

Expert Pack: Fossil Fun!

Submitted by: Ripley Central School, Ripley, NY and Sherman Central School, Sherman, NY
Grade: 3 Date: February 2016

Topic/Subject
Fossils and the study of fossils
Texts/Resources
<p>Books</p> <ol style="list-style-type: none">1. <i>Figuring Out Fossils</i>2. <i>Fossils - A True Book</i> <p>Article</p> <ol style="list-style-type: none">3. "A Mammoth Find"4. "The Girl Who Discovered The Dinosaurs" <p>Other Media</p> <ol style="list-style-type: none">5. "Exploring Fossils and Fossil Records" [Website]6. "Fossil Fabricator" [Website]7. "Mary Anning Lego" [Video] <p>Each expert pack contains a variety of selections grouped to create as coherent and gradual a learning process for students as possible, generally beginning with lower levels as measured by quantitative and qualitative measures, and moving to more complex levels in the latter selections. This gradated approach helps support students' ability to read the next selection and to become 'experts' on the topic they are reading about.</p> <p><i>Refer to annotated bibliography on the following pages for the suggested sequence of readings.</i></p>
Rationale and suggested sequence for reading:
<p>We designed this expert pack to begin with a fun look at how to make a fossil, knowing that students will potentially have no prior knowledge of this topic. The first hook is an activity where students "fabricate fossils." In this quick game, students make a fossil or fail to make a fossil based on the conditions in which the animal bones are exposed. After the create a fossil activity, students then read the book <i>Figuring Out Fossils</i> to gain a deeper understanding about what fossils are and how they are created in nature. "A Mammoth Discovery" is the next text where students can learn about discovering fossils in a present-day news story. After this article, students will continue to learn about fossils through a different lens of fossils long ago. At this point, Mary Anning, a fossil finder from the 1800s is introduced. The next resource, "The Girl Who Found The Dinosaurs", should be read aloud because of the high Lexile level. After listening to the article, students will then watch a video about a Lego kit that describes the life of Mary Anning. Students will learn about Anning's life, while watching a Lego kit get constructed. Students then check out the fossil record and what it is like to be a paleontologist, by using a fossil finding interactive website. To wrap up this expert pack, students will read the final text <i>Fossils</i> to recap all of the learning that has taken place. Several opportunities abound for extensions from this final text if students desire more content.</p>

The Common Core Shifts for ELA/Literacy:

1. Regular practice with complex text and its academic language
2. Reading, writing and speaking grounded in evidence from text, both literary and informational
3. *Building knowledge through content-rich nonfiction*

Though use of these expert packs will enhance student proficiency with most or all of the Common Core Standards, they focus primarily on Shift 3, and the highlighted portions of the standards below.

College and Career Readiness Anchor Standards for Reading Literary and/or Informational Texts (*the darkened sections of the standards are the focus of the Expert Pack learning for students*):

1. ***Read closely to determine what the text says explicitly and to make logical inferences from it;*** cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. ***Determine central ideas or themes of a text and analyze their development;*** summarize the key supporting details and ideas.
10. ***Read and comprehend complex literary and informational texts independently and proficiently***

Annotated Bibliography and suggested sequence for reading

N/A “Wonderville: Fossil Generator”

Author: Unknown

Genre: Interactive website

Length: N/A

Synopsis: This website offers an interactive opportunity for users to attempt to create a fossil by choosing a series of environmental conditions. How the organism died, where it died, climate after death, etc. are factors that can create fossilized remains - or not.

Citation: Fossil Fabricator. (n.d.). Retrieved November 17, 2015, from <http://www.wonderville.ca/asset/fossil-fabricator>

Cost/Access: \$0.00 <http://www.wonderville.ca/asset/fossil-fabricator>

Recommended Student Activities: A Picture of Knowledge

600L Figuring Out Fossils

Author: Sally M. Walker

Genre: Nonfiction

Length: 40 pages

Synopsis: Fossils give us a window to the past. Water, sediments, and pressure work together over time to preserve the shape of things that lived long ago. Studying these ancient plants and animals tells us more about our own existence. Have you ever searched for fossils? Unearth some in this book.

