MAGS EXPLORER

Memphis Archaeological and Geological Society Youth Newsletter

May 9, 2003 • Volume 2, Number 5

The First Fossils

MIKE BALDWIN--The MiniMAGS program for May is "Fossils: What Were They Before They Turned To Stone", presented by Idajean Jordan. Take a look at your fossils and find out all you can about how that creature [or plant] lived before it died.

For thousands of years, people studied footprints, bones, and shells in rocks and labeled them according to myth and fairy tale. Old tusks from elephants were once called unicorns' horns. Certain worn animal teeth named toadstones were believed to have been derived from dying toads, and were said to cure some diseases. The thick, curved shells of the oyster *Gryphacea* were called devil's toenails. Circular shells from ocean creatures were thought to be coiled snakes turned to stone by an enchantress. All of this conjecture later proved to be false; the fossil hunters were correct only in that their finds were remains of creatures from past ages.

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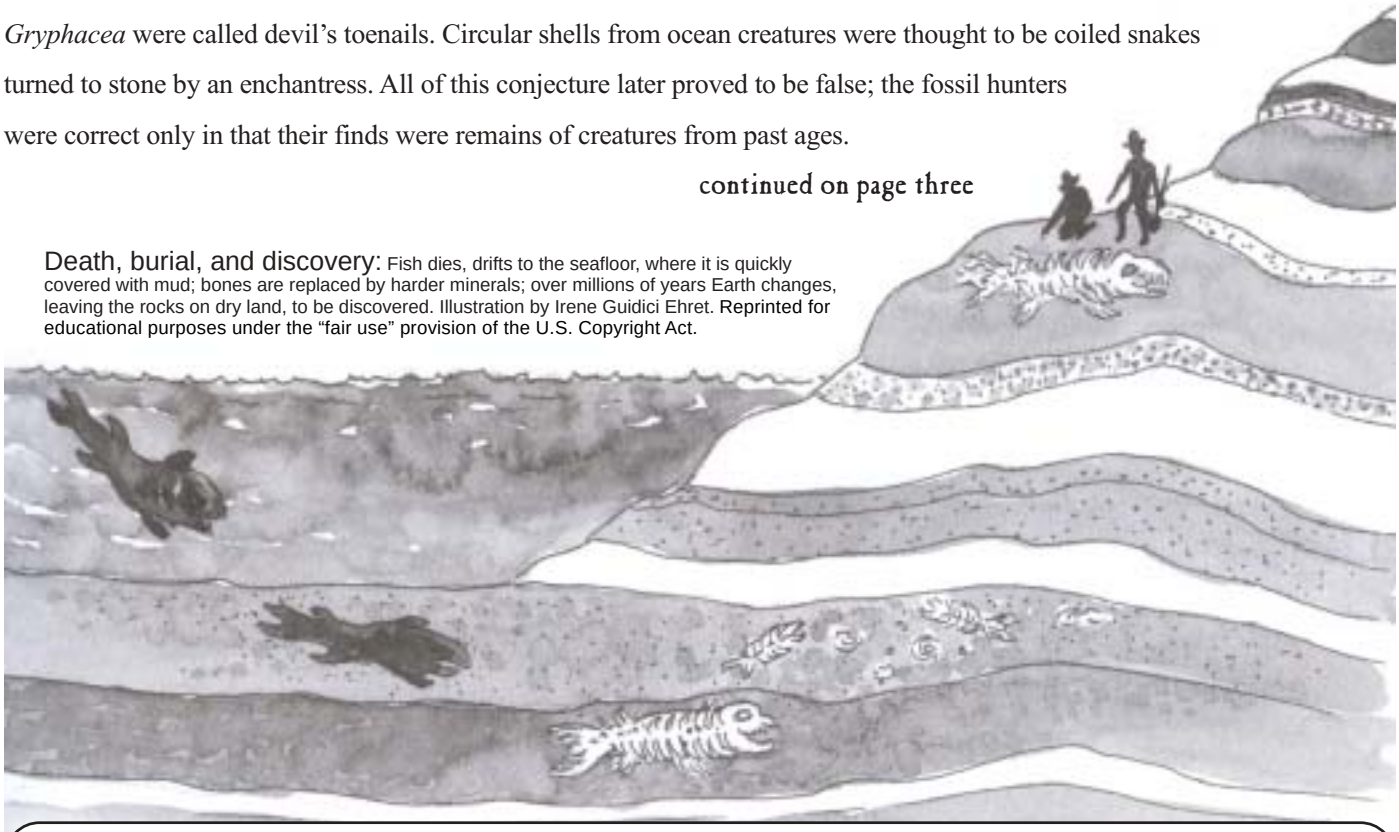


