Learn-Along-Guide

Squid

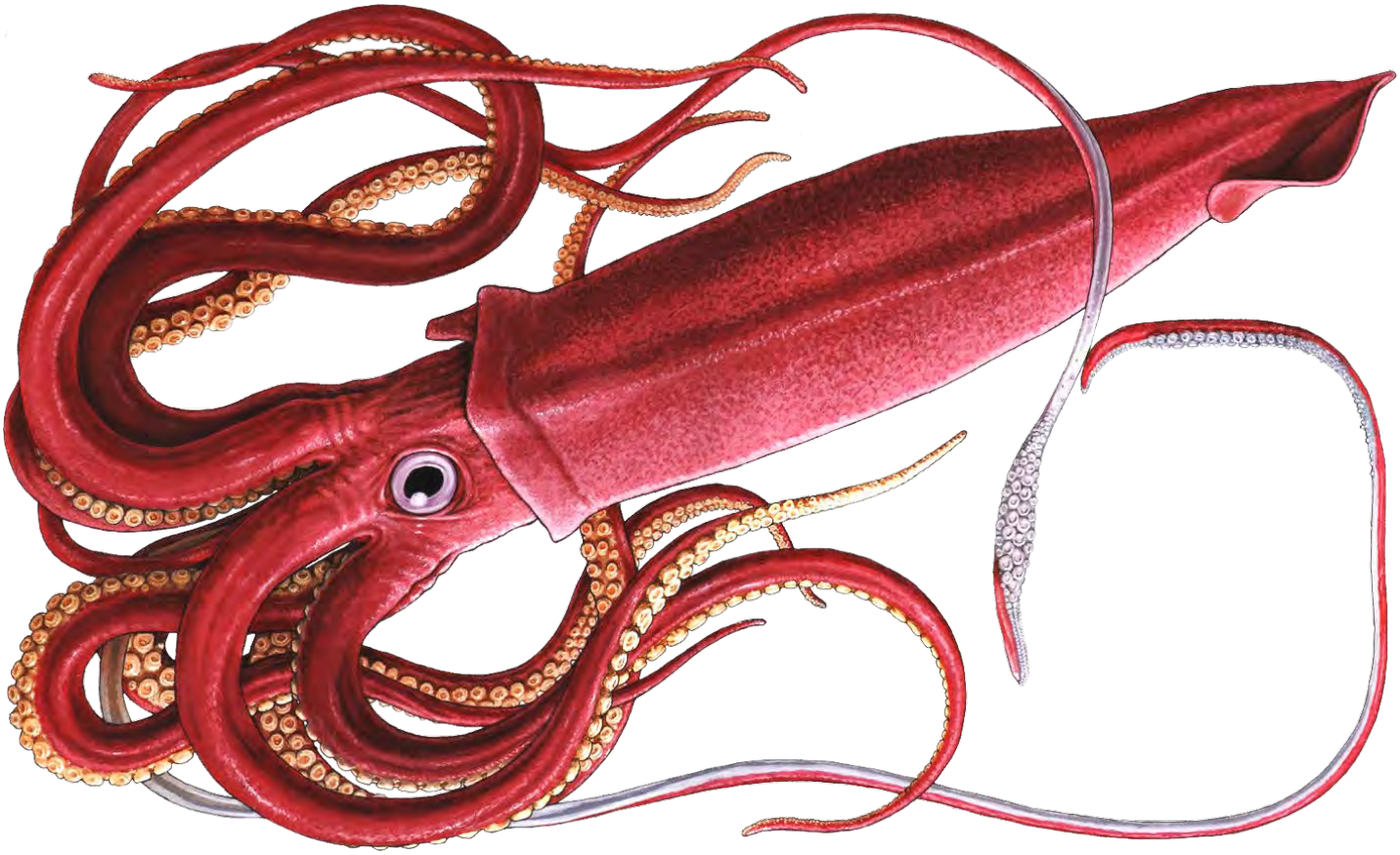
The Children's Hour radio show podcast

https://www.childrenshour.org/squid/

The Children's Hour
kids public radio

We hope you enjoyed listening to our interview with Dr. Sarah McAnulty. She is author of ***The Ink-credible Cephalopod Coloring Book***. We reached out to her through **Skype a Scientist**.

This print-ready guide may help you learn more about the natural history of Squid (and other Cephalopods). Also, there are links to where you can learn even more online. Connections to core learning standards are shown on page 14.



This is an artist's rendering of a giant squid. What do you know about this animal?

Have you ever seen one in person?

