4(g)$. Many of the laboratory experiments located are from the RSC resources *Classic Chemistry Experiments* (Hutchings 2000) and *Classic Chemistry Demonstrations* (Lister 1996).

LearnNet (www.rsc.org/Education/SchoolStudents/LearnNet.asp) is a resource database that has much more of a Google feel to it. Most word or phrase searches yield several hits and a good deal of picking and choosing is involved when scanning the hits. I located the resource *Spot the Bonding* (available in PDF and Word format at www.chemsoc.org/pdf/LearnNet/miscon2/Spot_the_bonding.pdf), which has oodles of beautiful illustrations of all kinds of bonding that most of us would have difficulty drawing for ourselves and that I have never seen collected in a single resource.

The Royal Society of Chemistry Periodic Table of Data (www.chemsoc.org/networks/learnnet/ptdata/table/index.htm) is an excellent tool for those students and teachers covering the periodicity topic of IB chemistry. The data sets of all kinds of periodic properties can be visualized in tabular or graphic forms, some of which are available for download/export, free of charge, to your own documents, worksheets or slides.

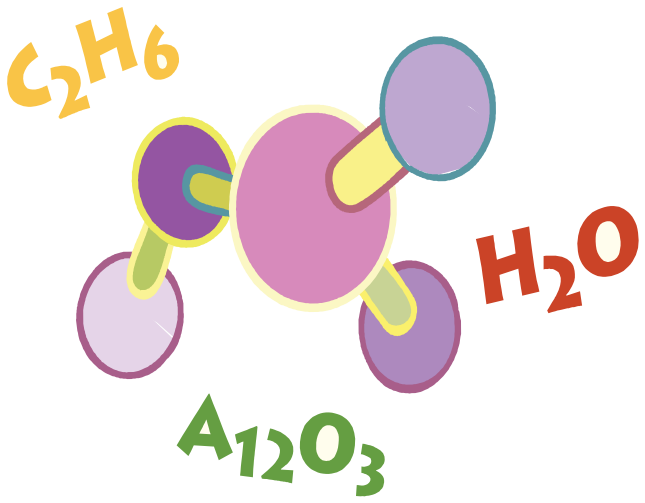
I noted in particular that the trends across period and down group were retained for first,

second and subsequent ionization energies for many elements. This was easily visualized using the handy graphing tool that allows you to plot, and print graphs of, several sets of data on the same axes all at once. While the resource does not allow you to import graphs into your documents, you can export the data to a spreadsheet and plot the information as necessary.

Inspirational Chemistry (www.rsc.org/Education/Teachers/inspirational.asp) is a packaged resource on LearnNet that has oodles of worksheets, lab sheets and information on topics ranging from diaper choice to the 12 principles of green chemistry.

RSC education-related periodicals that have many free articles and downloads include:

- *Education in Chemistry* (www.rsc.org/Education/EiC/). The sections Soundbite Molecules and Exhibition Chemistry offer interesting anecdotes and excellent details of demonstrations, most of which need only a modicum of adjustment to fit the Alberta chemistry context.
- *Chemistry World* (www.rsc.org/chemistryworld/) is a magazine, published monthly, that has daily updated chemistry news articles online from around the world. Virtually every article has an illustration that can be great for showcasing the science, technology and society emphases in our curriculum.
- *Chemical Technology* (www.rsc.org/Publishing/ChemTech/index.asp), *Chemical Science* (www.rsc.org/Publishing/ChemScience/index.asp) and *Chemical Biology* (www.rsc.org/Publishing/Journals/cb/index.asp) are sister publications that have other articles and news that in my opinion offer countless opportunities for teachers to feel the pulse of applied chemistry today.



Paper resources can be ordered too. By subscribing to the Schools and Colleges Publications Service (www.rsc.org/Education/Teachers/scps.asp) for $160 per annum, you receive six packages that contain up-to-date hard copies from some stimulating chemical education publications from around the world. These are *Education in Chemistry* (and *InfoChem*), from the UK; *Chem 13 News*, from Canada; *Chem NZ*, from New Zealand; *Chemistry in Action*, from Ireland; *Chemistry Reviews*. from the UK; *ChemMatters*, from the US; as well as all the latest educational material from the RSC, such as teaching resources, books, CD-ROMs, DVDs, careers material, posters and research reports.