Death, burial, and discovery: Fish dies, drifts to the seafloor, where it is quickly covered with mud; bones are replaced by harder minerals; over millions of years Earth changes, leaving the rocks on dry land, to be discovered. Illustration by Irene Guidici Ehret. Reprinted for educational purposes under the "fair use" provision of the U.S. Copyright Act.

MAGS Explorer is published monthly by and for the youth members of the Memphis Archaeological and Geological Society. Please send your comments and articles to Editor Mike Baldwin, 367 N. Main St., Collierville, TN 38017 or rockclub@earthlink.net. Youth can give articles, artwork, poems, puzzles, experiments, or stories to co-editors Jennifer Baldwin, Emily Randolph, Kelly Baldwin, or Abbey Randolph.

The Geology Girls

KELLY BALDWIN: [2003 SFMS JUNIOR-OF-THE-YEAR]
Kelly's favorite minerals are labradorite, emerald and apophyllite. Her favorite fossils are trilobites, ammonites, and any kind of dinosaur bone. Her favorite places to collect are Vulcan Quarry, Crowley's Ridge, Mt. Ida, Gray's Farm Alabama, and Dr. Cole's property. When she's not out collecting, she enjoys playing soccer, playing percussion in the church orchestra, drawing, playing piano, Art Club, Space Explorers Club, the square and volunteering at the Animal Shelter. Congrats Kelly!

JENNIFER BALDWIN: [2003 SFMS JUNIOR-OF-THE-YEAR RUNNER-UP]
Jennifer's favorite minerals are labradorite, Louisiana opal and pearl. Her favorite fossils are trilobites, ammonites, and blastoids. Her favorite places to collect are Crowley's Ridge, Mt. Ida, Gray's Farm AL. When she's not out collecting, she enjoys playing soccer, playing flute in the church orchestra, drawing, playing piano, Space Explorers Club, backpacking, Collierville town square and volunteering at the Animal Shelter. Congrats Jennifer!

EMILY RANDOLPH: [2003 SFMS JUNIOR-OF-THE-YEAR CANDIDATE]
Emily's favorite mineral is diamonds. Her favorite fossils are blastoids. Her favorite place to collect is Gray's Farm Alabama.

