LESSON 2:
THE CAMBRIAN EXPLOSION

What were the first animals?
How did they survive?

Lesson 2 introduces the major animal groups and basic ideas about natural selection and food webs.

Lesson Plan

Quick Dip Video

Classroom Activity: Eat or Be Eaten!

This curriculum features the STEM picture book
Out of the Blue: How Animals Evolved From Prehistoric Seas
by Elizabeth Shreeve, illustrated by Frann Preston-Gannon
Candlewick Press, 2021
More materials at www.ElizabethShreeve.com.

Lesson 2: THE CAMBRIAN EXPLOSION

Lesson Plan

During the **CAMBRIAN PERIOD** (541-485 million years ago) biodiversity "exploded" in the world's oceans. The first complex life-forms appear in the fossil record at this time and the major animal groups (phyla) took shape, with basic body plans that endure today. The Cambrian Period also marks the transition from simple feeding strategies (e.g., filter feeding) to more complex predator-prey relationships that have spurred evolution and biodiversity ever since.

Lesson 2 begins with a read-aloud and Quick Dip Video #2, followed by an art-focused activity for students to design their own predators and prey. Working in individually or in groups, they invent and draw body features and behaviors (adaptations) that help predators to be effective hunters and enable prey animals to defend themselves. This activity encourages creative visual thinking while reinforcing principles of natural selection and adaptation.

Learning Objectives

- ✓ I can describe how the major animal groups took shape in the Cambrian Period
- ✓ I can create a predator that has physical and behavioral characteristics to help it survive
- ✓ I can understand that life-forms are constantly changing and adapting to their environments

Time Required

Recommended for two class sessions (students love the classroom activity!)

1. Review the book, up to and including the Cambrian Period spread; watch Quick Dip Video #2.
2. Classroom Activity – *Eat or Be Eaten!*

NGSS Focus: Natural Selection

Performance Expectation (3-5): when environments change some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

LS4.B: Natural Selection. Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.

Lesson 2: THE CAMBRIAN EXPLOSION

Materials Needed

- A copy of *Out of the Blue: How Animals Evolved from Prehistoric Seas*
- Quick Dip Video #2: THE CAMBRIAN EXPLOSION (video available at www.elizabethshreeve.com or YouTube Elizabeth Shreeve Books
- Markers and pencils; blank paper
- Print-outs of the "Design Your Own Animal" charts (see below or in **Pages-to-Print Package)**

Video & Classroom Activity

STEP 1: Read and Prepare

1. Introduce the topic and tell students that they be designing their own predators and prey. Confirm definitions of PREDATORS (animals that catch and kill other animals) and PREY (animals that are hunted and killed by other animals).
2. Open the book to the Cambrian Period spread; read all text including captions.

   Suggested questions:

   - Can you name some of the major animal groups and their characteristics (e.g. exoskeletons)?
   - What are some examples of living animals from these animal groups? (*e.g. insects or crabs are arthropods*)
   - Which animals on the Cambrian Period pages appear to be predators? Which do you think are prey animals? What body parts or shapes make them successful predators or help them to defend against hunters?
   - Can you name some top predators in today's oceans (*e.g., orca whales, sharks*) and on land (*e.g., wolves, hawks, grizzly bears*)?
   - How do scientists know what animals were predators or prey so long ago? What are signs of predation in the fossil record? (*Note: fossil evidence of predation includes marks of boring, biting, scrapes, fractures.)*

Lesson 2: THE CAMBRIAN EXPLOSION

STEP 2: Watch Quick Dip Video #2

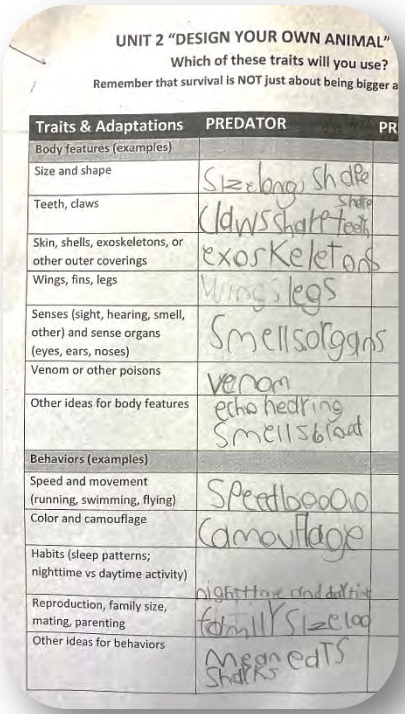
Watch the **Quick Dip Video #2: THE CAMBRIAN EXPLOSION,** available with Teaching Videos at www.elizabethshreeve.com and at YouTube Elizabeth Shreeve Books

Option: Discuss questions at the end of the video.

