The Science Museum ROCKS!

EDUCATOR’S GUIDE–Middle/Junior High
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IN THIS GUIDE
This self-guide will help your students explore exhibits which include geology throughout the Museum. The Science Museum Rocks! Guide looks at paleontological specimens and information in the Dinosaurs and Fossils Gallery, seismic information in the Atrium, rocks and minerals of Minnesota in the Collections Gallery, and rocks, landforms, ancient environments, and fossils of the Mississippi River valley in the Mississippi River Gallery.

HOW TO USE EXPLORATIONS
• Components are not sequential. You can start anywhere in the exhibit.
• Visit the museum before your field trip. The Science Museum offers a free ticket for school employees to preview the museum. Call 1-800-221-9444 or (651) 221-9444 for details.
• Visit the museum’s website to get an overview of the museum. (www.smm.org)
• Share the floor plans from the website with your students. If you need a copy of the floor plans, please contact us: maija@smm.org or 651-221-4554.
• Review with your students:
  — the schedule of your trip
  — curriculum connections
  — behavior expectations
  — activities to be completed at the museum or when you return to school
• Provide copies of the student pages and chaperone page for your chaperones.
CONNECTING WITH THE CLASSROOM

Before Your Visit

Review student activity pages with your students. (You can use the “Special Bulletins” for extra credit.)

Pre-trip Activity: Fossil Evidence?
Important characteristics of animals are not often preserved as fossils. Paleontologists reconstruct ancient organisms and environments based on a variety of evidence and logical reasoning. Scientists may construct mental or physical models to test evidence.

Materials: Non-fiction books and/or videos that focus on a single kind of modern animal.

After students read a book about a modern animal (for example, elephants), ask them to compile a list of physical characteristics and behaviors about that animal. Students might mention the elephant’s intelligence, good memory, protective mothers, long and highly sensitive trunk, large ears that are used to dissipate heat, a juvenile elephant’s sensitive skin, and the aggression shown by adults when threatened.

The data can be organized into different categories such as behavioral or skeletal and so on. Select from the large list the top ten items that the class feels are significant about elephants.

Finally, discuss with students, or ask students to respond in a journal or as a written assignment:
—What characteristics would be known if humans had never encountered a living elephant and the only thing we had to analyze were the fossilized bones of extinct elephants?
—Would the fossil evidence illuminate the student’s ten most important aspects of elephants?
—How do paleontologists know the important characteristics about extinct animals?
—Brainstorm adaptations modern animals show which give clues about the environment. E.g. webbed feet on animals which live in water; teeth shapes indicate food animal eats.

—What other, non-animal evidence, would give clues about the lives of extinct animals?
—What questions do you have about the way paleontologists reconstruct ancient environments?

Back in the Classroom

Review student activity pages and teacher answer key. (Page 11)

Ask students to find puns in the student pages, research correct spelling and meanings, as related to Earth Science and use as spelling/vocabulary words:
- E.O. Sien = Eocene, about 55.5–34 million years ago
- Oligo Scene= Oligocene, about 34–24 million years ago
- Si Dio = Silicon dioxide, chemical composition of the mineral quartz
- Lillie Dhael= Lilydale, Harriet Island Regional Park in St. Paul, a great place to look for fossils!

Ask students to collect news stories related to your earth science or geology-related curriculum. Are the stories complete? How do they compare with textbook information?

Students can extend the museum activities by writing news stories in the same formats as the newspaper. One activity is suggested in the guide itself (Weather Report—145 million years ago). Using notes collected at the exhibits, students can review contemporary weather reports and forecasts, then write one for Jurassic times, based on the evidence seen at the museum.

Try other writing exercises based on newspaper formats:
—Writing new, newspaper-style headlines for sections of the textbook or other class readings
—Writing up science notes in newspaper format, with headline and word limit
—Compare a magazine to a newspaper or a newspaper website, ask students to define parts of a magazine or news website, and create a class magazine or news website with earth science topics.
MINNESOTA ACADEMIC STANDARDS

The Science Museum of Minnesota provides a field trip that allows teachers and students to reinforce Academic Standards. Use of the materials in this The Science Museum Rocks! Explorations will help you link learning experiences to the following content standards.

