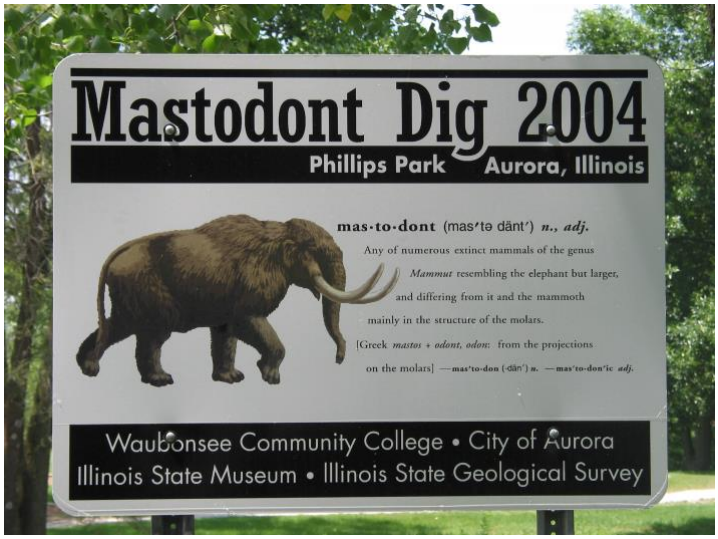


Aurora Mastodont Project

Matrix Analyses Project

Teachers Guide

Introduction

Thank you for helping us to continue our study of the mastodonts found in Mastodon Lake in Phillips Park. Aurora. You have been given a sample of the screenwash that was from the 2004 AMP. The systematic study and evaluation of the contents of this screenwash will help us to better evaluate the climate and associated fauna of the Aurora Mastodonts (if you are wondering about the extra 't', see lesson plan C4 below). In order to make the learning experience for your students more valuable, we have included several lesson plans to help you construct an entire instructional unit, if you desire.

Suggested sequence of lessons

	Core lessons	Optional lessons	Subject
C1	Pre-Assessment		Pre-assessment
O1		Geologic time	Construction and study of geologic time
C2	Ice Age		See Discoveryschool.com lesson below
C3	Glaciers		Glacier movement and how it sculpts a landscape
O2		Recipe for a Small Glacier	Using ice cream to model glacier formation & movement
O3		Pleistocene deposits	
O4		Glacial till identification	
C4	Pleistocene megafauna		Understand mammoth, mastodont, saber-tooth tiger
C5	Glacial Geology of IL		See Illinois State Museum 'Gliding Glaciers' below
O6		"The tooth is in the molars"	Study difference between molars of mastodonts & mammoths
O7		Fossils	Study of fossilization & fossils
C6	Screenwash		
C7?	Screenwash		
C8?	Screenwash		
C9	Post-assessment		Summary & finishing KWL chart

If there is ever any question, or you are in need of advice, please call or email us.

Voorhees, David H. Earth Science & Geology, Waubonsee Community College, Rt 47 @ Waubonsee Dr, Sugar Grove, IL 60554, dvoorhees@waubonsee.edu, 630.466.2783

Widga, Chris Illinois State Museum Research and Collections Center, 1011 East Ash St, Springfield, IL 62703 cwidga@museum.state.il.us

Ritter, Paul Pontiac High School, 1100 E Indiana Ave, Pontiac, IL 61764 PRitter@pontiac.k12.il.us

Acknowledgements

The AMP-MAP would not be possible without the time and energy donated by scores of volunteers involved in the 2004 excavations, as well as the students and staff at Pontiac H.S. (IL). Additional thanks to former Aurora (IL) Mayor David Stover, Jim Oliver, Paul Ritter, Brandon Curry, Jeff Saunders, Jim Pilmer, and Jane Regnier.

For Lesson C2: A lesson about the Ice Age from the Discovery Channel designed for grades 9-12, with adaptations given for younger students. This lesson plan is geared towards a life science class or unit and

will take approximately three class periods to complete. In class and out of class exercises are included. Additionally, optional Internet exercises are provided.

http://school.discovery.com/lessonplans/pdf/iceage/iceage.pdf

Note that the Illinois State Museum links have changed. Please use the following links

For http://museum.state.il.us/exhibits/ice_ages/ use
http://www.museum.state.il.us/exhibits/ice_ages/

For http://museum.state.il.us/exhibits/larson, use
http://www.museum.state.il.us/exhibits/larson/larson_top.html

For http://museum.state.il.us/exhibits/larson/env_change_extinction.html use
http://www.museum.state.il.us/exhibits/larson/lp_extinction.html

For http://museum.state.il.us/exhibits/larson/overkill.html use

For http://museum.state.il.us/exhibits/larson/cave_visit/examine_bone.html
http://www.museum.state.il.us/exhibits/larson/cave_visit/index.html

For Lesson C5: A downloadable lesson from the Illinois State Museum called 'Gliding Glaciers" is available at http://geologyonline.museum.state.il.us/tools/lessons/6.1/lesson.pdf
A useful extension to this for this project is to freeze the water in a rectangular container as described, and place on a bed of sand that is inclined with a couple of books at one end. You can set up a lamp, but it will probably melt without one. As the ice begins to melt, and the sand is wet and soupy, get an ice cube or two and place in the wet sand while the 'main glacier' is still melting. This will simulate the formation of a kettle. The depression made by the ice cube(s) will (hopefully) fill with water, just as the kettle in Phillips Park did 14,000 years ago. Mastodon Lake can then be illustrated by taking a spoon and removing a small spoonful of sand in the depression because it is an artificial lake dug by the Civilian Works Administration in the 1930's (see Lesson C6).

Other sources of lesson plans

Geological Society of America (GSA): for lesson plans on Earth Science, Earthquakes and volcanoes, Energy, Environmental Science, Geologic Time, Mapping and Geography, Paleontology and Evolution, Plate tectonics, Rocks, minerals and mining, Space science, Water and Weather and Climate
http://www.geosociety.org/educate/resources.htm

University of California Museum of Paleontology (UCMP): Lesson plans on Life has a history, Getting into the fossil record, Understanding geologic time, Stories from the fossil record, What did T. Rex taste like?, Adventures at Dry Creek, The evolution of flight, The arthropod story
http://www.ucmp.berkeley.edu/education/explotime.html

Lesson plans grouped by grade level & associated national science standards
http://www.ucmp.berkeley.edu/fosrec/Matrix.html

Discovery channel lesson on dinosaurs (many others available, linked to national standards):
http://school.discovery.com/lessonplans/programs/dinosaurdetectives/

SERC

Resources for teaching climate change
http://serc.carleton.edu/NAGTWorkshops/climatechange/recommended.html

Resources for glaciers
http://serc.carleton.edu/NAGTWorkshops/search.html?search_text=glacier&search=Go

Search for other Earth System Science resources (NASA TeachEarth program); searchable by grade level and content

http://www.teachearth.com/database.asp

United States Geological Survey (USGS) Education Resources for Secondary Grades Middle School and High School, which includes Fossils and Earth History
http://education.usgs.gov/common/secondary.htm#fossils

Illinois State Museum
http://geologyonline.museum.state.il.us/tools/lessons/

All about Mastodons
General info
http://www.museum.state.il.us/exhibits/larson/mammut.html
http://www.intersurf.com/~chalcedony/mastodon1.html
http://www.scsc.k12.ar.us/2000backeast/ENatHist/Members/SchullerL/Default.htm
http://www.sdnhm.org/fieldguide/fossils/mastodon.html
http://unmuseum.mus.pa.us/mastodon.htm
Discovery Channel Mastodon program
http://dsc.discovery.com/convergence/mastodon/mastodon.html
Mastodonts and Man (Clovis points, Kimmmswick):
http://www.greatriver.com/mastodon.htm
Mastodon State Historic Park, MO:
http://www.mostateparks.com/mastodon.htm
Mastodon vertebrae for sale:
http://www.paleodirect.com/lm15001.htm
Mastodon footprints:
http://www.exhibits.lsa.umich.edu/new/VirtualExhibits/Mastodon/Mastodon.html
Mastodon footprints:
http://www.adias-uae.com/mleisa.html
Elephants through time:
http://www.il-st-acad-sci.org/mammals/mami004v.html
Probisideans (elephants):
http://www.enchantedlearning.com/subjects/mammals/classification/Proboscidea.shtml
http://www.enchantedlearning.com/subjects/mammals/iceage/Mastodonprintout.shtm.

