# Bring authentic research to your K-16 class or lab with AMP-MAP (Aurora Mastodont Project - Matrix Analysis Project)


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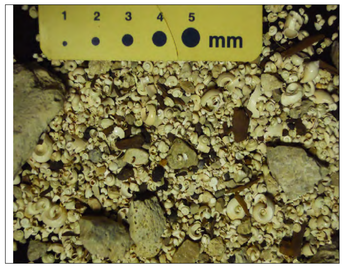
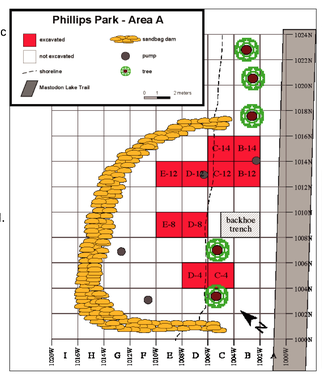
Abstract
Bringing cutting-edge scientific research into classrooms is pedagogically effective, fun and inspirational for students. Most obstacles to bringing research into classrooms involve identifying appropriate research topics and samples, and many times the samples involve specialized or expensive equipment. The Aurora Mastodont Project (AMP) can provide an opportunity to bring authentic research into K-16 classrooms and labs with limited logistics. We will send to your classroom a sample of screenwash to be analyzed and processed by your students.


The 2004 AMP was a joint project between the City of Aurora, the Illinois State Museum and Waubonsee Community College to uncover a (rumored) fourth mastodont skull left after multiple mastodont remains were discovered in the 1930's by the Civil Works Administration (3 skulls, 1 jaw, 3 tusks, 3 ribs, 1 scapula, 1 ulna, 1 femur, toe bones, 1 set of articulated cervical vertebrae, 1 set of articulated thoracic vertebrae). The 2004 AMP did not recover any additional mastodont remains, but it did illustrate the scientific and pedagogic importance of the Aurora Mastodonts. One of the many results of the 2004 AMP was that we now have significant quantities of sediment from the layer that the original mastodonts were discovered in that was systematically excavated, washed, and recorded, thereby retaining its stratigraphic control. This screenwash contains small bones, snails, plants, and other debris. Small screenwash samples (~1 liter) will be sent to classrooms for sorting and description, engaging students as collaborators in site interpretation of the project. This project is contributing to current research into climate change during the most recent glaciation 30,000 to 10,000 years ago, and extinct Midwestern megafauna. Analyses of the processed screenwash can incorporate data processing and analysis techniques, as well as interpretation of Illinois and Midwest climates, and discussion of the broader global conditions using lesson plans that will be provided.

Samples of screenwash, instructions, and lesson plans will be available, as well as contact information for obtaining samples to be used in your classroom.


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 m2) dewatered and Modern muck removed
- Excavation grid established and surveyed
- Systematic excavation of 10 m2
- Paleoecological analyses of macrofossils and gastropods (available upon request)
- Radiocarbon dating of selected wood and molar dentin
- Mapping and recovery of vertebrate remains
- Over 250 gallons of screenwashed matrix

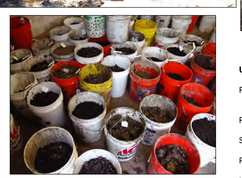
What you will get
You will receive approximately 1 quart of screenwashed matrix from the 2004 AMP, a list of instructions, a powerpoint presentation you may use as part of the introduction to your class, and a set of lesson plans that you may use in addition to the introduction to create a longer unit.

What you will do
- Present to your class any introductory lessons you feel is adequate for background information
- Perform the screenwash analyses. It is estimated that a class of 20 to 30 students can process about ½ quart of screenwash in a normal class period. You may request more screenwash if you want to extend the experience.
- Analyze your results by compiling the weights of the various fractions, and sending the data and processed samples back to the Illinois State Museum. Your data will be recorded in our data base, and you will be able to see your results relative to the whole project at http://www.waubonsee.edu/faculty/dvoorhees/index.html
- Optional
  - o Sort the rock fragments into types and separate out slag.
  - o Identify species of gastropods and plant remains and use it to develop an environmental interpretation.