**Science**

**Grade 7**

*Nature of Science and Engineering*

7.1.1.2.3 Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation).

7.1.1.2.4 Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations.

*Life Science*

7.4.3.2.1 Explain how the fossil record documents the appearance, diversification and extinction of many life forms.

7.4.3.2.2 Use internal and external anatomical structures to compare and infer relationships between living organisms as well as those in the fossil record.

7.4.3.2.4 Recognize that extinction is a common event and it can occur when the environment changes and a population's ability to adapt is insufficient to allow its survival.

**Grade 8**

*Nature of Science and Engineering*

8.1.1.1.1 Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.

8.1.1.2.1 Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.

8.1.3.3.1 Explain how scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations.

*Earth Science*

8.3.1.3.1 Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates.

8.3.1.2.1 Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering, erosion and deposition of sediment.

8.3.1.2.2 Explain the role of weathering, erosion and glacial activity in shaping Minnesota's current landscape.

8.3.1.3.1 Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.

8.3.1.3.2 Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks.

8.3.1.3.3 Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock.

8.3.1.3.4 Recognize that land and water use practices affect natural processes and that natural processes interfere and interact with human systems.

**English –Language Arts**

**Reading Benchmarks: Informational Text 6-12**

(Common Core Reading Standards for Informational Text 6–12)

**Grade 6 - 8**

6.5.8.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.

7.5.8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.

8.5.8.8 Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.

**Writing Benchmarks 6-12**

(Common Core Standards 6–12)

6.7.1.1 Write arguments to support claims with clear reasons and relevant evidence.

a. Introduce claim(s) and organize the reasons and evidence clearly.

b. Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.

7.7.1.1 Write arguments to support claims with clear reasons and relevant evidence.

a. Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.

b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
8.7.1.1 Write arguments to support claims with clear reasons and relevant evidence.
   a. Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
   b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.

Reading Benchmarks: Literacy in Science and Technical Subjects 6–12
6.13.8.8 Distinguish among claims, evidence, reasoning, facts, and reasoned judgment based on research findings, and speculation in a text.
6.13.9.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
9.13.9.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Writing Benchmarks: Literacy in History/Social Studies, Science, and Technical Subjects 6–12
6.14.1.1 Write arguments focused on discipline-specific content.
   a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
   b. Support claim(s) with logical reasoning and relevant, accurate data and credible evidence that demonstrate an understanding of the topic or text, using credible sources.
9.14.1.1 Write arguments focused on discipline-specific content.
   a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
   b. Develop claim(s) and counterclaims fairly, supplying data and credible evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns.

6.14.8.8 Gather relevant information from multiple data, print, physical (e.g., artifacts, objects, images), and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
9.14.8.8 Gather relevant information from multiple authoritative data, print, physical (e.g., artifacts, objects, images), and digital sources using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

RESOURCES
Minnesota geology resources for teachers, some free: http://www.dnr.state.mn.us/lands_minerals/index.html
Self-guided fossil hunting field trips to Lilydale-Harriet Island Regional Park, across the Mississippi River from the Science Museum of Minnesota: reservations and permits for a small fee are required to collect fossils. Contact Rita Aguirre at the City of St. Paul, 651-632-5111. Capacity is limited, reserve early.
**CHAPERONE PAGE**

**Trip Tips**

⭐ The Science Museum Rocks! guides students to exhibits which include geology throughout the Museum.

⭐ **IMPORTANT:** Remind your group they must stay with you as they move from level to level.

**Dinosaurs and Fossils Gallery**  Level 3
Fossils of all kinds. Some fossils are near the stairs to Level 4, outside the gallery. Look for signs with **Step back X Million Years Ago** at the top to guide students.