Mastodon finds
"Our' bones when in Aurora Museum: http://www.aocn.aurora.edu/ahs/highlights.htm
Hyde Park & Gilbert Mastodon in NY: http://www.priweb.org/mastodon/mastodon_home.html
Vassar students @ Hyde Park, NY: http://geologyandgeography.vassar.edu/mastodont.htm
Perry mastodon @ Wheaton College: http://www.wheaton.edu/Perry/start/start.html
MI state fossil: http://www.pittsfieldhistory.org/print.php?section=history&content=mastodons
Calvin College: http://www.calvin.edu/academic/geology/mastodon/calvin_c.htm
In Miss River: http://www.greatriver.com/skull.htm
Rustler Ranch, CA: http://www.museumca.org/mastodon/index.html

Book recommendation for young readers
West, Tracey, 1965, Mr. Peale's Bones. Silver Moon Press. NY. ISBN 1-893110-15-X.

"Mr. Peale's Bones" is a delightful story set in the early 19th century and focuses on a fictional set of characters intermingled with non-fictional characters. The story is about unearthing a Mastodon in upstate New York. Young Will Finch and his father are engaged in a project with Charles Wilson Peale to find the bones of a great Mastodon. Will they be found? Read the book to find out more!

Educators can use the lesson plan that goes with this book at: http://www.silvermoonpress.com/assets/PDFs/StoriesOfTheStates/TGUIDE-MrPealesBones.pdf . For book ordering information, please contact Silver Moon Press at 160 Fifth Avenue, NY, NY. 10010, 1-800-874-3320.

Resources for teaching hands-on geology (Courtesy of Kay Chwago)

Anderson, Alan, Diehn, Gwen, and Krautwurst, Terry, 1998, Geology Crafts for Kids, New York: Sterling Publishing Co, Inc.

The Audubon Society Guide to North American Rocks and Minerals, 1978, New York: Alfred A. Knopf, Inc..

Blobaum, Cindy, 1999, Geology Rocks! 50 Hands-On Activities to Explore the Earth, Charlotte, VT: Williamson Publishing Company.

Braus, Judy, ED, 1987, Geology: The Active Earth, Washington D.C.: National Wildlife Federation.

Busbey, Arthur B. III, Coenraads, Robert R., Roots, David, and Willis, Paul, 1996, The Nature Company Guide – Rocks and Fossils, San Francisco: US Weldon Owen Inc..

Cook, Deanna F., Editor, 1997, Family Fun's Crafts, New York: Disney Enterprises, Inc..

DeBruin, Jerry, 1986, Young Scientists Explore Rocks and Minerals, Carthage, IL: Good Apple, Inc..

DeVito, Alfred and Krockover, Gerald H., 1980, Creative Sciencing: Ideas and Activities for Teachers and Children, Boston: Little, Brown and Company.

Gibson, Gary, 1996, Science for Fun-Experiments, Brookfield, CT: Copper Beech Books.

Gray, Ian, et.al., 2003, Prehistoric America: A Journey through the Ice Age and Beyond, New Haven, CT: Yale University Press.

Hale, Janet A., 1992, Rocks and Soil, Huntington Beach, CA: Teacher Created Materials.

Kuntz, Margy, 1987, Adventures in Earth Science, Belmont, CA: Fearon Teacher Aids.

Robinson, Diane, 1994, Quarries: Rock Formation and Erosion, St. Louis: Milliken Publishing Company.

Schuberth, Christopher J., 1996, A View of the Past: An Introduction to Illinois Geology, Springfield, IL: Illinois State Museum.

Silver, Donald M. and Wynne, Patricia J., 1997, The Amazing Earth Model Book, New York: Scholastic, Inc..

Sussman, Ellen, 1998, Rocks and Minerals Activity Book, Dana Point, CA: Edupress.

Wiggers, Raymond, 1997, Geology Underfoot in Illinois, Missoula, MT: Mountain Press Publishing Company.

Children's literature on fossils and the Ice Age (Courtesy of Kay Chwago)

Bell, Robert A., 1991, Science Close-Up Fossils, Racine, Wisconsin: Western Publishing Company.

Brandenberg, Aliki, 1988, Digging Up Dinosaurs, New York: HarperCollins Publishers.

Brandenburg, Aliki, 1990, Fossils Tell of Long Ago, New York: Scholastic, Inc..

Bray, Edmund, Ancient Valleys, Modern Rivers: What the Glaciers Did, Minneapolis: Science Museum of Minnesota

Brimmer, Larry Dane, 2001, Glaciers, New York: Scholastic Library Publishing.

Butterfield, Moria, 1992, 1000 Facts about the Earth, New York: Scholastic, Inc..

Byles, Monica, 1990, Life in Polar Lands. New York: Scholastic, Inc..

Cerbus, Deborah Plona and Rice, Cheryl Feichtenbinder, 1996, Rocks are Everywhere, Huntington Beach, CA: Teacher Created Materials, Inc..

Chisholm, Jane, 1991, Finding Out about Our Earth, London: Usborne Publishing, Ltd..

Egan, Lorraine Hopping, 1998, Kids Discover Archaeology, New York: Kids Discover.

Fowler, Allan, 1998, Icebergs, Ice-Caps, and Glaciers, New York: Scholastic Library Publishing.

Gallant, Roy A., 1999, Glaciers, Minneapolis: Sagebrush Education Resources.

Goecke, Michael P., 2004, American Mastodon, Prehistoric Animals Set II, New York: ABDO Publishing Company.

George, Michael, 2003, Glaciers: Rivers of Ice, Creative Company.

Glaciers Change the Earth. New York: Harcourt School Publishers, 2002.

Lange, Ian., 2002, Ice Age Mammals of North America: A Guide to the Big, the Hairy, and the Bizarre, Missoula, MT: Mountain Press.

Marcus, Elizabeth, 1983, Rocks and Minerals. Mahwah, NJ: Troll Associates.

Michael, Jay, 2003, Ice Age Beasts, New York: Raintree.

Patchett, Lynne, 1994, Glaciers, Mahwah, NJ: Troll Associates.

Pope, Joyce, 1994a, Animal Homes, Mahwah, NJ: Troll Associates.

Pope, Joyce, 1994b, Animal Journeys, Mahwah, NJ: Troll Associates.

Pope Joyce, 1994c, Fossil Detectives, Mahwah, NJ: Troll Associates.

Ricciuti, Edward and Carruthers., Margaret W., 1998, National Audubon Society First Guide to Rocks and Minerals, New York: Scholastic, Inc.

Scoutter-Perrot, Andrienne, 1993, The Earth, New York: Creative Education, Inc.

Simon, Seymour, 1999, Icebergs and Glaciers, New York: HarperCollins Children's Books.

Stalker, Geoffrey, ed., 1995, The Visual Dictionary of the Earth, London: DK Publishing, Inc..

Steele, Phillip, 1997, Rocking and Rolling, New York: Scholastic., Inc..

Wood, Robert Muir, 1996, How It Works - Discovering Prehistory, London: Horus Editions Ltd..

Wyler., Rose and Ames, Gerald, 1970, Secrets in Stones, New York: Scholastic, Inc..

Aurora Mastodont Project Lesson Plan C1
Pre-Assessment and Introduction

Overview: The Ice Age was a period of time when large areas of the Earth's surface were covered with large sheets of ice. During this time period the Earth experienced an exceptionally long period of cold climate, which allowed snow to accumulate and glaciers to form. The last major Ice Age that occurred in North America happened 2 million to 11,500 years ago during the Pleistocene Period. There were three possible causes for the Ice Age: 1-Movement of the Earth's tectonic plates, 2- Reduction of carbon dioxide in the atmosphere and 3- Changes in the Earth's orbit. Many different animals lived during the Ice Age. Among the more interesting are the mastodont, the mammoth, the saber-tooth tiger, the dire wolf and the snowshoe hare. These animals have been found at several major excavation sites around North America. The remains have shown what the animals looked like and what they may have been eating. Plant remains found in the matrix reveal what the environment was like during the Ice Age. This is why going through the matrix is such an important job. It can help scientists to learn more about this period of time in our Earth's history.