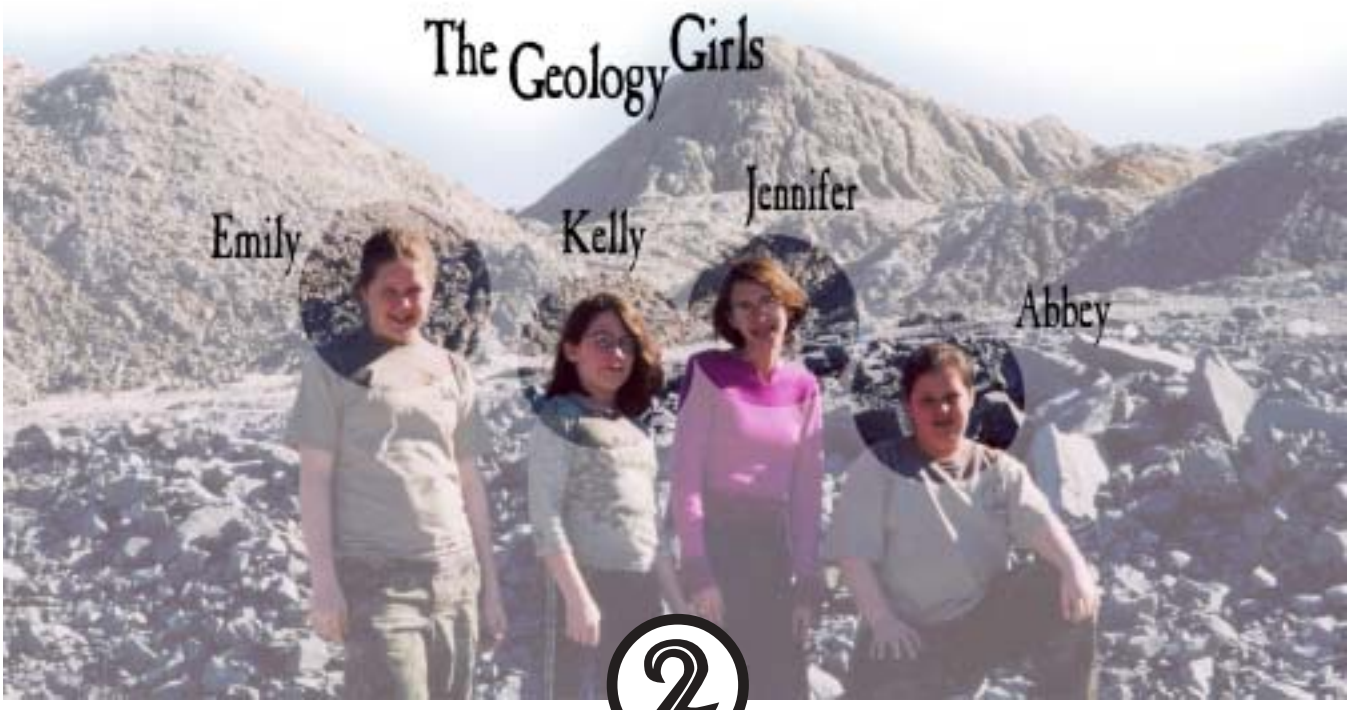
When she's not out collecting, she enjoys dance, dance, dance. There are 11-12 dancers in her class, which meets once a week.

Emily's wish is that lots of people would write articles for the Explorer newsletter. Send them to her and she'll make sure they get in the paper. Congrats Emily!

ABBEY RANDOLPH: [2003 SFMS JUNIOR-OF-THE-YEAR CANDIDATE]
Abbey's favorite minerals are diamonds and rubies. Her favorite fossils are trilobites. Her favorite place to collect is Vulcan Quarry.

When she's not out collecting, she enjoys gymnastics and dance. There are 16 dancers in her class, which meets once a week.

Abbey would like for more people to come to the MiniMAGS meetings and bring their friends. The programs are always interesting and fun. Congrats Abbey!



The First Fossils

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Buried Creatures

For any animal or plant to become a fossil, it must be buried by sand, silt, mud, or other sediments in a river, lake, pond, swamp, or other environment. Although many organisms die and decompose on the ground before burial, others are covered first and protected from totting. Burial is most likely to occur underwater, where currents can quickly move sediment over dead creatures. Land organisms can be covered by windblown sand, volcanic ash, river muds, or natural tar. If a plant or animal is buried soon after its death, its bony or wooden hard parts–bones, shell, teeth, branches–may be preserved in the enclosing sediments.

Body parts can be preseved in several ways. Burial may be quick enough or the organism's environment so hot and dry that a body is preserved nearly intact, in both its chemical composition and structure. Or the hard parts may petrify [turn to stone] when rainwater seeps into into microscopic pores thorughout the bone or wood, leaching away the original material and filling the tiny holes with harder minerals. Fossils are also preserved when a creature's body parts dissolve away completely after burial, leaving behind an empty mold in the rock. If the mold later fills with mineral matter carrying by seeping rainwater, a fossil cast is made.

An organism may leave behind only a trace of its existence. Trace fossils are preserved signs or trails, such as ancient footprints, gouges left by dragging animal tails, burrows made by worms, remains of eggs and shells, animal nests, and animal droppings. Or the traces may be of human activity, artifacts such as ancient stone tools or weapons, sometimes found with animal fossils.

