



Activity Description and Estimated Class Time

Throughout the guide teaching tips are in red.

This 3-day activity is intended for students to work with a simplified model of natural selection (and the evidence for it) before studying the multitude of examples in biology. In Part 1, the teacher presents the story of a biologist, a paleontologist, and a geologist who gather evidence on an imaginary planet to discover how life evolved there. Each student is assigned two of the organisms discovered on the planet. As the scientists in the story explore geologic, fossil, and anatomical evidence, students fill in information about when and how their assigned organisms came into existence, what their immediate ancestors looked like, and what factors contributed to success or extinction. In Part 2, students build an ancestry chart of these imaginary organisms. Part 1 requires about two class periods, and Part 2 requires one class period.

Objectives

Students will develop an understanding of the following ideas and content:

- the basic processes and mechanisms of natural selection,
- the uses of the three basic forms of evidence for evolution: geologic, fossil, and anatomical,
- roles of variation, mutation, and environmental change in natural selection,
- producers, consumers, and decomposers.

Students will demonstrate understanding of these ideas by recording changes in populations based on geologic, fossil, and anatomical evidence. They will also demonstrate understanding by discussing these changes.

Correlations to North Carolina Science Standards

8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time.

8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution.

8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment. Explain how factors such as food, water, shelter, and space affect populations in an ecosystem.

Brief Science Background

Natural selection is the gradual process by which traits become either more or less common in a population. This happens because inherited traits affect an organism's reproductive success in a given environment. The organisms that make up all populations vary slightly because their genes randomly mutate. The mutated genes pass on to offspring. Some organisms with a variant of a trait may survive and reproduce more than individuals with other, less successful, variants. The makeup of populations change over time in this way. Those variants that are able to reproduce more tend to build up in the population. On the other hand, traits that reduce an organism's success at surviving and reproducing become less well represented. In the



extreme, where environmental changes (both biotic and abiotic) reduce reproductive success for a whole species over a long period, the species can die out altogether, or become “extinct.”

This exercise is based on a simplified description of natural selection and the evidence for it, with many details left out in order to focus on basic concepts. For example, the story does not explain how scientists distinguished between predators and decomposers, or about specific evidence for an ice age. If students ask about these things, get them to speculate about kinds of evidence that a scientist might find.

During discussions, one idea about natural selection needs special care. In this lesson, some of the organisms are circles and triangles. Students are likely to say, for example, that circles developed pointy ends so that they could eat in cracks. In this case, it is very important that the triangles did not choose to have pointy ends. Pointy ends came about as a random mutation that allowed just a few triangles in the population to get into the cracks. That mutation gave an advantage that let them reproduce more, causing them to build up in the population.

Part 1 – Life on Hound (about 80-90 minutes over 2 class periods)

Materials

Materials for the Whole Class

- Several copies each of the 5 organisms worksheets (see step 1 in Preparation section)
 - BLM 1
 - BLM 2
 - BLM 3
 - BLM 4
 - BLM 5
- The PowerPoint presentation, with projector, of the Story of Life on Hound.

Materials for each student

- One of the organism worksheets (BLM 1-5)
- One copy, front and back, of BLM 11, Life on Hound Student Story Sheet for each student

Preparation

1. Copy the black line masters, BLM 1 through 5, to make the worksheets. For a class of 30, make 6 copies of each one
2. Go to <http://ciblearning.org/lesson-materials> and click on “Grade 8 Materials.” user name **cibl8** and password **learn16\$**

Procedure

The PowerPoint is designed for the teacher to present to the class. Open it and use it to tell the following story to students. The student version of the PowerPoint is for use in a later part. Name each era to be sure students are oriented on their worksheets.



