Introducing FOSS Diversity of Life Course for Middle School

Every nook and cranny of the Earth’s surface, from ocean depths to glaciers on mountain peaks, is occupied by living organisms. We usually know “life” when we see it, but what is it really? What criteria define something to be “living”? In what forms does life express itself? How does life sustain itself?

These are only a few of the questions addressed in the FOSS Diversity of Life Course for middle school. This course uses personal experience and inquiry as the starting point of investigations and employs strategies of collaboration and discourse to help students turn data and information into understanding.

Students wrestle with the concept of “living” at the start of the course. What is the miraculous set of characteristics that constitutes life? For many middle-school students, movement is the primary criterion for defining “living.” (“I don’t think a tree is alive. It doesn’t move unless the wind blows it.”) They discuss and begin to carefully identify the handful of essential characteristics of all living things.

The microscope is introduced as a scientific tool that enables more detailed observations. The virtual microscope on the CD-ROM helps students learn how to estimate the size of an object and to understand the concept of focal plane while viewing specimens.

Students examine Elodea to “discover” cells. They confront the questions: Are all living things made up of cells? Could tiny pond water organisms be living? What is your evidence? Do they fulfill all the criteria that we have decided all living things must possess? Are they made up of cells? Students observe paramecia feeding and watch as the food is digested and waste is excreted.

Continued on page 2
With the CD-ROM, students learn about the increasing complexity of life as one moves from atoms to prokaryotic cells and eukaryotic cells to complex organisms with tissues, organs, and systems. Through animations and QuickTime movies, the CD-ROM helps students organize information they have learned in previous investigations. They learn that all life is aquatic at the cellular level. They also examine how various body systems provide life-sustaining processes for cells in multicellular organisms.

By dissecting seeds and sprouting seeds in sprouting chambers and in soil, students recognize that seeds are living organisms in a dormant state. They compare the development of monocot and dicot seeds, investigate the effect of light on germinated seeds, and investigate the function of roots and root cells. Students begin to realize that life expresses itself in a wide variety of ways, but all organisms use the same basic life structures and processes.

If the purpose of roots is to take up water for the plant, what would happen if we cut the roots off and just stuck the stem/stalk in water? Students design a controlled experiment to solve the mystery of the missing water in a vial containing a celery stalk. They examine leaves from a variety of plants under various conditions, discover stomata, and make inferences about their function. They capture water from the leaves of trees and shrubs to discover that water is lost from leaves through the stomata.

Almost all middle-school students think plants have flowers so that they will look pretty in people's yards. After a flower dissection, they begin to understand the role of the flower as an adaptation that improves the chances of the plant's survival. During the dissection the students compare two different types of flowers. How are they different? What is it about flowers that attracts pollinators? Do different colors, smells, shapes, or patterns attract different pollinators? The students have an opportunity to apply what they learn in the “Pollinator Game” on the CD-ROM.

Students observe and analyze the structures and behaviors of snails. They are challenged to conduct experiments to determine the habitat preferences of a snail. After sharing their results, students build an “ideal” habitat for the snails.

After spending time exploring and observing the habits and behaviors of Madagascar hissing roaches, students generate numerous questions and conduct experiments to learn more about these unusual animals. Using the results of their findings and the premise that “every structure and behavior has survival value in the organisms’ habitat,” the students are challenged to infer what the native habitat of these animals must be like.
Students investigate the Monera and Fungi kingdoms and explore their role in the scheme of life. They grow and observe microbes on Petri dishes and bread slices, explore the concept of exponential growth, and become intimately acquainted with microorganisms. They explore the Itsy Bitsy Thingy Locator (IBTL) on the CD-ROM to explore a virtual house for microscopic organisms.

While interacting with numerous organisms to discover the myriad ways they carry out activities common to all life, students develop a respect and appreciation for all forms of life. They develop skills and apply science concepts needed to make evidence-based decisions, solve problems, and independently interpret the world around them.

The FOSS Diversity of Life Course is now available from Delta Education. For more information contact Delta Education at 1-800-258-1302 or check out the website http://www.delta-education.com/teachers/middle/fossmodules.html.

Calling all Mathematics and Science Curriculum Leaders!

Presidential Awards for Excellence in Mathematics and Science Teaching

Applications are being solicited for the Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST). This prestigious award is open to outstanding public and private school teachers with a minimum of five years experience.

The PAEMST is the nation’s highest honor for mathematics and science teachers in grades kindergarten through 12. Each award consists of a $7,500 grant from the National Science Foundation. Awardees also receive an expense-paid trip to Washington, D.C., and a Presidential Citation. Since 1983, more than 3,000 teachers have been selected as Presidential Awardees. The Awardees represent a premier group of science and mathematics teacher leaders who bring national and state standards to life in their classrooms.

If you know any outstanding science or mathematics teachers in your county or district who meet the above qualifications, encourage them to visit the website at http://www.ehr.nsf.gov/pres_awards/program.htm.

The deadline for submitting the application is April 1, 2002. Twelve finalists from each state will be selected in May 2002, and their names will go to the National Selection Committee. The National Science Foundation will announce the 2002 Awardees in February 2003. The Presidential Awards ceremony will be held in Washington, D.C., in March 2003.

Candidates for Presidential Award recognition must nominate themselves and complete a fairly extensive application process. It may be too late to complete the process for the 2002 awards, but if you are interested, visit the website and start planning your application for 2003.
Come and explore the science units that your child is learning in the classroom!

