

Blue Crab Adaptations



Appropriate for: Upper elementary-early high school

What you will learn: Blue crabs are specially adapted for surviving. In this lesson you will explore their physical adaptations and why they are good survivors.

Activities offered: Reading, videos, labeling activity, quiz

VOCABULARY FOR THIS ACTIVITY:

Adaptations	Soft shell crab	Turbid
Decapod	Claw	Compound eye
Invertebrate	Swim fin	Gills
Molt	Antennae	Carapace

Adaptations

Do you know what ADAPTATIONS are?

They are the special characteristics and behaviors that make an organism better able to survive in an environment. As environments change, the animals and plants that live there have to change too. Adaptations can be physical, like how different animals have bodies made specifically for living in their habitat or homes. Adaptations can also be behavior based, when organisms change what they do in response to the changes around them.

Blue crabs (*Calinictes sapidus*) live in the Chesapeake Bay. They are specially adapted for living in a range of waters with different salinities, or saltiness of the water, from the mouth of the Bay all the way to the top.



Let's explore how a blue crab is adapted to live in the waters of the Chesapeake.





Blue crabs are **DECAPODS**, which means that they have ten legs. Can you count them all? Scientists count the claws and swim fins as legs too, so don't be forget those.

They have:

- Six walking legs
- Two swim fins
- Two claws

Would you like to watch <u>a blue crab walking and using its claws.</u>?

Invertebrates

Blue crabs are **INVERTEBRATES**, meaning they don't have a backbone, instead they have the armor of a hard shell.



It **MOLTS** or sheds its shell each time it grows.



Another word for molting an outer cuticle or shell is called **ECDYSIS** (EH-K-Day-SIS). When a blue crab is ready to molt it hides somewhere safe, takes in water through its mouth, and a special seam at the back of the shell pops open. The blue crab struggles to come out of his old hard shell, which he leaves completely behind.



A blue crab molts up to 27 times in its lifetime! Each time it molts it grows by about 1/3 larger. Would you like to watch <u>a blue crab molting?</u>

A newly molted crab is called a paper crab or a **SOFT SHELL CRAB**.



When a crab comes out of its old shell it is larger and the new shell is soft and paper thin. Soft shell crabs must hide, because it takes them up to 48 hours to fully harden their shell.

Tools of the Trade

CLAWS



Can you see the bumps on the inside of the crab's claws?





1 - Blue crab claws are used for defense, displays, and catching food.

- Blue crabs have two claws
- Each claw has serrated or toothed bumps
- One claw is a like a knife and has sharp bumps for ripping and tearing meat
- The other claw has more rounded bumps and is like a fork, good for holding prey
- Female crabs, called sooks, have bright red claws

What happens if a blue crab loses a claw or leg to a predator?



They can grow back legs, claws, and swim fins when they molt. The new limb-bud grows inside the shell.



2 - Can you see the new claw forming? There is a little claw bud where the old claw used to be.

What adaptation does a blue crab have for swimming?



Its SWIM FINS!

A blue crab's swim fins make blue crabs different from any other crabs. These paddles help the blue crabs move freely about the Chesapeake Bay by helping them swim. They are also helpful for a quick getaway from predators!

SENSES

How do you think a blue crab smells what is around it? It doesn't have a nose. What do you think it uses instead?

They have two sets of **ANTENNAE** to help them smell and feel the water.



One set of antennae is fixed, and doesn't move, but another has a joint and bends. The bending antennae have feathered tips, and their ends pick up smells. The elbow of the antennae (in the middle) folds the antennae in half, and puts the feathered ends into holes between the crab's eyes. These holes have what is called a Jacobson's organ, which is used to process smell. Look carefully at the picture above and you can see the two sets of antennae. Can you find the ones that fold or bend?



3 - Can you see the set of fixed antennae here?

Most blue crabs live in **TURBID** or cloudy water. Because of this they need a way to know where they are going. They use their antennae to smell and sense chemicals in the water, and also to feel the current and movement of water.



Blue crabs also have **COMPOUND EYES** that sit on stalks. These eyes have thousands of lenses (like a fly) to help them see.

By having eyes on stalks, the blue crab can bury itself in the sand or mud and hide from predators and still look around.

How do you think a blue crab eats?

Blue crabs don't have teeth. They use their claws to rip and tear their food into small bites, then the food is put into their mouth, which is covered with armored plates that help move the food inside the crab. They eat small fish, worms, tiny clams, and even other crabs. Would you like to <u>watch a video of a blue crab eating?</u>



How do you think a blue crab breathes under water?



Blue crabs have **GILLS** under their top shell or **CARAPACE**, on either side of their heart and stomach. These gills are finger-like and are feathery. The feathering provides more surface area for the crab to absorb oxygen from the water. To breathe the blue crab takes water into its mouth, pushes it over its gills, and then spits the water back out its mouth in a continual motion.



4 - This is a picture of a crab without its top shell. Can you find the tan feather gills in this picture?



Let's review what we learned.

Try to answer the following questions without looking at the answers:

- 1. What is an adaptation?
- 2. Why do animals need to adapt to their environment?
- 3. Name three adaptations a blue crab has to live in the Chesapeake Bay.
- 4. How many legs does a blue crab have?
- 5. What adaptation does the blue crab have to help it swim?
- 6. What is it called when a blue crab sheds its shell?
- 7. Why does a blue crab have two different types of bumps on the inside of its claws?
- 8. What does a blue crab use to smell?
- 9. Explain the advantages of compound eyes on stalks.

10. Why are the gills of a blue crab feathered?

Extra credit: There is a special name for when a crustacean or crab molts. What is that term? (try to spell it the best you can)

Can you label the parts of a blue crab? Use the image below.



Here are the body parts to label:

- 1. Swim fins
- 2. Walking legs
- 3. Claws
- 4. Carapace (top shell)
- 5. Eyes
- 6. Antennae

Answers to the quiz:

- 1. What is an adaptation? It is the special characteristics and behaviors that make an organism better able to survive in an environment.
- 2. Why do animals need to adapt to their environment? The habitats and environments that they live in change, so the animals need to adapt to survive.
- 3. Name three adaptations a blue crab has to live in the Chesapeake Bay. Gills, swim paddles, claws, bumps on claws, a hard shell
- 4. How many legs does a blue crab have? 10
- 5. What adaptation does the blue crab have to help it swim? Swim paddles
- 6. What is it called when a blue crab sheds its shell? Molting
- 7. Why does a blue crab have two different types of bumps on the inside of its claws? One type is for holding the food (rounded ones) and one is for ripping and tearing apart food (sharp ones)

- 8. What does a blue crab use to smell? Antennae
- 9. Explain the advantages of compound eyes on stalks. The blue crab can see all around its body very well and they can also bury in mud and still see.
- 10. Why are the gills of a blue crab feathered? The feathering makes more surface area to help the crab absorb oxygen.

Extra credit: There is a special name for when a crustacean or crab molts. What is that term? (try to spell it the best you can) Ecdysis

Would you like to learn more about blue crabs and research by our scientists at the Smithsonian Environmental Research Center?



Visit our website called <u>"Blue Crabs: Top Predators in Peril"</u> to read about blue crab populations and watch a video. Want more information? Contact SERC Outreach: <u>SERCOutreach@si.edu</u>.