Materials: Chart paper for KWL chart, paper for each student to make their own chart, internet connection to view the suggested web page:

All about Glaciers http://nsidc.org/glaciers/
Glaciers for kids http://www.neok12.com/Glaciers.htm

Proficiency Standards:
-Identify evidence and show examples of changes in the Earth's surface.
-Demonstrate an understanding of the basic needs of living things.

Academic Content Standards:
Describe how wind, water, and ice shape and reshape Earth's land surface by eroding rock and soil in some areas and depositing them in other areas producing characteristic landforms.

Goals and Objectives: The goals of this lesson are to pre-assess students by using a KWL chart to find out what they already know about the Ice Age. This will make it easier for you to plan the rest of your lessons and designate more time where it may be needed. Then you will introduce the Ice Age by telling students a little bit about it, using information from above, and by viewing the website that I have listed above that shows some pictures of glaciers.

Procedures:

1. Make a KWL chart using chart paper or something that you can keep and add to later on. This is going to be your pre-assessment of what students already know.
2. Ask each student to get out a piece of paper and have them label it with a K-W-L. Then tell students that they are going to make a list of things they already know about the Ice Age. For younger students you can do this as a class on the chart paper instead of individually.
3. Then as a class brainstorm ideas to put on the class chart.
4. Next, tell students that they are going to make a list of things that they want to know about the Ice Age. Once students have made their individual list, brainstorm ideas as a class.
5. Tell the class that when we are finished talking about the Ice Age we will make a list of things we learned in the L column.
6. Introduce the Ice Age. Using information from the overview above. Tell students enough to get them excited about the unit. Make sure you talk about how glaciers form and how they move.
7. View the websites mentioned above to see pictures of glaciers and discuss how glaciers formed and why they move. The website may be over younger children heads but the pictures of the glaciers are

really neat and get the kids interested in the topic. I just summarized the information as we viewed the webpage.

8. Wrap up the lesson by telling the class that tomorrow we will be making our own glaciers to see how they form and move.

Essential Questions: Discuss these questions as a large group or you can have students answer individually for an assessment. What was the Ice Age? What was one of the causes of the Ice Age? What are glaciers and how are they formed? These questions maybe complex for younger grades feel free to change or modify as needed.

Post Assessment: You can use the questions above as a post assessment if you feel the need. You could do it individually, in a large group or small groups and use your own observations to see if students understand up to this point.

After Tracie Walsh, C.F. Holliday Elementary, taciec@aol.com

Aurora Mastodont Project Lesson Plan 01
Geologic time line

Objectives:

Students will work in cooperative groups to create a geologic time line beginning with the Paleozoic Era.**

Materials:

one roll of adding machine tape per group
centimeter rulers
geologic time line scale
pencils

Procedures:

1. Students will convert millions of years to an appropriate scale (Suggested Ex: .5 centimeter = one million years)
2. Students will calculate the location of each Era and Period and label their appropriate dates and length on adding machine tape.
3. Students may complete any or all of the options listed below.

Options:

Students will color-code their time lines using Illinois (or their county's) geologic time scale for a key (Clinton County is attached as an example.)
Students will illustrate the time line drawing their county at the time of each period (Ex: sea, bog, ice).
Students will measure areas of their school (such as tiles in a hallway) to locate a suitable area to lay out their time lines.**

Extension:

Students will add future information studied to their time lines (Ex: key fossils or life forms, gaps in rock record, formation of coal or limestone deposits).

Indicator of Success:

Students will explain (orally or in writing) their scale and list the steps used to create their time line.

**Note: It is suggested that the teacher create a time line for the Precambrian Era. Students can attach their completed time lines to the teacher's time line to complete geologic time.

After Kay Chawgo, Beckemeyer Grade School, 110 Louis Street, Beckemeyer, IL 62219,
chawgo@accessus.net

Aurora Mastodont Project Lesson Plan C2
The Ice Age

A lesson about the Ice Age from the Discovery Channel designed for grades 9-12, with adaptations given for younger students. This lesson plan is geared towards a life science class or unit and will take approximately three class periods to complete. In class and out of class exercises are included.

Additionally, optional Internet exercises are provided.

http://school.discovery.com/lessonplans/pdf/iceage/iceage.pdf

Note that the Illinois State Museum links have changed. Please use the following links

For http://museum.state.il.us/exhibits/ice_ages/ use
http://www.museum.state.il.us/exhibits/ice_ages/

For http://museum.state.il.us/exhibits/larson, use
http://www.museum.state.il.us/exhibits/larson/larson_top.html

For http://museum.state.il.us/exhibits/larson/env_change_extinction.html use
http://www.museum.state.il.us/exhibits/larson/lp_extinction.html

For http://museum.state.il.us/exhibits/larson/overkill.html use

For http://museum.state.il.us/exhibits/larson/cave_visit/examine_bone.html
http://www.museum.state.il.us/exhibits/larson/cave_visit/index.html

Aurora Mastodont Project Lesson Plan C3
Making a Glacier

Overview: Glaciers are formed when the climate is cold for a long period of time and snow begins to accumulate. As the snow accumulates and compresses, a glacier is formed. As the snow piles on top of itself it causes partial melting at the bottom of it. This is what causes the glacier to begin to move. As the glacier moves it erodes and collects all different kinds and sizes of earth materials. It also moves over most anything in its way, eroding and flattening obstacles of various geologic materials, and changing the shape of the surface in its path. This activity will show students how glaciers help to shape the land. This might also be a good time to talk to students about how glaciers shaped the land in which they live. For example, here in Illinois, the glaciers had a huge impact. Not only did they shape the land, they also deposited clay, sand, and rock, called glacial till. It is in this material that Illinois's fertile soils developed that are great for growing almost anything. The glaciers once covered almost all of Illinois and formed the Great Lakes.

Materials: 6 large aluminum pans, a large bag of sand, 6 large rocks to act as the glacier, and 6 pitchers of water.

Proficiency Standards:
-Identify evidence and show examples of changes in the Earth's surface.

Academic Content Standards:
-Describe how wind, water and ice shape and re-shape Earth's land surface by eroding rock and soil in some areas and depositing them in other areas producing characteristic landforms.
-Describe evidence of changes on Earth's surface in term of slow processes and rapid processes.
-Observe and describe that some weather changes occur throughout the day and some changes occur in a repeating seasonal pattern.
-Investigate how water changes from one state to another.
-Identify and describe how freezing, thawing and plant growth reshape the land surface by causing the weathering of rock.

Goals & Objectives: Students will learn how glaciers form and how they shape the land using a guided inquiry lesson. Students will pretend that their rock is a glacier moving through the land changing it as it goes.

Pre-assessment: Ask students to describe how glaciers form. Do this is a large group so that students who might not already know will learn from those who do. If they don't know then you can give them some help and guide them to the right answer.

Procedure:

1. Put students into 4 groups of six or whatever arrangement is more convenient for your classroom.
2. Tell students that today we are going to see how glaciers can change the land.
3. Pass out an aluminum pan with sand in it to each group as well as a large rock.
4. This might be a good time to remind students that they need to be careful with the rocks.
5. Tell students to create several landforms in their pans. They can create mountains, valleys, lakes, or volcanoes.
6. Then, tell them that the climate in their region is beginning to change. This could be a good time to review the difference between climate (longer periods of weather) and weather (talking about weather in the short term). It is getting colder and staying colder for long periods of time. Snow begins to accumulate and glaciers begin to form. Tell students that their rock will act as the glacier.