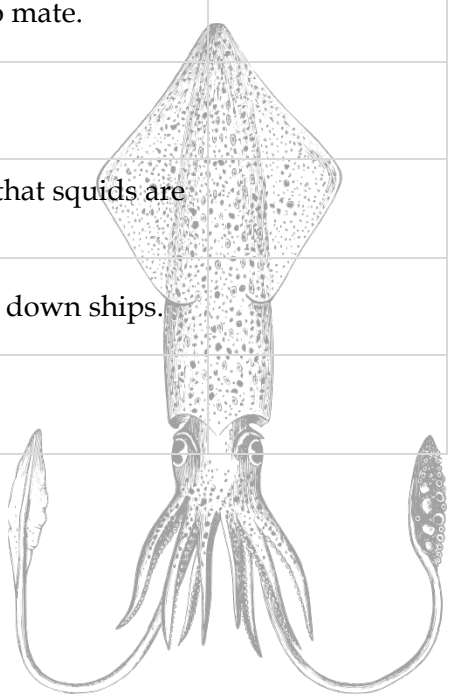
You can learn more about it on pages 9 and 10.

What do you know?

Get Set to Listen

Read the statements below. In the "Before Listening" column, write "TRUE" if you think the statement is true. Write "FALSE" if you think the statement is not true. Then listen to the ***Squid*** episode of The Children's Hour. Based on what the expert says, check if each point is true or false in the "After Listening" column. If the statement is false, explain why it is false.

Before Listening	TRUE or FALSE?	After Listening
	1. Squids have 10 tentacles.	
	2. Squids do not have bones.	
	3. Squids have a beak.	
	4. There are 30 species of squid.	
	5. Squids live in oceans and bays.	
	6. Ink is an adaptation that squids use to mate.	
	7. Humans eat certain parts of a squid.	
	8. Climate change is reducing the areas that squids are happy in.	
	9. Giant squids have attacked and taken down ships.	
	10. Humans have sent squid into space.	



What did you learn?

After listening to the radio show, answer these questions:

1. What is one new fact you learned about squids?
2. What is one new question you have about them?
3. What is an important thing about squids that you think everyone should know?

What is a squid's role in the ecosystem?

Squid live in both shallow coastal waters and the depths of the ocean. With at least 300 known species, squids play a vital role in **marine ecosystems** as both predator and prey.

Complete the food web by sketching in the missing animals. (You may have to research what they look like.)

Predators of Squids:

human

albacore tuna

dolphin

coho salmon

sea birds

sperm whale

other squids

squid

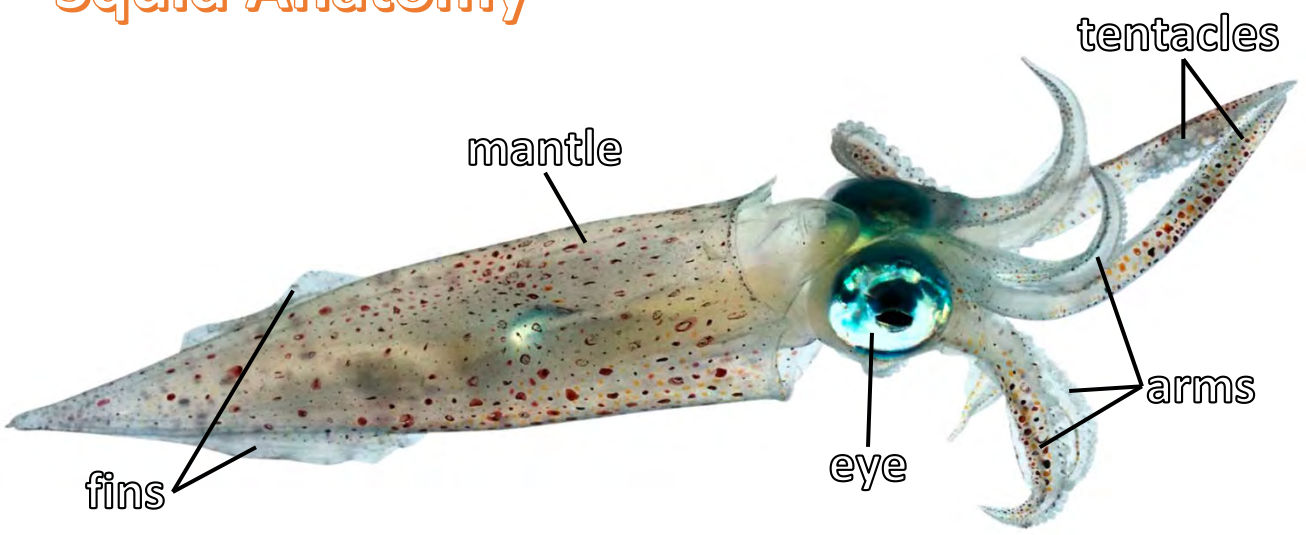
Prey of Squids:

fish

polychaete worms

shrimp

Squid Anatomy



The common squid grows up to 12 inches (30 cm) in length. It lives in the open waters of the Atlantic Ocean and the Mediterranean Sea.

These **invertebrates** (animals without backbones) are **mollusks**, just like snails, but they do not have protective outer shells. They have a tube-shaped body. A muscly bag called a **mantle** makes up most of a squid's body. Inside the mantle are the squid's **vital organs** and a rod-like internal shell called a **pen**.

Squid have two **tentacles** that are longer and stronger than its eight **arms**. The tentacles are usually hidden from view but shoot out to capture prey. Lined with **suckers**, the arms grip prey that has been caught by the tentacles and pass it to the squid's mouth which has a **beak**. The arms can also help steer the squid while swimming. As it swims, the squid beats two wing-like **fins** on the sides of its body. The fins also help the squid steer while swimming.

