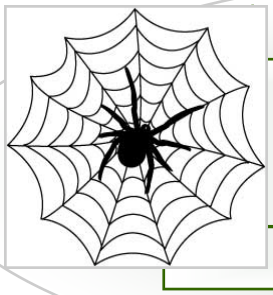
November Issue 2006



Enviro Web

Newsletter of the Manitoba Envirothon

Mark your calendar!!
May 24th to 26th, 2007

Coordinator's Corner by Andrea Swain

After an exciting and busy year working on the 2006 Canon Envirothon, I feel so thrilled to now be working on the Manitoba Envirothon.

The Steering Committee has another exciting year planned. Besides planning the April Workshop and Competition, we will be working on a number of outreach programs. We will be trying to attract new schools to the program and developing strategies for reaching more students in participating schools.

If you haven't already registered we'd like to remind you that we are currently accepting first teams only, on December 1 we will start accepting second teams from the same school. All registrations must be in by January 31, 2007.

I would also like to take this opportunity to thank Andrea Kraayeveld who continues to be involved with the Manitoba Envirothon. She prepared this newsletter and has a number of interesting ideas to make the content more interesting for Envirothon teams and advisors. We hope you enjoy this issue!

Meet the Competition

Four teams have already registered for the 2007 Manitoba Envirothon. Meet some of the teams that you will meet at the event!

Pembina Valley Conservation District team - Nellie McClung Collegiate Manitou, MB

The Pembina Valley Conservation District has sponsored a team from the Manitou area since 1999. They have sent a team to the Manitoba Envirothon every year with the exception of 2002 (a team was registered but was unable to compete). At the 2001 Manitoba Envirothon the Pembina Valley team was recognized for their EcoAction 2000 community project. We are pleased to see continued support from the Pembina Valley Conservation District for the Manitoba Envirothon, and happy to see that students from Nellie McClung school are joining us once again this year!

Vincent Massey Collegiate – Winnipeg, MB

Vincent Massey Collegiate is one of our founding schools. Vincent Massey was one of four schools who participated in the first Manitoba Envirothon in 1997. Vincent Massey has been at every Manitoba Envirothon competition since. We are excited that Vincent Massey is continuing into the next decade with us. Vincent Massey has been the past Manitoba Envirothon Champions in 1997, 1998, 2000, and 2001. They placed second in 2004 and 2006. They place third in 1999 and 2005. This team is a tough competitor!

Shaftesbury High School – Winnipeg, MB

Shaftesbury High School is another one of our founding schools. Shaftesbury first joined the Manitoba Envirothon family at the first Manitoba Envirothon in 1997 and has competed every year since. We are please that Shaftesbury is continuing into the next decade with us. Shaftesbury placed second in 2000 and third in 2001.

Fort Richmond Collegiate – Winnipeg, MB

Fort Richmond Collegiate is third of the four founding schools of the Manitoba Envirothon. They have competed every year since 1997. We are happy that Fort Richmond is continuing to part of the Manitoba Envirothon. The Fort Richmond team placed second in 1998, 1999, and 2003. They also placed third in 2000.

We hope to see your team at the event!

Inside this issue:

Forests in the Classroom

Did you know? The Manitoba Forestry Association offers "Forests in the Classroom" presentations. These 45- 50 minutes presentations focus on forest ecology, ecosystems and biodiversity. One of these presentation programs can be customized for an Envirothon team or class.

These presentations are free of charge, thanks to the funding received by the RBC and Manitoba Model Forest.

For more information about having a "Forests in the Classroom" presentations for your Envirothon team(s), please contact Bill Baker at the Manitoba Forestry Association at (204) 453-3182 or by email wrbaker@mts.net.

Career Focus

What's a Hydrogeologist?

A hydrogeologist is a person who studies the ways that groundwater (hydro) moves through the soil and rock of the earth (geology). A similar profession, a hydrologist, is someone who studies surface water.

Water is an essential part of life on earth and is something that people, plants and animals need to survive. It is important that the limited amount of freshwater that exists on earth stays safe to drink and use for the many purposes we require in everyday life. Just think of the many ways you use water each day and throughout the year.

A hydrogeologist is the person who makes and uses laws to be sure we have clean groundwater supplies, similar to how an officer of the law uses laws to keep people safe. Hydrogeologists are also like doctors because they help people stay healthy. When people become sick from contaminated water, they help find the problem and solve it.