This was the announcement for the FOSS Family Science Night at Lazear Elementary School in Oakland, California. The Bay Area Science Project supported a group of teachers to organize and present the event. Approximately 50 parents and students attended the Family Science Night. Ninety-eight percent of the students at Lazear are Spanish-speaking.

Seven investigations from the following modules were presented: Paper; New Plants; Solids and Liquids; Insects; Balance and Motion; Pebbles, Sand and Silt; and Magnetism and Electricity.

Several families joined together in one workshop for approximately 40 minutes, then took a break and attended a second session. The parents, grandparents, and students eagerly delved into the world of scientific exploration through the FOSS modules. What a remarkable sight to witness parents and children together immersed in inquiry learning. The evening was such a success that teachers ended the evening with plans for another FOSS Family Science Night at their school.

Joanna Totino
FOSS Professional Development Specialist and
Bay Area Science Project Manager
A Fair-nomenal Success!

The 1st Lazear Elementary Autumnal Science Fair in Oakland, California, was an outstanding success! All classrooms and staff at all grade levels participated enthusiastically in scientific inquiry with exemplary presentations.

The science fair took place over a two-day period during which participants from each classroom presented a hands-on investigation from their grade level. The investigations were science activities already being explored in the classroom. The presentations were given multiple times during the fair. Each classroom visited the other classrooms to hear and, in some cases, participate in the exhibitions. The activities covered inquiry topics from worms to plant growth, from water pressure to measurement of water, and from solids, liquids, and gases to patterns in nature. Most of the activities were drawn from the FOSS kits.

Students of all ages were excited to continue exploring and studying science at home and at school, as well as during and after the fair. Younger students wanted to learn about upper-grade activities, and vice versa.

Our goal was to engage and inspire all students and staff in scientific exploration early in the year. Our hope is to prepare and inspire our community for the (District) Spring Science Fair and continue scientific exploration. The children are excited, which in turn engages their families in the explorations. Their zeal continues to advance their methodical and scientific exploration as they move through the school year.

Jamie Zwick, 1st-grade teacher
Catherine Strohecker, 4th-grade teacher
Lazear Elementary
Oakland Unified School District
Oakland, California

Dr. Lawrence Lowery
2002 Champion for Science

Dr. Lawrence Lowery was inducted into the Texas Science Hall of Fame and named the 2002 Champion for Science at the Texas Science Summit held January 21–22 in San Antonio, Texas. Dr. Lowery is a professor emeritus at the University of California at Berkeley. He remains active as the Principle Investigator for the Full Option Science System (FOSS).

Dr. Lowery is the author of more than 50 articles and 31 books. His works include books published by the National Science Teachers Association and the Association for Supervision and Curriculum Development and a supplement to the National Science Education Standards, published by the National Research Council.

His many accolades include the President’s Quality Gold Award from Sandia Laboratories for the Distinguished Program in Science Education (LASER), the Distinguished Career in Science Award from the NSTA, the Outstanding Science Educator Award from the Association for the Education of Teachers of Science, and the Outstanding Teacher Education Program for Elementary Science award from the California State Department of Education.

Dr. Lowery serves on a number of editorial and advisory boards, including the California Assessment Program, the Compton’s Encyclopedia Board of Directors, the IntelliCorp Host Board, and the advisory board for Mindscape. He is also codirector of the Hughes Aircraft Galaxy Classroom.
Living with Critters in Your Classroom

By Teri Dannenberg and Terry Shaw, FOSS Developers

Several FOSS modules require living organisms for students to study and experience—everything from radish sprouts and ryegrass to crayfish and cockroaches. The new middle-school Diversity of Life Course, would not be complete without living organisms. They are an integral part of the learning environment, but by their very nature require more attention than the nonliving components.

Before the Critters Arrive

Prior to beginning a course that uses living organisms, you need to be prepared for their arrival. Ask yourself several questions:

- Where will I keep them?
- How much space do they require?
- What kind of container do they need?
- How much light do they need?
- What temperature is best?
- What do they eat?

Most of these questions are covered in the materials or the getting ready sections of the Diversity of Life teacher guide.

Here are a few things to keep in mind when ordering:

- Most biological supply companies do not ship on Thursday or Friday to make sure that the organisms do not arrive on the weekend.
- Plan to receive the organisms about a week before you need them in class.
- There are usually a few fatalities after the stress of shipping. You don’t want a student’s discovery of a dead critter to be his or her first experience with a new organism. If you live in an area of extreme hot or cold temperatures, consider this when determining the shipping method. Consider this actual experience: a shipment of crayfish arrived on a hot Texas Saturday and sat in the mail truck until Monday.
The mailman wasn’t happy, neither was the teacher. The overnight shipping fees may be worth the extra cost if they save you the frustration of having to reorder.

**What should I do with this roach motel now?**

A student’s first reaction to an insect or snail may be that they are dirty and covered with germs. This is an excellent time to discuss the difference between an organism that is found in the wild and one that is raised in captivity. The organisms that have been selected for the FOSS modules and courses are carefully chosen from reputable suppliers to prevent exposure to any potentially harmful diseases. Even so, it is a good idea to have students wash their hands after handling any organisms.