Citation: Walker, S. (2013). *Figuring out fossils*. Minneapolis: Lerner Publications.

Cost/Access: \$9.99 (paperback)

Recommended Student Activities: Quiz Maker

N/A “A Mammoth Find”

Author: Laura Leigh Davidson

Genre: Informational article

Length: 1 page

Synopsis: True story of a recent find; a mammoth uncovered on a Michigan farm October, 2015.

Citation: Davidson, L. (2015, October 13). A Mammoth Find. Retrieved November 17, 2015, from <http://magazines.scholastic.com/news/2015/10/A-Mammoth-Find>

Cost/Access: \$0.00 <http://magazines.scholastic.com/news/2015/10/A-Mammoth-Find>

Recommended Student Activities: Wonderings

1090L “The Girl Who Discovered The Dinosaurs”

Author: Lauren Tarshis

Genre: Informational article

Length: 5 pages

Synopsis: Mary Anning was a child when she accidentally discovered a dinosaur fossil. Her discovery shocked the world. Dinosaurs were unknown until this discovery.

Citation: Tarshis, L. (2014). The girl who discovered the dinosaurs (1st ed.). Scholastic.com. Retrieved from http://cdn.scope.scholastic.com/sites/default/files/uploads_scope/issues/040114/pdfs/SCOPE-040114-Nonfiction.pdf

Cost/Access: \$0.00

http://cdn.scope.scholastic.com/sites/default/files/uploads_scope/issues/040114/pdfs/SCOPE-040114-Nonfiction.pdf

Recommended Student Activities: A Picture of Knowledge

N/A “Mary Anning-The Paleontologist”

Author: Maddie Moate

Genre: Informational video

Length: 7 minutes

Synopsis: Lego has created a kit featuring famous women scientists. The woman in this video assembles the toy while explaining the story of Mary Anning's discovery and its scientific implications.

Citation: Moate, M. (2014). Mary Anning - The Paleontologist (Lego Research Institute!) [Video file].
https://www.youtube.com/watch?v=N_UyUL6vDcE

Cost/Access: \$0.00 https://www.youtube.com/watch?v=N_UyUL6vDcE

Recommended Student Activities: Wonderings

N/A “Exploring Fossils and the Fossil Record”

Author: N/A

Genre: Interactive website

Length: N/A

Synopsis: This is an interactive website where students can learn about how fossils are made and about the people who study them. The learning continues with details about the processes and tools used by paleontologists to unearth and study fossils.

Citation: Science - Exploring Fossils and Fossil Records. (n.d.). Retrieved November 17, 2015, from
<http://www.e-learningforkids.org/science/lesson/exploring-fossils-and-fossil-records/>

Cost/Access: \$0.00 <http://www.e-learningforkids.org/science/lesson/exploring-fossils-and-fossil-records/>

Recommended Student Activities: A Picture of Knowledge

1010L *Fossils*

Author: Ann O. Squire

Genre: Nonfiction

Length: 48 pages

Synopsis: Fossils have long fascinated humans. This book explains how fossils were formed and where they are now found. An explanation of how scientists find and use fossils to study prehistoric animals is also given.

Citation: Squire, A. (2013). *Fossils*. New York: Children's Press.

Cost/Access: \$6.95 (Paperback)

Recommended Student Activities: Wonderings

Supports for Struggling Students

By design, the **gradation of complexity** within each Expert Pack is a technique that provides struggling readers the opportunity to read more complex texts. Listed below are other measures of support that can be used when necessary.

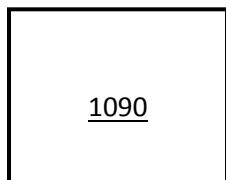
- Provide a brief **student-friendly glossary** of some of the academic vocabulary (tier 2) and domain vocabulary (tier 3) essential to understanding the text
- Download the Wordsmyth widget to classroom computers/tablets for students to access student-friendly definitions for unknown words. <http://www.wordsmyth.net/?mode=widget>
- Provide brief **student friendly explanations** of necessary background knowledge
- Include **pictures or videos** related to the topic within and in addition to the set of resources in the pack
- Select a small number of texts to **read aloud** with some discussion about vocabulary work and background knowledge
- Provide **audio recordings** of the texts being read by a strong reader (teacher, parent, etc.)
- **Chunk the text** and provide brief questions for each chunk of text to be answered *before* students go on to the next chunk of text
- Pre-reading activities that focus on the **structure and graphic elements** of the text
- Provide **volunteer helpers** from the school community during independent reading time.