7. Have students slowly and gently push the "glacier" through their pan. As they move throughout the pan, mountains will be destroyed, grooves will be shaped into the land. Lakes and rivers will freeze over (actually if you let your students make a small lake the water will just move around and soak into the sand.) This will show students how glaciers shape the land.
8. Once the glaciers have slowly moved through the land, collect the rocks from each group. Then tell the class that the climate is beginning to change again. Its warming up again and the glaciers are beginning to melt. Have students predict what they think will happen to the land when the glaciers melt. Students should come up with the idea that melting glaciers, which is ice, will produce large amounts of water. Students should mention the formation of lakes and rivers. This could be a good time to tell students that the Great Lakes were formed from glaciers as well as the Finger Lakes, which are found in New York.
9. To demonstrate melting glaciers, give each group a small pitcher of water and have them gently pour it into their pan. They should be able to see lakes form right before their very eyes. Tell the class that this is what happened after the glaciers melted.
10. Also, take this opportunity to discuss with the class other effects of the glaciers that could be seen in their pans. Allow each group to share one of their findings.
11. After the discussion collect the material from the groups.

Essential Questions: How do glaciers shape the land in which we live? Give me an example of how glaciers can change the land?

Post assessment: In their Science journal students can reflect on how glaciers changed the way in which we live today.

After Tracie Walsh, C.F. Holliday Elementary, taciec@aol.com

Aurora Mastodont Project Lesson Plan O2

Recipe for a Small Glacier

Overview: In this activity students will make a small glacier using ice cream. This activity will demonstrate how glaciers move and also how glacial till was deposited.

Grade Level: 2-4

Materials: Depending on the number of students you have, I had 21, you will need: 1 gallon of chocolate swirl or marble ice cream, 3 chocolate chip cookies, 1 can of marshmallow syrup, plastic lunch bag, clear bowl so that students can see the glacier move and a spoon.

Proficiency Standards:
-Identify evidence and show examples of changes in the Earth's surface.
-Evaluate a simple procedure to carry out an exploration.

Academic Content Standards:
-Investigate how water changes from one state to another.
-Identify and describe how freezing, thawing and plant growth reshape the land surface by causing the weathering of rock.
-Describe evidence of changes on Earth's surface in terms of slow processes.

Goals and Objectives: The students will use ice cream to demonstrate how a glacier is formed and moves.

Procedures:
1. Crumble the cookies and place in the bowl. They represent the glacial till.
2. Put two large scoops of ice cream on top of the cookies. Tell students that a glacier begins as clean snow. However, as it travels, it picks up dirt and rocks from the ground and becomes "dirty." The ice cream with the chocolate swirls represent the dirty glacier.
3. Place a plastic lunch bag over your hand, then slowly push down to "smoosh" the ice cream so that it oozes. Notice that the cookies stick to the ice cream. Tell students that glaciers move much in the same way. As more and more ice and snow fall on the glacier, the weight causes it to ooze, pushing the dirt in all directions.
4. Warm up the marshmallow syrup and pour over the ice cream glacier. This will show students how the glaciers moved.
5. Finally, eat the glacier and enjoy!

After Tracie Walsh, C.F. Holliday Elementary , taciec@aol.com

Aurora Mastodont Project Lesson Plan O3
Pleistocene deposits

Objective:

Students will observe the deposition of glacial materials.

Materials:

empty milk carton
pebbles or pea gravel
sand
water
dry fine silt, soil, or potting soil
9 x 12 cake pan or similar container
blow drier
safety glasses
student-generated adding machine time lines (optional)
3D Block Model of Illinois (optional, see below)

Procedure:

1. Teacher will cut top off of milk carton, place pebbles or pea gravel and sand in the bottom of container, fill with water, and freeze
2. Teacher or students will fill the cake pan with dry material.
3. Teacher or students will place one end of cake pan on a block or other object creating a slope.
4. Teacher will remove ice from carton, place the ice on top of dry material in the raised end of the cake pan, and allow it to melt in place.
5. Students will observe the results. Any material that dropped in place represents till. Any material that washed down the slope represents outwash.
6. After the material has been allowed to dry thoroughly, the teacher will apply a blow drier to the material in the pan while student observe results. The dry material which is moved by the 'wind action' represents loess. Note: Teacher and students should wear eye protection and avoid inhaling dust.

Extensions:

Students will add ice ages to their adding machine time lines.
Students will examine the bedrock valleys shown on the Shade Relief of Bedrock Surface map of the 3D Block Model of Illinois.
Students will use the key to examine Pleistocene deposits shown on the Quaternary Deposit map of the 3D Block Model of Illinois.

Indicator of Success:

Students will explain (orally or in writing) three types of Pleistocene deposits.

Adapted from *Quarries* by Diane Robinson. After Kay Chawgo, Beckemeyer Grade School, 110 Louis Street, Beckemeyer, IL 62219, chawgo@accessus.net

3D block model of Illinois: ***3-D Block Model Maps and Instructions EDX Block Model***
Maps and instructions needed to create a three-dimensional block model that shows Quaternary geology, bedrock geology, shaded relief, and cross sections of Illinois. Target: Grades 6–Adult, $10.00,order from https://shop.inrs.illinois.edu/shop-isgs.html

Aurora Mastodont Project Lesson Plan 04
Glacial till identification

Objective:

Students will work in cooperative groups to classify rocks, minerals, and/or fossils and to identify their characteristics.

Materials:

rocks, minerals, and/or fossils (7/16 – 1 ½ inch) dredged from glacial till**
books and/or posters containing rock, mineral, and fossil identifications
magnifying glasses

Procedure:

1. Students will examine characteristics of specimens.
2. Students will attempt to identify specimens by sorting by similar colors and/or textures.
3. Students will classify identified specimens as rocks (sedimentary, igneous, metamorphic), minerals, or fossils.

Extension:

Students will research uses of identified specimens.

Indicator of Success:

Students will correctly classify identified specimens.
Students will explain (orally or in writing) the identification process.

**Note: Specimens can be collected at a sand and gravel pit or at businesses that sell landscaping materials. These materials are dredged from deposits of glacial till and sorted by size.

After Kay Chawgo, Beckemeyer Grade School, 110 Louis Street, Beckemeyer, IL 62219,
chawgo@accessus.net

Aurora Mastodont Project Lesson Plan C4
Pleistocene Megafauna

Overview: Since the Ice Age was a unique period of time in our history, the animals that lived during this time were just as unique. This is because most of them died out when the climate began to change and get warmer. This lesson will focus on three major glacial animals that roamed during the Ice Age, the mammoth, the mastodont and the saber- tooth tiger. It is important to know the difference between the mammoth and the mastodon because they look so similar You can make a worksheet that can be used as an overhead to discuss some of the major differences between the two with your class using the enchanted learning site, below. Students will be curious about this topic so it is important that you can answer their questions. For younger students it might be a good idea to focus on two or three things that make the mammoth and the mastodont different from each other.

Grade Level: 2-4

Materials: Information sheets on the mastodont, the mammoth and the saber-tooth tiger from the following website: http://www.enchantedlearning.com/coloring/ (navigate to the mastodon(t), mammoth, and saber-tooth tiger) and the movie "Raising the Mammoths." Also see the Mammoth v Mastodont website from Cochise College: (http://skywalker.cochise.edu/wellerr/students/mammoth-mastodon/mastodon.htm)

Proficiency Standards- Demonstrate an understanding of the basic needs of living things.

Academic Standards- Explain that all organisms cause change in the environment where they live; the changes can be very noticeable or slightly noticeable, fast or slow.

Goals and Objectives: My goals for this lesson are for students to gain a better understanding of the mammoth, the mastodont and the saber-tooth tiger. Students will be able to describe these animals and their habitats. Students will also be able to describe several differences between a mammoth and a mastodon.

Pre-assessment: Ask students if they think animals lived during the Ice Age? Ask student if they can name any of the animals that roamed during the Ice Age? Once they have named or described several glacial animals ask students to describe what an animal might need in order to survive during the Ice Age?

Procedures:

1. Tell students that animals that lived during the Ice Age were very unique or special. They had to adapt to the cold climate and the snow. Tell students that glacial animals did not live on the glaciers. They actually lived in front of the glaciers where there was still plenty of vegetation left for food. Remind students that when the glaciers moved through an area that they destroyed everything in their path.
2. Introduce students to the animals one at a time. Going over the worksheets and answering questions.
3. Students may begin to ask you about the difference between a mammoth and mastodon. This is would be a good time to show students the mastodon versus the mammoth information sheet.
4. If available, show students clips of "Raising the Mammoth" so that students can get a better idea of what they look like. This is a great movie that should be available through your local library. I showed the whole video to my 4th grade class and feel that it would be appropriate for 3rd graders as well. For second graders it may be a little over their heads, you will have to use your own judgment.
5. Why is there an extra 't'? According to Dr Jeffrey Saunders, Curator at the Illinois State Museum, the true name should be mastodont, derived from the shape of their molars. The molars of mastodonts

are conical (see Figure 1), which helps to understand the combination of '*masto*' means nipple and '*dont*' means tooth, where the complete term would mean 'nipple tooth'.