Activity

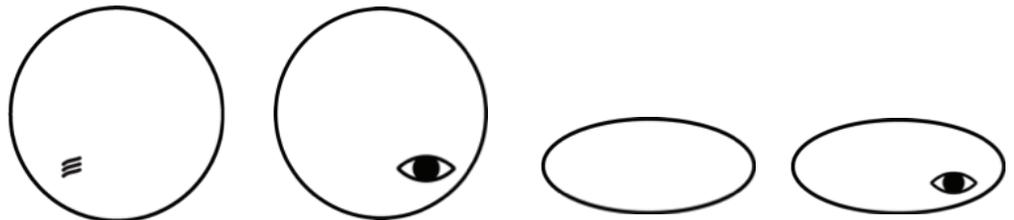
In this guide, all material in italics is in the PowerPoint presentation. Begin the PowerPoint, and read or explain: *The planet Hound was discovered in 2183 by a team visiting the planetary system around Sirius, the “dog star.” The team included a biologist (a person who studies living organisms), a paleontologist (a person who studies life in the past, most often using fossils), and a planetary geologist (a person who studies the physical makeup of planets). On Hound, they found living organisms, and evidence that organisms had been evolving there for millions of years. Using the same methods we use on Earth, they quickly set to work gathering information about how life might have developed. I will tell and show their story.*

1. Continue the story. Advance the PowerPoint to the first Primordial Era slide (slide 3).

PRIMORDIAL ERA Slide 3: *In her excavations, the paleontologist found fossils only down to a certain level. Below that, there were no fossils. At the deepest layer with fossils, there were only fossils of organisms with curvy exteriors. The paleontologist deduced that these curvy organisms were the earliest forms of life on Hound.*

Advance the PowerPoint to the next Primordial Era slide (slide 4).

PRIMORDIAL ERA Slide 4: *She only found plain circles, circles with a light sensor, plain ovals, and ovals with a light sensor. It seems that all of these organisms made their own food either from light from the star Sirius or from chemicals on Hound. These life forms are called ‘producers’ because they produce their own food.*



2. Give out **BLMs 1-5 Worksheet for Understanding Evolution** from Evidence.

Advance the PowerPoint to **Slide 5**, the blank sample of this worksheet. Use it to explain how to use the worksheets, as follows.

Near the top of your worksheet are two of the many life forms found on Hound, either currently alive or fossils. As you follow the story through the eras, write nothing on the sheet until one of your organisms appears in the story. When one of your organisms shows up, fill out the sheet for the era being described.

Point out the instructions at the top and the era column. Explain that the story begins at the earliest era, the “primordial” at the top row. It will now proceed one era at a time down the sheet until we reach present time, the “modern” era.

Tip: it is not necessary to define the nonsense era names.

Point out the check boxes at the top of each era row, and give an example for each type of instance, e.g.:

- “your organism comes into existence in a particular era. Check the box on the left in your organism’s column.”

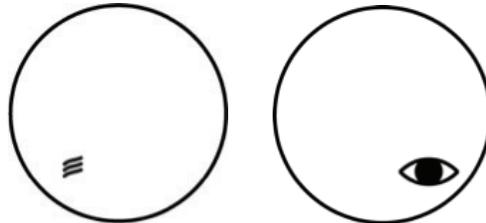


- “your organism is alive in a particular era, check the middle box in your organism’s column.”
- “your organism went extinct during a particular era, check the box on the right of your organism’s column.”

Point out factors that contribute to success or extinction. **Tip: This is a good time to define “extinction” for the class.** Also, ask students to watch carefully for the organisms that gave rise to the ones on their sheet (“immediate ancestor”). From this point on, as you finish the story of each era, stop to give students time to fill in their worksheet with drawings of the immediate ancestors and factors that caused success or extinction. Go back to **Slide 4**, the second Primordial Era slide, and give students with Primordial Era organisms on their sheet the opportunity to check the box under “alive now” (4 of the 5 sheets have one of these organisms on them, so most of the class will have something to do).

Tip: there are no known immediate ancestors for the organisms in this era. They are “alive now” and we don’t know when they came to exist. Factors for success are their ability to produce food from light and the environment (a producer).