Here's what they might do on an average day:

- investigate ways to test water to be sure it is safe to drink
- check licenses of people who construct wells and supply water to others
- inspect and/or help locate wells for safe water supplies
- inspect the design and function of wells
- help people understand the interactions between soil and other geologic formations and groundwater
- study groundwater flow in different parts of the state
- write new laws to protect groundwater
- train others to protect groundwater

Hydrogeologists also oversee the cleanup of spills and contamination. Contaminants in groundwater move through soil and rock, sometimes causing people to become sick far from the source of contamination. Groundwater contaminants can come from:

- natural mineral or chemical reactions in the earth
- air pollution (contaminants carried down into the soil or rock by rain soaking into the ground)
- insects and animals that get trapped in wells
- people's actions at home or businesses practices
- human and animal waste
- dumping or spilling harmful substances on the ground

Hydrogeologists also are like detectives and help solve contamination problems that are difficult to figure out. They will work with experts who specialize in geology, wastewater, water supply, waste management, soils and organizations that know how to clean up pollution or contamination. They may also help with designs for new facilities to help prevent future contamination.

In order to help keep our water supply in good condition, a person must know a lot about how water works with the earth. It is important to understand the relationships between the:

- water cycle
- geology
- math
- physics
- chemistry
- Soils

To become a hydrogeologist, you will need to graduate from a college or university with courses in hydrogeology and/or biological, chemical, environmental, and life sciences. A minimum of 30 geology credits and six hydrogeology credits are usually required.

Source:
http://www.dnr.state.wi.us/org/caer/ce/eek/job/hydrogeologist.htm

Test Your Knowledge

Name that Scat!!

1. What animal has scat like this?

Description: Dark brown, round or slightly flattened, pea-size pellets; usually in piles.

Is it a) White Tailed Deer
b) Little Brown Bat
c) Eastern Cottontail

2. What animal has scat like this?

Description: Dark brown or black; long, slender and segmented; often tapering at one end; frequently contains hair or bits of bone; deposited on rocks, logs, or stumps.

Is it a) Short Tailed Weasel
b) Common Hog Nosed Skunk
c) Black Bear

3. What animal has scat like this?

Description: Similar to deer scat; pellets may be rough-surfaced, irregular, and connected; often found in large accumulations at entrances to rock crevices or at the base of a single tree.

Is it a) Bobcat
b) Raccoon
c) Common Porcupine

4. What animal has scat like this?

Description: Droppings similar to those of a domestic dog but containing hair; usually left along hunting trail, often in concentrated areas.

Is it a) Nine banded Armadillo
b) Coyote
c) Mountain Lion

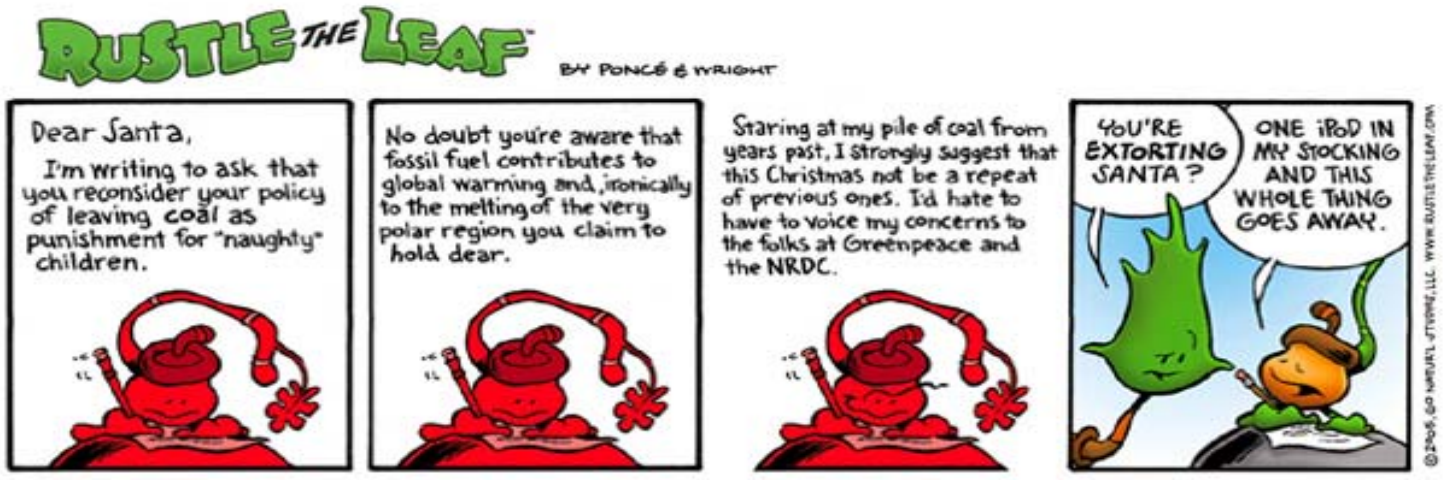
5. What animal has scat like this?

Description: Can be clumped or individual, dark, oval pellets, about 1/2-3/4" long, sometimes rounded; may be pointed at one end and indented at the other.

Is it a) White Tailed Deer
b) Northern River Otter
c) Black Tailed Jackrabbit

Answers on page 10.