Figure 1. Mastodont jaw and molars, Phillips Park, Aurora IL

Essential Questions: What did a mammoth, mastodont, and saber-tooth tiger look like? What was their habitat like? What did they like to eat? What is the difference between a mammoth and a mastodont?

Post assessment- Have students draw a mammoth and a mastodont. They should show at least three differences between them. Display them in the hallway for other students to see and learn from.

After Tracie Walsh, C.F. Holliday Elementary, taciec@aol.com

Aurora Mastodont Project Lesson Plan C5
Glacial Geology of Illinois

A downloadable lesson from the Illinois State Museum called 'Gliding Glaciers" is available at http://geologyonline.museum.state.il.us/tools/lessons/6.1/lesson.pdf

A useful extension to this for this project is to freeze the water in a rectangular container as described, and place on a bed of sand that is inclined with a couple of books at one end. You can set up a lamp, but it will probably melt without one. As the ice begins to melt, and the sand is wet and soupy, get an ice cube or two and place in the wet sand while the 'main glacier' is still melting. This will simulate the formation of a kettle. The depression made by the ice cube(s) will (hopefully) fill with water, just as the kettle in Phillips Park did 14,000 years ago. Mastodon Lake can then be illustrated by taking a spoon and removing a small spoonful of sand in the depression because it is an artificial lake dug by the Civilian Works Administration in the 1930's (see Lesson C6).

Aurora Mastodont Project Lesson Plan 06
The tooth is in the molars

Overview: The Ohio Historical Society and the Paleontological Research Institution both have mammoth and mastodont replica molars that you can borrow for your classroom. In Ohio please go to the following website and look for the Ice Age Ohio case history: www.ohiohistory.org/resource/teachers/ch.html. If you live in the New York area please contact the Utica Children's Museum or the Paleontological Research Institution.

If you can't get replica teeth then go to the following website to show students the difference between the teeth: http://www.150.si.edu/150trav/discover/mast.htm. If you are close to Waubonsee Community College, contact David Voorhees to borrow replicas of the molars.

Grade Level: 2-4

Materials: Mammoth molar (or image), mastodont molar (or image) and saber tooth tiger tooth.

Proficiency Standards:
-Demonstrate an understanding of the basic needs of living things.
-Identify ways in which organisms react to changing environments.

Goals & Objectives: The goal of this lesson is for students to learn the difference between a mammoth and a mastodont. One of the big differences is that their molars are very different because a mammoth was a grazer and mostly ate grass therefore their teeth were very flat. A mastodont ate twigs and branches, therefore their teeth were much sharper. Students will also learn that mastodont and mammoths were herbivores or plant eaters. They will learn that a saber-tooth tiger had different teeth as well because they are carnivores or meat eaters.

Procedures:
1. Hold up the molars and see if students can guess which animal they are from. If they don't figure it out give them a few clues.
2. Identify each tooth. It might be easier for students to see a picture of the animal to remember what they look like. They could always get out the handout from earlier on these three animals.
3. Start with the mammoth molar. Ask a student to describe the tooth to you. Ask students to take a guess (hypothesize) as to what kind of food this animal ate. Students should remember from the previous lessons that mammoths liked to eat grass. Tell students that mammoths were grazers who lived in front of the glaciers and ate the grass before it was destroyed.
4. Tell students that animals that only eat plants are called herbivores.
5. Next, hold up the mastodont tooth. Ask a student to describe this one to you and take a guess as to what they think a mastodont ate. They should remember that mastodont had much sharper teeth because they ate twigs and branches. Ask students what we call an animal that only eats plant. They should respond with the word herbivore.
6. Finally, hold up the saber-tooth tiger tooth and ask a student to use his or her own words and describe it to you. Ask them what kind of food they think this animal ate. They should remember that saber-tooth tigers like to eat meat. Tell the class that a saber-tooth would eat a mastodon if they could catch it. Also tell them that animals that eat only meat are called carnivores.
7. If you got the Ice Age Ohio Case History be sure to show students the video on the Ice Age it is very informative. If you got the teeth from somewhere else you could show your class a clip from "Raising the Mammoth."

Essential Questions: What is the difference between a mammoth and a mastodont tooth and what do they look like? What does a saber-tooth tiger tooth look like? What did a mammoth eat? What did a mastodon eat? What did a saber-tooth tiger eat? What is a herbivore? What is a carnivore?

Optional: If you are close to Phillips Park in Aurora, IL, take a field trip to the Phillips Park Visitors Center and Mastodon Gallery (http://www.aurora-il.org/operations/parksandrecreation/visitorscenter.php) to see real mastodont molars.

After: Tracie Walsh, C.F. Holliday Elementary, taciec@aol.com

Aurora Mastodont Project Lesson Plan O7a
Traces in sand

Objectives:

Students will create a 'fossil' imprint in sand.
Students will create a 'fossil' cast of imprint.

Materials:

fossils (optional)

(per child or group)

cup, tub, or carton at least 3 inches in diameter at bottom
wet sand to fill container
½ cup plaster of Paris
¼ cup water
paper or plastic cup
spoon
object to imprint such as shell, bone, or twig
magnifying glass
fossil time line or pictures identified by geologic period (optional)
student-generated adding machine time lines (from AMP lesson O1)

Procedure:

1. Students will mix plaster of Paris in cup according to the directions on box and allow it to remain undisturbed for five minutes.
2. Students will fill container with wet sand.
3. Students will press wet sand into container until firm.
4. Students will press object into wet sand making a distinct impression.
5. Students will observe impression and relate it to object.
6. Students will stir the plaster, slowly pour the mixture to fill the impression, and allow the plaster to remain undisturbed for about 20 minutes.
7. Students will remove plaster from sand, carefully remove loose sand, and allow the cast to harden completely.
8. Students will use a magnifying glass to compare the 'fossil' with the object imprinted.
9. Students will discuss how the imprint became a mold for the 'fossil' that was cast.

Extensions:

Students will compare 'fossil' with fossils found in nature.
Students will note fossils missing from rock record in Illinois.
Student will copy drawings of fossils from fossil time line (or cut pictures) and place in appropriate sections on adding machine time lines. (optional)

Indicators of Success:

Students will describe (orally or in writing) the process of imprinting and/or casting.
Students will place fossils in correct period on adding machine timelines.
Students will note (orally or in writing) fossils missing from rock record in Illinois.

Aurora Mastodont Project Lesson Plan O7b
Imprints in time

Objective:

Students will create a 'fossil' imprint in plaster.

Materials:

fossils (optional)

(per child or group)

- cub, tub, or carton at 3 inches in diameter at bottom
- 1 cup plaster of Paris
- ½ cup water
- paper or plastic cup
- spoon
- object such as shell, bone, or twig
- petroleum jelly
- magnifying glass
- fossil timeline or pictures identified by geologic period (optional)
- student-generated adding machine time lines (optional from AMP lesson O1)

Procedure:

1. Students will mix plaster of Paris in cup according to directions on box and allow to remain undisturbed for five minutes.
2. Students will stir the plaster and pour it into container.
3. Students will coat object with petroleum jelly.
4. Students will place object in plaster and allow it to remain undisturbed for about 20 minutes (this time may be adjusted if plaster hardens more quickly).
5. Students will carefully remove object from plaster and allow plaster to harden completely.
6. Students will use magnifying glass to compare 'fossil' impression to object imprinted.

Extensions:

Students will use magnifying glass to compare 'fossil' impression to fossils found in nature.
Students will create a story explaining what made the 'fossil'impression.
Students will copy drawings of fossils from fossils time line (or cut pictures) and place in appropriate sections on adding machine time lines. (optional)

Indicators of Success:

Students will describe (orally or in writing) the process of imprinting.
Students will place fossils in correct period on adding machine timelines.
Students will note (orally or in writing) fossils missing from rock records in Illinois.