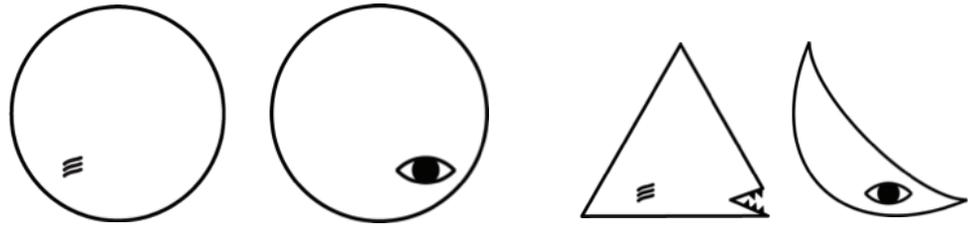
3. Advance the PowerPoint to **Slide 6 the ICE AGE ERA:** *After many eons, Hound’s climate turned cold for about a million years; the geologist found evidence for an ice age. The larger, circle-shaped critters could store extra energy, but the oval-shaped critters couldn’t store nearly as much, and they became extinct. At the top of this layer, these were the only fossils present:*



Allow a few minutes for students to fill in their worksheets.

Tip: Look around to notice whether students with ovals on their sheet checked “extinct” and wrote down the factor that caused them to become extinct.

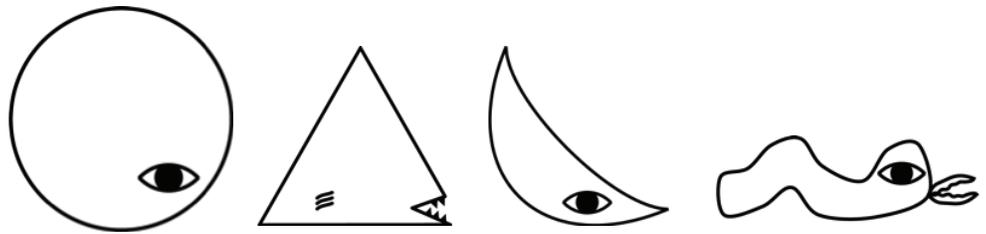
4. Advance the PowerPoint to the **Slide 7 the WARMING ERA:** *In the layer just above the Ice Age Era, bodies of all the ovals that died during the ice age had collected in cracks. This organic material was a plentiful food source for any organisms that could get at it. During this period, some of the plain circles had mutations that made them triangle shaped with mouths. Also, some of the circles with light sensors had a mutation that made them crescent shaped. The triangles’ and crescents’ points allowed them into cracks to absorb nutrients there. These organisms are ‘decomposers.’ At the top of this layer, these were the only fossils present:*



Allow a few minutes for students to fill in their worksheets.

Tip: Notice whether students with crescents and triangles checked “came into existence” and wrote about the newly available food source. Check students with triangles to see whether they drew the circle as the immediate ancestor, and students with crescents to see if they drew the circles with light sensors.

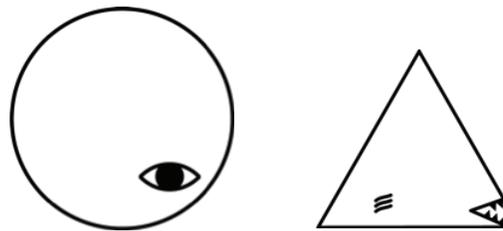
5. Advance the PowerPoint to **Slide 9** the **PREDACEOUS ERA**: *The layer above the Warming Era showed evidence that the triangles also ate the circles. The triangles had become a special kind of consumer called a predator, but they continued to be decomposers as well. As predators, they ate all of the plain circles. However, circles and crescents with light sensors saw the triangles coming and escaped. During this era, some circles with light sensors had a mutation that produced squiggles with light sensors that could crawl into cracks to eat some (but not all) of the crescents. These squiggles built up in the population and became a new predator. At the top of this layer, these fossils were present:*



Allow a few minutes for students to fill in their worksheets.

Tip: Notice whether students with circles checked “went extinct” and those with squiggles checked “came into existence” and wrote about the factors that contributed to this.