Text Complexity Guide

“The Girl Who Discovered the Dinosaurs” by Lauren Tarshis

1. Quantitative Measure

Go to <http://www.lexile.com/> and enter the title of the text in the Quick Book Search in the upper right of home page. Most texts will have a Lexile measure in this database. You can also copy and paste a selection of text using the Lexile analyzer.



2-3 band	420 -820L
4-5 band	740 -1010L
6-8 band	925 - 1185L
9 -10 band	1050 – 1335L
11 – CCR	1185 - 1385

2. Qualitative Features

Consider the four dimensions of text complexity below. For each dimension, note specific examples from the text that make it more or less complex.

<p>This text has a single level of meaning. The purpose of the text is not explicitly stated. Students will need to do a little work while listening to determine what the purpose of this text is.</p> <p style="text-align: center;">Meaning/Purpose</p>	<p>Graphics are simple and add to the article, but they are not necessary to understand the key details of the text. Events are listed in chronological order but the traits are specific to a particular discipline, archeology. Captions explain the images.</p> <p>Structure</p>
<p>Language It is narrative nonfiction; it reads like fiction but is a true story. The writer uses imagery to bring readers into the story. Language is literal; there is no irony, metaphors, or similes. Sentence structures vary between long simple sentences and complex sentences. Many uses of prepositional phrases are included in the text. Dependent clauses often explain vocabulary. Other vocabulary words appear in bold and can be found in the glossary.</p>	<p>Knowledge Demands Much of this text requires everyday knowledge. Familiarity with the genre, narrative nonfiction will be helpful.</p>

3. Reader and Task Considerations

What will challenge students most in this text? What supports can be provided?

- Students will be most challenged by the rigorous nature of the vocabulary
- Students will also be challenged by the narrative structure of an informational text
- Encouraging students to make connections to other texts in the set could support and deepen understanding.

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Learning Worth Remembering

Cumulative Activities – The following activities should be completed and updated after reading each resource in the set. The purpose of these activities is to capture knowledge building from one resource to the next, and to provide a holistic snapshot of central ideas of the content covered in the expert pack. *It is recommended that students are required to complete one of the Cumulative Activities (Rolling Knowledge Journal or Rolling Vocabulary) for this Expert Pack.*

1. Rolling Knowledge Journal

1. Read each selection in the set, one at a time.
2. After you read *each* resource, stop and think what the big learning was. What did you learn that was new *and important* about the topic from *this* resource? Write, draw, or list what you learned from the text about (topic).
3. Then write, draw, or list how this new resource added to what you learned from the last resource(s).

Sample Student Response

Title	Write, Draw, or List	
	New and important learning about the topic	How does this resource add to what I learned already?
1. "Wonderville: Fossil Generator"	<p>Learn how a fossil is created.</p> <p>Learn about conditions needed to make a fossil: How, where, and climate.</p> <p>Four main ways a fossil is preserved: Petrification, molds, imprints and sedimentary fossils.</p>	
2. <i>Figuring Out Fossils</i>	<p>Fossils are the hardened remains of plants and animals.</p> <p>There are different kinds of fossils including: Shells, tracks, teeth, eggs, trails and bones.</p>	<p>Fossils are things that form when they get caught in rock, or a bog, etc. Fossils are the remains of living things preserved for ages.</p>
3. "A Mammoth Find"	<p>New mammoth found on a Michigan Farm in October 2015.</p> <p>Scientists think they will find more but they don't know where.</p>	<p>A present day find, showing that fossils are still hidden right where we live. Also makes discovery exciting and possible.</p>

