THE ALBERTA SCIENCE TEACHER

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From the Editor

We are looking for an editor for the *Alberta Science Teacher.* I am sad to say that I am unable to keep up with the position because life has taken me in some new directions. Being editor has been a wonderful experience. I've been able to work with great people and I have learned a lot. Adding to the difficulty of leaving the position are the changes and challenges that the newsletter will be facing over the next couple of years.

Print in general is facing some big challenges. Newspaper readership across North America has dropped dramatically. Magazines have become more specialized in an effort to attract advertising and stay profitable. Even fiction is having a difficult time. My favourite genre—the science fiction short story—is facing extinction, if you believe some of the sources. No one reads pulp paperbacks anymore, such as Asimov's *Amazing Stories,* which leaves few paying markets for writers.

The *Alberta Science Teacher* newsletter is heading into this environment. Some of you may recall our experiment in setting up an electronic copy of the newsletter about two years ago. Many people liked the change—even preferred it. But there were also strong voices that hated the change and wanted their hard copies—something to hold in their hands and read. This was an awakening for me—there is a need for the *Alberta Science Teacher* newsletter.

Our new challenge, therefore, is to be ever-more vigilant that we meet the needs of our readers. Another challenge we face is reassessing what the role of the newsletter will be. The world of teaching has changed dramatically over the last few years. Our website (www.atasc.ab.ca) has a new feature that allows teachers to share their resources. This newsletter features an article about podcasts and their application to the classroom. Combine podcasts with LearnAlberta.ca (www.learnalberta.ca) and video conferencing, and the boundaries of the science classroom seem to fade away.

So what's up for the newsletter? The Science Council executive will be looking at our last survey and discussing some goals for our publications. I have some ideas but it is not going to be my task. I hope that one of you reading this is ready for the endeavour. Drop me a line if you are.

Derek Collins

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Please address all correspondence to the editor: Derek Collins, Box 3665, Vermilion T9X 2B7; phone (780) 853-5251 (school); fax (780) 853-4343. Material for publication may be submitted on disk or paper. Unformatted text formats are preferred. Articles may be given to any executive member for relaying to the editor. This publication is typeset using InDesign and operating under Windows.

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Nominations for Science Teacher Awards

The Science Council has two awards to recognize the excellent work done by teachers. Please nominate a colleague for one of the awards. The Outstanding Science Teacher Award goes to a teacher who contributes to the area of science teaching through articles, curriculum development and other professional development. The Distinguished Service Citation is given to a teacher who has shown extended contribution to science education in Alberta. Submit nominations to the president, Dennis Oppelt.

Alberta Science Teacher Needs an Editor

If you are interested in sitting on the Science Council executive and providing a resource for fellow science teachers, please consider volunteering to be the newsletter editor. It is a great growth plan activity. For more information, contact Derek Collins (dcollins@atasc.ab.ca).

Science Council Conference 2006: "Conquering the Challenges"

November 16–18, 2006

Join your fellow science teachers once again in beautiful Kananaskis for the 46th Annual Science Council Conference. The location itself should inspire you to "conquer the challenges."

The conference will begin on Thursday evening with registration and a welcome reception, and then an early 8:00 AM start on Friday morning will include the exhibitor's expedition, and coffee and snacks. The expedition will provide you with time to visit the booths and to complete your Trek Card for great prizes. Keynote presenter Justin Trudeau will open the conference at 9:00 AM. Registrations received by June 15 will be entered into a draw for a unique opportunity for a small-group discussion with Trudeau from 10:30 to 11:30 AM. Concurrent sessions are scheduled from 10:30 AM to noon. A gourmet box lunch will be provided for all registrants from noon to 1:00 PM, allowing time to socialize, relax or take a walk.

A second keynote at 1:00 PM will feature Joe Schwarcz from McGill University and from Discovery Channel fame. His session on "Science and the Parnormal" is sure to make you rethink a few scientific beliefs. Concurrent sessions will once again run from 2:15 to 4:30 PM, with opportunities for outdoor and offsite activities as well.

The Science Council Annual General Meeting (AGM) will take place from 4:45 to 5:45 PM, and will allow you to learn more about the operation of our organization, as well as meet the people involved.

The banquet and awards evening will begin at 6:30 PM and will include dinner, awards and another keynote address, followed by an evening of dancing and music. Come prepared to party!

Saturday will begin with breakfast from 7:30 to 8:45 AM, along with more exhibit time from 8:00 to 9:00 AM. Featured speakers will present from 9:00 to 10:00 AM, followed by concurrent sessions from 10:30 AM to noon. Following these will be lunch and a keynote address by Jeff P Fox on "Exploring Earth's Deep Time." Sessions will conclude at 3:30 PM for an early return home, leaving some free time for the weekend. Feedback would be appreciated regarding the time frame we are trying this year.

Accommodation is available at the Delta Lodge at Kananaskis and you are encouraged to book rooms early for the best selection. Thursday night's room rate does not include the meal plan, but hotel guests must book the meal plan for Friday night to be able to attend the Friday night banquet, Saturday morning breakfast, and Saturday lunch and keynote address. The meal plan was arranged for Friday night to keep conference costs to a minimum. Accommodation details with room types and total costs are available on the Science Council website (www.atasc.ab.ca). Many deluxe rooms and suites are available at the same rate. Be sure to indicate rate code GF349 to obtain the conference rate.

Register online at www.atasc.ab.ca. Registrations received and paid before June 15 will be eligible for great prizes, including a free night's accommodation. Check the website for frequent updates.

Mary McDougall and Barb Borchert

Hands-On Experience Gives Girls a Leg Up

Using chocolate cake to teach students about oil rigs? It's all part of the creative curriculum in Operation Minerva, a hands-on program that is changing Alberta's educational landscape and outlook on women in science, math and technology careers.