1. How did animals change (evolve) during the Cambrian Period?
2. What are some ways to be a better hunter?
3. What are some ways to avoid being eaten?
4. Some animals have hard outer shells (exoskeletons). Can you name one?
5. Other animals have internal skeletons (endoskeletons). Can you name one?
6. Can you name an important fossil from the Cambrian Period?

STEP 3: Design Your Own Predator and Prey

Now it's time to invent your very own animals! Some will be fierce hunters; others will be super-tough prey. Both types of animals must eat to survive and none want to be eaten. (*Note: recommend that teachers NOT draw any examples; let students invent their own!)*



UNIT 2 "DESIGN YOUR OWN ANIMAL"
Which of these traits will you use?
Remember that survival is NOT just about being bigger a

Traits & Adaptations	PREDATOR	PR
Body features (examples)		
Size and shape	Size long shape	
Teeth, claws	claws shark teeth	
Skin, shells, exoskeletons, or other outer coverings	exoskeletons	
Wings, fins, legs	wings legs	
Senses (sight, hearing, smell, other) and sense organs (eyes, ears, noses)	Smell sorgans	
Venom or other poisons	venom	
Other ideas for body features	echo hedring smell sbroad	
Behaviors (examples)		
Speed and movement (running, swimming, flying)	Speedboooo	
Color and camouflage	Camouflage	
Habits (sleep patterns; nighttime vs daytime activity)		
Reproduction, family size, mating, parenting	family size too	
Other ideas for behaviors	Megaedts sharks	

1. Provide each student with a worksheet charts (below) and blank paper. Ask them to decide on traits and adaptations for a predator, using the chart, and then draw it.

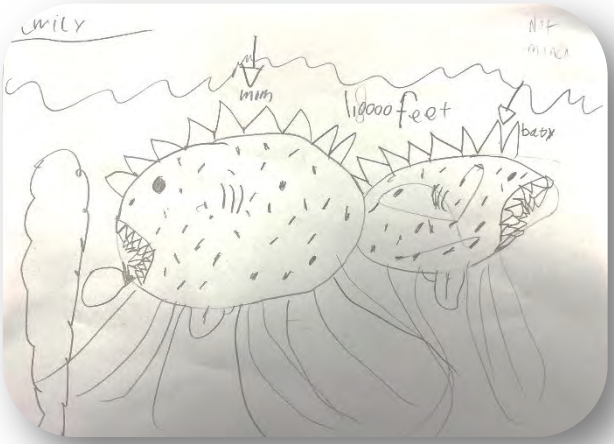
2. Each group discusses body features and behaviors that are useful for predators and prey. Students can use the chart to select a few traits for their animals and jumpstart ideas. Be sure to decide whether the animal lives in ocean or on land.

3. Have students pair up. Each student has two minutes to explain their predator to the other person, who can ask questions; then switch roles.

4. After students have explained the predators to their partner, have them switch drawings and draw a prey animal that can defend itself against their partner's predator. For example, if the predator has big sharp teeth, the prey animal might adapt by growing a tough outer shell, running faster, or hiding during the hours when that hunter is active.

STEP 4: Discuss

Each student has now designed a predatory animal and a prey animal, with features that provide advantages for survival.



- Ask students to show and describe their animals. What body features and behaviors did they include?
- How were these traits help them to survive? How were they suited to the animals' habitat?
- How did body features and behaviors of the PREDATOR affect how they designed the PREY?

This activity reinforces:

- Ways in which animals evolve in relationship to each other, changing and adapting through natural selection over time.
- The importance of adaptations, both anatomical and behavioral.
- The interconnected nature of ecosystems and food webs.

Other possible discussion topics:

- Predators eat prey, but what do prey animals eat? This is a chance to discuss food webs, starting with plants and plankton at the bottom, animals that eat plants (herbivores), animals that eat plants and other animals (omnivores), and all the way up to apex or top predators.
- In an ecosystem, are there more prey animals or more predators?
- What are some typical characteristics of predators vs. prey animals? For example, prey animals such as zebras typically have eyes on the sides of their faces, giving them a wider range of view, while predators typically have eyes that focus straight ahead.

Visit www.elizabethshreeve.com for more activities and resources.

Bye for now!

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LESSON 2 "DESIGN YOUR OWN ANIMAL" CHART

Which of these traits will you use?

Remember that survival is NOT just about being bigger and stronger!

Traits & Adaptations	PREDATOR	PREY
Body features (examples)		
Size and shape		
Teeth, claws		
Skin, shells, exoskeletons, or other outer coverings		
Wings, fins, legs		
Senses (sight, hearing, smell, other) and sense organs (eyes, ears, noses)		
Venom or other poisons		
Other ideas for body features		
Behaviors (examples)		
Speed and movement (running, swimming, flying)		
Color and camouflage		
Habits (sleep patterns; nighttime vs daytime activity)		
Reproduction, family size, mating, parenting		
Other ideas for behaviors		