4. "The Girl Who Discovered the Dinosaurs"	<p>In 1811, Mary Anning was a 12-year-old girl who discovered the first skeleton in England.</p> <p>This find started the field of paleontology. She made several discoveries but was not given credit due to the fact that she was a woman. This finding added to understanding of the prehistoric world.</p>	<p>Kids discover dinosaur fossils as well! Fossils are big business.</p> <p>Fossils tell us about the prehistoric world.</p>
5. "Mary Anning- The Paleontologist"	A visual example of what Mary Anning really did. Shows what looking for dinosaurs in this location was really like.	Mary Anning was a young girl, who found something incredible. I could be like her!
6. "Exploring Fossils and the Fossil Record"	There are several tools that archaeologists use when exploring. Archeology is a special science with special tools and uses.	Archeology is a very specialized science that requires special tools and techniques.
7. <i>Fossils</i>	A fascinating topic that has recently been "unearthed", fossils hold so much history. Fossils allow us a window into the past to study animals.	Fossils help us piece together historical events that we would otherwise not understand.

2. Rolling Vocabulary: "Sensational Six"

- Read each resource then determine the 6 words from each text that most exemplify the central idea of the text.
- Next use your 6 words to write about the most important idea of the text. You should have as many sentences as you do words.
- Continue this activity with EACH selection in the Expert Pack.
- After reading all the selections in the Expert Pack, go back and review your words.
- Now select the "Sensational Six" words from ALL the word lists.
- Use the "Sensational Six" words to summarize the most important learning from this Expert Pack.

Title	Six Vocabulary Words & Sentences
"A Mammoth Find"	hybrid, interact, remains, vertebrae, estimate, prehistoric <ol style="list-style-type: none"> When two different animals are put together they form a hybrid. When baking soda and vinegar interact they bubble. By studying mammoth remains, scientists get a glimpse into their lives. Your back bone is made up of many vertebrae. We tried to get an estimate of how old the fossil is. During the prehistoric era dinosaurs roamed the earth.
<i>Figuring Out Fossils</i>	asphalt, dissolve, groundwater, preserve, sediment, fossil <ol style="list-style-type: none"> When new roads are made they are often made of asphalt. The salt I added to my soup started to dissolve immediately.

	<p>3. July was so rainy we have a lot of groundwater right now.</p> <p>4. Depending on the location of a fossil, the soil may preserve it for hundreds of years.</p> <p>5. There was some sediment in the fishbowl when I went to change the water.</p> <p>6. I found a fossil along the lake in a piece of shale.</p>
"The Girl Who Discovered Dinosaurs"	auction, embedded, remnants, specimens, unearthed, thrived <p>1. We went to the auction to look for some furniture for my bedroom.</p> <p>2. The stone was embedded in my sneaker sole.</p> <p>3. The remnants of my pumpkin from Halloween are under the snow when it melts.</p> <p>4. We found many specimens of fish in the creek yesterday.</p> <p>5. When we were digging a hole in the yard we unearthed a huge rock.</p> <p>6. The animals thrived in the warm climate.</p>
<i>Fossils</i>	amber, decompose, droppings, excavate, impressions, remote <p>1. I bought a spider preserved in amber at the flea market.</p> <p>2. I put the food in the compost pile so it could decompose.</p> <p>3. When we go looking for deer my dad tells me to look for droppings.</p> <p>4. We got a new basement and had to excavate the yard to build it.</p> <p>5. My boots made impressions in the freshly fallen snow.</p> <p>6. We went to a remote location for summer break this year.</p>
"Fossil Fabricator"	exposure, geographic, imprints, petrification, sedimentary, predator <p>1. You have to wear a scarf and hat to limit your exposure to the winter weather.</p> <p>2. One of the major geographic features of western New York is Lake Erie.</p> <p>3. I made a thumb imprint on my clay pot in art class.</p> <p>4. The flowers I gave my mom started to petrify because we didn't water them.</p> <p>5. The sedimentary rocks in our area hold many fossils.</p> <p>6. Large dinosaurs were always a threatening predator for smaller dinosaurs.</p>
"Exploring Fossils and Fossil Records"	base camp, record, quest, chisel, climate, paleontologist <p>1. When we were climbing in the Adirondacks we had to pick a different base camp each night.</p> <p>2. During the experiment we had to record our findings</p> <p>3. We went on a quest to find the best pizza in town.</p> <p>4. After finding the fossil, paleontologists used a chisel to chip away the remaining rock.</p> <p>5. After a major climate change the dinosaurs became extinct.</p> <p>6. Paleontologist are special scientists who study dinosaurs and other ancient life.</p>
"Mary Anning Lego"	model, Jurassic, carpenter, binoculars, pane, passion