Squid have two big **eyes**, almost as complex as human eyes, that are usually set into the sides of the head. The eyes help them see in the deep ocean, where there is very little light.

Squid that dwell in deep waters have skin that is **luminescent**, which may be for recognition and for attracting prey.

How to Draw a Squid

Check out these helpful online tutorials:

Video: https://youtu.be/SaWUHrRkcVQ

Still frames with guidelines: https://www.drawingtutorials101.com/how-to-draw-a-giant-squid

Squid Adaptations

Squids have many **adaptations** to evade their predators:

- They have large, well-developed eyes for seeing predators.
- In murky waters where visibility is limited, squid use tiny hairs in their head and arms for sensing movement in the surrounding water.
- A squid can mask itself by changing its skin color; thousands of tiny organs called **chromatophores** contain pigments that are controlled by the squid's muscles.
- Squid **ink** is made **mucous** and **melanin**. It can create a "smokescreen" to block a predator's view, or it can create a blob called a **pseudomorph** that tricks the predator into going after the blob instead of the squid itself.
- Squids have **jet propulsion**, which enable them to swim away fast.

Watch an animated video demonstrating these and other squid adaptations:
https://youtu.be/cpJlQo_65Ko

Oh, The Inks They Can Ink

Depending on the species, Cephalopod ink acts like a **smokescreen**, a **decoy**, or an **alarm**.

Learn all about this fascinating adaptation in the video: ***Sparkling Clouds and Other Wild Ways Cephalopods Use Ink***: https://nerdfighteria.info/v/vIkmO9-bICM/

Bigfin reef squid

The Largest and the Fastest Invertebrates

Many squid are small, slim animals, about 0.75 inch (1.5 centimeters) or less in length. However, the giant squid and the colossal squid can both grow to 65 feet (20 meters) in length. The largest specimens can weigh about 1,000 pounds (454 kilograms). These squids are the largest invertebrates on Earth.

Squid swim by pushing **water** out from their bag-like bodies. The mantle wall has **elastic fibers** that intensify the jet propulsion. **Giant nerves** enable fast reflexes, and **three hearts** pump oxygen. Some squids can reach speeds up to 25 miles (40 km) per hour. This is faster than any other invertebrate.

Watch an animation of the squid's body plan: https://www.shapeoflife.org/video/mollusc-animation-squid-body-plan

Jet Water Balloon

The squid uses **jet propulsion** to swim through the ocean. They do this by using a **siphon**. In this activity, a toy balloon acts as the squid's body and a dish-soap lid acts like the siphon. You will put this model in a bathtub, sink, or large bin to explore how the siphon helps a squid jet through water.

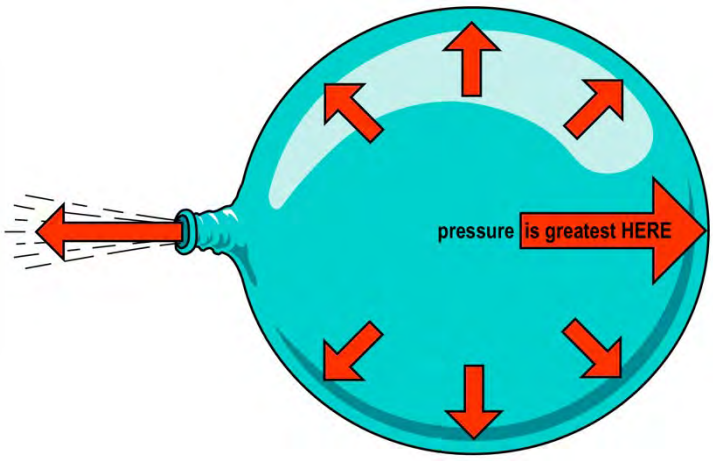
MATERIALS: small balloons, lid from a dish detergent bottle, water from the faucet, tub (or an under-the-bed storage bin)

STEP 1: Carefully place the open end of the balloon over the faucet and fill it up halfway with water.

STEP 2: Pinch the balloon top so the water stays in. Place a closed dish-soap lid in the open end of the water balloon.

STEP 3: Add a few inches of water to your tub. Place the balloon in the tub and pop open the lid to let the water flow out. Watch the squid balloon move. Record your observations. Discuss.