Named for the goddess of wisdom, Operation Minerva was founded in 1988 by a group of teachers, science mentors and others who recognized the need to develop an awareness of the small number of female students choosing science, mathematics and technical courses and careers. To accomplish this, they provided Grades 8 and 9 girls with the opportunity to job shadow a positive role model in a male-dominated field.

Sydni Kind, a 14-year-old student at St Gabriel the Archangel School in Chestermere, Alberta, spent a day at the University of Calgary's Heritage Medical Research Centre with Linda Sandercock.

"The day started with Dr Sandercock teaching me about molecular biology. I got to see many computerized visuals of DNA sequencing and experienced mixing and analyzing a polymerase chain reaction," she says. "As this was happening, I realized that this really triggered a part of my brain I very rarely use."

In the lab, Sydni handled research mice while learning the integral role that the rodents play in making scientific and medical breakthroughs. She viewed cross-sections of mouse tissue through a microcomputer tomography machine and state-of-the-art confocal microscopy.

"I was so amazed that I was given the chance to watch this advance in science at work," Sydni says. "[Everyone] was passionate and willing to share as much as possible with me."

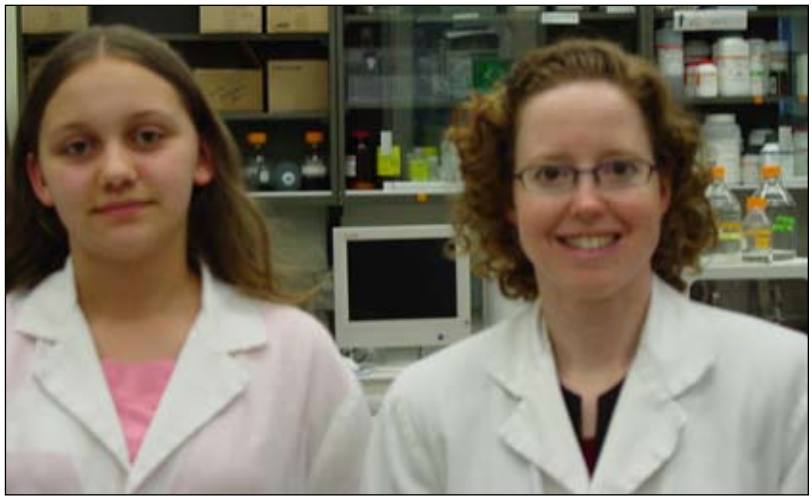
Joyce Luethy is executive director of the Alberta Women's Science Network (AWSN), formed by Operation Minerva groups in Calgary, Red Deer and Medicine Hat, and other provincial organizations. She says that in AWSN's view, there is simply no substitute for working alongside a mentor.

"The student becomes familiar with the science, engineering or information technology workplace, the tools and teamwork of the job and the educational background of the mentor," says Luethy. "As well, they see how their mentor balances work and lifestyle, and how they may have overcome obstacles."

Many girls in the program can relate to such obstacles. Peer pressure, the image of scientists as nerds, few role models, lack of knowledge about career opportunities, competitive rather than collaborative teaching methods and failure to take sufficient classes in high school are all contributing factors to the weak numbers of girls enrolling in scientific fields of study.

"Science and math genes can be passed on to both male and female children," Luethy reminds students and teachers. "There are a lot of women who are very talented and interested in science, math and engineering—possibly half the population."

The experiences offered by Operation Minerva are as varied as the students in the program, with the only parameters being mentors' imaginations. If this is the case, Operation Minerva mentors Christine Wielezynski Singh and Gina Wozney really take the



Operation Minerva essay winner and mentee Sydni Kind with mentor Linda Sandercock

cake. The two are engineers at ConocoPhillips Canada.

To illustrate the technology used in Canadian oil fields, Wozney bakes a chocolate layer cake that students use to simulate drilling for oil, as well as the environmental precautions that must be exercised. Naturally, everyone drills their cake and eats it, too.

"It is important to educate young people, help them develop confidence and make choices," says Singh, a former program participant herself. "Operation Minerva helps inspire young women to pursue careers in science, math and engineering, and empowers girls who need positive role models in our ever-evolving culture."

To measure the success of Operation Minerva over the past 17 years, the equation is simple. When the program started in 1988, only 9 per cent of the students in the University of Calgary's Faculty of Engineering were women. By 2005, that number had risen to 25 per cent.

One may also gauge success by looking, unscientifically, at the smiles of participants like Sydni, who is now considering a future career in biochemistry.

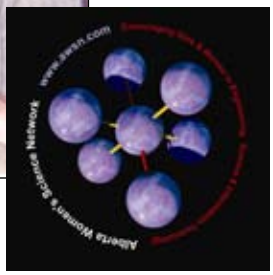
Barbara Chabai

Canadian industry leaders and interest groups will be discussing ways to motivate young women through programs like Operation Minerva at the 11th Canadian Coalition of Women in Engineering, Science, Trades and Technology (CCWESTT) National Conference for the Advancement of Women in Engineering, Science, Trades and Technology, June 22–25 in Calgary. The theme of this year's conference is "Producing Influential Leaders." For more information, visit www.ccwestt.ca.

The Alberta Women's Science Network can be found online at www.awsn.com.

Mentor Gina Wozney and Operation Minerva Calgary participants

Joyce Luethy, executive director, Alberta Women's Science Network



Ralph McCall School Makes First Alberta Contact with the International Space Station

"November-Alpha-One-Sierra-Sierra, this is Victor-Echo-Six-Juliet-Bravo-Juliet from Ralph McCall School in Airdrie, Alberta, how do you copy?"

"Victor-Echo-Six-Juliet-Bravo-Juliet, November-Alpha-One-Sierra-Sierra, I have you five and nine, loud and clear, and good day to all the folks in Canada, over."