**Atrium**  Level 3 next to Chomp and the Dinosaurs and Fossils Gallery
The giant Seismophon sculpture of red tubes plays notes based on earthquakes and other earth tremors read from Internet information

**Collectors’ Corner**  Level 5
Rocks and minerals of Minnesota are in the area near the Collectors’ Corner.

**Mississippi River Gallery**  Level 5
Rocks, landforms, ancient environments, and fossils of the Mississippi River valley

Questions are designed to allow some exploration. Finding the right answer is not as important at looking for the right answer. Encourage your group to work together to decide how to answer the questions. Students should make drawings as indicated.

If students are stuck or can’t find something, ask any staff member in a blue vest or apron.
Paleontologists learn about prehistoric plants, animals and environments by studying fossils. Step back in time and discover how North America has changed over time by looking at our imaginary newspaper.

**DINOSAURS AND FOSSILS GALLERY–LEVEL 3**

**Tip:** In this gallery, look for the small yellow rectangles in the corner of the labels for the names and age of the fossils. Look for large floor signs with 145 million years ago, 70 million years ago, 50 million years ago, 30 million years ago at the top.

**145 Million Years Ago**

- Area starts just outside the gallery

As a reporter for *The North American Times*, take some notes for a weather report for 145 million years ago, based on the exhibits and written information about plants and animals in this area. Write your weather report when you get back to school.

**Notes:**

Find plants and animals who lived in this subtropical North American world

1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
6. __________________________

**News Flash!**

“You’re not in Kansas anymore!” A giant fish has been sighted in the huge warm sea, in the area which one day will be known as North America.

**70 Million Years Ago**

- Area is outside of gallery

Illustrate this news flash.

Name of fish __________________________

What other animal might you find in this sea?
Editorial

by E.O. Sien

As I survey the world of 50 million years ago, I believe that the environment will become extremely cold and rainy in the next few years. The warm seas will freeze and huge snowdrifts and glaciers will cover the land any day now. No animals will be able to live here! What a disaster!

50 Million Years Ago

Under the fish mobile in the gallery

What do you say? Does Sien’s prediction describe this environment of 50 million years ago?

_____Yes  _____No

Explain by using evidence from this part of the Science Museum gallery:

The Oligo Scene

All the news from 30 MYA!

Looks like winter’s coming, but it won’t be too cold.

30 Million Years Ago

Near the entrance to the gallery

List three animals found during this time.

1.)______________________________________

2.)______________________________________

3.)______________________________________

Circle one you think is like an animal alive today.

Describe what you think the environment was like. Is the headline above correct?

Include some evidence you see in the exhibits to support your description.

Could a human really have written this editorial 50 million years ago? Why not?

(Read the labels to check your hypothesis.)
Look at the field camp miniature scene (diorama).
Describe what it would be like if you were working with the crew in this scene.

List tools you see that you would use if you were a paleontologist.

The paleontologists found evidence of an ancient environment very different than 20th century North Dakota. Turn around and investigate the North Dakota of 60 million years ago. Check off all of the plants and animals you find in the crocodile pool, forest understory, and ancient lake.

- Crocodile
- Soft-shelled turtle
- Butterfly
- Primate
- Snake
- Snapping turtle
- Dragonfly
- Condylarth
- Ginko
- Oak Tree
- Lily pads
- Champsosaurs
- Amphibian
- Cypress
- Lizard
- Alligator
- Ptilodus
- Bird
- Fern

Choose one of the organisms you found and find out one thing about it:

Draw a picture of it here.

EARTHQUAKE!

Seismofon in Atrium
In the last 72 hours, there has been an earthquake. Where was it located? (Give the latitude and longitude, time and date of the seismic activity.)
Music Review

Minnesota's Favorite Rock Groups
It's hard to pick the best of the hottest groups, but critics agree they all have their special qualities. Here's your chance to experience the top three talked about groups of the year!