Model balloon with siphon in a tub of water

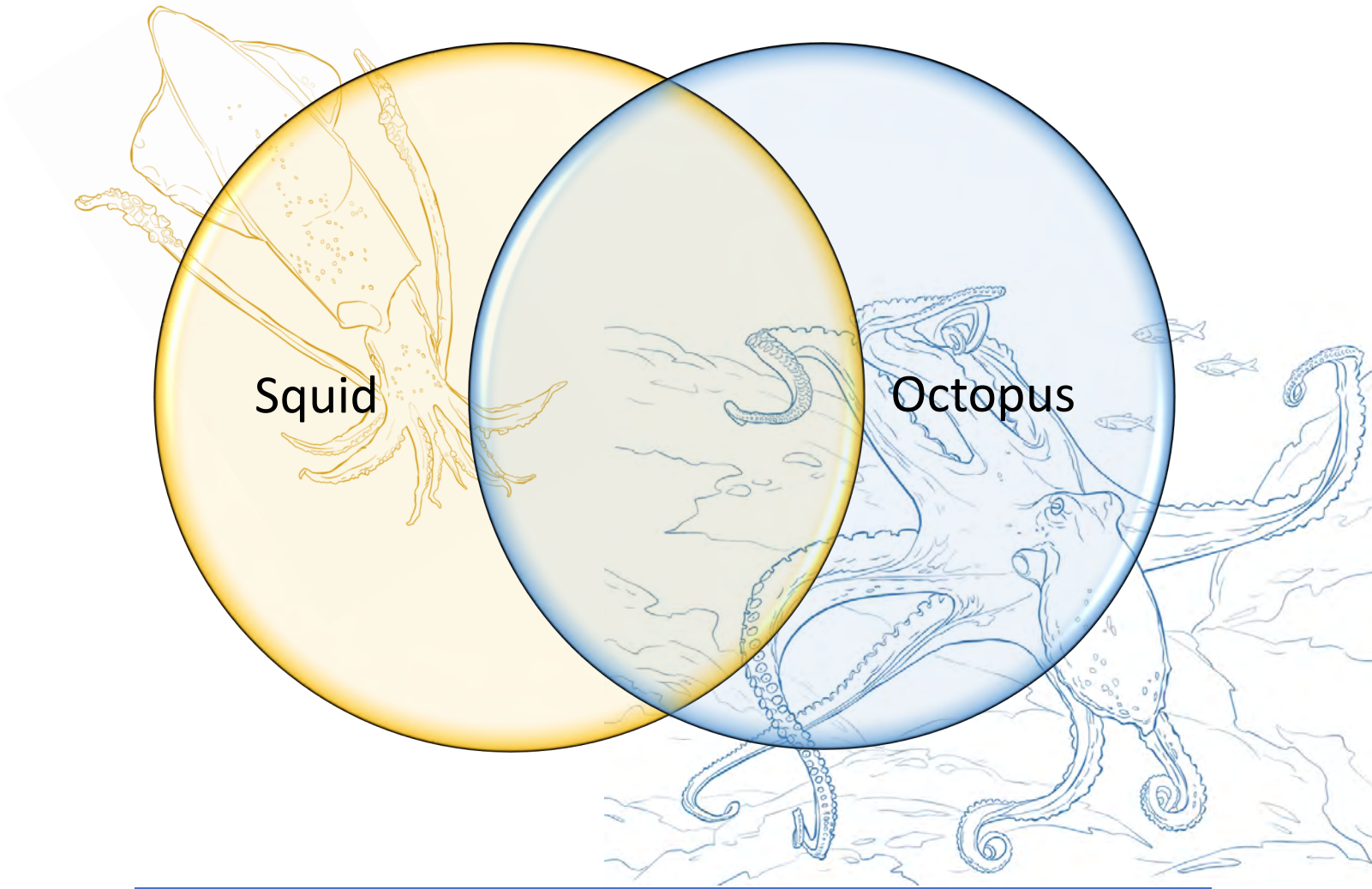


Squid vs. Octopus

Squid are closely related to octopuses. What do they have in common? How do they differ? Using the diagram below, put each characteristic into the squid bubble, the octopus bubble, or both.

Characteristics:

A. ability to change skin color
B. ability to spray ink
C. Class Cephalopoda
D. eight arms
E. eyes have square pupils
F. female guards eggs until they hatch
G. grab their prey with their arms, pierce it to inject paralyzing venom, and crush its body in their mouth
H. intelligent
I. Kingdom Animalia
J. live in the open ocean
K. live is schools
L. live on the sea floor
M. live solitary lives
N. no backbones
O. Order Octopoda
P. Order Teuthida
Q. Phylum Mollusca
R. prominent heads and arms or tentacles that extend from their bodies
S. round head
T. symmetrical bodies
U. triangular head
V. two tentacles
W. use their two long tentacles to catch their prey and bite it into chunks



Calamari

Squid is a popular seafood all over the world. It's abundant, versatile, and tasty. It can be grilled, seared, boiled, braised, and even eaten raw as **sashimi**. One of the most popular preparations of squid is chopped, breaded, and fried. This is popularly referred to as calamari, though the term **calamari** can mean any squid eaten as food.

Squid are a healthy source of **protein**. They are also rich in polyunsaturated fatty acids, also known as **omega-3 fatty acids**.

There may be health risks in eating squid. As with any shellfish, squid carries a risk of allergic reaction. A substance called **tropomyosin** is the likely culprit. If you have a shellfish allergy, you should avoid squid. Seafood has long been known to contain **mercury**. A build-up of mercury in the body can cause serious harm, especially for children. The US Food and Drug Administration (FDA) considers squid one of the 'Best Choices' for seafood, meaning it contains relatively low levels of mercury. It's recommended that adults eat squid and other 'Best Choices' seafood at most two or three times per week in 4-ounce servings. For children between age 2 and 11, the recommended serving size is 1 ounce.

