



Expeditionary Learning Schools
Learning Expedition Documentation Project

Get a Clue!

An Expedition into Fossils, Dinosaurs,
and the Earth Around Rochester, NY
Grade One

Expedition Author

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Summary

In the *Get a Clue!* learning expedition, first graders investigated the following questions: What lived in the Rochester, NY area long ago? How do we know? How can fossils be clues to the past?

The expedition consisted of in-depth investigations of living and non-living things in prehistory using fossil evidence, including specific local fossil finds. These investigations focused on three time periods of prehistory: Warm Seas, Dinosaur Times, and Ice Age. Children worked with a partner from first grade, as well as a fifth grade buddy and a parent assistant, to research a living or non-living thing from prehistory and write and illustrate a book page highlighting their topic and scientific evidence of its existence. The class's final product was a book and Power Point presentation called *Get a Clue!*.

During the expedition, kindergarten students were involved in hands-on research at five different sites, including two museums and three outdoor sites. Students did observations and scientific drawing in the field, and collected warm sea fossils at two different collection sites. Professional experts included a geologist from the Rochester Museum and Science Center. The teacher who lead the expedition, Kate Daniels, received an Expeditionary Learning Fund for Teachers Fellowship in the summer of 2008 to learn skills of paleontological excavation, working with a paleontologist in Bynum, Montana.



Warm seas covered the area around Rochester, NY approximately 500 million years ago. These seas receded approximately 300 million years ago and left a wealth of fossil evidence, including evidence of invertebrates such as crinoids, brachiopods, trilobites, and corals. Other warm sea invertebrates have been found and documented in the area by geologists, biologist, and paleontologists. The proximity of such an abundance of resources helped shape the Guiding Questions for this expedition. The availability and proximity of quality fieldwork sites made this expedition developmentally appropriate for first graders.

Guiding Questions

- What lived in the Rochester, NY area long ago?
- How do we know?
- How can fossils be clues to the past?



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Immersion Activity

First grade students embarked on an adventure to discover the earth around Rochester by first receiving a letter from Great, Great, Grandmother Earth. In her letter, she encouraged the students to look closely at the earth to see if they could find any clues about her long life. This narrative approach to kicking off the expedition was a perfect fit for the imaginations of young children. Subsequent letters from her remarked on the children's progress with research and questioning, and new fieldstudy directions. She even sent a FedEx package of information on prehistoric animals to help guide their learning. As part of the writing work of this investigation, students wrote back to Great, Great, Grandmother Earth and shared their fieldstudy notes, observations, collective research, and other descriptive writing with her.

Investigations

Investigations during this expedition focused on three time periods of prehistory:

- Warm Seas,
- Dinosaur Times,
- The Ice Ages

To learn about all of these times, students learned how the fossil record has built our knowledge of the past. Working in the classroom, in museums, and in the field, students learned how scientists think and how scientists work.

During fieldwork, students observed and sketched exposed strata in the Genesee River gorge, and collected warm sea fossils in two sites: an old salt mine in Retsof, NY, and the Penn Dixie site in Hamburg, NY. They worked in the Rochester Museum and Science Center with museum staff to look at warm sea and dinosaur skeletal fossils. Students also worked at the Museum of the Earth in Ithaca to understand how paleontologists identify and classify vertebrate fossils.

Learning Targets

- I can identify, explain and sequence three periods of prehistory (Warm Seas, Dinosaurs, Ice Age).
- I can give examples of living things from each time period.
- I can describe how geologists and paleontologists use clues to make inferences about the Earth's history.
- I can identify and explain how the three types of fossils are formed (trace, animal part, and mineral).
- I can distinguish between a fossil and a non-fossil.
- I can describe what a scientist does.





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- I can research and identify important facts about one living or non-living thing from prehistory and record the information using pictures and words.
- I can classify and categorize fossils.
- I can make inferences about what lived long ago by looking at fossils.
- I can create a visual representation of a living or non-living thing from prehistory and a representation of the fossil evidence of its existence.



Name _____ Date _____

Research Notes

I am researching the...

Habitat:

Where and when did this animal live?

Diet:

What did this animal eat?

