

## Activity 27: A Fossil Hunt Tells the Age of Sediments

### Maine Geological Survey



#### **Objectives:**

To have the students, using adequate reference materials, identify some common fossils, and determine their age. To evaluate a fossil population and make some correlations to prehistoric environments.

#### **Time:**

45 minutes to 2 hours

#### **Background:**

Fossil remains can provide a great deal of information about the prehistoric environment in which the fossilized species lived, as well as telling us the age of the material they are found in. A large clay pit is mined for lime materials between Fort Fairfield and Limestone, Maine. This clay contains at least eight species of fossil shells and the material enclosing the shells is easily crushed by hand. This makes it ideal for student work as no heavy equipment is required to break up the material. Students need to have some idea of geologic time frames, and the appearance, existence, and disappearance of species across these time frames; some work or discussion on classifying fossils is also helpful.

Maine bedrock fossil occurrences are quite rare compared to those found in many states and are located mostly in Aroostook County; see Figure 1. Shell fossils found in marine clays associated with glacial deposits in southern Maine are more widely

distributed and make better sources of fossils. Regardless of the source, the teacher needs to be familiar with the general types of fossils found in the material his/her students will be hunting through. There are a number of good fossil guidebooks on the market.

### **Materials:**

- About one pound of fossiliferous material per two or three students
- Golden Book Guide to Fossils - 1 copy per group
- Dissection needles or straightened large paper clips to break up clay lumps
- Half egg cartons to use as sorting trays
- Lots of newspapers if this is done in a classroom (non-lab) setting.

If a local source of fossiliferous material is not readily available, Ward's Natural Science Establishment (see sources), can provide a "Find a Fossil" kit for under \$30; this kit can be used repeatedly but the age relations will not match up for questions at the end of this exercise. Other sources may provide equally adequate materials. See Appendix A. If proximity to a collecting site allows, the ideal sequence is to have students field collect the materials and then work on them in class. A blank analysis table is included based on the genera found in the Fort Fairfield deposit.

### **Procedure:**

Distribute materials and let students break up the clay and sort out the various fossil types for about 15 minutes. Next distribute the guidebooks and tell them they have species of pelecypods and gastropods (and/or whatever additional categories may be present - depending upon the source of material). Give the appropriate page numbers for the fossils involved and ask the students to determine the species names of the fossils they have found. After 5 minutes list vertically on the board the names of the fossils. Make a horizontal list of the major time periods and mark in when each fossil lived. The discovery aspect of this exercise is that all of these fossils existed together in only one time period. The environment of these fossils, a fresh water lake, is ascertained from using the fossil guidebook.

## FOSSIL → TIME UNITS

Cardium

Unio\*

Pecten

Astarte

Turritella

Polygyra

Vertigo

Natica

Arca

\*Tells us that this was a lake (fresh water) environment.

In analyzing the time distribution of the fossils, you will note that the genus *Vertigo* has existed ONLY since the Eocene. This acts as a "limiting factor" and tells us the lake was in existence at some time between the beginning of the Eocene epoch (37 million years ago) and now.