Nutrition Facts: Squid

Serving Size 4 Ounce-weight

Calories 104	% Daily Value*
Total Fat 2 g	3%
Saturated Fat 0 g	0%
Trans Fat 0 g	
Cholesterol 264 mg	88%
Sodium 50 mg	2%
Potassium 0 mg	0%
Total Carbohydrate 3 g	1%
Dietary Fiber 0 g	0%
Sugar 0 g	
Protein 18 g	36%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Vitamin C	6%	Calcium	3%
Iron	6%	Vitamin D	0%
Vitamin B6	0%	Cobalamin	0%
Magnesium	0%	Vitamin A	1%

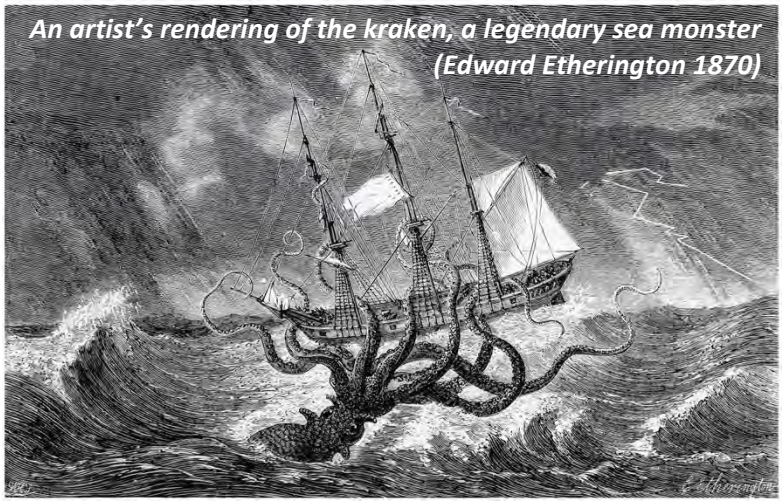
Video: How to clean a squid for cooking: https://youtu.be/9awYChmJayM

Video: How to pan fry squid (calamari): https://youtu.be/900Q5373c70

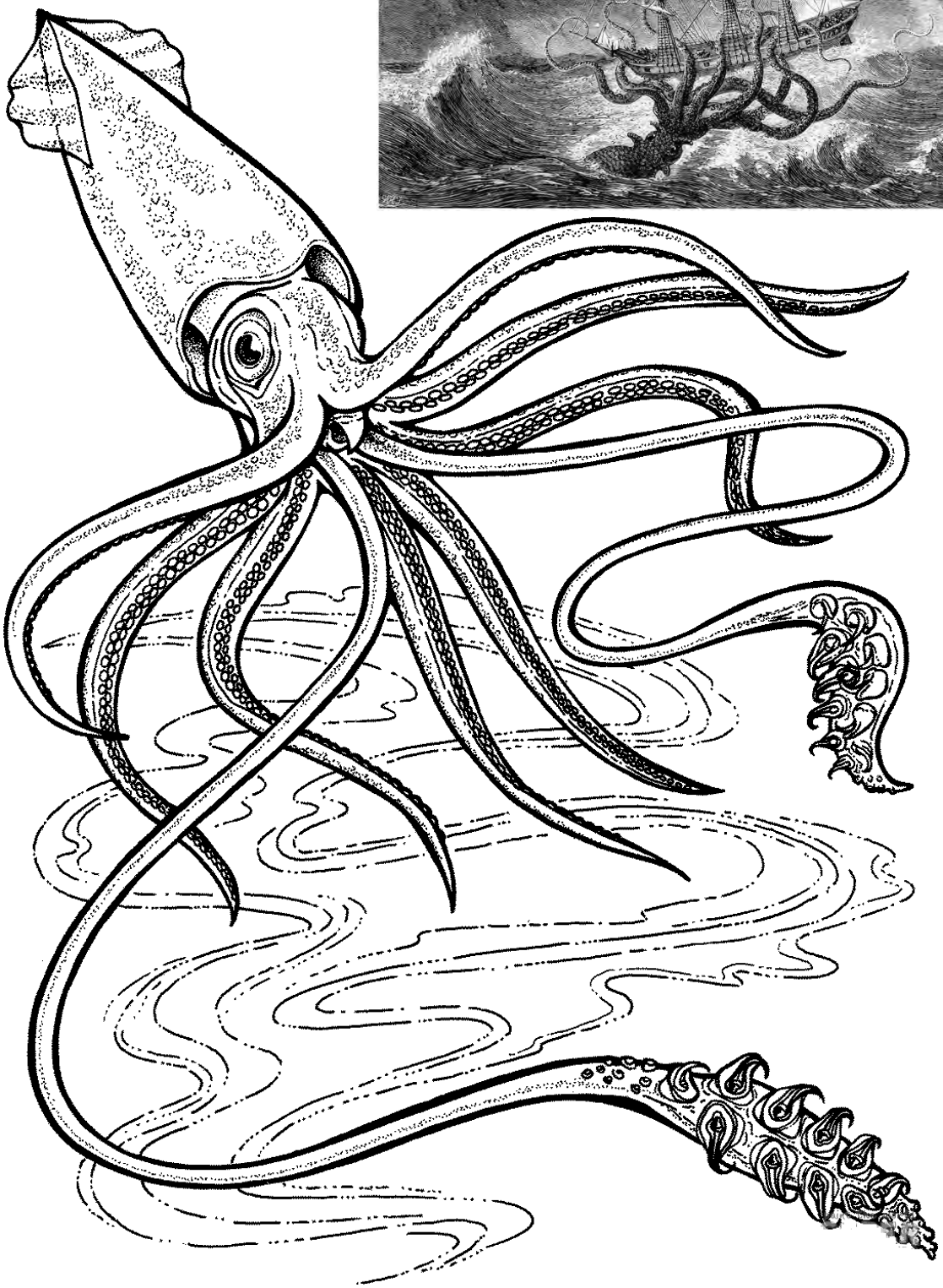
Read about ***fishing for squid*** in California: https://www.montereybayaquarium.org/stories/squid-fishing-monterey-bay