- Explore the drawers near Collectors' Corner

<table>
<thead>
<tr>
<th>Choose one from each group</th>
<th>Write 2 words to describe your choice</th>
<th>Where in Minnesota is it from?</th>
</tr>
</thead>
<tbody>
<tr>
<td>igneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>metamorphic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sedimentary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Check this out!

Lake Superior's North Shore Rocks!
Few groups can top the depth and versatility of the rocks found here.

What do these rocks have in common?
Travel Section Special  Visit the Gorge to See Fossils and Rocks

Visitors to the Mississippi River near St. Paul are in for a special treat declares Lillie Dhael, travel director for The Gorge. “We have layers of sedimentary rocks here like you wouldn’t believe! Why, we have sandstone, limestone, and two kinds of shale! It is hard to believe that just 400 million years ago, this was all a warm, shallow sea. Think of all the tourists we could have had then! But we welcome travelers here now. We hope they visit the Science Museum right here on the river bluffs, because it is a good place to learn about the River.”

Dig down! Match each sediment with the Mississippi River Valley rock it became. Fill in the blanks—the first one is done for you. Hint: Check the wall label for more information.

<table>
<thead>
<tr>
<th>sediment</th>
<th>rock</th>
</tr>
</thead>
<tbody>
<tr>
<td>mud</td>
<td>shale</td>
</tr>
<tr>
<td></td>
<td>limestone</td>
</tr>
<tr>
<td>mud</td>
<td>sandstone</td>
</tr>
</tbody>
</table>

Draw and name one fossil found within these rock layers.

Name of fossil________________________________ Where was it found?_____________________

It lived__________________ years ago.
Special Bulletin

Visitors to Science Museum Discover Change Over the Last 11,700 years

The remains of a **wooly mammoth** lie under large pictures of the riverfront outside the museum. Three views show how it has changed over time.

Lillie Dhael, travel director for The Gorge, says “I can’t believe how much this place has changed! There must be at least two things in each time period which are not in the others.”

List two things for each picture which do not occur in the other scenes.

<table>
<thead>
<tr>
<th>11,700 years ago</th>
<th>in 1873</th>
<th>in 1999</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</table>

What is one thing which remains the same?

What happened to the large waterfall?
Paleontologists learn about prehistoric plants, animals and environments by studying fossils. Step back in time and discover how North America has changed over time by looking at our imaginary newspaper.

**DINOSAURS AND FOSSILS GALLERY–LEVEL 3**

**Tip:** In this gallery, look for the small yellow rectangles in the corner of the labels for the names and age of the fossils. Look for large floor signs with 145 million years ago, 70 million years ago, 50 million years ago, 30 million years ago at the top.

**145 Million Years Ago**

Area starts just outside the gallery

As a reporter for The North American Times, take some notes for a weather report for 145 million years ago, based on the exhibits and written information about plants and animals in this area. Write your weather report when you get back to school.

Notes:

*Specimens on display, illustrations, and text on labels all indicate a warm, moist climate. The weather would not include snow, ice or sleet.*

Find plants and animals who lived in this subtropical North American world

*Stegosaurus, triconodont, Diplodocus, cycads, Camptosaurus, Allosaurus, Apatosaurus*

*The environment was warm and wet. There were no grasses or flowering plants yet.*

**News Flash!**

“You’re not in Kansas anymore!” A giant fish has been sighted in the huge warm sea, in the area which one day will be known as North America.

**70 Million Years Ago**

Area is outside of gallery

Illustrate this news flash.

*Name of fish Xiphactinus*

What other animal might you find in this sea?

*Mosasaur, Plesiosaur, sea turtles, aquatic relatives of modern lizards are some mentioned in the label. The student should research the hypothesis they generated. What evidence has been found to support their hypothesis?*
Editorial

by E.O. Sien

As I survey the world of 50 million years ago, I believe that the environment will become extremely cold and rainy in the next few years. The warm seas will freeze and huge snowdrifts and glaciers will cover the land any day now. No animals will be able to live here! What a disaster!