Adapted from *FamilyFun's Crafts* by Deanna F. Cook, Ed.. After Kay Chawgo, Beckemeyer Grade School, 110 Louis Street, Beckemeyer, IL 62219, chawgo@accessus.net

Aurora Mastodont Project Lesson Plan C6
Sorting screenwash samples

Overview

AMP 2004

The Aurora Mastodont Project in 2004 was a joint collaboration between Waubonsee Community College, the City of Aurora, the Illinois State Museum, and the Illinois State Geological Survey. Our goal was to recover additional mastodont remains to improve the scientific understanding of the mastodonts environments in which they lived.

Mastodon Lake in Phillips Park (the star in Figure 1) is within a kettle that is in glacigenic sediments of the Wisconsin Episode in Northeastern Illinois. Phillips Park is east of the Elburn Complex and west of the Minooka Moraine.

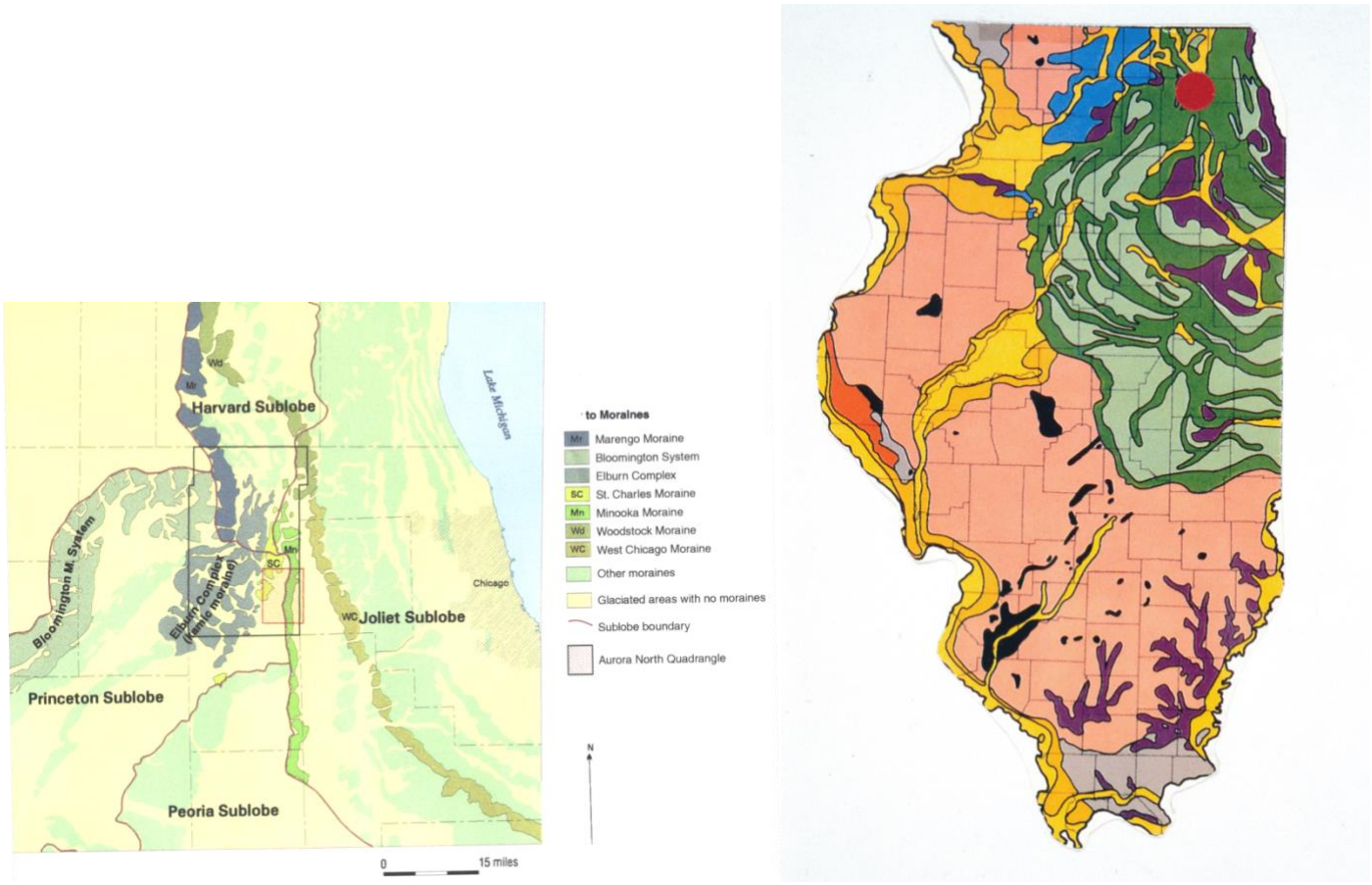


Figure 1. Location of Phillips Park in Northeast Illinois (after Curry, 2001)

Mastodont bones found

555 men working for the Civil Works Administration (1933—1935) with picks and shovels dug a municipal lake, when they uncovered remains of several extinct animals 4 to 7 feet below the ground surface in marl. Bones of American mastodont (*Mammut americanum*) and giant beaver (*Castoroides ohioensis*), trumpeter swan (*Cygnus buccinator*), Virginia deer (*Odocoileus virginianus*), and elk (*Cervus elaphus*) were revovered. The mastodont remains included 3 skulls, 3 tusks, a lower jaw, a femur, a scapula, and an articulated series of neck and chest vertebrae. Many of these mastodont bones are currently on display in the Phillips Park Visitors Center and Mastodon Gallery. Verbal history of the CWA project includes stories that at least 1 mastodont skull was uncovered and then reburied.

The American Mastodont (*Mammut americanum*) is an extinct member of the same order (*Probiscidea*) of today's Asian elephant (*Elephas maximus*) and African elephant (*Loxodonta Africana*). It is similar in size to today's elephants, but smaller than mammoths. The major differences between mastodonts and mammoths are that mastodonts have a broad and flat skull, simple "straight" tusks, and conical molars. In fact the term *mastodont* literally means "*nipple tooth*" in Greek. A more accurate name is *mastodont,* although that is commonly (and not incorrectly) simplified to *mastodon*.

Aerial photograph of Mastodon Lake, named in honor of the mastodont remains found by the CWA. The bones found in 1933 were located along the eastern shore (right) of what is today Mastodon Lake. The dark line indicates the interpreted shoreline of the original lake during the Late Pleistocene.

Figure 2: Aerial photograph of Mastodon Lake and Phillips Park Kettle (Joyce, 2004, personal communication)

What happened in the 2004 Aurora Mastodont Project?

- Geologic survey of Phillips Park, including coring, trenching, GPR, and resistivity surveys,
- Coffer dam built, lake bottom (~24 m^2) dewatered and Modern muck removed (Figure 3)
- Excavation grid established and surveyed (Figure 4)
- Systematic excavation of 10 m^2 (Figure 5)
- Paleoecological analyses of macrofossils and gastropods (available upon request)
- Radiocarbon dating of selected wood and molar dentin (see stratigraphic column)
- Mapping and recovery of vertebrate remains
- Over 250 gallons of screenwashed matrix (Figure 6)

Figure 3. Jim Oliver surveying the newly drained Mastodon Lake behind the coffer dam.