6. Advance the PowerPoint to **Slide 11** the **MORTALITY ERA**: *The layer of rock just above the Predaceous Era held evidence that the squiggles were ferocious and very hungry. It appears that they ate every crescent they could find. In fact, they ate so many that the crescents could no longer find mates and reproduce, and they went extinct. With nothing to eat, the squiggles also perished. At the top of this layer, only these fossils were present:*

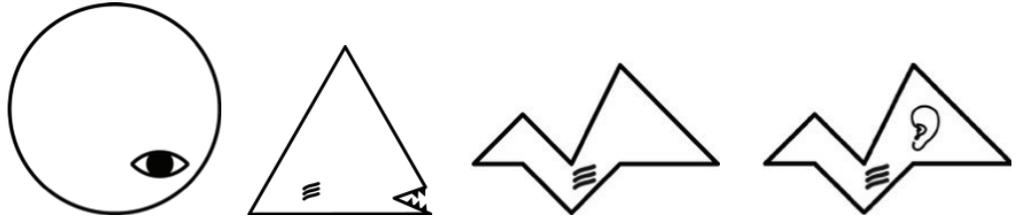


Allow a few minutes for students to fill in their worksheets.

Tip: Be familiar enough with BLMs 6-10 to check students’ progress on their worksheets.



7. Advance the PowerPoint to the **ANGLIFEROUS ERA**: *In the layer of rock just above the Mortality Era, there was evidence that some triangles were born with a mutation for jaggedness. With so many dead crescents and squiggles, there was plentiful food in the cracks. Two kinds of jagged organisms began to build up in the triangle population, some with sound sensors and some without. Eventually, these became two new species. At the top of this layer, these fossils were present:*



Allow a few minutes for students to fill in their worksheets.

8. Advance the PowerPoint to the **MODERN ERA**. *When the team landed, they found only circles with light sensors, rounded triangles, and jaggeds with sound sensors. The triangles hunted the jaggeds with no sound sensors to extinction. The pointy-edged triangles made a scraping sound when they moved, and the jaggeds with sound sensors could hear them coming and escape. Eventually, so many pointy triangles starved that they became extinct. However, a few mutant triangles had rounded points that made them quiet enough to sneak up on jaggeds with sound sensors, and these survived. These are the only organisms the team found alive on Hound when they landed:*



9. Give each pair of students a copy of **BLM 11 Life on Hound Student Story Sheet**, then arrange the class in groups of students who all have the same organism worksheet. Ask them to compare their work, go back through the story, and modify anything they would like to, based on their discussions with others in their group. They should specifically discuss:
- immediate ancestors
 - causes for success
 - causes of extinction.

Tell them that after 10 minutes, they will choose a representative to report on which era(s) their two organisms came into existence and went extinct, their immediate ancestors and causes for success and extinction.

10. Ask each team's representative to report results of their discussion to the class. After each team reports, show the appropriate **Answer Key for BLMs 6-10 (Answer Keys for Understanding Evolution From Evidence)**.

Tip: Students may come to this unit with misconceptions about evolution. For example, they might say that when circles became triangles, they developed pointy ends so that they could scavenge in the cracks. It is



important to make the distinction that the triangles did not choose to have pointy ends. Pointy ends came about by a random mutation that allowed some of the triangles in the population to eat other organisms. Have students define “random” and “mutation” separately, then put the two words together. That mutation conferred an advantage that allowed pointy-ended ones to build up in the population. This subtle but critical idea underpins evolution by natural selection as described by Charles Darwin. The idea that organisms develop adaptations so that they can succeed is an outmoded concept (evolution by acquired characteristics) that was proposed by Jean-Baptiste Lamarck.

Part 2 – Wrap-Up (50 minutes)

Materials

Materials for the teacher

- Ability to project **BLM 13 Ancestry Chart** (Teacher Version and Answer Key)

Materials for each student

- a copy of **BLM 11 Life on Hound Student Story Sheet**
- a copy of **BLM 12 Ancestry Chart (Student Sheet)**
- a copy of **BLM 14 Definitions**

Procedure

Hand out **BLM 11 Life on Hound Student Story Sheet** and **BLM12 Ancestry Chart** to each pair of students. The student version of the chart is missing the organisms for the Angliferous, Mortality, and Predaceous Eras, and the arrows showing ancestry going from the Ice Age Era to the Warming Era. Ask students to begin filling out the Ancestry Chart worksheet as follows:

1. Start at the bottom of the chart, and explain that these first four organisms were found at the deepest levels under the ground and were the oldest organisms known to exist on Hound.
2. Ask students to read the information on **BLM 11 Life on Hound Student Story Sheet** about the Ice Age Era. Project **BLM 12 Ancestry Chart** (student sheet), point out the arrows and the Xs on the bottom row, and explain their meaning:
 - the arrows mean ancestry – either the same organism continued from one era to the next or an organism had a mutation that gave rise to a new organism in the next era,
 - the Xs means “went extinct” – in this case, the ovals all went extinct.
3. Allow students a few minutes to read the paragraph about the Warming Era.
4. Ask students to supply any arrows or Xs needed to go from the Ice Age Era to the Warming Era. After a few minutes, discuss their results.
5. Ask the class to draw in the organisms for the Predaceous, Mortality, and Angliferous Eras with all of the appropriate arrows and Xs, including those



leading to the Modern Era based upon the information on **BLM 11 Life on Hound Student Story Sheet**. Give them plenty of time to read both sides of BLM 11.

6. Ask students to find a partner and share and discuss similarities and differences in their work.
7. Project **BLM 13 Answer Key**. Students' charts might not look exactly like the answer key, but their arrows should lead to the correct organisms and Xs should show extinctions at appropriate eras.

WRAP UP DISCUSSION

1. Give out **BLM 14 Evidence Worksheet** and ask students to read the definitions and answer the questions on the worksheet in the spaces provided.
2. Discuss the results of all of the work from Day 1 and Day 2.

DEFINITIONS

Geology: The science that deals with the earth's structure and the processes that act on it. Although geology is often understood as the study of rocks, it is also the way we understand earth's history.

Superposition: In geology, this rule states that sedimentary layers and the fossils in them are deposited in a time sequence, with the oldest on the bottom and the youngest on the top.

Index Fossils: Fossils are the remains or impressions of prehistoric organisms preserved in rock. Index fossils are found in only one era and therefore help to define the time span of that era.

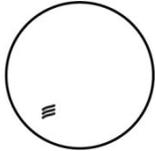
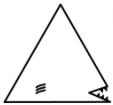
Comparative Anatomy: The branch of science concerned with the bodily structure of humans, animals, and other organisms is called anatomy. The science of comparative anatomy is concerned with similarities and differences in structure between organisms.

QUESTIONS FOR STUDENTS

Using your Ancestry Chart, the definitions above, and what you have learned about the work of the scientists on Hound, answer the questions below:

1. Give two examples in which superposition was used to determine the era in which an organism lived. **Tip: Any organisms found in lower layers must have lived earlier than organisms only found in higher layers. Circles before triangles. Ovals before crescents. Triangles before rounded triangles. However, circles with light sensors occurred both lower than and higher than squiggles. So the paleontologist had to be careful when trying to place the circles with light sensors.**
2. There are only 3 index fossils in the story. Name them. **Tip: Ovals, squiggles, and jaggeds without sound sensors. All of these appear in only one era.**
3. Give two examples of creatures and their immediate ancestors and describe similarities in their anatomy that might indicate relatedness. **Tip: Circles vs. ovals, circles vs. triangles, pointy triangles vs. rounded triangles, etc**

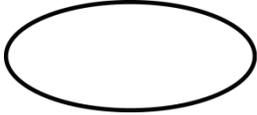
ANSWER KEY FOR BLM 1

ERA									
			came to exist	alive now	went extinct	came to exist	alive now	went extinct	
Primordial	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	It was a producer during the primordial era.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ice Age	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Warming	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Predaceous	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	It could not avoid predators.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Mortality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Angliferous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					(immediate ancestor)				
Modern	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
					Jaggedness let it feed in cracks. It could hear and avoid its noisy predator.				

ANSWER KEY FOR BLM 2

For each era below, check the appropriate check box and then add the following:

- If it came into existence, draw the immediate ancestor.
- If it is currently alive, write down which factors contribute to its success.
- If it went extinct, write down which factors caused its extinction.

ERA						
	came to exist	alive now	went extinct	came to exist	alive now	went extinct
Primordial	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	It was a producer during the primordial era.			It was a producer during the primordial era.		
Ice Age	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
				It could not store enough food during the ice age.		
Warming	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Predaceous	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	It was able to avoid predators.					
Mortality	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angliferous	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Modern	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

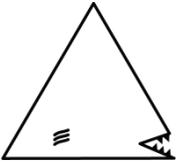
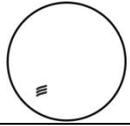
ANSWER KEY FOR BLM 3

For each era below, check the appropriate check box and then add the following:

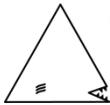
- If it came into existence, draw the immediate ancestor.
- If it is currently alive, write down which factors contribute to its success.
- If it went extinct, write down which factors caused its extinction.