Source: www.enature.com/challenge/Scat challenge.asp



Experiment: Soil as Electrical Systems?

Soils As Electrical Systems

Materials Needed:

1. 60 grams (1/4 cup) of clayey soil
2. One 500 mL (pint) glass or plastic beaker or jar
3. One 6 volt dry-charge lantern battery with two screw top terminals at the top of the battery (e.g. Everready Classic Lantern Battery)
4. Two pieces of 12 gauge, plastic insulated, multiple strand, twisted copper wire about 50 cm (20 inches) in length

Procedures:

1. Place 60 grams of the clayey soil in the 500 mL glass or plastic jar.
2. Add 500 mL of tap water to the above container with soil
3. Stir or shake the container for several minutes until the soil is completely mixed with the water.
4. Let the suspended soil materials in the container settle for 10 minutes.
5. On each end of the electric wires, remove the insulation and strip back to expose the bare wire for about 5 cm (2 inches) at the end of the wires.
6. Connect one end of each wire to the terminals of the battery and screw the terminal cap tight to fix the wire to the terminal.
7. Place each of the other ends of the electrical wires in the clay suspension about 5 cm (2 inches) below the top of the water line in the beaker holding the clay slurry. Make sure the bare ends of the two wires are spaced about 5 cm (2 inches apart) and do not touch each other. Mark or note which of the two wires is connected to the anode (positive end of the battery) and which is connected to the cathode (negative end of the battery).
8. Leave the wire electrodes in the clay slurry for about 10 to 15 minutes and then pull them out to see what happened.

Observations and Interpretations:

1. Before the wire electrodes are removed from the clay slurry, predict what you will find when the electrodes are removed. Which electrode do you think will have attracted the clay to accumulate about the bare wire? Why?
2. What general principle is being observed here? Anions (e.g. clay minerals) go to the anode (positive electrode) and cations (e.g. most plant nutrients-Ca, Mg, Na, K, etc.) go to the cathode (negatively charged electrode). Hence, most plant nutrients (cations) in soils bond to clay surfaces
3. If, instead of a clay suspension, suppose that the Methylene Blue dye solution had been used. In that case which electrode would you have predicted that the dye would have been plated out on--cathode or anode.
4. The demonstration here is the same principle used in electrolysis for resilvering a mirror. Silver chloride is used as the plating material. The mirror is placed in a solution of silver chloride. Cations of silver and anions of chloride form the silver chloride solution. An electric current is introduced into the solution such that the mirror is made the cathode. Hence, silver cations plate out on the mirror by the process of electrolysis.
5. This demonstration also confirms the electrical principle that LIKES REPEL AND UNLIKES ATTRACT.
6. This demonstration confirms the fact that SOILS ARE ELECTRICAL CHEMICAL SYSTEMS that provide remarkable potential to attract and hold plant nutrients. The more positive charges associated with the nutrient the tighter the adsorption to the soil. Also, the greater the clay and organic colloid content of the soil the greater the storage bank to hold nutrients available to plants.
7. The demonstration also supports the remarkable chemical buffering and filtering qualities of soils for cationic pollut ants. Most soils also possess some anionic buffering potential but this is less effective than the cationic sorptive capacity.

This is why the potential for nitrate pollution from water transport through soil systems is much greater than pollution from metal cations moving through soil systems. However, pollutants absorbed to soil colloidal surfaces can be major concerns to water quality when soil sediments are eroded into fresh water stream and aquifer bodies.

Source: http://soil.gsfc.nasa.gov/elec/soilelec.htm

What is Geothermal Energy?

What does the word "GEOTHERMAL" mean?

"Geothermal" comes from the Greek words geo (earth) and therme (heat). So, geothermal means earth heat.

What is Geothermal Energy?

Our earth's interior - like the sun - provides heat energy from nature. This heat - geothermal energy - yields warmth and power that we can use without polluting the environment.

Geothermal heat originates from Earth's fiery consolidation of dust and gas over 4 billion years ago. At earth's *core* - 4,000 miles deep - temperatures may reach over 9,000 degrees F.

How does geothermal heat get up to the Earth's surface?

The heat from the earth's core continuously flows outward. It transfers (conducts) to the surrounding layer of rock, the *mantle*. When temperatures and pressures become high enough, some mantle rock melts, becoming *magma*. Then, because it is lighter (less dense) than the surrounding rock, the *magma rises (convects), moving slowly up toward the earth's crust, carrying the heat from below*.

Sometimes the hot magma reaches all the way to the surface, where we know it as lava. But most often the magma remains below earth's crust, heating nearby rock and water (rainwater that has seeped deep into the earth) - sometimes as hot as 700 degrees F. Some of this hot geothermal water travels back up through faults and cracks and reaches the earth's surface as *hot springs* or *geysers*, but most of it stays deep underground, trapped in cracks and porous rock. This natural collection of hot water is called a *geothermal reservoir*.