Equipment you will need
- Tweezers for each student
- Paper to sort screenwash on
- Hand lenses or microscope
- Scale to weigh screenwash before and after sorting
- Ruler (mm) to sort rocks and artifacts into size categories
- Optional:
  - o Spreadsheet program for data analyses
  - o Binocular microscope for gastropod study

Suggested sequence of lessons

| Core | Optional | | Subject |
|---|---|---|---|
| C1 | | Pre-Assessment | Pre-assessment |
| | O1 | Geologic time | Construction and study of geologic time |
| C2 | | Ice Age | Discoveryschool.com lesson |
| C3 | | Glaciers | Glacier movement and how it sculpts a landscape |
| | O2 | Recipe for a Glacier | Using ice cream to model glacier formation & movement |
| | O3 | Pleistocene deposits | |
| | O4 | Glacial till ID | |
| C4 | | Pleistocene megafauna | Understand mammoth, mastodont, saber-tooth tiger |
| C5 | | Glacial Geology of IL | Illinois State Museum 'Gliding Glaciers' |
| | O6 | Pleistocene Proboscideans | Study differences between Pleistocene elephants |
| | O7 | "The tooth is in the molars" | Study difference between molars of mastodonts & mammoths |
| | O8 | How Big Is It? | Study true size of saber-tooth cat |
| | O9 | Fossils | Study of fossilization & fossils |
| C6 | | Screenwash | Process & sort |
| C7? | | Screenwash | Sort & analyze |
| C8? | | Screenwash | Analyze and investigate |
| C9 | | Post-assessment | Summary & finishing KWL chart |




Mastodon Lake in Phillips Park (the star in the figure below) 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.

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.

Mastodont bones found
555 men working for the Civil Works Administration (1933—1935) with picks and shovels were digging 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*), White-tailed deer (*Odocoileus virginianus*), and elk (*Cervus elaphus*) were recovered. The mastodont remains included 3 skulls, 3 tusks, a lower jaw, a femur, a scapula, and an articulated series of cervical and thoracic vertebrae. Many of these mastodont bones are currently on display in the Phillips Park Visitors Center and Mastodon Gallery. Oral history of the CWA project includes stories that at least 1 mastodont skull was uncovered and then reburied.

skull--facial view
right M3
11,130+/-30 RC yr BP (UCIAMS-19329)
[13,110 - 12,955 BP]

Photograph by J. S. Oliver
Aurora Mastodont #1
(Mammut americanum)
Kane County, Illinois

**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 | 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 & 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 | |

What is screenwash?
The 'bone bed' of Mastodon Lake is in a layer of marl that was the target of our 2004 excavation. The marl was carefully removed from the site, and transported to the screenwash area, where it was washed to remove most of the marl, leaving the larger clasts and fossils. This was great fun in the hot summer months!



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


Acknowledgements
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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

Curry, B. B., 2008, Stop 5: Mastodon Lake at Phillips Park, Aurora: History, Educational Outreach, Mastodons, Cosmic Dust?, and Geology, in Curry, B.B. (ed.) Deglacial History and Paleoenvirohnments of Northeastern Illinois, 54th midwest Friends of the Pleistocene Field Conference, Illinois State Geological Survey Open File 2008-1, p 95 - 96

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

Saunders, Jeffrey, 2008, Annotated bibliography of paleontological resources for Aurora, Illinois, in Curry, B.B. (ed.) Deglacial History and Paleoenvirohnments of Northeastern Illinois, 54th midwest Friends of the Pleistocene Field Conference, Illinois State Geological Survey Open File 2008-1, p 97- 111

Voorhees, David, 2008, Aurora Mastodont Project 2004 - A successful outreach and educational experiment in Curry, B.B. (ed.) Deglacial History and Paleoenvirohnments of Northeastern Illinois, 54th midwest Friends of the Pleistocene Field Conference, Illinois State Geological Survey Open File 2008-1, p 112 - 122