Living organisms increase the interest and enrich the experience of science for students, but a dilemma usually comes up at the end of the course, “What do I do with them now?” It is easy for us to just stop watering a plant. The soil and dead plant can be easily added to the garden or compost. But animals pose a much bigger problem. While plants and animals are all living organisms, we have a closer kinship with the animals, even the buggy sort.

Some organisms are easy to get rid of. You can usually find a student and parent willing to adopt a goldfish or guppy. You can usually be comfortable with the thought that your fish will live out their days in a glass bowl.

Insects and snails are different. After a time in your classroom, you and your students will probably begin to see these organisms as gentle and interesting to have around. But not many parents will welcome a box of creepy-crawly friends into their living room. Madagascar hissing cockroaches usually evoke an initial negative response from everyone. Some organisms, such as land snails, are also considered agricultural pests. Finding a safe and humane way to dispose of these animals is important.

Be very hesitant about giving insects to students as pets, unless you have personally talked to the parents and they are fully aware of the care and feeding of these organisms. Parents must understand how to dispose of them. The animals were not born in the wild so they should never be set free in the wild. In most areas there are severe restrictions for releasing any insect, native or not. Madagascar hissing cockroaches are certainly not native. Under no circumstances should you release them to the environment.

Have a plan for how you will get rid of organisms before you receive them so that you don’t need to make a spur-of-the-moment decision. Contact the biology departments of local universities, community colleges, and high schools. Pet stores, especially those that specialize in snakes and lizards, may be interested in hissing cockroaches. If you have a local biological supply company in your state they may be willing to take them. Don’t expect to be able to sell the organisms to them—they are usually just willing to take any extras off your hands. An ideal situation would be to locate a teacher in your district or area willing to maintain the organisms and share them with everyone.

If you absolutely have to get rid of them, the most painless way to euthanize them is by placing them in a closed container and putting it in the freezer for a
couple of days. Then dispose of them in the garbage.

**Frequently Asked Questions About FOSS Organisms**

**Land Snails**

• **What if they escape?**

Land snails are easy to take care of and deceptively fast. Never leave the container open or you will be finding snails in very unexpected places. If they do escape, look under shelves and behind books. They like dark places.

• **What should I do with them over student holidays?**

They don’t need to be fed and watered over holidays. If their habitat dries up, they will simply estivate until you return. Don’t leave any wet food in the container that may spoil.

With a few sprays of water when you return, the snails return to their old selves. When they wake up they are very hungry; so make sure you feed them unless students will be observing their eating habits. Then it is better for them to be a bit hungry.

• **Will they breed?**

Land snails will breed in captivity. Cover the bottom of their container with at least three centimeters of moist potting soil. Look through the bottom of the container for clusters of small, white, BB-sized eggs. The hatchlings are tiny versions of adult snails. They can escape through the holes in the lid of a six-liter container. Cover the inside lid with nylon mesh and tape in place. This will keep the babies inside.

• **Should I keep the males and females apart?**

You can’t. Snails are hermaphrodites, so it just takes two, any two. If you happen to see a love dart protruding from the neck of one of your snails, that is a sure sign they have mated.

• **Why does the shell feel soft and fragile?**

If the shells begin to get thin and fragile, it is very easy to damage them. This is a sign that the snails are not getting enough calcium. In the wild they graze on high-calcium sources, such as limestone, cement, and dirt. To add some calcium to their diet, place a few pieces of chalk or some antacid tablets in the container. Fruit-flavored antacid tablets yield some surprising results upon egestion.

• **What do I do if they won’t ship snails to my state?**

Snails are an agricultural pest and strictly regulated in some states. Some companies cannot ship snails across state lines. Look for a biological supply company within your state or plan on collecting snails from the garden. The USDA will issue permits to use snails for educational purposes, but this can be a long process. If this is the way you have to go, start the process early. The permits can be found at [http://www.aphis.usda.gov/ppq/permits/snails_slugs.htm](http://www.aphis.usda.gov/ppq/permits/snails_slugs.htm).

**Madagascar Hissing Cockroaches**

• **Do they bite?**

They have chewing mouthparts, but they are so small that they do not pose a danger to human fingers.

• **What about allergies?**

Cockroaches do not seem to be allergic to anything. Seriously, one of the reasons we chose them is that they do not seem to cause allergic reactions, carry parasites or diseases, or bite.

While we have not found any reference to allergies associated with hissing cockroaches, some people may be allergic to molds that form in damp substrates. It is important to keep the water dish positioned so that water does not wick out into the substrate. More frequent changing of the substrate will also keep allergens in check.

• **What should I do with the eggs if any appear?**

The females carry the egg case inside their abdomens. You won’t see them, except for a short time when the egg case is forming, and you see it protruding from her abdomen. It is then drawn back into
a special cavity where the eggs mature for about 60 days. The nymphs emerge in what appears to be a live birth. Keep a little peat moss in the bottom of the tank and have something for the nymphs to crawl under or into, such as a paper towel tube.

**Should I keep the males and females separate?**

It is not necessary to keep them separate unless you absolutely do not want them to breed. However, the females may be carrying egg cases when you receive them. They are not aggressive and a mix of sexes and ages can be kept in the same container.

**How long do they live?**

Madagascar hissing cockroaches live about two years. But a healthy breeding community can be kept indefinitely.