	<ol style="list-style-type: none"> 1. Making a <u>model</u> is a good way to determine what a dinosaur was like. 2. During the <u>Jurassic</u> period dinosaurs roamed the earth. 3. Mary Anning's father worked as a <u>carpenter</u> making furniture for people. 4. Using <u>binoculars</u> helps scientists see dig sites that are far away. 5. The binoculars and microscopes used to study scientific objects are made of <u>panes</u> of glass. 6. Mary Anning had a <u>passion</u> to discover, a burning interest in science.
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Sensational Six	decompose, fossil, sediment, unearthed, excavate, record
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Summary:

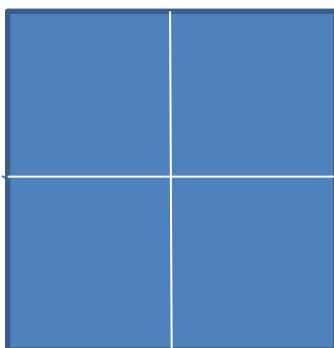
When an animal dies the location where it dies really matters! Animals decompose at different rates based on where they are when they die. Animals that die in the right location might turn into fossils if the sedimentary rock around them is forming. When fossils are unearthed, an entire area will be excavated to determine what life was like millions of years ago. When the archeologists are done digging, the site will be recorded so that all information can be kept and studied.

Learning Worth Remembering

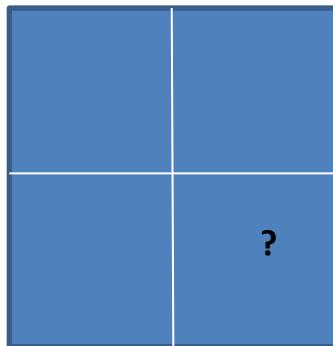
Singular Activities – the following activities can be assigned for each resource in the set. The purpose of these activities is to check for understanding, capture knowledge gained, and provide variety of ways for students to interact with each individual resource. Students may complete some or none of the suggested singular activities for each text. Singular activities should be assigned at the discretion of the teacher.

1. **A Picture of Knowledge** (Recommended for Wonderville: Fossil Generator, “The Girl Who Discovered The Dinosaurs”, “Exploring Fossils and the Fossil Record”,)

- Take a piece of paper and fold it two times: once across and once top to bottom so that it is divided into 4 quadrants.



- Draw these shapes in the corner of each quadrant.



1. Square
2. Triangle
3. Circle
4. Question Mark

- Write!

Square:

What one thing did you read that was interesting to you?

Triangle:

What one thing did you read that taught you something new?

Circle:

What did you read that made you want to learn more?

Question Mark:

What is still confusing to you? What do you still wonder about?

- Find at least one classmate who has read [selection] and talk to each other about what you put in each quadrant.

Quiz Maker (Recommended for *[Figuring Out Fossils]*)

- Make a list of # questions that would make sure another student understood the information.
- Your classmates should be able to find the answer to the question from the resource.
- Include answers for each question.
- Include the where you can find the answer in the resource.

Question	Answer
1.	
2.	
3.	

Wonderings (Recommended for “A Mammoth Find”, Fossils, “Mary Anning-The Paleontologist”)

On the left, track things you don’t understand from the article as you read (or media you watch).

On the right side, list some things you still wonder (or wonder now) about this *topic*.