Happy Googling!

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Hutchings, K. 2000. *Classic Chemistry Experiments*. Cambridge, UK: Royal Society of Chemistry.

Lister, T. 1996. *Classic Chemistry Demonstrations*. Cambridge, UK: Royal Society of Chemistry.

Ian Phillips, Chemistry Teacher
Ross Sheppard High School
Edmonton Public Schools

Edmonton Teachers: Treat it Right!

Edmonton's Drainage Services launched its new elementary public education program Treat it Right! in October.

Treat it Right! Wastewater links to the personal action concepts of the Grade 4 science topic Waste and Our World. The program develops the idea of biodegradability by discussing what ends up in the waste water. It examines how waste water is managed and treated in Edmonton and the kinds of actions students and their families can take to minimize their impact on the waste water. Integrating science, language arts and social studies, Treat it Right! Wastewater includes a teacher's guide complete with duplicating masters. It also includes a game that can be used for assessment and as a culminating activity.

A second program, for Grade 5, Treat it Right! Storm Water links to the human action concepts of the Wetlands science topic. It also includes some information on weather and reviews some chemistry activities as well.

The program develops the concept of how natural drainage from precipitation is altered within a city and how it is managed in the city of Edmonton. Students will learn about the kinds of waste that end up in the storm water system and how that can have a negative effect on wetlands and the environment. Students will work with their families to assess what is done at home and what kinds of actions they can all take to treat storm water right.

Through the chemistry activities, students will perform basic tests to help them understand that storm water is monitored and tested for contaminants by the City of Edmonton. They will also learn about the kinds of jobs that are done to manage the storm water system in the city.

Integrating science, language arts, social studies (Canada: Its Geography and People) and mathematics, Treat it Right! Storm Water provides a teacher's guide complete with duplicating masters.

Both programs include a flow chart for either storm water or waste water. An evaluation is part of each program, and teachers are encouraged to provide their feedback. The evaluation is also available online.

Treat it Right! has been developed in consultation with classroom teachers and the Edmonton Catholic and Public school boards. Alberta Education has also been consulted.

Grades 4 and 5 Edmonton teachers will be receiving these programs. Drainage Services will be participating in professional development workshops with the science consultants in both the Edmonton Public and Catholic school boards and will participate in the ATASC conference in Edmonton in November.

For all other teachers in Alberta, this program is available on the City of Edmonton's website at www.edmonton.ca/drainage/education. For more information, contact the project manager, Janice Dewar, at (780) 442-4364, e-mail janice.dewar@edmonton.ca.

Professional Development

35th C_3 Conference

College Chemistry Canada (C_3) is an organization of college, technical institute, university and high school teachers who are interested in the teaching of chemistry. The NAIT Chemical Technology Program is pleased to host next year's conference, which will take place on May 22–25, 2008. The conference starts on the Thursday evening with a wine and cheese mixer and an exhibition of chemical suppliers and textbook publishers. Technical and teaching sessions will take place on Friday, May 23 and Saturday, May 24. The technical sessions are designed to provide information that can be included in our classrooms.

Several sessions have been organized. Nanotechnology, "Small Is Big," will feature local activity in the field of nanotechnology and a tour of the National Institute for Nanotechnology (NINT).

There will be a session on innovation in energy, "Illuminating the Alternatives," that will cover the latest work in oil sands technology, coal bed methane, biodiesel and fuel cells. A tour of NAIT's operating high-voltage fuel cell will be included.

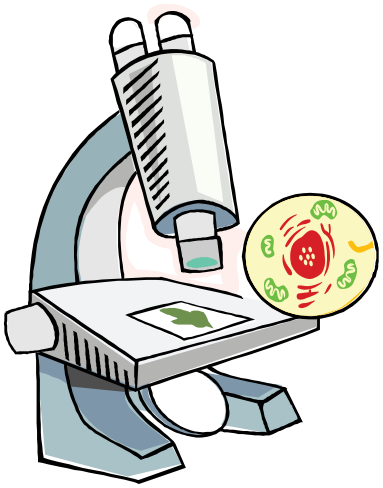
Another session on green chemistry, "Roots and Offshoots," will cover the principles of green chemistry, how they can be incorporated into teaching labs and how industry is adopting green chemistry.