**What should I do if my school doesn’t allow us to have them in the building?**

There is an almost universal aversion at the mention of cockroaches. Visions of herds of huge cockroaches scurrying across the floor in the night come to mind. But remember these are not the same species as the common household or German cockroach. If you encounter resistance from administrators or other teachers, you may want to direct them to some of the websites listed at the end of this article. Assure them that the cockroaches will be secure and unable to escape. You may have to go the extra mile and over-secure them. Smear a wide line of petroleum jelly around the inside, top edge of the container. They can’t stick to this. Keep the container covered with a screen or glass lid. The larger the aquarium, the less likely they are able to crawl out.

Hissing roaches are much slower moving and not nearly as prolific as other insects. They are not a health threat. If the name “roach” has bad connotations, call them something else. Some pet stores sell them as Madagascar hissing “beetles.” They aren’t beetles, but mothers would probably be more likely to let their children buy a beetle than a roach. It’s all in the marketing.

**What should I do if they escape?**

Catch them. They are not nearly as fast as common German cockroaches and since they lack wings they are not going to fly away. Look under things for them. Use a piece of banana for bait and have something (e.g., an egg carton or paper towel tube) for them to hide under or inside near the bait.

The best way to prevent escapees is to coat the inside top edge of the aquarium with petroleum jelly. A nice goopy border about six centimeters wide will keep adults and nymphs from climbing out. They will squeeze through any crack and climb glass or plastic, but they will not cross Vaseline.

(From Teri: I have to admit, I was hesitant to work with them. They reminded me of large, flying Palmetto bugs I once saw in Texas. But after a time of watching them in my office and observing students warm up to them, I did see that they are actually fascinating creatures. Don’t expect them to be received with the same open, loving arms that a cute, fuzzy bunny might get, but acceptance can be gained.)

**Can I feed them to my lizard?**

Yes, but the exoskeleton of the adults is pretty tough. Your lizard would probably like the smaller ones better, especially just after they have molted. They are almost white for a day or so after they molt. During that time the exoskeleton is fairly soft and easier for lizards to digest.

Many people raise these cockroaches to feed to insect-eating lizards. One advantage is their ease in reproduction and the absence of offensive smells from their feces. They are not cannibalistic, so it is safe to keep the nymphs with the adults in the same container. In fact they seem to prefer crowded conditions. Like all roaches, they like to be in contact with as many surfaces as possible.

(From Teri: In the three years Terry Shaw had them in his classroom, there were only two escapes. Both happened when a student thought it would be a neat idea to take them to another class and cause a commotion. To prevent this from happening in your classroom, keep them in a place in the room that you can supervise or that the students can’t easily access.)
Living with Critters continued

• How do I humanely get rid of them?
  Place the cockroaches in a container, and put the container in the freezer for a couple of days. After the cockroaches freeze, you can throw them in the garbage or use them for dissection. Madagascar hissing cockroaches are much larger than preserved grasshoppers, and internal structures are much easier to see on frozen specimens than on preserved ones. However, if you use them for more than one day, you will need to keep them refrigerated between classes so they don’t spoil.

• If I do get them, how long will I have to keep them in the classroom for the lesson?
  The activities that use the roaches take about five or six class periods. Several teachers can share the same set of cockroaches. They only need to be in each classroom that length of time. It helps for them to be visible in the classroom while the students are studying them so that they can see their behavior during the non-stressful times when they are not being handled. 🕷

Resources

Websites:

• Madagascar Hissing Cockroaches
  
  Madagascan Hissing Cockroach Care Sheet
  http://www.a1reptiles.com/a1mhrcare.html

  University of Kentucky Entomology/Madagascar Hissing Cockroach Site
  http://www.uky.edu/Agriculture/Entomology/entfacts/misc/ef014.htm

• Snails
  
  Raising Snails/U.S. Department of Agriculture
  http://www.nal.usda.gov/afsic/AFSIC_pubs/srb96-05.htm#Introduction

  All About Snails
  http://www.kiddyhouse.com/Snails/snail.html

• Milkweed Bugs
  
  Milkweed Bug Information/Center for Insect Science Education Outreach at The University of Arizona
  http://insected.arizona.edu/milkinfo.htm

  Amazing Insects (click on Milkweed Bugs)
  http://www.ivyhall.district96.k12.il.us/4th/kkhp/1insects/milkweed.html

• General
  
  Using Live Insects in Elementary Classrooms for Early Lessons in Life/Information Sheets
  http://insected.arizona.edu/info.htm

Books:

In the News

Ideas that Gel
Jet Propulsion Laboratory
Pasadena, California
February 11, 2002
NASA Press Release

The most obvious ideas are not always clear. Take aerogel for instance, a transparent, smoky blue substance that's been especially manufactured to bring home a piece of a comet, among other things.

This exotic substance, commonly referred to as “frozen smoke” for its hazy appearance, has many unusual properties and can withstand extreme temperatures. Its versatility was obscured until it got into the hands of some NASA researchers. They saw through the haze and realized the possibilities. The result was the development of a novel use of aerogel for space exploration.

Aerogel is the world’s lightest solid. It is a silicon-based solid with a porous, sponge-like structure in which 99.8% of the volume is empty space. Aerogel is 1,000 times less dense than glass, another silicon-based solid. A Stanford University researcher discovered aerogel in the 1930s. NASA’s Jet Propulsion Laboratory in Pasadena, California, altered the original recipe to come up with a way to use aerogel for space exploration. This particular aerogel approaches the density of air, but it is durable and easily survives launch and space environments. JPL used aerogel to insulate the electronics box on the Mars Pathfinder Sojourner rover, which explored the red planet in 1997.