Physical characteristics:

What did this animal look like? How big was it? How many legs did it walk on? Did it have fur or feathers? What color was it? Did it have teeth?

Defenses:

How did this animal protect itself against other animals?

Adaptations:

How did this animal change over time?

Fossil Evidence:

How do we know that this animal lived long ago?
What fossil evidence exists about this animal?

Other interesting facts:



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Connections to State and District Standards

Charter Standards

Prehistory

- The Big Bang – First People: 4,500 – 12,000 years ago
- Students will answer the following questions:
 - What were the beginnings of our universe, or planet, and its living things?
 - How do we know
- Prehistoric Life
- Time and sequence
- Living and non-living things
- Life cycles
- Fossil formation
- Food chains
- Animal defenses

Science Process

- Classifying – arranging or distributing objects, events, or information representing objects or events in classes according to some method or system
- Communicating – giving oral and written explanations or graphic representations of observations
- Comparing and contrasting – identifying similarities and differences between or among objects, events, data, systems, etc.
- Creating models – displaying information, using multisensory representations
- Gathering and organizing data – collecting information about objects and events which illustrate a specific situation
- Generalizing – drawing general conclusions from particulars
- Inferring – drawing a conclusion based on prior experiences
- Interpreting data – analyzing data that have been obtained and organized by determining apparent patterns or relationships in the data
- Manipulating materials – handling or treating materials and equipment safely, skillfully, and effectively
- Measuring – making quantitative observations by comparing to a conventional or nonconventional standard
- Observing – becoming aware of an object or event by using any of the senses (or extensions of the senses) to identify properties
- Predicting – making a forecast of future events or conditions expected to exist



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Connections to State and District Standards

Science Content

- Each animal has different structures that serve different functions in growth, survival, and reproduction.
- Animals need air, water, and food in order to live and thrive.
- Plants require air, water, nutrients, and light in order to live and thrive.
- Nonliving things do not live and thrive.
- Nonliving things can be human-created or naturally occurring.
- Living things grow, take in nutrients, breathe, reproduce, eliminate waste, and die.
- Each animal has different structures that serve different functions in growth, survival, and reproduction.
- Each plant has different structures that serve different functions in growth, survival, and reproduction.
- Individuals within a species may compete with each other for food, mates, space, water, and shelter in their environment.
- All individuals have variations, and because of these variations, individuals of a species may have an advantage in surviving and reproducing.

ELA

- Students will read, write, listen, and speak for information and understanding.
 - Locate and use classroom and library media center resources to acquire information, with assistance
 - Read familiar informational texts to begin to collect data, facts, and ideas, with assistance
 - Draw on a prior experience to understand new data, facts, and ideas
 - Dictate information from personal experience
 - Report information briefly to peers and familiar adults, with assistance
 - Connect information from personal experiences to information from nonfiction texts, with assistance
 - Retell more than one piece of information in sequence
 - Share observations
- Students will read, write, listen, and speak for critical analysis and evaluation.
 - Identify and explain ideas and experiences from texts and performances
 - Engage in pre-reading and reading activities to identify what they know and have learned about a specific story or topic
 - use illustrations to assist in understanding the content of a text and to anticipate what will happen next - predict what could happen next or the outcome of a story or article read aloud
 - Draw and/or write to express opinions and judgments to share what they know and have learned about a theme or topic



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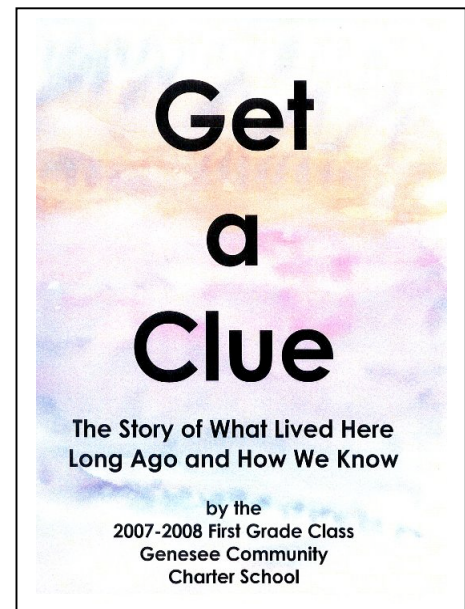
Major Project