How have people used geothermal energy in the past?

From earliest times, people have used geothermal water that flowed freely from the earth's surface as hot springs. The oldest and most common use was, of course, just relaxing in the comforting warm waters. But eventually, this "magic water" was used (and still is) in other creative ways. The Romans, for example, used geothermal water to treat eye and skin disease and, at Pompeii, to heat buildings. As early as 10,000 years ago, Native Americans used hot springs water for cooking and medicine. For centuries the Maoris of New Zealand have cooked "geothermally," and, since the 1960s, France has been heating up to 200,000 homes using geothermal water.

How do we use geothermal energy today?

Today we drill wells into the geothermal reservoirs to bring the hot water to the surface. Geologists, geochemists, drillers and engineers do a lot of exploring and testing to locate underground areas that contain this geothermal water, so we'll know where to drill geothermal *production* wells. Then, once the hot water and/or steam travels up the wells to the surface, they can be used *to generate electricity in geothermal power plants or for energy saving non-electrical purposes*.

How is electricity generated using geothermal energy?

In *geothermal power plants* steam, heat or hot water from geothermal reservoirs provides the force that spins the *turbine generators* and produces electricity. The used geothermal water is then returned down an *injection well* into the reservoir to be reheated, to maintain pressure, and to sustain the reservoir.

There are three kinds of *geothermal power plants*. The kind we build depends on the temperatures and pressures of a reservoir.

1. A "dry'" steam reservoir produces steam but very little water. The steam is piped directly into a *"dry" steam power plant* to provide the force to spin the turbine generator. The largest dry steam field in the world is The Geysers, about 90 miles north of San Francisco. Production of electricity started at The Geysers in 1960, at what has become the most successful alternative energy project in history.

2. A geothermal reservoir that produces mostly hot water is called a "hot water reservoir" and is used in a *"flash" power plant*. Water ranging in temperature from 300 - 700 degrees F is brought up to the surface through the production well where, upon being released from the pressure of the deep reservoir, some of the water flashes into steam in a 'separator.' The steam then powers the turbines.

3. A reservoir with temperatures between 250 - 360 degrees F is not hot enough to flash enough steam but can still be used to produce electricity in a *"binary" power plant*. In a binary system the geothermal water is passed through a *heat exchanger*, where its heat is transferred into a second (binary) liquid, such as isopentane, that boils at a lower temperature than water. When heated, the binary liquid flashes to vapor, which, like steam, expands across and spins the turbine blades. The vapor is then recondensed to a liquid and is reused repeatedly. In this closed loop cycle, there are no emissions to the air.

What are some of the advantages of using geothermal energy to generate electricity?

- *Clean*. Geothermal power plants, like wind and solar power plants, do not have to burn fuels to manufacture steam to turn the turbines. Generating electricity with geothermal energy helps to conserve nonrenewable fossil fuels, and by decreasing the use of these fuels, we reduce emissions that harm our atmosphere. There is no smoky air around geothermal power plants -- in fact some are built in the middle of farm crops and forests, and share land with cattle and local wildlife. For ten years, Lake County California, home to five geothermal electric power plants, has been the first and only county to meet the most stringent governmental air quality standards in the U.S.

- *Easy on the land*. The land area required for geothermal power plants is smaller per megawatt than for almost every other type of power plant. Geothermal installations don't require damming of rivers or harvesting of forests -- and there are no mine shafts, tunnels, open pits, waste heaps or oil spills.

- *Reliable*. Geothermal power plants are designed to run 24 hours a day, all year. A geothermal power plant sits

right on top of its fuel source. It is resistant to interruptions of power generation due to weather, natural disasters or political rifts that can interrupt transportation of fuels.

- *Flexible*. Geothermal power plants can have modular designs, with additional units installed in increments when needed to fit growing demand for electricity.

- *Keeps Dollars at Home*. Money does not have to be exported to import fuel for geothermal power plants. Geothermal "fuel"' - like the sun and the wind - is always where the power plant is; economic benefits remain in the region and there are no fuel price shocks.

Helps Developing Countries Grow. Geothermal projects can offer all of the above benefits to help developing countries grow without pollution. And installations in remote locations can raise the standard of living and quality of life by bringing electricity to people far from "electrified" population centers.

What are some non-electric ways we can use geothermal energy?

Geothermal water is used around the world, even when it is not hot enough to generate electricity. Anytime geothermal water or heat are used directly, less electricity is used. Using geothermal water 'directly' *conserves energy* and *replaces the use of polluting energy resources with clean ones*. The main non-electric ways we use geothermal energy are DIRECT USES and GEOTHERMAL HEAT PUMPS.