Fossils known as inclusions are objects trapped in the hardened sap, or amber, of ancient evergreen trees. The inclusions may be insects, spiders, small lizards, and tiny bits of plants, preserved in perfect detail.

First Fossils

The oldest known fossils, which date back to 3.5 billion years ago, are collections of algae. Scientists believe that the sun's rays heating the earth's first oceans created ideal conditions for the growth of proteins, chains of complex chemicals, in seawater. Over time, these simple life forms developed into more complicated forms: single-celled bacteria-like algae. As they died, they fell and piled up in huge mats on the ocean floors. When fossilized, they

Worm tracks crossing ripple marks made by waves of water over sand. Illustration by Irene Guidici Ehret.

Worm burrows that churned up mud at the seashore. Illustration by Irene Guidici Ehret.

Footprints of a three-toed dinosaur. Illustration by Irene Guidici Ehret.

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formed huge beds of limestone and stromatolites, mounds of layered blue-green algae that look like cabbages made of rock. Large deposits of stromatolites were found in Canada in the Gunflint Chert, 2-billion-year-old, ocean-deposited rocks. The early atmosphere of the earth had no oxygen,a nd the blue-green algae that made up stromatolites needed no oxygen to survive. As they took energy from the sun, they digested their own food and gave off oxygen as waste. After thousands of years of countless algae constantly producing oxygen, the earth's atmosphere changed in composition. By 1.5 billion year ago, larger, more complex animals thrived n the presence of oxygen. Fossils finds in sedimentary deposits in the Ediacara Hills of Australia turned up well-preserved evidence of soft-bodied ocean animals from 670 million years ago: jellyfish, sea pens (which look like ferns), and arthropods (similar to today's crabs, lobsters, and insects).

Shells and Backbones

The first creatures of the ancient seas had no backbones, teeth, or other easily preserved parts to contribute to the fossil record, but that changed when hard-shelled creatures entered the picture 570 million years ago. Rocks deposited since that time contain abundant fossils, because more hard parts were available to preserve. Animals probably developed shells because of a change in the environment–perhaps the acidity of the sea changed. Oceans came alive with brachiopods (clamlike creatures), graptolites (wormlike animals in branched colonies), trilobites (animals with outer skeletons and jointed legs), coral, jellyfish, sea sponges, and sea anemones. Some primitive fishes developed backbones. Fossils from around 500 million years ago show that early fishes had bony plates covering their heads, rows of scales on their sides, and no fins or jaws.

Soft-bodied creatures adapted to changes in the oceans. Althought he soft-bodied survivors still left few remains in the fossil record, an important 530-million-year-old fossil deposit in Canada, the Burgess Shale, provides a glimpse of the wide variety of shaped assumed by soft-bodied creatures in those early years. Their bodies were preserved in amazing detail in the fine-grained shales, thought to have been deposited by ocean currents spilling over into nearby lagoons.

Between 400 and 350 million years ago, oxygen in the atmosphere, which had been building gradually since life

Dinosaur footprints and tailprint in the making. Illustration by Irene Guidici Ehret.

One way the soft parts of a creature may be fossilized: an insect is sealed in amber, the fossil sap from an ancient tree, from about 40 million years ago. Illustration by Irene Guidici Ehret.

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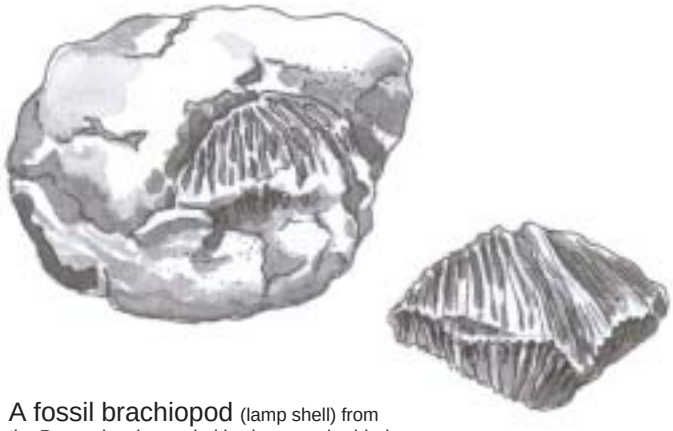