Get a Clue! Book

Description

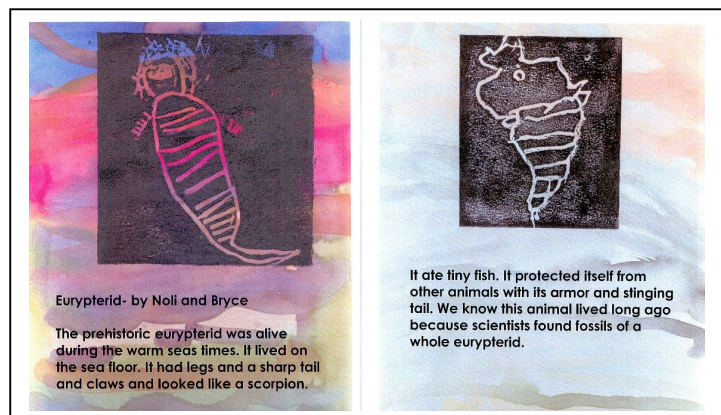
Each student worked with a partner to research a living thing/rock formation from one of the time periods that we studied in Prehistory (Warm Seas, Dinosaur Times, Ice Age). Students included information on defenses, habitat, physical characteristics, adaptations, and formations, and explored questions about what the earth looked like, how we know, and how fossils are a clue to the past. Each child wrote one page for the book about Prehistoric life. Students made a print to visually represent their living thing/rock formation or the evidence of the remains. Students prepared for this writing through fieldwork and building background knowledge workshops. These workshops included sharing common texts, looking at mystery documents, role-playing a story such as the rock cycle, being a predator or prey and non-verbally communicating survival strategies, and recording mental images from a shared text as part of a crew mural.

Get a Clue! was shared with families and friends at the school's Exhibition Night and is for sale on the school website.



Key Skills Addressed

- Create a visual representation of the animal, plant, or rock formation from each time period
- Research and identify important facts about an animal
- Write sentences with a clear main idea
- Write sentences that provide supporting details about the animal, plant, or rock formation
- Write a line of a poem based on one of the time periods studied
- Write sentences using appropriate conventions
 - Capitalization
 - Punctuation
 - Spacing
- Complete multiple drafts based on feedback



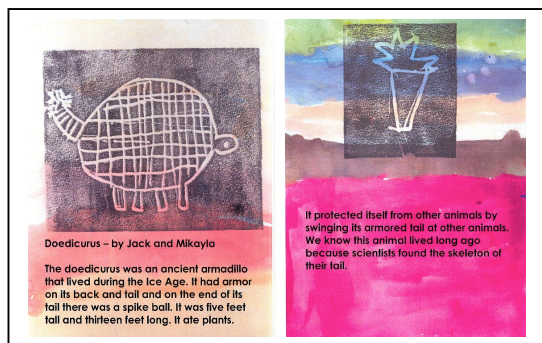


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Final Product

The *Get a Clue!* book included the following sections:

- A title page with an illustration
- Three sections (one for each time period in prehistory)
- An introductory page to each section, including a collaboratively-written poem about the time period
- Two pages for each living thing/rock formation within the section
- Visual representations of the living thing/rock formation or evidence of how we know what lived in Rochester long ago
- At least four sentences about each living thing/rock formation, including a topic sentence and supporting details for each



Embedded and Related Literacy, Math, and Arts Work

Literacy skills were a focus throughout this expedition. The final product, *Get a Clue!*, specifically focused on the following learning targets:

- I can work with others to write a line of a poem based on one of the time periods studied.
- I can write a complete sentence using correct capitalization and punctuation.
- I can write at least four sentences about my topic with a clear main subject and supporting detail.
- I can give, receive, and incorporate feedback when creating drafts and final copy of my book page.
- I can read the text of my book page fluently and audibly for a live presentation of the book.
- I can apply my knowledge of text features in order to access information from non-fiction texts.
- I can use the comprehension strategy of *Determining Importance* to select information to include in my writing.
- I can use the comprehension strategy of *Making Inferences* to make sense of what I hear or read.