50 Million Years Ago

Under the fish mobile in the gallery

What do you say? Does Sien’s prediction describe this environment of 50 million years ago?

___ Yes ___ No

Explain by using evidence from this part of the Science Museum gallery:

Sien’s comments are not supported by the many fish fossils in this area. They indicate water resources were available, so at least a temperate climate existed there. The label indicates that this area was tropical or subtropical, but somewhat dryer with vast freshwater lakes and river systems replacing the warm seas of 70 million years ago.

Could a human really have written this editorial 50 million years ago? Why/why not?

No. Humans were not around yet!

The Oligo Scene

All the news from 30 MYA!

Looks like winter’s coming, but it won’t be too cold.

30 Million Years Ago

Near the entrance to the gallery

List three animals found during this time.

Camel, rodent, rabbit, tortoise, horse (mesohippus), creodont (a carnivore), the pig-like entelodont, sheep-sized hoofed oreodont, saber-tooth cat, titanother, leptomeryx.

Circle one you think is like an animal alive today.

All of the animals listed above have some similarities with animals of today. Some are more like modern animals than others.

Describe what you think the environment was like. Is the headline above correct?

Include some evidence you see in the exhibits to support your description.

The exhibit shows animals from forests and brushlands, with grasses, hardwood forests, and warm and cold seasons, but warmer than today.

(Read the labels to check your hypothesis.)
Paleontologists dig in North Dakota 1970-1996

- Look at the field camp miniature scene (diorama).
Describe what it would be like if you were working with the crew in this scene.

*Hot, dry, and/or windy.*

List tools you see that you would use if you were a paleontologist.
*There are many in the diorama and also actual tools in a case below the environmental diorama.*

The paleontologists found evidence of an ancient environment very different than 20th century North Dakota. Turn around and investigate the North Dakota of 60 million years ago. Check off all of the plants and animals you find in the crocodile pool, forest understory, and ancient lake.

- Crocodile
- Soft-shelled turtle
- Butterfly
- Primate
- Snake
- Snapping turtle
- Dragonfly
- Condylarth
- Ginko
- Oak Tree
- Lily pads
- Champsosaurs
- Amphibian
- Cypress
- Lizard
- Alligator
- Ptilodus
- Bird
- Fern

*Evidence of all of these organisms have been found at the Wannagan Creek Quarry site in North Dakota. All may not be obvious in the diorama.*

Choose one of the organisms you found and find out one thing about it:
*This can be done by reading the labels. More information can be researched back at school.*

Draw a picture of it here.

ATRIUM–LEVEL 3

Special Bulletin  **EARTHQUAKE!**

- Seismofon in Atrium
In the last 72 hours, there has been an earthquake. *Where was it located?* (Give the latitude and longitude, time and date of the seismic activity.)

*The computer information about a specific seismic event or a world map of activity over the last 24+ hours. Did everyone record the same event? Discuss the pattern if all of the locations are mapped on a world map. Do they all fit on the “Ring of Fire?”*
### COLLECTORS' CORNER—LEVEL 5

#### Music Review

**Minnesota’s Favorite Rock Groups**

It’s hard to pick the best of the hottest groups, but critics agree they all have their special qualities. Here’s your chance to experience the top three talked about groups of the year!

Explore the drawers near Collectors’ Corner

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<tbody>
<tr>
<td><strong>igneous</strong> Name:</td>
<td>igneous rock e.g. gabbro, diabase, rhyolite, granite, felsite, basalt, Ely greenstone, syenite</td>
<td>Each specimen is labeled with the place of origin. The majority are from Minnesota.</td>
</tr>
<tr>
<td><strong>metamorphic</strong> Name:</td>
<td>metamorphic rock e.g. jaspilite, gneiss, schist, quartzite</td>
<td>Compare the locations students recorded to a geological map of Minnesota. Where would you go to collect igneous, metamorphic or sedimentary rocks to get the most or best variety of specimens?</td>
</tr>
<tr>
<td><strong>sedimentary</strong> Name:</td>
<td>sedimentary rock e.g., sandstone, limestone, slate, graywacke, dolomite, flint, breccia, conglomerate</td>
<td></td>
</tr>
</tbody>
</table>

Check this out!