Direct uses: Geothermal waters ranging from 50 degrees F to over 300 degrees F, are used directly from the earth:

- to soothe aching muscles in hot springs, and health spas ;

- to help grow flowers, vegetables, and other crops in greenhouses while snow-drifts pile up outside (*agriculture*);

- to shorten the time needed for growing fish, shrimp, abalone and alligators to maturity (*aquaculture*);

- to pasteurize milk, to dry onions and lumber and to wash wool (*industrial uses*);

- *Space heating* of individual buildings and of entire districts, is - besides hot spring bathing - the most common and the oldest direct use of nature's hot water. Geothermal *district heating* systems pump geothermal water through a *heat exchanger*, where it *transfers* its heat to clean city water that is piped to buildings in the district. There, a second heat exchanger transfers the heat to the building's heating system. The geothermal water is injected down a well back into the reservoir to be heated and used again. The first modern district heating system was developed in Boise, Idaho. (In the western U.S. there are 271 communities with geothermal resources available for this use.) Modern district heating systems also serve homes in Russia, China, France, Sweden, Hungary, Romania, and Japan. The world's largest district heating system is in Reykjavik, Iceland. Since it started using geothermal energy as its main source of heat Reykjavik, once very polluted, has become one of the cleanest cities in the world. Geothermal heat is being used in some creative ways; its use is limited only by our ingenuity. For example, in Klamath Falls, Oregon, which has one of the largest district heating systems in the U.S., geothermal water is also piped under roads and sidewalks to keep them from icing over in freezing weather. The cost of using any other method to keep hot water running continuously through cold pipes would be prohibitive. And in New Mexico and other places rows of pipes carrying geothermal water have been installed under soil, where flowers or vegetables are growing. This ensures that the ground does not freeze, providing a longer growing season and overall faster growth of agricultural products that are not protected by the shelter and warmth of a greenhouse.

Geothermal heat pumps: Animals have always known to burrow into the earth, where the temperature is relatively stable compared to the air temperature, to get shelter from winter's cold and summer's heat. People, too, have sought relief from bad weather in earth's caves. Today, with geothermal heat pumps (GHP's), we take advantage of this stable earth temperature - about 45 - 58 degrees F just a few feet below the surface - to help keep our indoor temperatures comfortable. GHP's circulate water or other liquids through pipes buried in a continuous loop (either horizontally or vertically) next to a building. Depending on the weather, the system is used for heating or cooling.

Heating: Earth's heat (the difference between the earth's temperature and the colder temperature of the air) is transferred through the buried pipes into the circulating liquid and then transferred again into the building.

Cooling: During hot weather, the continually circulating fluid in the pipes 'picks up' heat from the building - thus helping to cool it - and transfers it into the earth.

GHP's use very little electricity and are very easy on the environment.

In the U.S., the temperature inside over 300,000 homes, schools and offices is kept comfortable by these energy saving systems, and hundreds of thousands more are used worldwide. The U.S. Environmental Protection Agency has rated GHP's as among the most efficient of heating and cooling technologies.

What parts of the world have geothermal energy?

- ***For electricity and direct use***: Geothermal reservoirs that are close enough to the surface to be reached by drilling can occur in places where geologic processes have allowed magma to rise up through the crust, near to the surface, or where it flows out as lava. The crust of the Earth is made up of huge plates, which are in constant but very slow motion relative to one another. Magma can reach near the surface in three main geologic areas:

1. where Earth's large oceanic and crustal plates collide and one slides beneath another, called a subduction zone The best example of these hot regions around plate margins is the Ring of Fire -- the areas bordering the Pacific Ocean: the South American Andes, Central America, Mexico, the Cascade Range of the U.S. and Canada, the Aleutian Range of Alaska, the Kamchatka Peninsula of Russia,

What is Geothermal Energy? - Continued

Japan, the Philippines, Indonesia and New Zealand.

2. spreading centers, where these plates are sliding apart, (such as Iceland, the rift valleys of Africa, the mid-Atlantic Ridge and the Basin and Range Province in the U.S.); and

3. places called hot spots-- fixed points in the mantle that continually produce magma to the surface. Because the plate is continually moving across the hot spot, strings of volcanoes are formed, such as the chain of Hawaiian Islands. The countries currently producing the most electricity from geothermal reservoirs are the United States, New Zealand, Italy, Iceland, Mexico, the Philippines, Indonesia and Japan, but geothermal energy is also being used in many other countries.

4. ***For geothermal heat pumps***, use can be almost worldwide. The earth's temperature a few feet below the ground surface is relatively constant everywhere in the world (about 45 - 58 degrees F), while the air temperature can change from summer to winter extremes. Unlike other kinds of geothermal heat, shallow ground temperatures are not dependent upon tectonic plate activity or other unique geologic processes. Thus geothermal heat pumps can be used to help heat and cool homes anywhere.

How much geothermal energy is there?