I'm a little confused about:	This made me wonder:

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Expert Pack Glossary

"Fossil Fabricator"

<i>Word</i>	<i>Student-Friendly Definition</i>
Exposure	Being affected by the forces of nature like wind, rain, cold, or heat. Heat, freezing temperatures, high winds, or water affect people and animals. Environmental conditions affect dead animals too, and some of these conditions lead to fossilization.
Geographic	The physical features of an area of the land or an area of the Earth, like mountains, valleys, rivers, and oceans.
Imprints	A mark made by pressing into a surface. You could make an imprint of your hand by pressing your hand into clay.
Petrification	To turn into stone.
Predator	An organism that lives by eating other organisms.
Sedimentary	Formed from sediment. Water in streams, lakes, and oceans have tiny bits of dirt and other materials floating in it. When those particles settle to the bottom, they form a layer of rock after a long time.

Figuring Out Fossils

<i>Word</i>	<i>Student-Friendly Definition</i>
Asphalt	A sticky black or brown thick liquid that is a form of petroleum (the oil we use to make gasoline). Asphalt is often mixed with other things and used to make roads.
Dissolve	To mix with a liquid and become part of the liquid. For example, sugar will dissolve in water.
Fossil	The hardened remains of plants and animals.

Groundwater	Water that is underground. Groundwater provides water for springs and wells.
Preserve	To prevent from rotting or decaying.
Sediment	Solid material that settles to the bottom of a liquid.

“A Mammoth Find”

<i>Word</i>	<i>Student-Friendly Definition</i>
Estimate	An approximate age of a fossil, a guess.
Hybrid	Something that is formed by combining two or more things. For example, the mule is a hybrid of a horse and a donkey.
Interact	To act together. Two or more things interact when they work together and have an effect on each other.
Prehistoric	A time period before history was written down to be remembered.
Remains	The dead body of a person or animal. In this case, the remains are the parts of the animal that are left when most of the animal has decomposed.
Vertebrae	The small bones that make up the backbone. The backbone is really made from a series of smaller bones. Each small bone is called a vertebra. The plural of vertebra is vertebrae.

“The Girl Who Discovered the Dinosaurs”

<i>Word</i>	<i>Student-Friendly Definition</i>
Auction	A public sale at which things are sold to the people who offer to pay the most.
Embedded	Placed or set firmly in something else.
Remnants	The parts of something that are left when the other parts are gone.
Specimens	Something (such as an animal or plant) collected as an example of a particular kind of thing.
Thrived	Lived successfully in their environment.
Unearthed	Dug up from the earth or ground.

"Mary Anning Lego"

<i>Word</i>	<i>Student-Friendly Definition</i>
Binoculars	Two small telescopes that you look through with both eyes to see things far away.
Carpenter	A person who builds things from wood.
Jurassic	A time period when dinosaurs were present, about 140-190 million years ago.
Model	A small example of an event or item that you can build.
Pane	A piece of glass that is flat and often square.
Passion	A drive or desire to complete something challenging.

"Exploring Fossils and Fossil Records"

<i>Word</i>	<i>Student-Friendly Definition</i>
Base camp	A camp that is a starting point or main gathering place for a group of campers. Scientists use a base camp to keep their supplies and equipment, and they take short trips from the base camp to excavation sites.
Chisel	A tool used by paleontologists to chip away rock that surrounds a fossil.
Climate	The general weather/seasons of an area.
Paleontologist	A scientist who studies the ancient world.
Quest	A journey made in search of something.
Record	To put into writing. To save information. Scientist must record the data that they are finding so they can share the information with other scientists.

Fossils

Amber	Fossilized resin. It is often transparent, like glass or gemstones, and is usually yellow or orange in color. Resin is a sticky substance that oozes from some trees and some plants. It is not the same as tree sap, but it is similar. Both sap and resin are liquids found in trees; sap is sugar and
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	water, and resin is something sticky that helps the tree repair itself when a branch is broken. The resin can fossilize, and it becomes amber. Insects caught in resin can be seen inside the amber.
Decompose	To rot or decay.
Droppings	Solid waste from animals.
Excavate	To dig up or uncover things that are buried. Scientists have many special tools to clear the dirt and rocks away from the fossils that are buried. They must excavate the fossils carefully so they are not damaged.
Impressions	Something (such as a design or a footprint) made by pressing or stamping a surface. When you walk on a snowy sidewalk, your boots leave impressions in the snow. The impressions will show the tread pattern in the bottom of your boot or shoe.
Remote	Far away from other people, homes, or cities.