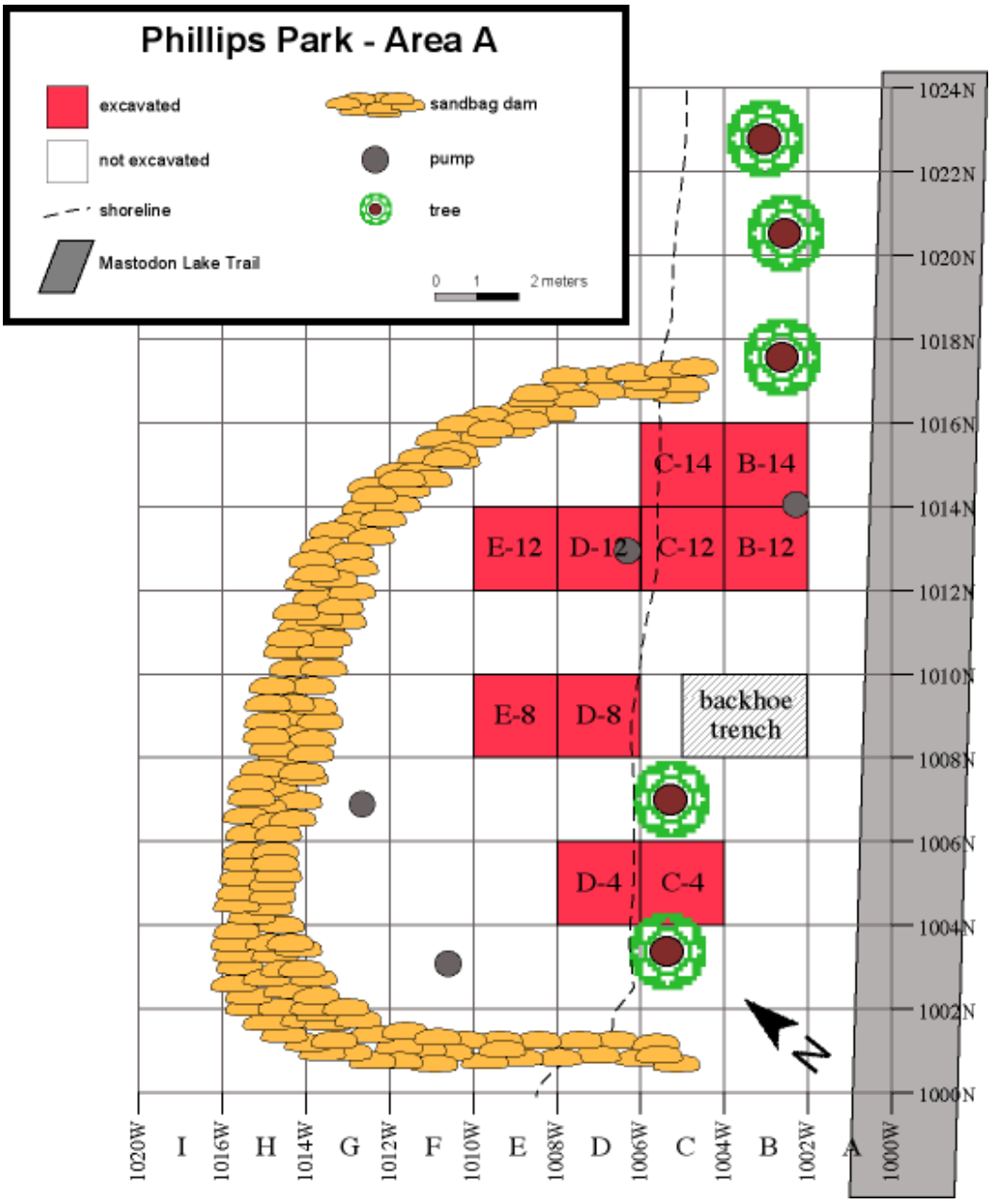


Figure 4. Excavation grid that was established for AMP 2004.

Figure 5: Ongoing excavation in squares B14, B12 (with prominent walls in photo), C14 and C12. B14 and C14 are on the left of the photo and B12 and C12 are on the right of the photo, which is looking southeast. Mastodon Lake is behind the photographer.

Figure 6: ___ showing the technique of screenwashing the marl from the dig site to Wade Lehew.

<u>Required materials:</u>
Bag of screenwash (dirt)

large sheet of paper
tweezers
sharpie
Ziploc Bags (varied sizes)
Poly tubs(gastropods)

Split into Groups of 2-3 students

1. Record the matrix bag information on the log form. This includes the location the sample was acquired (in 3D space) as well as when it was excavated and who excavated it. Measure the initial volume of the sample by dumping the sample into a plastic bucket and record the measurement to the nearest 0.1 liter. Look at the stratigraphic drawing. What geological unit did this sample come from? When was it deposited?

2. Lay the paper on the table and scoop ~1 cup of matrix (dirt) onto the paper. Use the tweezers to move the matrix across the paper (grain by grain). Keep an eye out for plant remains, snails, bone fragments, etc. Sort these materials out into separate piles. Repeat the process until you are finished with the bag.

3. Measure the volume of each class of materials. Record these numbers on the log form.

4. Each class of material will be stored in a separate Ziploc bag or plastic tub. Ziploc bags are for plant remains (i.e. BOT samples), bone fragments, and possible artifacts. Choose an appropriate size for your sample, label with all of the sample information, and dump your sample into it. Since gastropods (snails) are so fragile, choose a tub or vial that is approximately the size of your sample, cover the bottom with a paper towel for padding, dump your sample in and label accordingly. This is how the materials you have sorted will be permanently stored.

<u>An example of a label</u>
(this is only an example, your label will be copied from the bag you are sorting)

C-4	(Unit number)
97.8-97.7	(elevation)
7/16/04	(date excavated)
SNAILS	(material)

Label the bags and jar with the material class as follows:
Bag of Rocks: ROCK
Bag of Macrobotanical samples=BOT
Bag of Faunal remains=BONE
Bag of Possible artifacts=ARTI
Bag of Charcoal=CHAR
Bag of Slag=SLAG
Tub of Gastropods=SNAILS

4. When you have finished sorting and recording the data from all of your matrix samples, enter the logged data into an Excel spreadsheet. Combine the volumes and weights of samples that have the same location information (i.e., level). Plot changes in different materials by depth.

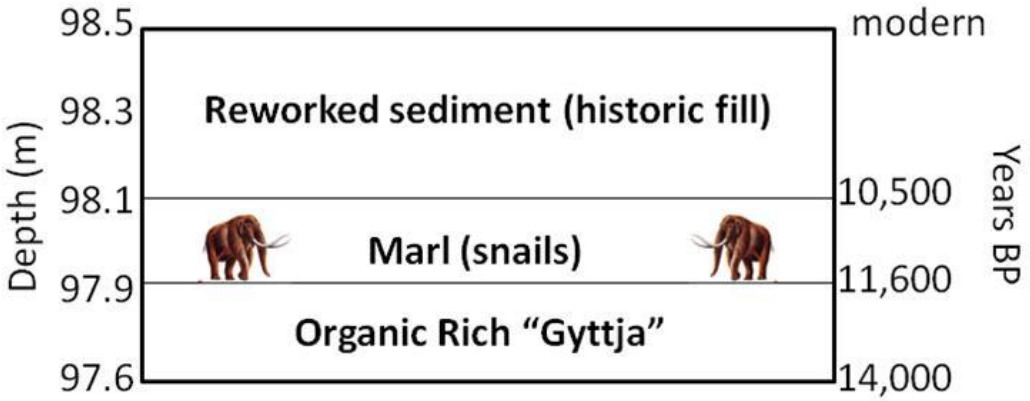
<u>Vocabulary</u>
macrobotanical: plant remains that are visible to the un-aided eye
matrix: the dirt that encases the fossils
marl: carbonate rich lake-bottom sediment, lots of snails

gyttja: fine-grained, organic-rich, lake-bottom sediment. It contains fewer snails (carbonate) than marl and much less quartz, feldspar, and clay minerals (i.e. silicate minerals) than silt.

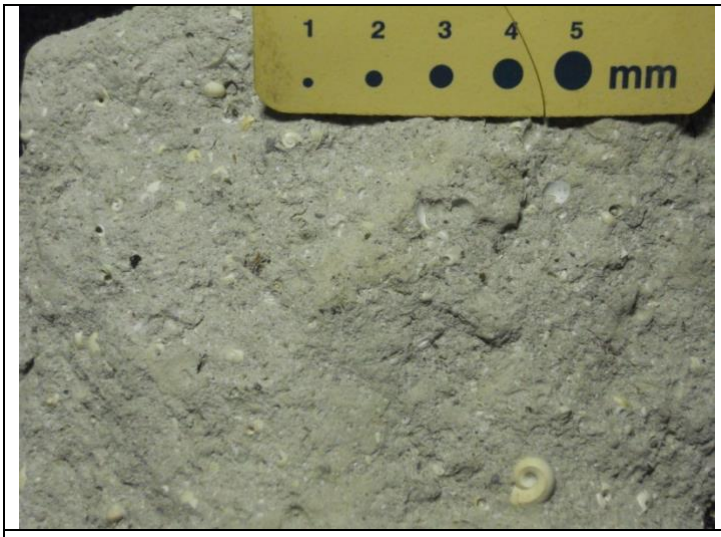
chipped stone flake: usually made of siliceous material such as chert, petrified wood, etc. Has breakage pattern illustrating high impact fracture (smooth, tapering underside, striking platform, etc.)

gastropod: snail

Slag: metallic by-product of smelting ore to separate the metal fraction from the unwanted fraction, or as is often the case in central Illinois, a by-product of burning coal to heat homes.