These were the first words exchanged with International Space Station (ISS) Commander Bill McArthur, KC5ACR, as the space station came into radio range. Teacher and radio operator Brian Jackson, VE6JBJ, was left momentarily breathless as two years of waiting and months of technical preparation came to fruition—a once-in-a-lifetime event that students at Ralph McCall School will not soon forget.

McArthur now has the honour of being involved in two Canadian Amateur Radio on the International Space Station (ARISS) school contacts—events that bring to light some of the best that this great hobby has to offer. The opportunity to talk directly with an orbiting astronaut on the ISS using amateur radio brought out the best in not only everyone involved but also the community. A personal letter from Canadian Astronaut Chris Hadfield, VA3OOG, and a letter from the Canadian Space Agency demonstrated their support for these types of projects and the role that these projects can play in education. CBC Newsworld covered the event live on national television, thus showing an aspect of amateur radio other than that of providing relief during emergency situations, which is more common to public viewers.

In the following section, Jackson explains how his love for teaching, amateur radio and everything to do with space was cultivated into a project that was out of this world.

"When my friend and mentor, Neil Carleton, VE3NCE, told me that our scheduled ARISS contact would be the opportunity of a lifetime and something I would never forget, I don't think I fully understood what he meant. But now that I look back at the Ralph McCall School experience, I see what he was talking about. I have taught for 15 years, and this was without a doubt the highlight of my career.

The process initially sounded easy: first apply, then wait for two years and then go like crazy once the call comes to tell you it is your turn to talk with the ISS. I also had to put together a team of dedicated local amateur radio volunteers and convince my new school that this really was the chance of a lifetime. Finally, we would let the students catch the same excitement, then sit back and watch it evolve. It was almost this easy.

I had recently transferred from a school where I had taught for 14 years when I went to see my new administration and ask them for permission to try the ARISS project. "The first of its kind in Alberta," I boasted—and the first of any kind of space project for this school. I am still not sure if they knew what they were getting themselves into. Before they knew it, we had a team of amateur radio volunteers rounded up, thanks to the efforts of Ken Oelke, VE6AFO, and his knowledge of the Calgary

Ralph McCall School ISS contact logo, design by Grade 8 student Gabby Field

Big day at Ralph McCall School

radio community. A great asset was the continued support from the Quarter Century Wireless Association (QCWA) Wild Rose Chapter 151 and their involvement with the Radio Amateurs of Canada (RAC) Youth Education Program (YEP). Also on our team was Andrew Webb, VE6EN, who had past experience with an ARISS contact in Almonte, Ontario, in 2001. It was easy to follow their lead, for they had paved the road for our success.

Before my principal knew it, he was inundated with e-mails and with requests asking for permission for each phase of the project. This ranged from getting the antenna on the gymnasium roof to providing seating for the students in a gym with a limited seating capacity to finding time to introduce the students and staff to what we were about to embark on. Each request, including the budget needed to pull this off, was received with a resounding "yes!"

It all sounds so easy, but it certainly wasn't. It was more hours than I had originally imagined, but it was a labour of love, and the work was never boring. Despite the long hours, knowing that each hour that passed got us one step closer to our final destination drove us all on. The team set up and tested the equipment many times, brainstorming and problem solving until we got it right. We simply told everyone in the school what lay ahead, and then let their enthusiasm carry us the rest of the way. My colleagues stepped up to offer help and ideas, making this a true Ralph McCall event, and more than I could ever have imagined.

Students submitted hundreds of questions in a schoolwide contest, from which we selected the best and most unique. The winning students practised their questions and overcame their nervousness. Students also submitted logos. The winning logo was used on T-shirts, which were proudly worn on the day of the contact, and which are still proudly worn today. Students made "space-age" art projects that were displayed on the gym walls.

Finally the day was upon us, and students, parents, media and special guests (including the mayor and the emerging technologies manager from Alberta Education) were all in their places. A professional photographer and his wife had volunteered to take pictures. Our video arts students were making a digital recording of the day's events for future projects, making it not only a schoolwide event but a community event as well. The Internet Radio Linking Project (IRLP) carried our signal to all YEP schools, as well as Chestermere Lake Middle School, the place where my dream had begun and the school I had left to come to Ralph McCall.

When Commander McArthur replied, my heart jumped clear out of my body and all the plans of the past three months and the two years of waiting fell into place.

Richard Roadhouse ,VE6AX (back), and Gerry McDonald, VE6QLT, monitor nearby 2 m signals using a spectrum analyzer during a technical rehearsal (photo courtesy of Andrew Webb)

Brian Jackson, VE6JBJ (centre), with the ten ISS kids (photo courtesy of Neil Koven)

One by one, the students stepped up to the microphone, sounding like seasoned professionals. Before we knew it, 10 minutes had passed and we had asked 18 of our 19 questions. Then we lost the signal and it was all over. I had been told that the one thing the astronauts regret about communications like this is when they are unable to say goodbye. The plan was, therefore, to stop the final question 30 seconds before losing the signal so that we could bid farewell as a school. I was aware of this plan and my team kept me well informed of the time remaining, but I just had to give the students every chance to ask their questions. I ran us out of time! Even though we could no longer hear Commander McArthur, we took a chance that he could still receive and we sent out a goodbye, then ended the event. The cherry on the top of an already perfect day was hearing from Bob Clermont, VE3AKV, in Carleton Place, Ontario, who monitored and heard our farewell attempt. He relayed back to us via IRLP that Commander McArthur had replied back, thanking us for our questions and wishing us a Merry Christmas. With that, the crowd erupted into a huge round of applause. The day was better than perfect!

The day took lots of work but was absolutely worth every second. I am proud of the strength of our volunteers, both behind the scenes on the radio and in the classrooms of our school. Did we make this Alberta-first something that we will never forget? Just ask anyone in that crowd. Everyone agrees that it was amazing! Is this something that all schools should get a chance to do? Oh yeah!"