Giant Squid

It's got suckers, huge eyes, and beak. It can fight a sperm whale. Are you afraid of the giant squid?



An artist's rendering of the kraken, a legendary sea monster (Edward Etherington 1870)

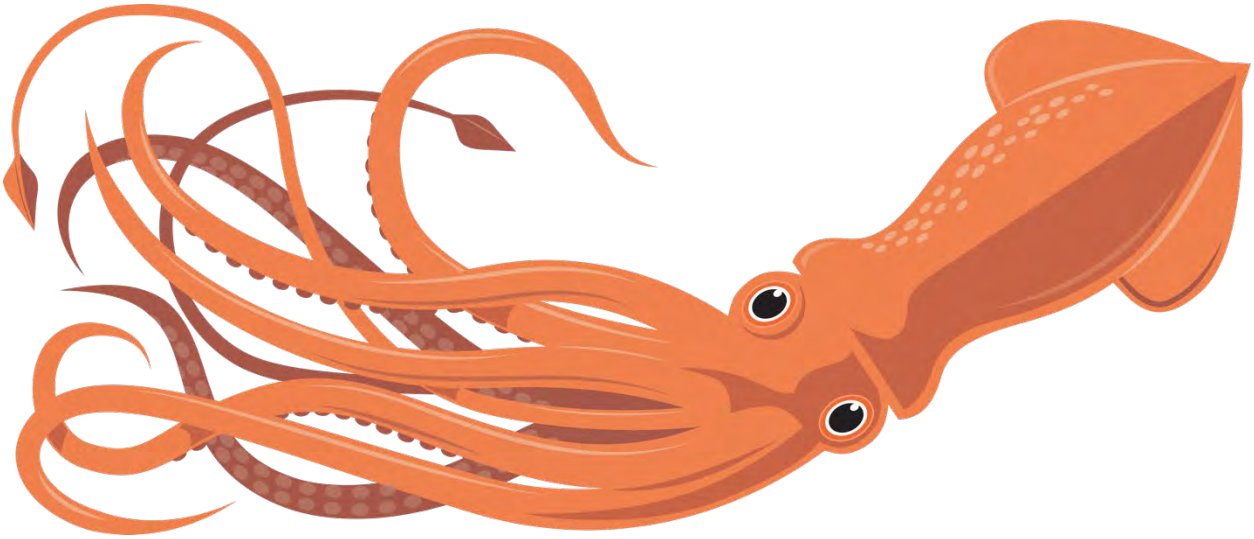


Here's everything you wanted to know about the Giant Squid: https://www.sciencefocus.com/nature/everything-you-wanted-to-know-about-the-giant-squid/

Read even more about Giant Squid: https://www.nationalgeographic.com/adventure/article/giant-squids-biggest-animals-science-oceans

A Giant Squid washed ashore in 2022: https://www.independent.co.uk/asia/east-asia/giant-squid-japan-nine-foot-b2062226.html

In Search of Giant Squid, a Smithsonian online exhibit: https://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/squid_opening.html; curriculum guide for teachers: http://d6mw2g7x24h5i.cloudfront.net/Education/Giant%20squid.pdf



Music Video

On our show, you listened to the song ***Sid the Squid*** by Two of a Kind. Now watch the video! Sing-along to name various kinds of squids, and pulse and wave your arms: https://youtu.be/5vz-5ZBhwkE

How to Make a Squid Hat: https://www.instructables.com/DIY-Squid-Hat/

Squids in Space

Hawaiian bobtail squid

On June 5, 2021, a SpaceX Dragon capsule arrived at the **International Space Station (ISS)** and delivered the special package of about 128 baby **bobtail squid**. Each animal was observed by the crew to better understand how the environment in space affects living things.