The Stardust mission, currently on its way to comet Wild, will use aerogel to encapsulate interstellar and comet dust particles and bring samples home in 2006. When Stardust encounters the comet, the particles will be traveling up to six times the speed of a rifle bullet. To collect these delicate particles, each smaller than a grain of sand, aerogel will gradually slow them to a stop without damaging them or altering their shape and chemical composition.

Researchers at JPL are working to improve on the properties and performance of aerogel. By making aerogel more versatile, it might become competitive as a commercial material. Until then, researchers keep looking to the sky, anxiously awaiting the return of the smoky blue substance, which will bring home a souvenir from space.

If you are using the Planetary Science Course, you might ask your students to download and read the complete aerogel story (http://www.jpl.nasa.gov/technology/features/aerogel.html) and discuss how aerogel will work to capture comet particles and what scientists might learn after the samples are returned to Earth. Encourage them to do more research about the Stardust mission and report their findings to the rest of the class.

FOSS Kindergarten Revision

The FOSS staff is in the final stages of revising the kindergarten modules. In addition to making the improvements recommended by teachers over the years, we made two major changes to the kindergarten program. We now have a FOSS Science Stories book written to enhance the content of each module. The books will be available in big book and student book formats. The second change is the organization of the physical science strand. Two modules have been combined into one. The Wood Module and the Paper Module have been integrated to produce the Wood and Paper Module.

FOSS kindergarten now has two modules for life science and two modules for physical science: Animals Two By Two, Trees, Wood and Paper, and Fabric. The revised modules and the new FOSS Science Stories will be available in the fall and featured in the fall FOSS Newsletter.

Middle School Course Development

The FOSS Weather and Water Course for middle school is now in preparation for commercial distribution by year end. The course starts with a survey of the atmosphere—the scene of the action—and progresses through investigations of the specific physical factors that determine and drive the weather. It focuses on physical and earth science concepts that conspire and interrelate to produce weather of many different kinds. Concepts include energy source and transfer (Sun, radiation, absorption, conduction, convection), kinetic energy, heat, temperature, density, humidity, evaporation, and condensation. The importance of weather as a mechanism for redistributing water around the planet is incorporated into the course of study.

The FOSS Populations and Ecosystems Course for middle school is slated for commercial preparation when the weather clears. The field test data are in the churning process. The revision work will start this summer and extend into the fall. The status of the course and a projected release date will be announced in the Fall 2002 issue of the FOSS Newsletter.

The middle school staff is teetering on the threshold of classroom development for the Force and Motion Course. This spring and next fall three to five staff members will spend an hour each day in an adopted classroom grappling with the force. The path we will follow through the fundamentals of Newtonian physics is, as usual at this stage of development, uncertain. Students will be our guides. More on this adventure later.
This issue’s Wordsmiths contributions include selections discovered by FOSS developers and consultants while developing new courses and when working with teachers and students during FOSS implementations. If you have a book you’d like to recommend to other FOSS users, please send the book’s title, other vital statistics, and annotation to Sue Jagoda, either at the LHS address on the back of this newsletter or via e-mail at skjagoda@uclink4.berkeley.edu. For more reading resources, check the resources section of your FOSS teacher guide or log on to http://www.fossweb.com. An online searchable database is available at http://www.lhs.berkeley.edu/FOSS/FOSS.html.

**The Handy Bug Answer Book**

Not just bugs, this book answers all those questions that students have about insects. Every question you can imagine and a few you didn’t. Questions are answered with short, concise responses that lead you into reading more and more questions. This book is hard for students and adults to put down. (Insects, Environments, Diversity of Life)

**The Map That Changed the World: William Smith and the Birth of Modern Geology**

You and your students heard about William “Strata” Smith in the FOSS Earth History Course. This book provides all of the details we couldn’t tell you. Although his life was somewhat less than easy, William Smith did create the first recognized geologic map—a map depicting the “underworld” titled “A Delineation of the Strata England and Wales.” This is a good book for the history student who is interested in geology. It has a “happy ending” as “the villains are foiled, [the] hero restored, and science triumphs.” (Earth History)

**They Don’t Have To Die: Home and Classroom Care for Small Animals**

This book is a must for teachers who keep small animals in their classroom. You’ll find complete instructions for the care and feeding of all those wonderful classroom pets from insects to small mammals. There is a section on inexpensive solutions for cages and containers. The book also deals with the safe and humane disposal of most animals, too. (Life Science Strand)

**Look What I Did with a Leaf**

Explains how to use leaves to create pictures of animal. Includes instructions and illustrations of the final products. (Trees)
Ten Apples Up On Top!
This book has been helping young students learn to count and read simultaneously for over 40 years. Simple illustrations and rhymes tell the story of an apple-balancing competition between a dog, a tiger, and a lion. (Balance and Motion)

A Dinosaur Named Sue: The Story of the Colossal Fossil: The World’s Most Complete T. rex
The story of Sue, the Tyrannosaurus rex, from its discovery in South Dakota to its installation in Chicago’s Field Museum. It contains behind-the-scenes details about Sue’s preparation and installation. Also included in a question-and-answer chapter is information about life in the Cretaceous period. (Human Body, Earth History)