Brian Jackson, VE6JBJ; Andrew Webb, VE6EN; and Ken Oelke, VE6AFO

Brian Jackson, VE6JBJ, is a classroom teacher in Airdrie, Alberta. Having been licensed only since January 2004, his goal has been and will continue to be finding ways to use amateur radio in innovative ways in the classroom and to share these with colleagues. One of these ways includes his work with the RAC YEP.

Andrew Webb, VE6EN, was licensed in 1992 at the age of 16. After receiving his MSc in geology from Carleton University in 2003, he moved to Calgary and is currently working for Nexen in the oil and gas business. Webb has been involved with several aspects of amateur radio from Jamboree on the Air (JOTA) events to helping out with the RAC YEP program, including the second Canadian ISS contact at R Tait McKenzie Public School in Almonte, Ontario. Some of his many interests include high frequency (HF) weak-signal digital modes, fast-scan amateur television (ATV) and automatic position reporting system (APRS).

Ken Oelke, VE6AFO, was licensed in 1961 at the age of 15. He is married to Linda-Lou, VE6LGO, and works for Jazz Air as a ground equipment mechanic. He was the Midwest director of the Canadian Radio Relay League (CRRL) from 1988 to 1993, and served as the RAC's Alberta, Northwest Territories and Nunavut director from RAC's formation until 1999, at which point he became president, serving in that position until the end of 2001. He is now the president of the Quarter Century Wireless Association (QCWA) Wild Rose Chapter 151 and an accredited examiner. His interests are many, and he enjoys rag chewing, and very high frequency (VHF) and ultra high frequency (UHF) weak-signal and moonbounce communications. He also enjoys building and experimenting with antennas and other related amateur radio equipment.

ARISS Amateur Radio Team—Back row (l–r): Kevin McCoy, VE6KJM; Tyler McCoy, VE6TGM; Linda-Lou Oelke, VE6LGO; Bruce Reynolds, VE6BR; and Jack Blair, VE6ARQ. Front row (l–r): Ray Loranger, VA6FRA; Lindsay Gavel, VE6GAV; Ken Oelke, VE6AFO; Brian Jackson, VE6JBJ; Daniel Krysak; and Andy Webb, VE6EN. ARISS team members not present: Gerry McDonald, VE6QLT; Richard Roadhouse, VE6AX; and Mike Taddeo, VA6MJT (photo courtesy of Neil Koven)

Grade 5 student Carly Goble asking astronaut Bill McArthur a question (photo courtesy of Neil Koven)

Are You an Iron Science Teacher?

Alberta science teachers will fearlessly match wits in the first-ever Iron Science Teacher event this fall. Sponsored by Alberta Ingenuity, the event is modelled after the fabled *Iron Chef* television series. Each participating teacher will be given a "secret ingredient" and some basic guidelines, and will come back with a science demonstration to delight and amaze the audience.

The two-hour show will take place during Science and Technology Week in October, offering the combined chemistry of ideas and entertainment, and putting outstanding educators in the spotlight.

What does it take to be an iron science teacher? It takes the things that every teacher possesses—nerves of steel, passion for ideas and a skill for improvisation.

Entry packages will be available on the Alberta Ingenuity website by mid-August and distributed to Alberta schools with the annual Science and Technology Week information kits. Visit www.albertaingenuity.ca for updates.

Science Camp for Teachers

Last summer, a teacher attening the Heritage Science Teacher Workshop at the University of Calgary exclaimed over lunch: "I'm having a great time at science camp!" Well, it wasn't quite science camp, but it was close.

The Alberta Heritage Foundation for Medical Research (AHFMR) is offering a variety of free three-day summer programs for high school science teachers. At the workshops, teachers conduct laboratory experiments, attend topical science presentations and tour research facilities at either the University of Calgary or the University of Alberta. The dates of the programs are August 14–16 at the University of Calgary, and July 17–19 or August 8–10 at the University of Alberta. Out-of-town participants who need accommodation will be provided with a room in university campus housing at no cost.

Applications for the Heritage Science Teacher Workshops will be available at the beginning of May. For more information about the workshops, visit the AHFMR website at www.ahfmr.ab.ca.

Science Connections in the Rockies: An Earth Science PD Workshop

Presented by the Burgess Shale Geoscience Foundation

Date: August 17–20, 2006
Location: Yoho National Park, British Columbia
Cost: $400 per person, including three nights accommodation, meals and lots of resource materials
Optional: Guided hikes to world-famous fossil sites
Contact: E-mail Lisa Holmstrom at lisa.holmstrom@burgess-shale.bc.ca

Graduates say:

- The best mini-science conference I have attended in six years!
- Everything was very well organized.
- It exceeded my expectations! I received fantastic resource materials to make my lessons more interesting and fun!
- I have a much more holistic picture of earth science, and this will allow me connect all of the topics in my curriculum.
- The location and setting were astounding!
- This was the best use of four days I've seen in a long time!

Don't be disappointed—register early. For more information, visit www.burgess-shale.bc.ca.

Science Connections in the Rockies is run with support from the following sponsors: EdGeo, Suncor Energy Foundation and the Canadian Society of Petroleum Geologists (CSPG) Educational Trust Fund.

A Computer Simulation Game to Teach Sustainable Development

A new, Internet-based educational resource called Alberta Tomorrow is available for teaching Alberta students sustainable development concepts. The website www.albertatomorrow.ca is a simulator that allows students to explore the future consequences of land use options in Alberta.