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Math

We used the *Investigations* program for teaching math but made connections to the expedition with the following activities: sorting and classifying fossils by various characteristics; developing a timeline of when the different prehistory periods happened; physically laying out the body sizes of various dinosaurs in a large area of the parking lot; and looking for and documenting symmetry in fossils.

Arts

This expedition had a strong integration of the Arts. In Physical Education, students were pushed to develop creative movements to represent each time period in pre-history. In Visual Art, students focused on observational drawing and print making skills. Music concentrated on the study of opera and an operatic performance of an aria from Bizet's *Carmen*, with words changed to represent paleontology and Mozart's Papageno, from *The Magic Flute*, as a tribute to Pre-history. As noted before, each Arts team member was involved at the planning stages of the expedition to ensure that each Arts lesson was scaffolded to target the grade level skills for each discipline, as well as the necessary skills for success in the final product.



Connections to the Community and Larger World

Fieldwork

- Lower Falls Park, Rochester – observed and sketched exposed strata in gorge of the Genesee River.
- Old salt mine, Retsof, NY – observed the geology and collected warm sea fossils. This field study was documented for a broadcast on public television. Dr. George McIntosh, Chief Curator of Geology for the Rochester Museum and Science Center, brought a crew to



- document the museum's work with the school.
- Penn Dixie site, Hamburg, NY – observed geology and collected warm sea fossils.
- Rochester Museum and Science Center, Rochester, NY – visited exhibits about warm seas, dinosaurs, and the Ice Age, including interactive exhibits with the Fairview mastodon.
- Rochester Museum and Science Center, Rochester, NY – toured



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vaults and museum storage of warm sea fossils and disassembled mastodon skeletons

- Museum of the Earth, Ithaca, NY – visited exhibits about the warm seas, dinosaurs, and Ice Age. This museum provides many hands-on activities, including how paleontologists work and identification of vertebrate fossils (dinosaur and mastodon).

Experts

- Tim Cauley, RMSC Players – demonstration on how different types of fossils are formed.
- Dr. George McIntosh, Chief Curator of Geology, RMSC – in-class help with sorting and classifying fossil collection.
- GCCS fifth grade students – assistance on field studies and direct help with research and writing
- GCCS parents and staff – chaperoning field studies and assists student teams with writing for final product.
- Steven Levy, ELS School Designer – help with expedition planning.

Exhibitions

Students shared their work with families and friends at Exhibition Night with a PowerPoint presentation of the book. As each page was projected on an enormous screen, the author of each page read his or her work and then transitioned to the next page with an automated feature of a page turn, walking along the screen to the other side of the stage. During this transition, the remaining students played an original composition on xylophones.





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Calendar

Week 1	- Expedition pre-assessments - Looking for clues around us
Week 2	- How the earth was formed - BBK on rock cycle - First letter from Great Great Grandmother Earth
Week 3	- Lower Falls field study - Begin strata backgrounds in art - Letters to and from Great Great Grandmother Earth
Week 4	- Field study to Retsof salt mine - Guest expert Dr. McIntosh visits - How are fossils formed? - Begin observational drawing lessons - Letters to and from Great Great Grandmother Earth
Week 5	- Penn Dixie field study, extended day - Sorting and classifying fossils - Question Circle "How did the shell get on top of the mountain?" - Field study to RMSC vaults
Week 6	- Building Background Knowledge workshop on dinosaurs - Field study to RMSC - Question Circle "What happened to the Warm Seas?" - Letters to and from Great Great Grandmother Earth - Mid-expedition assessments for learning
Week 7	- BBK workshop on the Ice Age mammals - Question Circle "What happened to the dinosaurs?" - Field study to RMSC - Visualization activities with Ice Age mammals
Week 8	- Field study to Museum of the Earth - Students choose which animal they would like to research further - Begin research with partner
Week 9	- Begin process of making print of animal - Continue research. Begin writing with partner and fifth grade buddies - Letters to and from Great Great Grandmother Earth.
Week 10	Continue research and begin writing
Week 11	- Final drafts of writing - Practice music and movement pieces for critique by fifth grade buddies
Week 12	- Practice speaking parts - Practice performance pieces - Exhibition Night - Post assessments