Microalians: Dazzling Journeys with an Electron Microscope
Dennis Kunkel is an electron microscopist, and his images are the basis for this book. It includes an electron-eye’s view of insects, pollen, algae, dust, and even humans (skin, taste buds, etc.), as well as a discussion of the botany, biology, and ecology. (Diversity of Life, Environments)

Snail Girl Brings Water: A Navajo Story
This book is a Navajo creation story about bringing water to the desert and how snails got their shells. (Animals Two by Two, Diversity of Life)

Each Living Thing
Celebrates the creatures of the Earth, from spiders dangling in their webs to owls hooting and hunting out of sight. The theme of the book is that we respect and care for these creatures. (Animals Two by Two)

Urban Fox Family
This video follows the daily lives of a family of red foxes living in the urban environment of Fort Collins, Colorado. Students will enjoy the adventures of the foxes as they co-exist within a busy human environment. You see the mother fox capturing prey and returning home to feed her catch (squirrel, duck, and snake) to her family. You observe the kit foxes romping and playing with each other and with their mother. You hear the natural sounds of the kit foxes fighting for food, the mother fox’s bark warning a large dog to leave the area, and a crow’s caw as it dives at the fox to defend its nest. This video enhances topics in several of the FOSS Life Science Strand modules and courses.
For more information about the video and a teacher’s guide, contact Jo Ella Turner, 855 Sandy Cove Lane, Fort Collins, CO 80535. Her phone number is 970.223.9541.

Video Review
This issue’s list of fascinating websites includes a number that focus on the life sciences and range from kindergarten to middle school. If you or your students have encountered any websites you’d like the FOSS staff to know about, send the URL and an annotation to Sue Jagoda at skjagoda@uclink4.berkeley.edu. Look for more online resources at http://www.fossweb.com.

**Amazing Insects**
http://www.ivyhall.district96.k12.il.us/4th/kkhp/1insects/bugmenu.html

Photos, drawings, and other information for a number of the insects used in FOSS Life Science modules and courses are included in this website created by students in Mr. Koday’s technology class at Ivy Hall School in Buffalo Lake, Illinois. (Life Science Strand)

**Isopods of Southern Australia**

A gallery of photos and information on the strange and fascinating isopods of Australia! (Environments, Animals Two by Two)

**Enchanted Learning**
http://www.enchantedlearning.com

This site has information, classroom activities, and, most importantly for FOSS teachers, outlines of animals with blanks for students to label the structures (along with prefilled-in copies). Includes ant, butterflies, snail, beetle, bee, fish, and tree. (Animals Two by Two, Structures of Life, Trees, Insects)

**Kids Astronomy**
http://www.kidsastronomy.com/

This award-winning website includes a variety of resources, links, activities, and games related to the Solar System and astronomy. (Planetary Science)

**Neuroscience for Kids**
http://faculty.washington.edu/chudler/neurok.html

Neuroscience for Kids has been created for all students and teachers who would like to learn more about the nervous system. Enjoy the activities and experiments on your way to learning more about the brain and spinal cord. (Human Brain and Senses)
Powers of Ten
http://cern.web.cern.ch/CERN/Microcosm/P10/english/welcome.html
This interactive site from the Microcosm museum is based on the popular ‘Powers of Ten’ video and takes you into the hidden corners of the universe. Microcosm is located at the world’s largest particle physics laboratory, CERN, in Geneva, Switzerland. (Earth History, Planetary Science, Diversity of Life)

Singing Hawaiian Tree Snail Origami (Pupu Kani Oe)
http://www.tammyyee.com/origamipupu.html
This Hawaiian site has information about the Hawaiian singing tree snail and a printout with directions for making an origami Hawaiian singing snail. (Animals Two by Two, Paper, Structures of Life)

Using Live Insects in Elementary Classrooms For Early Lessons in Life/Information Sheets
http://insected.arizona.edu/info.htm
The Center for Insect Science Education Outreach at the University of Arizona has put together these information sheets and lesson plans to provide helpful facts about several insects and other organisms used in the FOSS program. Each insect’s information sheet includes a section on identifying features, natural history, impacts on the ecosystem, and tips on collecting. Images of the insects in their different life stages are also included.

Current Events in San Diego
A One-Week FOSS Electronics Course Workshop
June 23–28, 2002

The electron is that tiny, almost insignificant fleck of negative charge associated with the atomic nucleus. Minute as a single electron is, their effects can be monumental when electrons act in concert. And when they are induced to flow from one location to another, they can be an exceptional source of energy for doing countless kinds of work.

Electronics is the inquiry into the behavior of electrons in a vast array of environments. Different kinds of materials placed in the path of a flow of electrons can produce an amazing array of effects, including light, heat, and motion. The study is fascinating and intellectually challenging.

FOSS is offering an opportunity to spend a week exploring the world of the electron—a week-long FOSS Electronics Course workshop is scheduled for the week of June 23–28. The workshop will be hosted by General Atomics Sciences Education Foundation in La Jolla, California—on the coast just north of San Diego. The week will include plenty of quality time working with the FOSS Electronics Course curriculum, as well as a nice salting of presentations by cutting-edge electronics engineers, field trips to prominent electronics-oriented industries in the region, and a couple of social events. The experience promises to be memorable.