Thousands more megawatts of power than are currently being produced could be developed from already-identified hydrothermal resources. With *improvements in technology*, much more power will become available. Usable geothermal resources will not be limited to the "shallow" hydrothermal reservoirs at the crustal plate boundaries. Much of the world is underlain (3-6 miles down), by *hot dry rock* - no water, but lots of heat. Scientists in the U.S.A., Japan, England, France, Germany and Belgium have experimented with piping water into this deep hot rock to create more hydrothermal resources for use in geothermal power plants. As drilling technology improves, allowing us to drill much deeper, geothermal energy from hot dry rock could be available anywhere. At such time, we will be able to tap the true potential of the enormous heat resources of the earth's crust.

Source: http://geothermal.marin.org/pwrheat.html

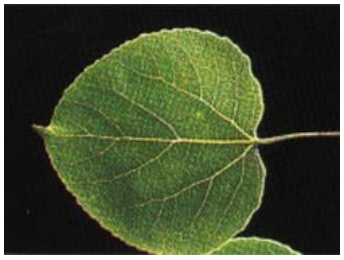
The Featured Tree

Trembling Aspen – *Populus tremuloides*
Also known as Poplar.

Because of their long, flat stems, the leaves of the trembling aspen quiver in the slightest breeze: this is what earned the tree its name. It is the most wide- spread tree in North America and grows from coast to coast. Like other poplars, it reproduces by root suckers: the roots of established trees sprout new offshoots that gradually become autonomous.

Although it prefers well-drained loam, the trembling aspen adapts to a wide variety of environments.

It forms pure stands and quickly becomes established on sites cleared by fire and logging or on vacant lots. Because of its intolerance of shade, it eventually yields to other species like spruce and fir. It also associates with white birch and jack pine.



Leaves, alternate, simple, toothed, egg- or bean-shaped.

The wood of the trembling aspen is light, soft and low in strength. Its colour ranges from white to gray.

It is used to make plywood, particleboard, pallets, crates, excelsior, matches, and pulp for paper.

Fruits, cone-like capsules on drooping catkins.

Source: http://www.domtar.com/arbre/english/p_tremb.htm

Did you know that trees, shrubs and plants in the Boreal forest can also have important uses such as food, medicinal and technological purposes?

Food Uses:

The outer bark of trembling aspen can be stripped off and the innerbark and cambium peeled off with a knife and eaten in the springtime, when it tastes almost like honeydew melon. The sap can be collected for making syrup. Dry or rotting wood can be used to smoke meat and fish. Aspen wood ashes were used as a source of salt long ago.

Medicinal Uses:

The leaves can be chewed and applied to bee or wasp

The Featured Tree - Continued

stings to relieve the pain. They can also be used for mosquito bites or cuts. The bark from a young tree can be cut into squares that can be placed under the tongue to treat a stomachache or when the patient is spitting up blood. A strip of bark about the length of the heart, cut from the south side of a mature tree at heart height, can be chewed and the juiced swallowed as a heart medicine. A small strip (2x5 cm) of fresh green bark may be chewed and swallowed for relief from food poisoning or diarrhea. An aspen bark infusion (extract made by adding plant material to water after it has stopped boiling (like tea)) can be drunk to treat cancer; it makes you throw up but helps to flush out of the body whatever is making you sick. The bark infusion can also be drunk to treat diabetes. The bark decotion (Extract made by boiling the plant material in water (like a soup)) can be drunk to treat a stomachache, diarrhea, fever, venereal disease, or couching. Aspen branch bark can be boiled for 30 minutes with balsam poplar buds for a decotion drunk to treat diabetes. The inner green bark can be used as a wound dressing to stop bleeding . The white "dust" on bark can be scraped off and applied to cuts or even deep wounds to coagulate the blood ans thus stop bleeding or used in the treatment for veneral disease. The bud can be used like balsam poplar buds, applied directly to a toothache.

Technological uses:

The wood can be used to make canoe paddles, tepee poles, snow shovels, temporary snowshoe frames, and plates, and knurls can be hollowed out to make bowls. It is also an important firewood. The stems can be used to make whistle. Young branches can be stripped of leaves, and split in half to make a cooking stick used to hold meat over the fire for cooking. The rotten wood is burned to smoke hides. Ashes can be put into a sack through which boiling water can be poured, and the resulting caustic solution can be boiled with rendered caribou grease to make soap. The ashes can also be rubbed into moose hides during tanning to soften them.

Properties:

Aspen bark (100 g fresh weight) provides 1.3 g of protein, 31.7 g of crude fiber, 1.6 g of ash, 684 mg of Ca, 17 mg of P, 1.8 mg of Na, 130 mg, of K, 53.1 mg of Mg, 0.5 mg of Cu, 8.3 mg of Zn, 4.4 mg of Fe, and 1.2 mg of Mn. The leaves and bark contain salicylates and thus have pain relieving , fever-reducing and anti-inflammatory activities.