ERA						
	came to exist	alive now	went extinct	came to exist	alive now	went extinct
Primordial	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	It was a producer during the primordial era.					
Ice Age	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warming	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Predaceous	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Light sensor allowed it to avoid predators.			 (immediate ancestor)		
Mortality	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Its prey (food source) died out.					
Angliferous	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Modern	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ANSWER KEY FOR BLM 4

<p>For each era below, check the appropriate check box and then add the following:</p> <ul style="list-style-type: none"> • If it came into existence, draw the immediate ancestor. • If it is currently alive, write down which factors contribute to its success. • If it went extinct, write down which factors caused its extinction. 							
ERA							
	came to exist	alive now	went extinct	came to exist	alive now	went extinct	
Primordial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	It was a producer during the primordial era.
Ice Age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	It could not store enough food during the ice age.
Warming	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	 (immediate ancestor)
Predaceous	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	It had plenty of food from dead organisms and became a predator able to eat live ones.
Mortality	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Angliferous	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Modern	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	It consumed all of the jaggeds without sound sensors. It was too noisy to sneak up on jaggeds with sound sensors.

ANSWER KEY FOR BLM 5

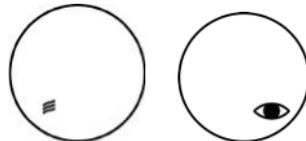
For each era below, check the appropriate check box and then add the following: <ul style="list-style-type: none"> • If it came into existence, draw the immediate ancestor. • If it is currently alive, write down which factors contribute to its success. • If it went extinct, write down which factors caused its extinction. 						
ERA						
	came to exist	alive now	went extinct	came to exist	alive now	went extinct
Primordial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ice Age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				 (immediate ancestor)		
Predaceous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
				It could feed on dead organisms (decomposer) and could avoid predators using its light sensor.		
Mortality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
				The entire population was eaten by the squiggles.		
Angliferous	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	 (immediate ancestor)					
Modern	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	It was eaten by predators that it could not hear coming.					

Life On Hound Student Story Sheet (front and back)

PRIMORDIAL ERA : In her excavations, the paleontologist found fossils only down to a certain level. Below that, there were no fossils. At the deepest layer with fossils, there were only fossils of organisms with curvy exteriors. The paleontologist deduced that these curvy organisms were the earliest forms of life on Hound. She only found plain circles, circles with a light sensor, plain ovals, and ovals with a light sensor. It seems that all of these organisms made their own food either from light from the star Sirius or from chemicals on Hound. These life forms are called 'producers' because they produce their own food.



ICE AGE ERA After many eons, Hound's climate turned cold for about a million years; the geologist found evidence for an ice age. The larger, circle-shaped critters could store extra energy, but the oval-shaped critters couldn't store nearly as much, and they became extinct. At the top of this layer, these were the only fossils present:



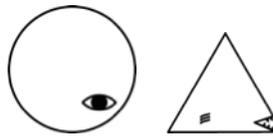
WARMING ERA In the layer just above the Ice Age Era, bodies of all the ovals that died during the ice age had collected in cracks. This organic material was a plentiful food source for any organisms that could get at it. During this period, some of the plain circles had mutations that made them triangle shaped with mouths. Also, some of the circles with light sensors had a mutation that made them crescent shaped. The triangles' and crescents' points allowed them into cracks to absorb nutrients there. These organisms are 'decomposers.' At the top of this layer, these were the only fossils present:



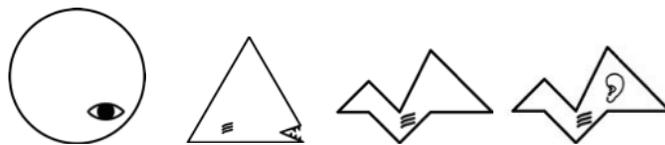
PREDACEOUS ERA The layer above the Warming Era showed evidence that the triangles also ate the circles. The triangles had become a special kind of consumer called a predator as well as a decomposer. As predators, they ate all of the plain circles. However, circles and crescents with light sensors saw the triangles coming and escaped. During this era, some circles with light sensors had a mutation that produced squiggles with light sensors that could crawl into cracks to eat some (but not all) of the crescents. These squiggles built up in the population and became a new predator. At the top of this layer, these fossils were present:



MORTALITY ERA The layer of rock just above the Predaceous Era held evidence that the squiggles were ferocious and very hungry. It appears that they ate every crescent they could find. In fact, they ate so many that the crescents could no longer find mates and reproduce, and they went extinct. With nothing to eat, the squiggles also perished. At the top of this layer, only these fossils were present:



ANGLIFEROUS ERA In the layer of rock just above the Mortality Era, there was evidence that some triangles were born with a mutation for jaggedness. With so many dead crescents and squiggles, there was plentiful food in the cracks. Two kinds of jagged organisms began to build up in the triangle population, some with sound sensors and some without. Eventually, these became two new species. At the top of this layer, these fossils were present:



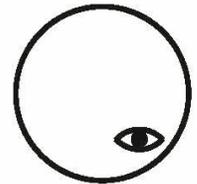
MODERN ERA When the team landed, they found only circles with light sensors, rounded triangles, and jaggeds with sound sensors. During the previous era, the triangles had hunted the jaggeds with no sound sensors to extinction. The pointy-edged triangles made a scraping sound when they moved, and the jaggeds with sound sensors could hear them coming and escape. Eventually, so many pointy triangles starved that they became extinct. However, a few mutant triangles had rounded points that made them quiet enough to sneak up on jaggeds with sound sensors, and these survived. These are the only organisms the team found alive on Hound when they landed:



Name _____ Date _____

ANCESTRY CHART--STUDENT SHEET

MODERN ERA

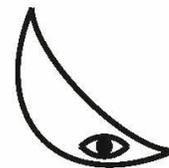
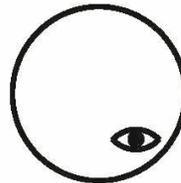
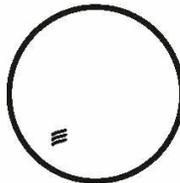
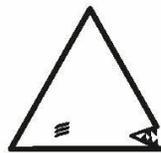


ANGLIFEROUS ERA

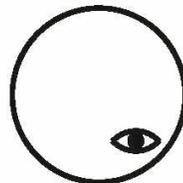
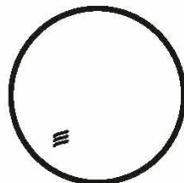
MORTALITY ERA

PREDACEOUS ERA

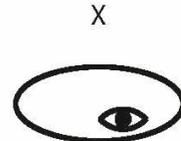
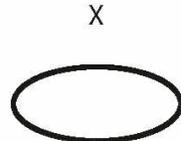
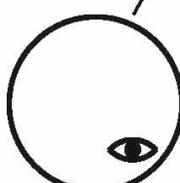
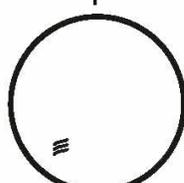
WARMING ERA