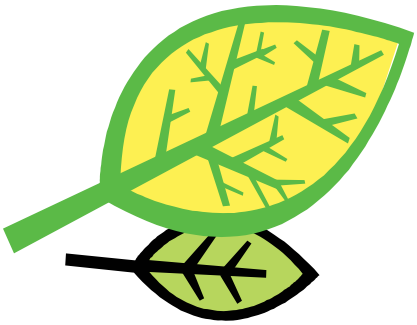
No C_3 conference would be complete without "Creative Chemical Communication," Innovations in Teaching, a session on innovations in technology which covers teaching methods, tools and technology.

Finally, there will be a showcase of demos, "Lights, Camera, Action," where instructors will share their best demos for use in the classroom. The demos will be recorded and will include step-by-step instructions that will be uploaded onto the C_3 website.

On Sunday, May 25, there will be an optional joint session with the Canadian Society for Chemistry Conference on undergraduate research. The tour of NINT may also take place on Sunday.

If you would like more information on this conference, please contact Cindy Rothwell, conference chair, at cindyr@nait.ca.



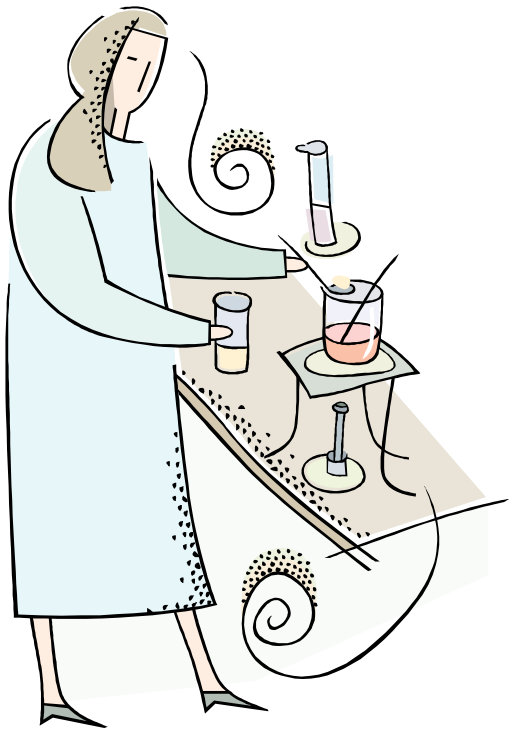


Women in Science

Operation Minerva Contest

Since 2002, the Alberta Women's Science Network (AWSN) has sponsored the Operation Minerva essay contest for Grade 8 girls in Calgary. The Calgary committee has been organizing job shadowing for Grade 8 girls with women professionals in science and engineering since 1990. Operation Minerva is also organized in Medicine Hat and Red Deer.

The winning essays are posted on AWSN's webpage (www.awsn.com/essay.htm) along with a photograph of the student and her mentor. The 2007 winning essays were written by Abbey Kind, from St Gabriel the Archangel School; Jessie Godsman, Willow Park School; and Meaghan Carlson, Simon Fraser Junior High School. Abbey's mentor was Dr Cecile Siewe, of Shell Canada. Jessie's mentors were from WorleyParsons Komex, and Meaghan's mentor was Corinne Richmond, from Nexen Inc. Of the 108 Grade 8 girls from the Calgary region who registered, 104 participated in job-shadowing day. Participants included 58 students from the Calgary Board of Education, 38 from Calgary Catholic Schools, 12 students from private and charter schools, and 1 home-schooled student.



The following companies, organizations and university departments hosted the girls with 96 participating mentors. Long-time mentor, past committee member and mentor coordinator Corinne Richmond has been the subject of two prize-winning essays: 2003 and 2007. Mentors at WorleyParsons Komex have been featured as prize-winning essays in 2006 and 2007.