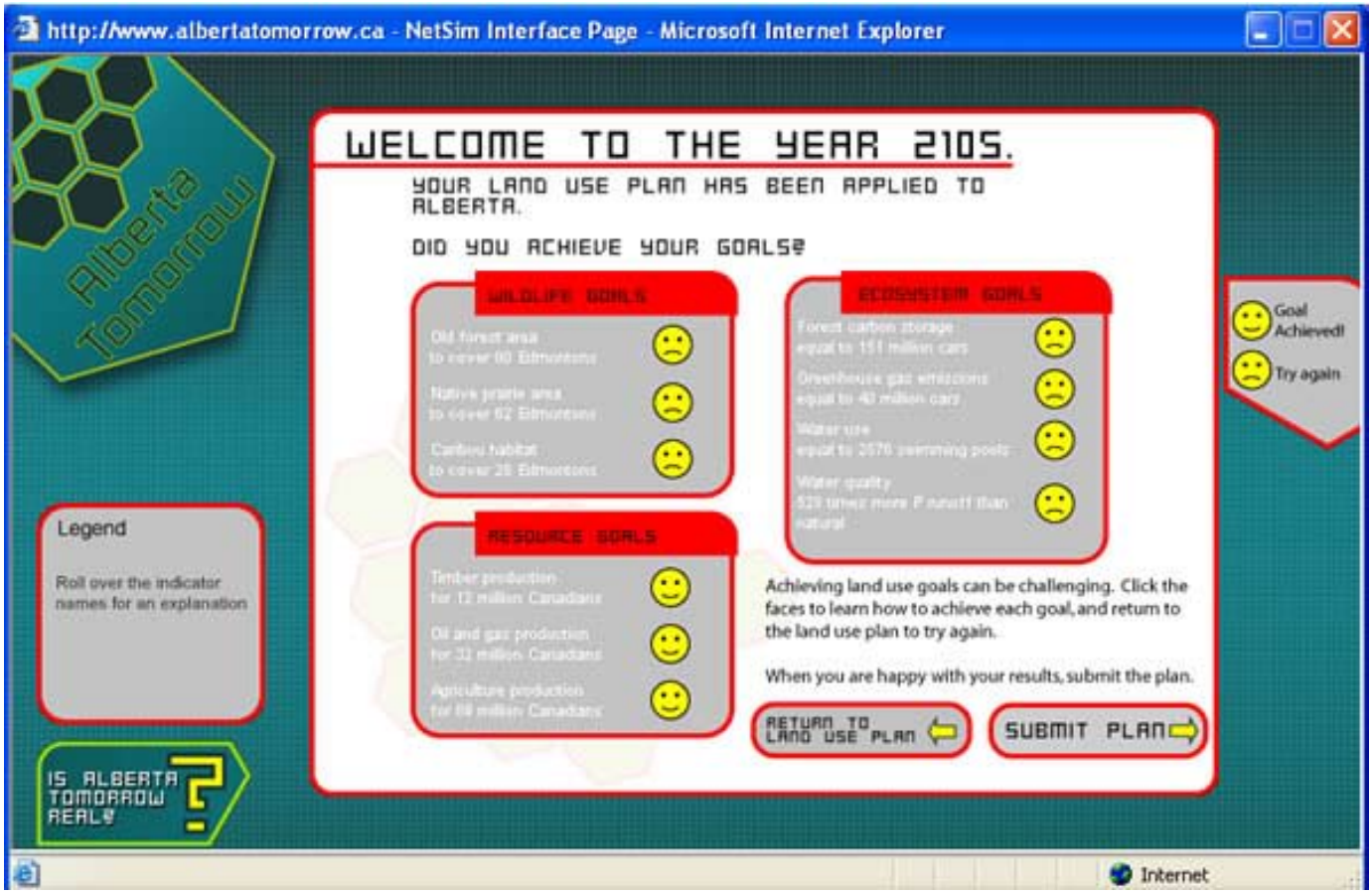
Sustainable development, a concept widely supported in Alberta and around the world, states that actions today should not harm the health of ecosystems for future generations. Achieving sustainable development requires that we understand the long-term consequences of our actions. With this information, we can plan development that is consistent with society's vision for Alberta's ecosystems and economy. This knowledge not only provides the foundation for wise resource-management decisions but can also foster stewardship by demonstrating the finiteness of Alberta's resources.

The future health of Alberta's ecosystems depends on providing students with the attitudes and skills necessary to achieve sustainable development. The importance of sustainable development education is recognized internationally through the United Nations Decade of Education for Sustainable Development (2005 to 2014) and in Alberta through numerous curriculum links to sustainable development concepts. According to the program of studies for Biology 20, for example, students are required to "demonstrate the interrelationships among science, technology and society by . . . evaluating the impact that human activity has had, or could have, on ecosystems." However, teaching the long-term effects of human activity to ecosystems is a formidable challenge. Large

temporal and spatial scales can make the relationships abstract, and the numerous variables that interact to determine the status of Alberta's ecosystems can make the relationships appear overwhelmingly complex. In addition, much of the relevant sustainable development information exists only in academic literature, which is not accessible to most teachers. What is needed are teaching resources that bring together key land-use concepts and deliver them to students in an engaging and meaningful way.

Alberta Tomorrow (www.albertatomorrow.ca) is a computer game designed to teach the long-term effects of natural resource management on the ecology and economy of Alberta. Students use Alberta Tomorrow to design strategies to manage oil and gas, forestry and agriculture development in Alberta. The computer game then forecasts the future effects of these strategies on timber production, oil and gas production, agricultural production, caribou habitat, old forest habitat, prairie habitat, water use, water quality, forest carbon storage and greenhouse gas emissions. Students use the game in an iterative fashion, improving resource management strategies as they go, to develop their own Alberta sustainable development strategy. Short background movies are also available to introduce students to key concepts. By allowing students to experience natural resource management challenges and long-term consequences, the game breathes life into sustainable development education. The game's experiential learning environment also promotes higher-order thinking skills, such as synthesis and evaluation, which are required to identify real-world sustainable development solutions.