Source: Aboriginal Plant Use in Canada's Northwest Boreal Forest – R.J. Marles, C. Clavelle, L. Monteleone, N. Tayes and D. Burns.

Sounds Fishy

You've seen one fish.....you've seen them all?

Fish are amazingly diverse in their morphology. Some primitive species, such as the lampreys, lack jaws, scales and paired fins. Others, like the sharks do not have bones, but possess a cartilaginous skeleton instead. They come in all shapes and sizes, from the expected, to the bizarre. Form and function work together and examination of basic body shapes gives us insight to fish lifestyles.

Most fish fall into one of six basic body forms: **the rover predator, lie-in-wait predator, surface oriented, bottom dweller, deep-bodied or eel like.**

Rover predator
A streamlined body, pointed head, narrow caudal peduncle and a forked tail are the characteristics of this typical fish. In fact, this is the shape most people think of when they think of a fish! Their evenly distributed fins provide stability and manoeuverability, which is important for endurance swimming and actively seeking prey. This body type is typical of stream dwellers, which forage in fast water. Common examples of this body form are the trouts (family Salmonidae), some minnows (family Cyprinidae), tuna (family Scombridae) and swordfish (family Xiphiidae).

Lie-in-wait predator
These are typical ambush predators on fast moving prey. Their bodies are streamlined and elongate, with a flattened head and a mouth full of pointy teeth. In some families with this body plan, such as the pikes, the dorsal and anal fins are inserted far toward the rear, very near the caudal fin. This fin arrangement allows the normally still fish to generate rapid acceleration when the large muscle mass of the cylindrical body pushes against the water with the combined area of the dorsal, caudal and anal fins. In this way, they are able to thrust forward at high speeds to attack a passing fish. Their cryptic colouration and secretive behaviour helps to conceal them from suspecting prey. The pikes (family Esocidae), gars (family Lepisosteidae) and the marine barracudas (family Sphyraenidae) have this body plan.

Surface oriented
The upward turned mouths of these fish allow them to exploit plankton and small fish at the surface of the water. These fish are typically small in size, with a dorsoventrally flattened head, large eyes, streamlined body and a dorsal fin that occurs far back on the body. In stagnant water, this body design is ideal for taking advantage of the rich oxygen supply at the air-water interface. The Arctic cod (family Gadidae) and many killifishes (family Fundulidae) have this body form.

Bottom Dwellers
As the name suggests, this body plan is suited for living in benthic habitats. Many body shapes accomplish this goal, but generally fish with this body plan have a reduced or absent swim bladder and are flattened. Bottom fishes can be further classified into five categories: bottom rovers, bottom clingers, bottom hiders, flatfish and rattails.

Bottom rovers have a shape similar to the rover-predator, but have a flattened head, humped back and enlarged pectoral fins. These fish often possess barbels or "whiskers" with taste buds to locate prey in muddy water. The mouth shapes of these fish vary to exploit different food sources found on

Sounds Fishy - Continued

the bottom. Catfishes (family Ictaluridae) have large, terminal mouths, while sturgeons (family Acipenseridae) have fleshy, protrusible lips to suck plant and animal material off the bottom.

Bottom clingers, such as the sculpins (family Cottidae), have enlarged, closely spaced pelvic fins and specialized pectoral fins which help to anchor them to the bottom. The pectoral fins of gobies (family Gobiidae) and clingfishes (family Gobiesocidae) are actually modified into suction cups.

Bottom hiders are typically found under rocks, in crevices or remain still at the bottom. Darters (family Percidae) and blennies (family Blennidae) have this strategy.

Flatfish are also specially designed for benthic habitats. Flounders (family Pleuronectidae) are unusual looking, deep-bodied fish with both eyes on one side of their head. Their mouth is twisted for feeding on the bottom. Skates (family Rajidae) and rays (family Dasyatidae) are also flattened, but have a completely ventral mouth.

Finally, ***rattail shaped*** fish as seen in the grenadiers (family Macrouridae), brotulas (family Ophidiidae) and chimaeras (family Chimaeridae) have large pointy snouts, large pectoral fins and pointed rat-like tails. These fish inhabit the deep sea where they prey on benthic invertebrates.

Deep-bodied

This deepened body form is adapted for maneuverability in spatially complex habitats. The pelvic fins are moved far forward, so that the pectorals and pelvics together form a single control surface for turning, stopping and holding position. The mouth is small, the eyes large and the snout short, adaptations for feeding on small invertebrates at the bottom or in the water column. These fish are not designed for speed and instead rely on their maneuvering ability and spiny fins for protection from predators. The butterflyfish (family Chaetodontidae), which live in coral reefs, and the sunfish (family Centrarchidae) have this body form.