The ultra-tiny baby bobtail squid are only around 0.12 inches (3mm) long, but if you saw some, you'd notice them. That's because these animals can glow. They use **bioluminescence**, an ability where chemical reactions generate low light. The squid are not born with this ability though. Instead, they absorb a certain **bacterium** from the ocean around them. This bacterium then reacts with an organ inside the squid to create the glow.

On board the ISS, the squid arrived without the bacteria inside them. The crew added the bacteria to them on the station and watched to see if the reaction takes place just as it does on Earth. Without Earth's gravity, would it take longer for the squid to get the glow? Can that tell us anything about how the environment of space affects the way that cells interact?

It's part of an experiment, named **Understanding of Microgravity on Animal-Microbe Interactions (UMAMI)**. Jamie Foster, a professor at the University of Florida who leads the UMAMI experiment, says that this research could help us understand how extended spaceflight may affect astronauts' health. "One of the things that happens to astronauts when they're in space is that their **immune systems** can become compromised or dysregulated, and so that could be potentially dangerous when you can't go to a doctor immediately or you can't get help. So, we really want to understand that impact of long-duration spaceflight on animal health, like the immune system," she says. Since squid have similar immune systems to humans, they are useful as a model to study.

Video: Learn why squids are being rocketed to outer space: https://youtu.be/3Q_5pnxckms

More Resources:

Watch squids swimming in the wild: https://kids.britannica.com/students/article/squid/602806/media

Learn 30 Squid Facts: https://youtu.be/4TA5Ezk49bU

Jonathan Bird shows ***cephalopods*** (octopuses, squid, cuttlefish, and nautiluses) in the wild: https://youtu.be/rZwV0PCW2w8

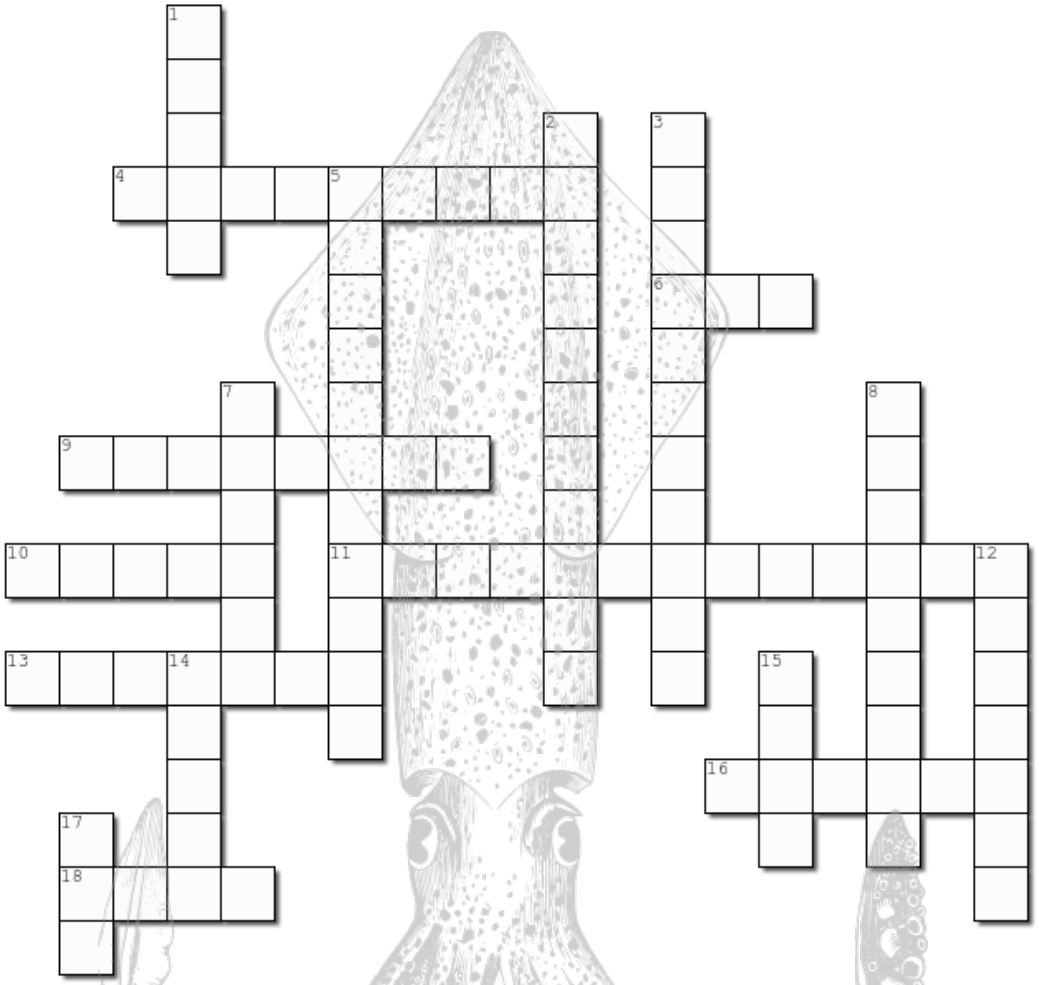
Read an article about an example of squids migrating because of ***climate change***: https://www.nbcbayarea.com/news/local/climate-in-crisis/stanford-researchers-say-1800-mile-squid-migration-caused-by-climate-change/2831044/

For ***many articles about squid***, visit: https://www.montereybayaquarium.org and search keyword "squid".