Although land-use simulators are extensively used in natural resource management, they have not been widely used for education, likely due to their complexity, cost and technological requirements. Alberta Tomorrow is an adaptation of A Landscape Cumulative Effects Simulator (ALCES), an award-winning, professional land-use planning tool developed and extensively applied in Alberta and elsewhere. To make the tool applicable to junior and senior high school students, ALCES has been streamlined and linked to curriculum, and the interface has been modified so that management options and results are presented in an engaging manner.



The simulator is Internet-based and free so that it is widely available, and a variety of industry, conservation, government, research and education organizations guided its development to ensure that it would be accurate and unbiased.

Evaluating the future consequences of human actions to ecosystems is relevant to many parts of the Alberta curriculum. The curriculum links targeted by the project are the Grade 7 Science unit "Interactions and Ecosystems," the Grade 9 Social Studies unit "Economic Systems in Canada and the United States" and the Grade 11 Biology unit "The Biosphere." Teacher guides have been developed for these curriculum links to make it efficient for teachers to apply the land-use simulator in their classrooms. Teacher guides, student activity sheets and answer keys can be downloaded from www.albertatomorrow.ca/teachers/teacher1.htm. Examples of knowledge concepts that can be taught by Alberta Tomorrow include "investigating and describing relationships between humans and their environments, and identifying related issues and scientific questions" (Grade 7) and "predicting and hypothesizing the human influence in [biogeochemical] cycles" (Grade 11). Further explanation of curriculum links is available at www.albertatomorrow.ca/teachers/teacher1.htm. Although teacher guides are currently limited to the three classes listed above, other links to Alberta's curriculum are apparent, such as the Science 9 unit "Biological Diversity" and the Science 10 unit "Energy Flow in Global Systems."

Matthew Carlson

Reference

Alberta Education. 1995. *Biology 20 Program of Studies.* Curriculum Standards Branch, Edmonton: Alberta Education.

No-Cost PD for Alberta Teachers

Inside Education is a nonprofit, nongovernment education organization that offers Alberta educators no-cost, professional development (PD) opportunities. Designed for teachers by teachers, Inside Education's PD programs feature engaging, hands-on learning about the science, issues and range of values associated with our environment and our forest, water and energy resources.

The Inside Education PD experience has included aerial tours of the oil sands; visits to wind farms in Pincher Creek, coal mines in central Alberta and forest product mills throughout the province; water quality testing; and question-and-answer sessions with provincial ministers.

In addition to these exciting activities, teachers leave all of our professional development programs with the tools and knowledge they need to investigate these topics in the classroom. Participants workshop the ideas that have been presented, learn how to relate them to their teaching situation and take away curriculum-connected learning materials.

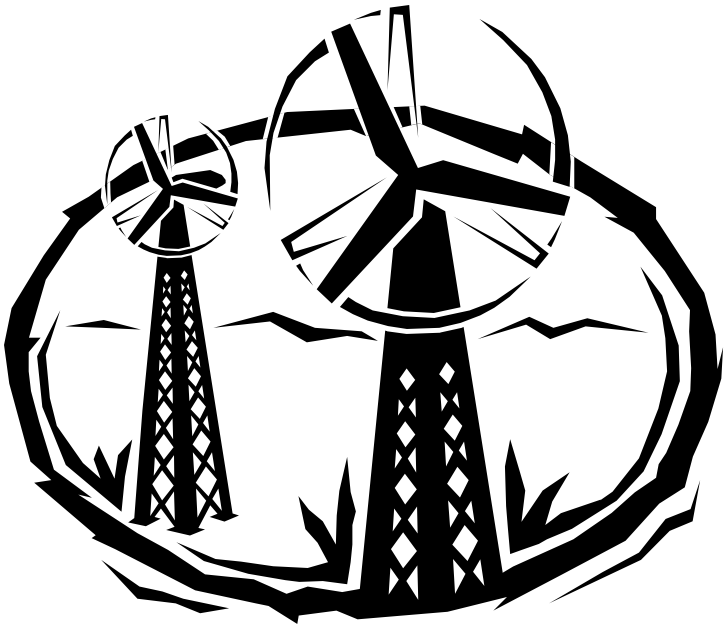
The following PD sessions were recently held:

- Electricity Education Tour
  April 28–30, 2006
  Edmonton
- Forest Education Tour
  May 5–7, 2006
  Lac La Biche
- Bow River Basin Education Tour
  May 26–28, 2006
  Kananaskis

Considering how many professional development opportunities are available, this has been the most comprehensive, useful and practical professional development program that I have been on. We had the information, practical application, and curriculum and classroom tie-ins. Thank you for an excellent time.

—Jayme Crawford, Okotoks

For more information, visit www.insideeducation.ca or call (780) 421-1497.



Biology 30: Meio-Socks!

Adapted from "Meio-Socks & Other Genetic Yarns" by Anthea M Stavroulakis, American Biology Teacher *67, no 4, April 2005. A copy of this resource can be found on the Science Council website, www.atasc.ab.ca, under "Resources."*

There are many different strategies and materials traditionally used to teach meiosis to biology students, including pipe cleaners and yarn, but how about paired socks? What a simple way to illustrate maternally and paternally derived homologous chromosomes, sex chromosome differentiation, telomere structure and chromosomal mutations and rearrangements.

Materials

This lesson requires unwanted pairs of socks (socks of various sizes and with coloured bands are best) and large binder clips. Determine the number of pairs needed (the diploid number), or have students bring in their own pairs. Make sure you have some extra identical pairs for demonstrations and a few single socks for procedure steps 7 to 9.