The Electronics Course presenters are
Larry Malone, FOSS Codirector
Linda De Lucchi, FOSS Codirector

For more information and registration materials, check the FOSS calendar at http://www.lhs.berkeley.edu/FOSS/FOSS.Calendar.html or contact Larry Malone by e-mail (lmalone@uclink4.berkeley.edu) to have hard copy materials sent directly to you.
In the FOSS Earth History Course for middle school, students establish a virtual study site at Grand Canyon from which they investigate and interpret the canyon’s geologic history. A virtual visit is great, but even better is an opportunity to study the canyon at the Canyon! The FOSS staff from Lawrence Hall of Science, in cooperation with the National Park Service team at Grand Canyon, is presenting another Earth History Course workshop at the South Rim of Grand Canyon from July 28–August 3.

Who should apply?
• Science leadership educators from universities or districts, who are responsible for implementing the FOSS Earth History Course.
• Teachers using or planning to use the Earth History Course in their classrooms.

What will happen at the workshop?
• Hands-on training in the FOSS Earth History Course.
• Slide presentations and discussions on the geology and natural history of the Grand Canyon by NPS staff.
• Hikes along the South Rim to fossil beds and down the Hermit and South Kaibab Trails for close-up looks at Grand Canyon geology.
• Computer lab time to experience the FOSS Earth History CD-ROM.
• Consultation time with FOSS, NPS, and Grand Canyon Association representatives to identify resources and “personalize” the FOSS/Grand Canyon experience to your local area.
• Friday night BBQ on the South Rim.

The workshop will take place at the National Park Service’s Albright Training Center, located in Grand Canyon National Park on the South Rim. Accommodations ($20 per person per night, double occupancy) will be available at Albright Training Center’s apartment complex. Apartments are available for participants only. Food service and groceries are located within the park or in Tusayan just south of the park.

The workshop fee is $150. Participants are responsible for their own travel to Grand Canyon and for room and board costs. College credit may also be available if there is enough interest. Group size is limited to 30 participants.

For more information contact:
Sue Jagoda
FOSS Project
Lawrence Hall of Science
University of California
1 Centennial Drive
Berkeley, CA 94720-5200
Phone: 510-642-8941
E-mail: skjagoda@uclink4.berkeley.edu
I recently received this e-mail from a FOSS educator, Melissa Wick, from Fayetteville Public Schools in Arkansas, who came right to the point. Our school district recently adopted the FOSS kits for our science curriculum. I want to point out a major error in the way the Magnetism and Electricity kit was packaged. Hopefully your manufacturers can correct this error in the future.

In the Magnetism and Electricity kit, drawer 2 contains 48 magnets and 8 compasses, all packed into the same box together. I'm sure you won't be surprised to find out that when our kits arrived, several of the compasses no longer worked. This should definitely be corrected quickly.

Frustrating, I replied, assuring Ms. Wick that Delta Education would make things right and replace the nonfunctional compasses quickly, but went on to suggest another solution to the problem. The compasses were actually working fine— the north seeking pole of the compass needle was pointing north, but it wasn't the painted end of the needle! The needle was reverse-polarized, so it appeared to be pointing south. This is what I suggested to Melissa.

Think about tackling the problem as a project—a learning experience—for teachers and students. Teachers might challenge students to discover a way to “fix” the compasses. This is what I'm thinking.

The compasses are fragile little magnets at best...the needles are small and easily re-magnetized. In the course of using them in classrooms, students inadvertently reverse the polarity—which is what happened to the compasses in your kits by accident in shipment, or even before. The polarity of the compass needle can be easily reoriented as follows.

I will assume you know approximately where north is. Hold up a compass. If the red end of the needle points north, put the compass into the “good guys” pile. If it points south, bring one of the flat surfaces of a donut magnet (in the kit) up to the compass. One of the points of the needle will quickly point to the magnet—it doesn't matter which one.

Tip the magnet over on top of the compass glass and scoot the magnet quickly across the glass, over the length of the needle, and off on the opposite side.

The needle will now be properly magnetized. The compass can be promoted to the good guys pile. (Repeating the process disorients the needle again, and repeating a third time puts it right again—back and forth; back and forth.)

Now that I ponder it, I'm thinking that the problem may not be in shipping. Simple proximity does not usually alter the polarity—you have to do the “slide-over” business. Magnets and compasses should be able to travel as shipmates without any problems if things are not sliding all over the place. The problem might be in the polarity of the needles at the time Delta Education takes delivery from their supplier. The quest for the final answer continues.

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**Rebel Compasses—They Point South**
By Larry Malone

Think about tackling the problem as a project — a learning experience — for teachers and students... Tip the magnet over on top of the compass glass and scoot the magnet quickly across the glass, over the length of the needle, and off on the opposite side.
Pre-NSTA Institutes
Presented at the San Diego Marriott next to the Convention Center

TUESDAY 3/26
8:30–4:30
FOSS K–6 Introductory Institute
Presented by Linda De Lucchi and Larry Malone
An overview of the elementary program including the research and development behind the program, new components (FOSS Science Stories and FOSSWEB), assessment strategies, and revised modules for grades 1–6.

8:30–4:30
FOSS Middle School Introductory Institute
Presented by Terry Shaw
An introduction to the middle school courses, this institute will show how these modules combine hands-on science with an integrated technology component, and how they meet the needs of the developing adolescent promoting both problem-solving and critical thinking skills.