**Lake Superior’s North Shore Rocks!**

Few groups can top the depth and versatility of the rocks found here.

What do these rocks have in common?

After students list similarities, ask why they are similar. Students can generate hypotheses to verify. (They have holes, trapped gas bubbles in lava, some are filled. They are igneous, colors are white, reddish-brown, pink, gray.)
Contributors: Lillie Dhael, travel director for The Gorge. 

Travel Section Special  Visit the Gorge to See Fossils and Rocks

Visitors to the Mississippi River near St. Paul are in for a special treat declares Lillie Dhael, travel director for The Gorge. “We have layers of sedimentary rocks here like you wouldn’t believe! Why, we have sandstone, limestone, and two kinds of shale! It is hard to believe that just 400 million years ago, this was all a warm, shallow sea. Think of all the tourists we could have had then! But we welcome travelers here now. We hope they visit the Science Museum right here on the river bluffs, because it is a good place to learn about the River.”

Dig down! Match each sediment with the Mississippi River Valley rock it became. Fill in the blanks—the first one is done for you. Hint: Check the wall label for more information.

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<td>mud</td>
<td>shale</td>
</tr>
<tr>
<td>carbonates</td>
<td>limestone</td>
</tr>
<tr>
<td>mud</td>
<td>shale</td>
</tr>
<tr>
<td>sand</td>
<td>sandstone</td>
</tr>
</tbody>
</table>

After viewing the exhibition and researching the formation of sedimentary rocks and layers, ask students to write a step by step description of how the rock layers along the gorge of the Mississippi River were formed. Ask students to study the wall label and/or take notes on the sequence of layers and composition and supplement with research resources.

There is also information here about how people use earth materials. There are many examples in the gallery, including some seen outside the museum by looking out of the window. A few are:

- Platteville limestone early 1900’s building stone
- Decorah shale 20th century bricks
- St. Peter sandstone 1925-1950’s sand for glassmaking
- Silicified sandstone prehistoric projectile point
- Clay prehistoric pottery

Draw and name one fossil found within these rock layers.

Name of fossil: The organisms shown in this area are cephalopod, brachiopods, bryozoans, crinoid. Where was it found? Mississippi River gorge area: Lilydale Regional Park, bluffs near University of Minnesota.

It lived... All of them lived 500–350 million years ago.

As you approach or leave the Museum, look at the cliffs north of Shepard Road or Warner Road. You can see this rock sequence there, as well as at Fort Snelling, Hidden Falls or Minnehaha Falls.
**Special Bulletin**

**Visitors to Science Museum Discover Change Over the Last 11,700 years**

The remains of a wooly mammoth lie under large pictures of the riverfront outside the museum. Three views show how it has changed over time.

Lillie Dhael, travel director for The Gorge, says “I can’t believe how much this place has changed! There must be at least two things in each time period which are not in the others.”

List two things for each picture which do not occur in the other scenes.

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</thead>
<tbody>
<tr>
<td>bison, mammoth</td>
<td>wooden houses, railroad bridge</td>
<td>electric lines, large chimney</td>
</tr>
<tr>
<td></td>
<td>ponds</td>
<td>Science Museum</td>
</tr>
</tbody>
</table>

What is one thing which remains the same? river

What happened to the large waterfall?

*Over the last 10,000 years, the water gradually eroded the layers of rock underneath, which would collapse, causing the waterfall to be slightly more upstream. This waterfall ended up at the area which is now St. Anthony Falls in Minneapolis, the only waterfall on the Mississippi.*