Procedure

1. A clumped pile of socks is used to illustrate the arrangement of chromosomes, such as during interphase. A single sock represents a homolog.
2. Draw the nuclear membrane on the socks (see Figure 1).
3. Students karyotype the pile of socks.
4. Arrange pairs of socks of various sizes in order according to the karyotype (see Figure 2).
5. Match socks with banding or unique patterns—band for band, or gene for gene.
6. Delineate alleles on unstriped socks at various regions using paper tags or adhesive, coloured dots.
7. Introduce a third sock of a pair to demonstrate trisomy.
8. Introduce one mismatched pair to represent the male sex chromosomes. Don't forget to inform students of the diploid number.
9. Other variations on this activity can include using unpaired socks to demonstrate deletions, or holes in the socks to show mutations.
10. Socks with frayed ends are great for showing the important role that telomeres have in maintaining chromosome integrity (see Figure 3).

Figure 1: Nuclear arrangement of chromosomes—A circular background representing the nuclear membrane and containing a ball of socks illustrates the arrangement of chromosomes, such as during interphase.

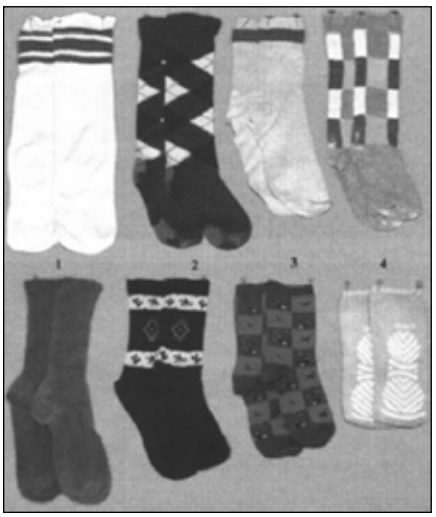


Figure 2: Karyotypes—Paired socks with or without designs show homologously paired chromosomes.

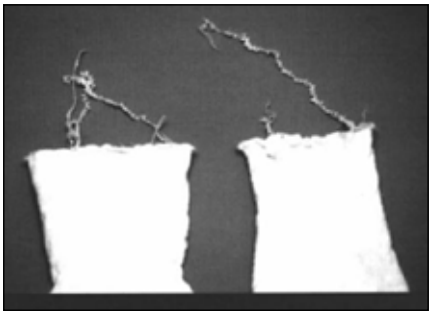


Figure 3: Telomere—Frayed sock ends illustrate the role of the telomere in maintaining chromosome end integrity.

Chromosome replication requires two identical pairs of socks. A single sock represents a chromosome prior to replication, and the duplicated chromosome (sister chromatid) is attached to the first by a large binder clip (see Figure 4). Demonstrate reductional and equational meiotic divisions using two identical pairs of socks. As a genetic extension, place alleles (labelled paper on pins) on the socks and allow the homologs to independently assort.

Choose two pairs of socks to represent one homologous pair (one pair being longer than the other), and demonstrate inversion by stapling or using Velcro strips to invert one sock on another (see Figure 5).

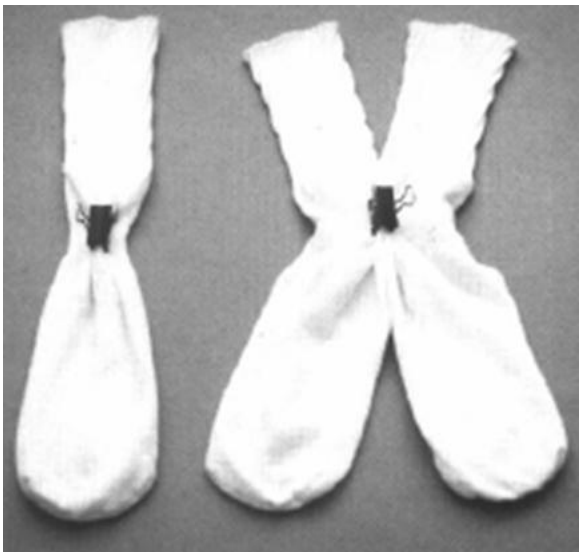


Figure 4: Chromosome replication—Athletic socks are useful for showing chromosome duplication. The binder clip shows the common centromere adjoining sister chromatids.

Figure 5: Inversions—Use a stapler or Velcro strips to illustrate inversions.

Astronomy Notes

Over the years of trying to be an amateur astronomer, I've purchased (or my family has purchased for me) many books and calendars to get a listing of astronomical events for the upcoming year. So many resources are easily available now on the Internet, and many astronomy websites have great guides, including Space.com (www.space.com) and its "What's Up Tonight" feature.

But I'm a rural guy with a dial-up connection, and I have to wait 15 minutes for my favourite webpage to load. This doesn't make the Internet a handy way of checking for updates on my way out the door into the darkness. However, I did find a wonderful resource while surfing the Internet—a free, entire-year summary. It took some time to download, but it is well worth it.

What's Up 2006: 365 Days of Skywatching is a 389-page book that is full of great hints and ideas. It is a professional publication that gives a hint for each day of the year. Did I mention it is free? Just drop by www.universetoday.com and check it out.

Derek Collins

Exploring Extremes and Diving the Depths with Science Alberta

From racing across Alberta's landscape to carousing with crazy cartoon characters, two new crates from the Science Alberta Foundation engage and enlighten students about science in their communities and across the province.

The Extreme Alberta Challenge and Team Aquatica tackle Grades 8 and 9 science concepts using unique storylines, interesting activities and engaging visuals that highlight core curriculum components. Inspired by the hit reality television series *The Amazing Race,* The Extreme Alberta Challenge gets students thinking about the environmental effect of a potential race through some of the province's sensitive parks and ecosystems.