8:30–4:30
FOSS Advanced Institute: Research Into Practice
Presented by Dr. Lawrence Lowery at the San Diego Marriott
This institute is for educators with at least three years of experience teaching with FOSS. This institute involves advanced study into the research underpinnings of the programs and application of research findings.

FOSS Middle School Short Courses
Presented by FOSS staff in Convention Center, Room 5A

WEDNESDAY 3/27
8:00–11:15
FOSS Middle School: Diversity of Life Introduction
This FOSS course introduces students to the big picture of life on Earth. Students discover that all living things, despite their complexity, share the same basic characteristics. Students learn that all organisms (bacteria, protists, fungi, plants, and animals) are composed of cells, and that a single cell is the fundamental unit of life.

THURSDAY 3/28
8:00–11:15
FOSS Middle School: Planetary Science Introduction
Join FOSS staff members on a trip into the solar system! Work with the FOSS Middle School Planetary Science Course to explore the Moon, planets, and beyond.

1:00–4:15
FOSS Middle School: Electronics Overview
Electronics dominate many aspects of everyday life. In the FOSS Electronics Course, students use electronic components, circuit boards, and multimeters to explore fundamental electronic principles. This course includes intriguing logic puzzles and many opportunities to integrate math skills into the science content.

2:00–3:15
FOSS for Grades 1–2: An Overview featuring Air and Weather
Young learners are enthusiastic science students. FOSS modules for grades 1–2 invite students to explore the natural world in playful but demanding ways. FOSS investigations teach students to be critical observers and precise communicators while encouraging the joy of individual discovery.

4:00–5:15
FOSS for Grades 3–6: An Overview Featuring Physical Science Investigations
Join FOSS staff members for an overview of the FOSS elementary program including the research and development behind the program and an introduction to new components such as FOSS Science Stories, FOSSWEB, math problems of the week, and the assessment system.
Delta Education will host one-day Informational Institutes this academic year in conjunction with the NSTA Area and National Conventions. There will be an elementary institute (grades K–6) and a middle-school institute (grades 6–8). These Institutes are designed for all educators—lead teachers, administrators, curriculum coordinators, university methods instructors, science committee members, and school board members—who are interested in finding out what FOSS is, who developed it, what philosophy of education it supports, and to begin networking with other FOSS users. A lot of time at these Institutes is spent with the program materials, doing activities and engaging in inquiry.

The Institutes are led by FOSS development staff. There is no charge, but participants must register in advance to attend. Times and locations are listed in the calendar. To secure your spot at the Institute of your choice, call, write, fax, or e-mail:

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Nashua, NH 03063
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Phone: 1.800.258.1302 ext. 503
Fax: 603.579.3504

**FOSS Institutes and Workshops**

**NSTA National Convention**
March 26, 2002
San Diego, CA
(see complete schedule on page 18)

**Pre-NSTA Institutes**
October 23
Louisville, KY
NSTA Eastern Area Convention
November 13
Portland, OR
NSTA Northwestern Area Convention
December 4
Albuquerque, NM
NSTA Southwestern Area Convention

**One-week FOSS Middle School Courses**
June 23–28
General Atomics Sciences Education Foundation
La Jolla, CA
FOSS Electronics Course
(see page 15 for more information)
July 28–August 3
Grand Canyon, AZ
FOSS Earth History Course
(see page 16 for more information)

**Summer Institutes and Workshops**
July 1–3
Northern Arizona University
Flagstaff, AZ
K–6 FOSS Institute
For more information, contact:
Karen Gilbreath
Science and Mathematics Learning Center
Northern Arizona University
P.O. Box 5697
Flagstaff, AZ 86011-5697
1.928.523.7160
karen.gilbreath@nau.edu

August 1–3
Northern Arizona University
Flagstaff, AZ
FOSS Middle School Institute
For more information, contact:
Karen Gilbreath (see July 1–3)

August 9–10
Lawrence Hall of Science
Berkeley, CA
FOSS Diversity of Life Workshop for Leadership Educators
For more information, contact:
Linda DeLucchi
1.510.642.8941
ldelucchi@uclink4.berkeley.edu

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☐ Yes! I’m interested in attending a FOSS Elementary Institute.
☐ Yes! I’m interested in attending a FOSS Middle-School Introductory Institute.

Please send me registration information for the __________________________ Institute.

**Please send me me registration information for the __________________________ Institute.**

(Date, location)

Name
School __________________________ District __________________________
Title __________________________
Address __________________________
City __________________________ State ______ Zip __________________________
Day Phone __________________________

☐ I did not receive this newsletter in the mail. Please add my name to the FOSS mailing list.
About This Newsletter . . .
The intent of the FOSS Newsletter is to help FOSS users develop a network of support across the country. Delta Education and LHS will work together to bring you news two times per year, including articles regarding the latest development of modules, tips about management from teachers and administrators, ways to make connections with other teachers and districts, extensions and reading materials to add to modules you are already using, and informative articles about good educational practices.

So, we need your help. If you have a tip that enhances the teaching of FOSS or would like to submit an article (with photos) about exciting activities or school projects, please send them in. We would also like to hear from your students, whether they have questions about the content, projects they have done, photos or other images they have created, or insights into how they use the World Wide Web with FOSS. Send your contributions to:

FOSS Newsletter
Lawrence Hall of Science
University of California
Berkeley, CA 94720-5200

The deadline for submissions to the next issue is June 10, 2002. We’re waiting to hear from you.

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Please remove my name from the mailing list.