A fossil brachiopod (lamp shell) from the Pennsylvanian period is shown embedded in limestone. A similar brachiopod is shown erroded from the limestone that once held it. Illustrations by Irene Guidici Ehret.

began on earth, became abundant enough to ring the planet in a layer of ozone, much as it is today. Living things could survive out of water, protected from the sun by the ozone. Over many millions of years, as life still flourished in the oceans, some mosslike sea plants washed up onto land and took root, to become the first creatures to live on the shore. As early as 395 million years ago, amphibians appeared with lungs which enabled them to live for short periods out of water. Extensive deposits of 380-million-year-old Old Red Sandstone in Scotland and in the United States (in New York, Pennsylvania, and West Virginia) contain fossils of lobe-fin fishes, creatures with both fish and amphibian characteristics–fish scales as well as strong-boned, lobe-shaped fins. Creatures with feet, instead of lobe-shaped fins developed later.

A Great Extinction

From 350 to 250 million years ago, forests of horsetails, ferns, and cone-bearing trees spread over the land. Reptiles colonized areas farther inland than amphibians could with their more primitive lungs. Reptiles also dominated the seas and air in swimming and flying forms. Rocks deposited in the rivers, swamps, lakes, and oceans of 300 million years ago are rich in fossils of ancient reptiles, fishes, woody plants, mollusks (shellfish), coral, horsetails, land snails, centipedes, millipedes, and cockroaches.

The fossil record of 225 million years ago, however, shows a big break in the timeline. More than 90 percent of all plant and animal species died out in an extinction even larger than that of the dinosaurs 160 million years later. Many scientists believe that the mass extinction of 225 million years ago, a time of crisis for global life, was

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PETRIFIED WOOD

SPECIMEN OF THE MONTH

Petrified wood can be brown to black in color with traces of other colors. Turn the page and cut out the Specimen Card for your collection.

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due to a gradual drying of the earth's shallow seas. The shrinking of the oceans left fewer places for plants and animals to survive. Half of the species of jellyfishes, sponges, mollusks, worms, and fishes were wiped out. Only four of fifteen major groups of reptiles survived. Trilobites did not survive, nor did horned corals and many brachiopods. Overall, only about five of every hundred species remained.

Some ocean reptiles survived, responding to the great drying of the oceans by moving onto land. These new land reptiles looked somewhat like modern crocodiles– great lizardlike creatures with muscular hind legs. They also had distinctive hip joints. Some of these reptiles eventually began to walk upright–as ancestral dinosaurs.

A section of a stem of a fossil crinoid, or Pennsylvanian-age "sea lily," is shown as it once lived, attached by its stem to the ocean floor. Illustrations by Irene Guidici Ehret.

Information for this article gathered from: Rebecca Lawton, Diana Lawton, and Susan Panttaja; Illustrations by Irene Guidici Ehret; Discover Nature in the Rocks: Things to Know and Things to Do; Stackpole Books, Mechanicsburg, PA; 1997; pp 93-101. Reprinted for educational purposes under the "fair use" provision of the United States Copyright Act of 1976.

If you would like to find a copy of this book, search Amazon.com for ISBN 0-8117-2720-3.

NOTES FROM THE MEETING

Name:	Petrified Wood $SiCO_2$
Hardness:	7
Streak:	white
Crystals:	prismatic
Fracture:	conchoidal
Color:	brown to black
location:	Brilliant, Alabama

This is your newsletter. Put your name on it, and take it home with you.

Your Name _____

1. What is the name of the May Specimen-of-the-Month?

   _____

2. Cut out the specimen card and put it with your mineral specimen.

3. What is your favorite fossil? Write down a few things about it.

   _____

   _____

   _____

4. May MAGS Field Trip will be May 24-26 to Potosi, Missouri to collect druse quartz and other minerals. Sign up tonight!