"The Extreme Alberta Challenge will support learning by looking at such concepts as biological diversity in a way that challenges students to think about the impact and relationship humans have with their environment. It broadens awareness of some of the species at risk in Alberta and the role of protected areas," explains Donna Kipta, who worked with the Science Alberta Foundation to develop the crate. "Concepts dealing with genetics and genetic diversity are often more difficult concepts to understand and to teach. I hope that this crate will allow students to understand more about species at risk in Alberta in a challenging and fun scenario."

Focusing on the Grade 9 biological diversity unit in the Alberta program of studies, The Extreme Alberta Challenge is a fictional Alberta-wide, multisport race. Each activity showcases real-life examples of field research techniques, species at-risk in Alberta, and species and habitat management practices. Before the race can take place, students must determine if each leg of the race will negatively affect habitats or local species, then decide if the event should be cancelled, modified or continued as planned.

"The Extreme Alberta Challenge presents a real challenge in an exciting format," says Julie Guimond, Manager of Learning Projects for the Science Alberta Foundation. Guimond adds that some of the sites students will investigate include a cross-country ski race through the wintering range of the woodland caribou and a canoe race through a pink lady's slipper habitat. "Young people are familiar with the television show, they know the parks featured in the crate and they have an intriguing scenario tying the activities together. It places the science in a tangible context."

Team Aquatica: Fresh and Salt Water Systems also strives to place the Grade 8 Unit E in a tangible context by featuring seven exciting missions led by the wacky characters of the fictional Team Aquatica comic strip. Using the comics as a guide, students will embark on a number of water-based adventures explaining glaciology, tidal processes, the distribution and adaptations of aquatic species, continental drainage patterns and human influence on aquatic systems.

"Some aspects of this particular unit, such as the causes of tides and other oceanic or glacial concepts, are difficult for some Albertan students to understand," says science teacher and crate developer Cole Carlson. "Many students have never actually seen the ocean or a glacier, so providing them with some materials and information to help them understand and visualize these ideas is a good thing. It also lets kids know that their curriculum is connected to and based on actual science that is occurring throughout the world on a daily basis."

Team Aquatica missions include a diving expedition in search of evidence of a lake monster in Sylvan Lake, glacial ice core sampling to determine atmospheric trends, analyzing water samples for possible contamination and researching spring and neap tides to establish the most appropriate time of day for a surf kayak competition.

"Both the Extreme Alberta Challenge and Team Aquatica are a lot of fun and a great way to help students understand some of the more difficult curriculum units. Donna and Cole have done a fabulous job at integrating exciting concepts and mandatory learning," says Guimond.

To learn more about the Extreme Alberta Challenge or Team Aquatica: Fresh and Salt Water Systems, or to book these crates online, check out www.sciencealberta.org. You can book these crates free until June 30 by entering promo 24 in the gift certificate section of the booking system (quantities are limited and are available on a first-come, first-served basis while supplies last).

Heather C Hudak

A Science and Technology Website for All Seasons

The Science and Technology Week website can help students and teachers celebrate science and technology throughout the entire year. Teachers can visit the Science and Technology Week website at www.scitechweek.gov.ab.ca for ideas and activities related to the science curriculum. There are also video clips and biographies to inspire students to investigate careers in science and technology.

The *Alberta Innovation* videos showcase past winners of the Alberta Science and Technology (ASTech) Awards whose amazing discoveries and cutting-edge research are helping people not just in Alberta but all over the world. The website features curriculum links to the video segments so that the videos tie into what the students are learning in the classroom. They are a great way to show students the science and technology work happening in their own province.

The Science and Technology Week website includes an online calendar of science education and awareness events occurring throughout the province, and it is updated regularly. It is a good resource for field trip ideas. The website also has information on organizing a science Olympics or science fair, and has fun facts about science and technology in Alberta that can be shared with students. Alberta's Timeline of Innovation displays the history of innovation in the province.

The website also includes such games as Jeopardy, Molecule Master and Magical Math, which test students' science and math skills. If students are wondering what they want to do as a career, they may enjoy some of the fascinating profiles of Albertans working in science- and technology-related jobs.

For more information on how to celebrate science and technology year-round, visit www.scitechweek.gov.ab.ca, call (780) 427-4498 or e-mail is.inq@gov.ab.ca.

Discover Your Potential: Science and Technology Week 2006

With Science and Technology Week a mere four months away, Alberta Innovation and Science is busy revamping resources to better meet your classroom needs, based on your comments in our 2005 survey.

This year's theme is "Discover Your Potential: Careers in Science and Technology." What classes should students be taking to make it in the science and technology field? What are the challenges and rewards of the science and technology field? By looking at this field of study from a financial, social and individual point of view, we can prepare students for a successful career in science and position the province as a leader in science education. This year's Science and Technology Week activities will link students with like-minded professionals in the field, helping plot their academic course in support of career goals.

Last year, students and teachers asked that greater emphasis be placed on electronic tools, and as a result, the Science and Technology Week website (www.scitechweek.gov.ab.ca) is our main focus. We're shifting to curriculum-related electronic tools, including Internet features, under the direction of professionals in a variety of science and technology careers, as well as a personalized calendar to be downloaded and printed.

Every teacher knows it's never too early to lay the groundwork for building career goals. By bookmarking the Science and Technology Week website, you'll have easy access to many opportunities for students to discover their own potential in science and technology, and possibly discover their career, too.

As you know, science doesn't always happen in a lab. In addition to some fantastic online resources provided by the Science Alberta Foundation, the wildly popular Science in a Crate program is available for your use and is appropriate for every grade. Links to this and other classroom resources can be found on the Science and Technology Week website at www.scitechweek.gov.ab.ca.

Teachers of all disciplines have something in common with the science-minded, namely, the need to ask questions. We innovate by reflecting on what we learn and remaining open to change. Innovation is Alberta's key to prosperity, and, by extension, so are our students. Join us in introducing students to careers in science and technology. It's about creativity and exploration, and possibly even about changing the world or some aspect of it.

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