- Achilles Foot Clinic, Dr Maegan Purych
- AJM Petroleum Consultants
- Alberta Children's Hospital, Cardiology
- ARC Energy Resources
- Calgary Animal Referral Emergency Care Centre
- Calgary Audiology Clinic
- Canada Natural Resources
- ConocoPhillips Canada
- Dillon Consulting
- EnCana Corporation
- Glenmore Landing Animal Clinic
- HINZ Automation
- Nexen
- Petro-Canada
- Shell Canada Energy
- SMART Technologies
- WorleyParsons Komex
- University of Calgary
  - o Biotechnology Training Centre
  - o Biochemistry and Molecular Biology
  - o Chemical and Petroleum Engineering
  - o Physiology and Biophysics

Shell Canada Limited

by Abbey Kind
St Gabriel the Archangel School

Reprinted with permission from the Alberta Women's Science Network (www.awsn.com).

My Operation Minerva experience started the day I received my letter of acceptance from the program with information about the job site I was visiting and my mentor, Dr Cecile Siewe. Out of more than 60 students in the eighth grade, I was privileged to be one of two chosen to represent my school. My science teacher described it as an interesting and beneficial opportunity for me to increase my knowledge and, hopefully, to encourage a strong interest in pursuing a career in the sciences. Sitting in a classroom and learning out of a textbook always seemed to limit my abilities to try new things, but my day at Shell Canada changed everything.

The bus ride was long, and as we got closer, I was getting anxious to meet my mentors and start the day. The bus dropped me and four other students at the door of Shell Canada Limited (at the Calgary Research Centre) where our mentors came to greet us. It was a large building that towered over us and enclosed numerous research labs, offices, and meeting and conference rooms. It wasn't short of remarkable. We were led up to a conference room where we were given an itinerary of the day and did an introduction exercise where we were required to get up and talk to the other people in the room. The business of this oil and gas company requires everyone to do his or her job. A few people we met who have important roles are Jessica, Lauren, Nory, Jill, Mike and Tim. I learned that most of these people have families and other important interests that made them who they are. The exercise taught me that your career doesn't have to be your whole life, and it is important to choose a career that works for you.

(l) Dr Cecile Siewe, (r) Abbey Kind

After introductions Cecile gave us a presentation about the business of Shell and the oil sand processing. She gave us a brief overview of the company and what her role is. She showed us that oil isn't used just in cars, but that petrochemicals from oil make over 4,000 products that are used every day. Some examples are plastic bags, bottles, tires, fabric, cosmetics and bubble gum.

The five of us split into two groups, and both groups headed downstairs into the first lab. Before we entered the lab we were told about the safety precautions and laboratory policies, and were given rubber gloves, lab coats, protective glasses and rubber-soled shoe coverings. There we did an experiment with the CST (capillary suction time) measurement machine to find the viscosity of a sample of oil. We tested and calculated the time, and then recorded the numbers in the record book. I learned that all good scientists record everything and that no information about a test is useless.

We gathered together in the conference room to discuss the recent experiment and then viewed a movie of pictures and scenes from petrochemical plants and oil refineries. We then followed Michael Sprague to his research lab; he is one of the few male mentors who helped us throughout the day. He is a research scientist and showed us samples of oil under a high power microscope. We identified the differences between the density of two different samples, noticing both a change in the structure of the particles and a colour change. We then visited another lab, observed and took part in another experiment and then assembled in the conference room for lunch.

As we waited for lunch we talked about our day's experiences so far. The mentors were eager to answer our questions to give us a better understanding of the oil and gas business and their roles. Two guest speakers, Rob and Lorraine, spoke to us about running a large company and how they got to be where they are now. Being inspired by all the skilled and accomplished business people around me, I asked what qualities made a good business person and their answer surprised me more than ever. Lorraine said that we should develop good communication and social skills, develop conflict resolution and teamwork skills, always think with an open mind, and be a balanced person in general. Another interesting thing she told me was that a recent University of Calgary scientific study proved that girls score higher in math and the sciences than boys. She emphasized that it is just as important for women to pursue a professional career as it is for men.

Before lunch ended, I had a chance to talk with Cecile. She told me that before she chose her career, became a chemical engineer and joined Shell, she tried many different things until she found what she liked most. There's research, design, managing and computing. One field of work has many possibilities that fit different kinds of people. She talked a lot about how she worked in the field and research labs, and designed equipment and processes to be used in oil processing and extraction. She taught me that having a flexible job that fits your life is important. Cecile, being an accomplished development and chemical engineer, inspired me to choose a field of work that I love.