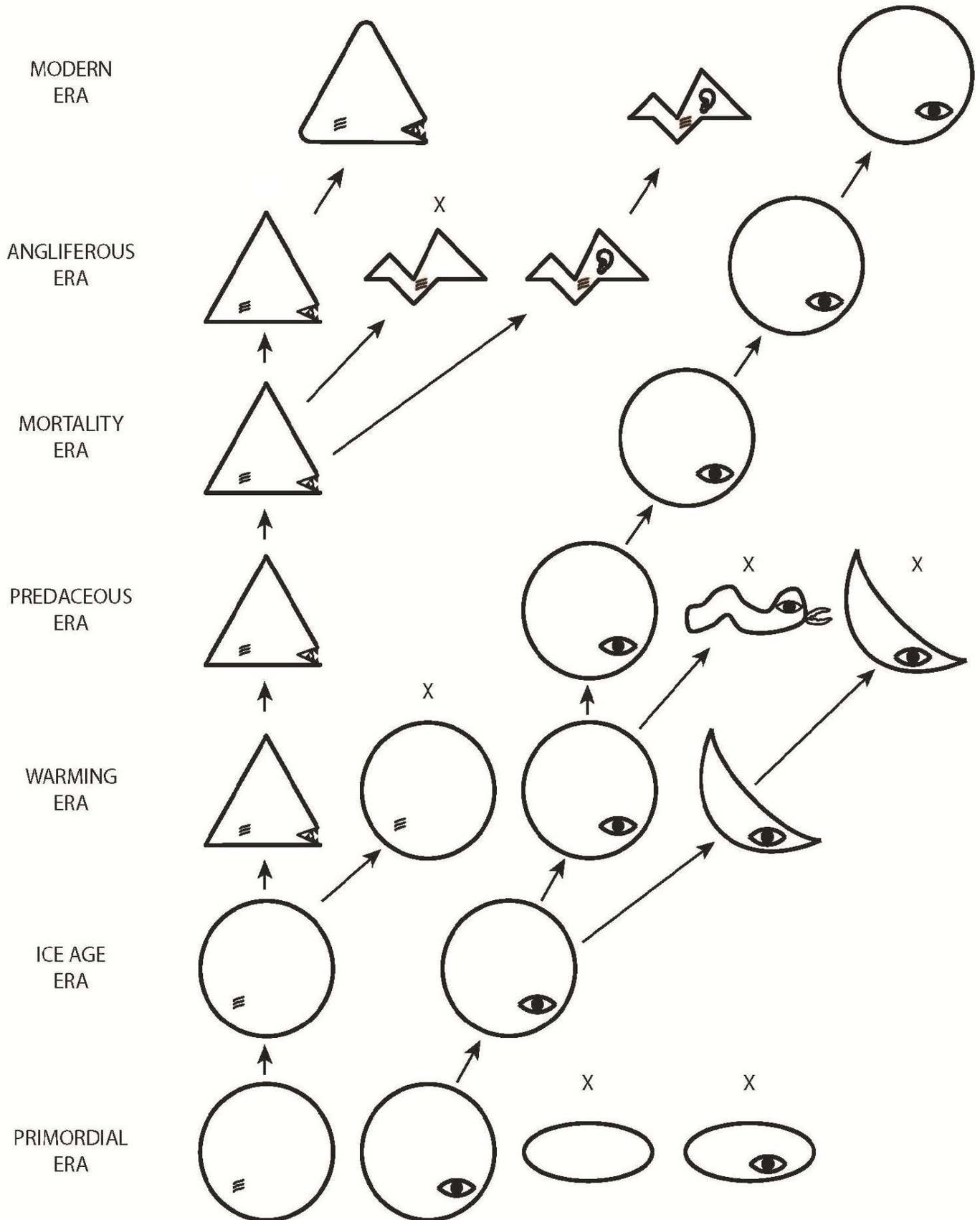
ICE AGE ERA



PRIMORDIAL ERA



ANCESTRY CHART--ANSWER KEY



Name _____ Date _____

EVIDENCE WORKSHEET

Definitions

Geology: The science that deals with the earth's structure and the processes that act on it. Although geology is often understood as the study of rocks, it is also the way we understand earth's history.

Superposition: In geology, this rule states that sedimentary layers and the fossils in them are deposited in a time sequence, with the oldest on the bottom and the youngest on the top.

Index Fossils: Fossils are the remains or impressions of prehistoric organisms preserved in rock. *Index fossils* are found in only one era and therefore help to define the time span of that era.

Comparative Anatomy: The branch of science concerned with the bodily structure of humans, animals, and other organisms is called anatomy. The science of *comparative anatomy* is concerned with similarities and differences in structure between organisms.

Questions

Using your Ancestry Chart, the definitions above, and what you have learned about the work of the scientists on Hound, answer the questions below:

1. Give two examples in which superposition was used to determine the era in which an organism lived. _____

2. There are only 3 index fossils in the story. Name them. _____

3. Give two examples of creatures and their immediate ancestors and describe similarities in their anatomy that might indicate relatedness. _____