Eel-like

Elongate bodies, rounded heads and rounded tails allow these fish to explore a diversity of habitats including crevices and holes in rocky and reefed areas, soft muddy bottoms and densely vegetated areas. Long dorsal and anal fins allow these fish to exploit open water habitats as well. Eels (family Anguillidae), loaches (family Balitoridae) and gunnels (family Pholidae) have this body plan.

Source: http://www.aquatic.uoguelph.ca/fish/intro/fshintro.htm

Funky Fish

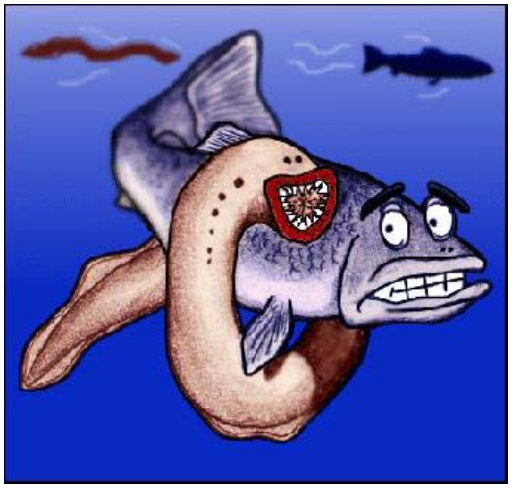
No bones about it!

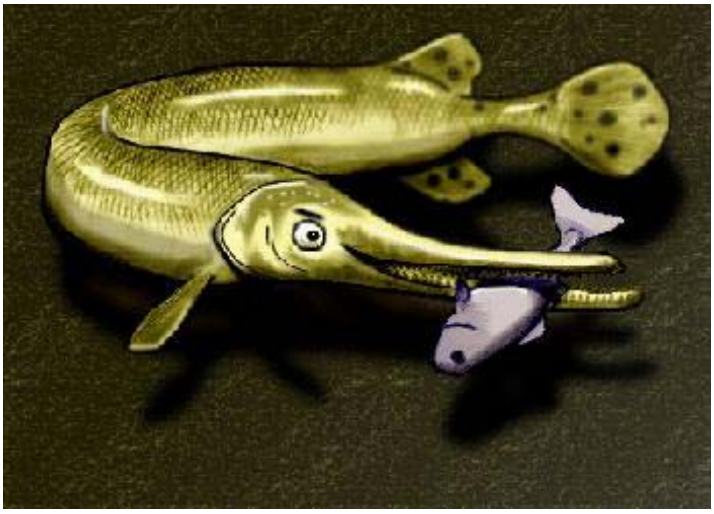
The sea lamprey (*Petromyzon marinus*)
The sea lamprey doesn't look like a fish at all! In fact, this primitive fish doesn't even have bones. The sea lamprey has a long, slender eel-like body, with a sucker disc mouth. This parasitic fish attaches its mouth onto unsuspecting victims such as lake trout or whitefish, and literally sucks the life out of them! Since its introduction into the Great Lakes in the 1930's, this species has caused many problems for the commercial and recreational fishing industries and some 10 million dollars are spent each year to control them.

Piscine Pinocchio

The longnose gar (*Lepisosteus osseus*)
This freshwater fish is curious looking. Although this fish is no liar, it has a monstrous snout with many sharp teeth. Its fins occur far back on its very long, cylindrical body, making it efficient at darting out quickly to capture prey. This ancient fish is also well protected by heavy, armored scales, called ganoid scales.

Source:
http://www.aquatic.uoguelph.ca/fish/funky/funkfish.htm





Energy Conservation Ideas

North Americans consume a disproportionate amount of the world's energy. But we can make a difference by conserving energy in our daily lives and by supporting the production of renewable energy.

If we all make an effort, it will help:

- save us money,
- make everyone healthier,
- reduce the chance of catastrophes such as wild fires and hurricanes.

What you can do to save energy

- Turn off your TV and computer when you are finished using them.
- Ride your bike, rollerblade, walk or take public transit instead of asking your parents for a ride.
- Reduce the amount of time you spend in the shower.

Top Five Decisions That Will Make the Biggest Difference

- Buy a fuel efficient vehicle: Include the fuel economy rating as part of the decision making process.
- Buy green power.
- Install a programmable thermostat: It takes about 10 minutes to install and allows you to save lots of energy costs when you are not home.
- Buy less stuff: Everything we buy creates waste and uses energy both in the manufacturing process and after we use it.
- Stand up for what's right: and keep in touch with what's happening on this issue.

Upcoming Events

Youth Conference on Climate Change
December 15, 2006 at the University of Winnipeg hosted by the Climate Change Connection
http://www.climatechangeconnection.org/pdfs_ccc/Registration%20Form.pdf

For further information on Manitoba Envirothon, contact:

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Answers to Name that Scat quiz

1. c) Eastern Cottontail
2. a) Short Tailed Weasel
3. c) Common Porcupine
4. b) Coyote
5. a) White Tailed Deer