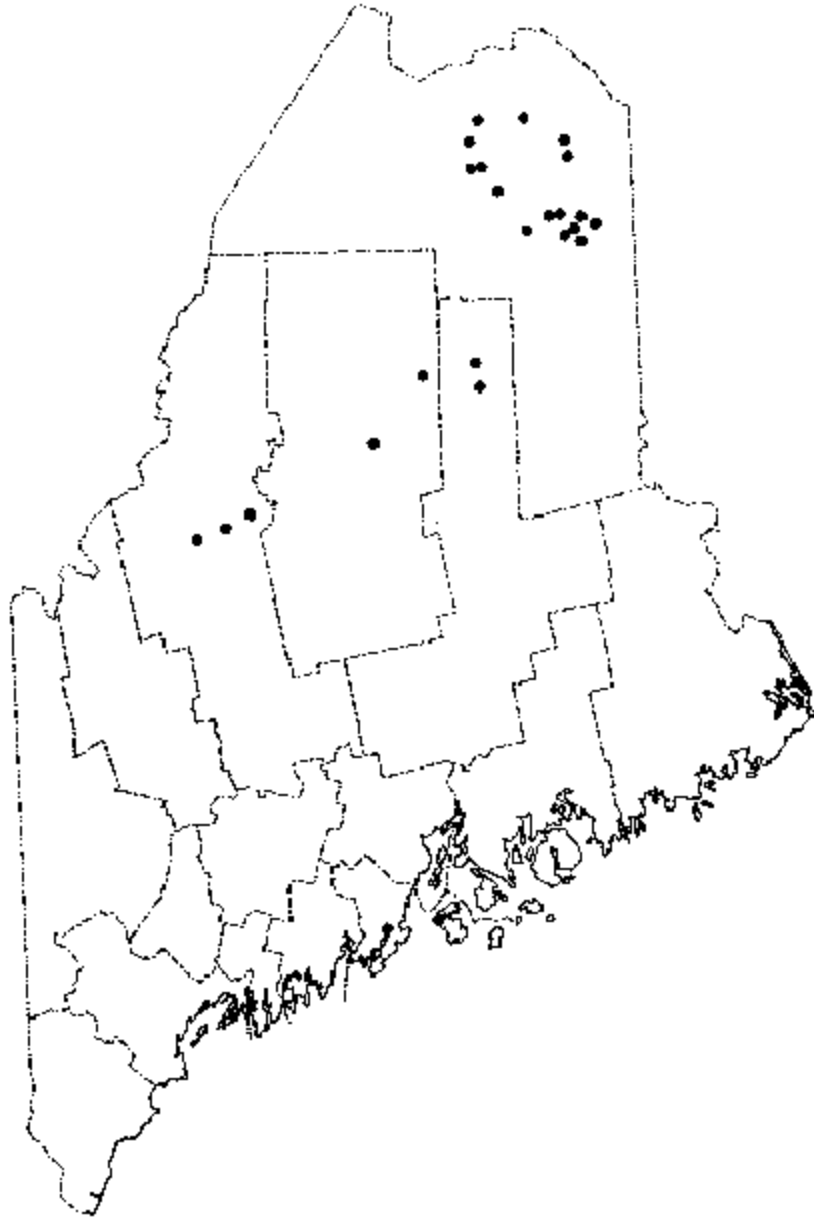
### **Follow-Up:**

Discuss the concept of index fossils and use this idea to show simple stratigraphic correlations.

Obtain samples of fossil-bearing materials from other parts of the country and repeat the exercise. How does the new area's distribution of fossils compare with the Maine sample in terms of time spread and environment?

### **References:**

Activity developed by Curtis Talbot during the 1991 CREST intern program.



**Figure 1.** This map shows the general location of most major fossil-bearing bedrock exposures in the state. Fossil locations that consist of shell deposits in "recent" glacial sediments are not shown. These latter deposits are much more common and have a wide geographic distribution in the southern part of the state. Local construction often exposes these sites on a temporary basis.

Name \_\_\_\_\_



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#### Student Sheet

#### **Purpose:**

You will identify some common fossils in order to determine their age and the environment in which they lived.

#### **Materials:**

Your teacher will supply you with one pound of fossiliferous materials. It may be a clay or a soft bedrock. You will have a probe for breaking up and searching through this material. You will also have an egg carton for sorting the fossils. You will need pens, notebook, data recording chart, and possibly a ruler.

#### **Procedure:**

1. Break up the material and extract all structures that are obviously fossils or parts of fossils. Place fossils of the same type in one of the egg carton compartments, different fossils in different compartments. Continue this procedure until all of the material is processed or your teacher tells you to stop.
2. Using the Guidebook to Fossils provided, identify the types that you have found in your samples.
3. Find the age of each fossil by reading its description in the guidebook. Fill in the data table by placing an X in each time period that a fossil type existed, ONLY if you have

found that fossil in the material you processed. If you cannot identify a fossil, get help from your teacher.

4. When your chart is complete, analyze the data and determine the minimum and maximum age of the sediment containing the fossils. This will be shown, in the chart, as the time interval when all of the age ranges overlap.

**Questions:**

1. What do you think is the age of materials contained in your fossils? How do you know this?
2. What type of environment did these organisms live in? Was it warm or cold, salt water, fresh water, or land? Explain your choices.
3. Did you find many complete fossils or were they mostly broken pieces and parts? What does your answer to this question tell you?

Fossils	Time Periods								
	Triassic	Jurassic	Cretaceous	Paleocene	Eocene	Oligocene	Miocene	Pliocene	Pleistocene
Cardium									
Unio									
Pecten									
Asarte									
Turritella									
Polygyra									
Vertigo									
Natica									
Arca									

Record the presence of a fossil in your material by an X in the chart. Make certain that the X is placed in ONLY those time periods when the genus lived. You would not place a trilobite in the Pleistocene for example. After you have recorded all the data, analyze it and see what conclusions you can make regarding the general age of the deposit where the fossils came from and the type of environment the organisms lived in.

Typical distribution of the Fort Fairfield / Limestone fossils:

Fossils	Time Periods								
	Triassic	Jurassic	Cretaceous	Paleocene	Eocene	Oligocene	Miocene	Pliocene	Pleistocene
Cardium	X	X	X	X	X	X	X	X	X
Unio	X	X	X	X	X	X	X	X	X
Pecten	X	X	X	X	X	X	X	X	X
Asarte	X	X	X	X	X	X	X	X	X
Turritella			X	X	X	X	X	X	X
Polygyra				X	X	X	X	X	X
Vertigo					X	X	X	X	X
Natica	X	X	X	X	X	X	X	X	X
Arca		X	X	X	X	X	X	X	X