Photos of what you should see (except unwashed marl at top left)



Unwashed marl

Marl after screenwashing

Snails only after processing

Slag only after processing

Rocks and marl (top) after processing

Macrobotanical after processing

	
Large sample of slag	Pieces of vegetation (wood, stems, seeds)
Chipped stone flake	

References

Curry, B. B., 2001, Surficial Geology Map, North Aurora Quadrangle, Kane and Du Page Counties, Illinois: Illinois State Geological Survey, Illinois Geological Quadrangle Map, IGQ Aurora North-SG, 1:24,000

Haynes, Gary, 1991, Mammoths, mastodonts, and elephants: Biology, behavior, and the fossil record, Cambridge University Press, 413 p.

Killey, Myrna M., 1998, Illinois' Ice Age Legacy, Geoscience Education Series 14, Illinois State Geological Survey, 66 p.

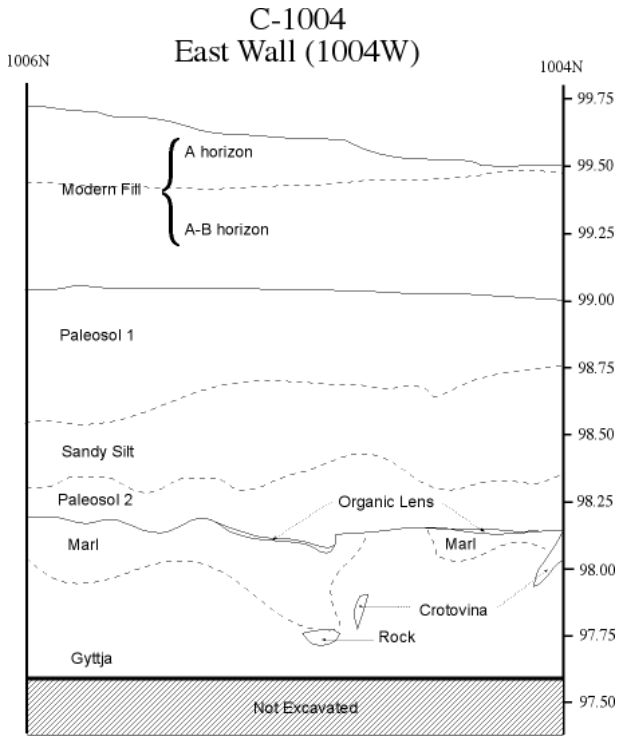
Lange, Ian M, 2002, Ice Age Mammals of North America: a guide to the big, the hairy, and the bizarre, Mountain Press Publishing, 226 p.

Olsen, Stanley J., 1979, Osteology for the Archaeologist, Vol 56, No. 3 The American Mastodon and the Woolly Mammoth, Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA.

Saunders, Jeffrey John, 1977, Late Pleistocene Vertebrates of the Western Ozark Highland, Missouri, Illinois State Museum Reports of Investigations No. 33, 118 p.

Stratigraphic Column
Phillips Park
Aurora Mastodont Project – 2004

Unit	Thickness (m)	Description	Notes
Fill	0.1 to 1.1	Mix of black earth, marl, till, bricks, slag, bottles & clay pidgeons	
Paleosol 1	0.4	black clay loam (occasional vertebrate)	Not seen under dewatered lake
Sandy silt	0.25	dark grey sandy silt with tan sandy silt lens	Not seen under dewatered lake
Paleosol 2	0.1 to 0.4	black clay loam with organic rich lens at base	Not seen under dewatered lake
Marl (Grayslake Peat)	0.3 to 0.7	grey silt with abundant freshwater snails, some turtle, some fish; mastodont material recovered in 1930's	Top marl 11520 +/- 90 (wood) (13280 +/-120 cal; yr BP) Mastodont M3: 10980 ± 60 RCYBP (ISGS-A-0548) on dentin 10430 ± 40 RCYBP (ISGS-A-0545) on enamel.
Gyttja (Grayslake Peat)	1 (+/-)	grey silty clay with some freshwater snails, some fish; mastodont material?	Middle gyttja 13710 +/- 70 (wood) (17120 +/-150 yr BP) Base gyttja 14130 +/- 70 (wood) 17480 +/- 180 cal yr BP)
Lake mud (Equality Formation)	?	blue-green clay with no fossils	



Post-Assessment and Project

Based on lesson by Tracie Walsh, C.F. Holliday Elementary, Ohio (taciec@aol.com)

Overview: Students will finish their unit on the Ice Age by finishing the L part of their KWL chart and by beginning a project based on everything they learned. The projects can be done as a group or individual, it is up to you. I had my students work alone and they had to present it to the class in a two-minute presentation. By sorting through a sample of AMP screenwash collected from around the bones of a mastodont students will be able to create a picture of Ice Age life.

Grade Level- 2-4

Materials: Individual KWL chart and class KWL chart, scrap paper for students to brainstorm ideas and post board for their final product.

Goals & Objectives: Students will complete the KWL chart individually and as a class. Students will answer several of my own questions to see what they learned about the Ice Age. Students will create a picture of what it was like when the mastodonts roamed Illinois based on what they found in the screenwash.

Procedures:

1. Begin by passing back each students KWL chart. Ask them to find the L part of the chart and number it 1-13. Ask the questions at the bottom of the page. For younger students you might want to only ask a few of these questions in a group. Then allow students 10-15 minutes to fill in what they learned part of the KWL chart. Remind them to try and answer their own questions in the W part of the chart.
2. Then call them to attention and complete the class chart using their ideas. I think you will be amazed at all the things they learned from this unit. Because they are active learners they really pick up the information and remember it.
3. Tell the class that they have one more thing to do before they finish studying the Ice Age. They are going to put together a final project.
4. Their project is to draw a picture of what Illinois was like 12,000 years ago when the mastodonts roamed the Earth. If they could go back in time what kind of other animals and plants would you see?
5. Tell students that they will be provided with poster board to put their final product on and that they will have to present it to the class in a two-minute presentation.
6. Pass out the scrap pieces of paper so that students can get started.

Allow them at least 2 days to complete their posters and one day to present.

Post-Assessment Questions:

Glaciers:

1. How they formed?
    a. Accumulating snow and cold temperatures for a long period of time.
2. How they moved?
    a. As the snow piles up and gets heavy it begins to move.
3. How they changed the shape of the land?
    a. Students can give examples like the Great Lakes or the Finger Lakes. Or they can describe how they moved through and leveled everything, changing the land.
4. How big were they?
    a. In Illinois they covered most of the state. They were up to one mile thick near Chicago.

5. What caused them to melt?
    a. Warmer temperatures.
6. How long ago was the last Ice Age?
    a. It officially ended 10,000 years ago, but IL was ice-free (ice was only in Lake Michigan) by about 13,000 years ago. Aurora and Phillips Park was ice-free about 17,000 years ago.

Mammoth & Mastodont:

1. What are the differences between a mastodont and a mammoth?
    a. 2 differences-check out the Mammoth versus the Mastodont information sheet for possible answers.
2. Where they lived during the Ice Age?
    a. They lived in front of the glaciers.
3. What they both liked to eat?
    a. Mastodont-twigs and branches, Mammoth-grass and leaves
4. Describe the shape of their teeth-
    a. Mammoth-flat Mastodont-sharp
5. Why did they become extinct?
    a. Warmer temperatures and/or humans over-killing them