After lunch Lauren Asplund led us back to the lab and took us through a day of being a chemical technologist. She took us through an experiment called a flocculation test, in which you use a solvent to separate oil, sand and water. Her job is to test different solvents, using the same procedure each time, to determine which would be the best to use in the extraction and processing of oil sands. She let us use all the materials and do the experiment as she supervised. It was the hands-on work I'd been waiting for.

We ended the day with some final questions and a group picture at the sign in front of the building. Then the bus came. Although we would've loved to stay longer, we knew we couldn't, so we said a quick goodbye and thanked them for everything. We then hopped on the bus for a long ride home; it allowed us to soak in our awesome day.

I couldn't imagine going to a more interesting place to learn about the sciences. My job-shadowing experience at Shell Canada's Calgary Research Centre was really inspiring and was all that I'd hoped for and more. As soon as the opportunity arose for me to participate in the Operation Minerva Program I was immediately interested and was not disappointed. I learned a lot—not just about being a chemical engineer or technologist but about choosing a career. The most important thing that I learned on my job-shadowing experience was to keep all my doors open and that developing soft skills as I mature is equally important in any job. I also learned that I don't need to decide what I want to do for the rest of my life right now and that I have all the time in the world to experience new things and explore all my options. In the words of a great mentor, "Don't give up too early."

AWSN at Science Conference

Terri MacDonald will be presenting the results of a three-year study exploring the impact of the Operation Minerva Program in Calgary across educational sectors (public, Catholic, alternative) at the upcoming ATASC conference. More specifically, the study explores the impact of female science mentoring and job shadowing on science choices and attitudes influencing science attrition. This session will be of specific interest to science teachers, especially at the junior high level.

Book Reviews

Ten Tomes for the Teacher

In no particular order, I offer some brief reviews on books that will appeal to a broad range of science book lovers out there.

The Creation: An Appeal to Save Life on Earth, by Edward O Wilson. New York: W W Norton, 2006, 160 pages. ISBN-10: 0393062171, ISBN-13: 978-0393062175.

Wilson presents a passionate appeal to save the earth from the ravages of climate change. This gem is written as an agnostic letter to a southern Baptist preacher but is really a letter to all of us.

Big Coal: The Dirty Secret Behind America's Energy Future, by Jeff Goodell. Boston, Mass: Houghton Mifflin, 2006. ISBN-10: 0618319409, ISBN-13: 978-0618319404.

An engaging account of the politics and science, some of it scandalously bogus, behind America's desire to overcome dependence on foreign oil resources—no matter what negative effects accrue to the environment, locally or globally.

Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites That Make Us Who We Are, by Marlene Zuk. Orlando, Fla: Harcourt, 2007, 336 pages. ISBN-10: 0151012253, ISBN-13: 978-0151012251.

A jovial jaunt through all aspects of parasitism and its implications for life. Nowhere near as gruesome as Carl Zimmer's *Parasite Rex* (2001).

The Snoring Bird: My Family's Journey Through a Century of Biology, by Bernd Heinrich. Scarborough, Ont: HarperCollins Canada/Ecco Press, 2007, 461 pages. ISBN-10: 0060742151, ISBN-13: 978-0060742157.

A delightful story of the remarkable collector father of Bernd Heinrich, himself a noted scientist and writer. Heartbreakingly beautiful writing makes this and Heinrich's many other books probably the best science books around for lovers of animal behaviour. Check out his classics *Bumblebee Economics* and *Geese of the Beaver Bog*.

Uncertainty Underground: Yucca Mountain and the Nation's High-Level Nuclear Waste, by Allison M Macfarlane and Rodney C Ewing, eds. Cambridge, Mass: MIT Press, 2006, 455 pages. ISBN-10: 0262633329, ISBN-13: 978-0262633321.

Essentially everything you ever wanted to know about the technologies, the difficulties and the promises of nuclear waste disposal at Yucca Mountain in Nevada.

The Flu Pandemic and You: A Canadian Guide, by Vincent Lam and Dr Colin Lee. Scarborough, Ont: Doubleday Canada, 2006, 352 pages. ISBN-10: 0385662777, ISBN-13: 978-0385662772.

Two Canadian doctors' no-nonsense take on dealing with an influenza pandemic. Lam and Lee, veterans of the SARS epidemic, offer sound, easy-to-apply advice on the local and global implications of personal actions in the runup to, or in the throes of, an avian flu crisis. This book calms irrational fears and points out the eventualities we can plan for, and those we cannot.

Niko's Nature: The Life of Niko Tinbergen and His Science of Animal Behaviour, by Hans Kruuk. Illus Niko Tinbergen. New York: Oxford University Press, 2003, 406 pages. ISBN-10: 0198515588, ISBN-13: 978-0198515586.

A phenomenally well-written biography of Nicholae/Niko Tinbergen, a co-Nobelist with Konrad Lorenz for studies in animal behaviour. Written by one of Tinbergen's graduate students among whose numbers are Desmond Morris (*The Naked Ape*) and Richard Dawkins (*The God Delusion*).

Heat: How to Stop the Planet from Burning, by George Monbiot. Scarborough, Ont: Anchor Canada, 2007, 304 pages. ISBN-10: 038566222X, ISBN-13: 978-0385662222.

A bracingly erudite discussion of how to achieve a 90 per cent cut in greenhouse gas emissions using off-the-shelf hardware, smart organizational technologies and a modicum of international cooperation.

Vanity, Vitality, and Virility: The Science Behind the Products You Love to Buy, by John Emsley. New York: Oxford University Press, 2006, 259 pages. ISBN-10: 0192806734, ISBN-13: 978-0192806734.

Everything you ever wanted to know, from a chemical point of view at least, about the chemicals we use to improve our looks, our health and our reproduction.

The Agile Gene: How Nature Turns on Nurture, by Matt Ridley. Scarborough, Ont: HarperCollins Canada. Reprint edition, 2004, 352 pages. ISBN-10: 006000679X, ISBN-13: 978-0060006792.

Matt Ridley is arguably the best popularizer of biology today. This followup to *Genome* provides a perfect blend of history, genetics and social science for those of us who wish to understand the implications of sequencing the human genome. His use of humour in tackling many examples of the "gene for _____ (insert character trait here)" claims, whether legitimate or quite bogus, is most refreshing.

Enjoy.

Ian Phillips

Speaking of Science

Help fellow teachers solve the mysteries of teaching science. If you have a question about teaching science (or a science question in general), this is the place to ask. Send your questions to andilynn.bender@gmail.com. If you can help answer any of the questions below, please send in your response to the same e-mail address. You can remain anonymous if you prefer.

Here are the responses to the questions posed in the last issue.

Excretory Failure

Teaching the excretory unit in Biology 20 has always been a challenge for me. How can I teach the kidney structure and function section to make the material more meaningful to students?

Response

I purchased tunnel toys from Ikea to recreate the nephron and Styrofoam balls in different sizes and shapes to represent glucose, sodium, red blood cells (RBCs) and so on. I then had the students hold the tubing (three tunnels) in the shape of a nephron, and other students dropped molecules into the nephron. A large ball represented a RBC to show students that it shouldn't pass through the nephron. Smaller molecules did fit through, and we removed them at different places to represent reabsorption or added them to represent secretion. Any remaining balls fell out the bottom into a garbage bag to represent the renal pelvis.

Leslie Heinsen
Queen Elizabeth High School

Tired of the 3-D Cell

It has been my experience that when students first learn about cell structure and function, they usually build a 3-D model. Could this material be taught differently and have the same impact on student learning?

Response

A colleague of mine used to do cell elections. Students would create a platform and election poster about their organelle and present it to the class. Students would vote on the best organelle. The posters were then displayed so students could see the different organelles.

Leslie Heinsen
Queen Elizabeth High School

Still Looking for a Response: Outdated Scope

When teaching students about the microscope, I use the lowercase letter experiment to demonstrate how images move oppositely and appear different than when viewed by the naked eye. Is there a better way to teach this concept?

Fossil Flunk

I am teaching the fossil topic in the Grade 7 science Planet Earth unit. I was looking for a video to show the class that emphasizes the importance of fossils in Alberta. Any suggestions?

Thank you, science teachers, for making this newsletter a little more personal and interactive.

Andi-Lynn Bender
ATASC Newsletter Editor

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