Squids4Kids offers free science education materials based on the huge, mysterious Humboldt squid: https://gillylab.stanford.edu/squids-4-kids

Crossword Puzzle: Squid

Hint: Words used in this puzzle appear in **boldface** in this learning guide.



Created using the Crossword Maker on TheTeachersCorner.net

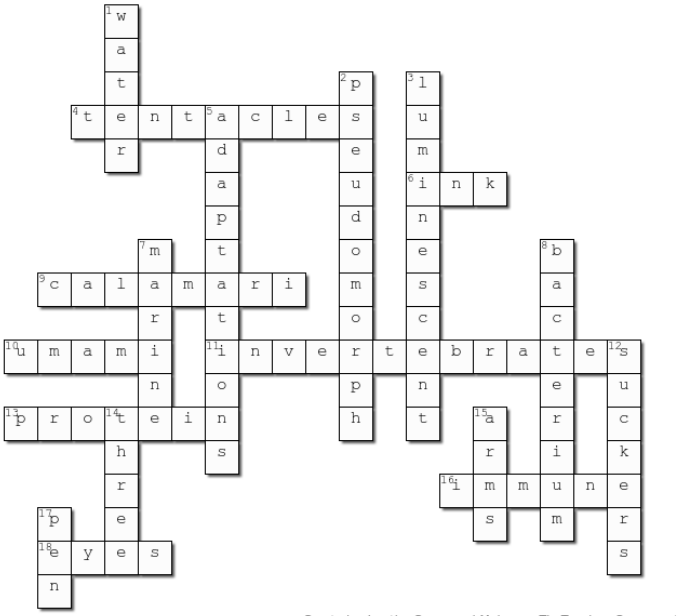
Across

4. two appendages that shoot out to capture prey
6. sprayed by a squid to block a predator's view
9. the squid we eat
10. Understanding of Microgravity on Animal-Microbe Interactions
11. animals without backbones
13. Nutritionally, squid are a healthy source of _____ and omega-3 fatty acids.
16. Squids are model organisms for learning more about astronauts' _____ systems.
18. Squids have complex _____ similar to humans.

Down

1. Squid swim by pushing _____ out from their bag-like bodies.
2. a blob of ink that acts like decoy
3. the ability to glow
5. Squids have many _____ to evade their predators.
7. Squids play a vital role in _____ ecosystems.
8. A certain _____ from the ocean enables the bobtail squid to glow.
12. Arms have _____ for gripping.
14. How many hearts does a squid have?
15. A squid and an octopus together have 16 _____.
17. rod-like internal shell

Crossword: Answer Key



Created using the Crossword Maker on TheTeachersCorner.net

Across

4. two appendages that shoot out to capture prey (**tentacles**)
6. sprayed by a squid to block a predator's view (**ink**)
9. the squid we eat (**calamari**)
10. Understanding of Microgravity on Animal-Microbe Interactions (**umami**)
11. animals without backbones (**invertebrates**)
13. Nutritionally, squid are a healthy source of _____ and omega-3 fatty acids. (**protein**)
16. Squids are model organisms for learning more about astronauts' _____ systems. (**immune**)
18. Squids have complex _____ similar to humans. (**eyes**)

Down

1. Squid swim by pushing _____ out from their bag-like bodies. (**water**)
2. a blob of ink that acts like decoy (**pseudomorph**)
3. the ability to glow (**luminescent**)
5. Squids have many _____ to evade their predators. (**adaptations**)
7. Squids play a vital role in _____ ecosystems. (**marine**)
8. A certain _____ from the ocean enables the bobtail squid to glow. (**bacterium**)
12. Arms have _____ for gripping. (**suckers**)
14. How many hearts does a squid have? (**three**)
15. A squid and an octopus together have 16 _____. (**arms**)
17. rod-like internal shell (**pen**)

Get Set to Listen: Answer Key

1. Squids have 10 tentacles. = FALSE […8 arms and 2 tentacles.]

4. There are 30 species of squid. = FALSE […at least 300 species of squid.]

6. Ink is an adaptation that squids use to mate. = FALSE […use to escape predators.]

9. Giant squids have attacked and taken down ships. = FALSE [A giant squid has never taken down a ship.]

All other statements are true.

Squid vs. Octopus: Answer Key

A. ability to change skin color **[both]**
B. ability to spray ink **[both]**
C. Class Cephalopoda **[both]**
D. eight arms **[both]**
E. eyes have square pupils **[octopus]**
F. female guards eggs until they hatch **[octopus]**
G. grab their prey with their arms, pierce it to inject paralyzing venom, and crush its body in their mouth **[octopus]**
H. intelligent **[both]**
I. Kingdom Animalia **[both]**
J. live in the open ocean **[squid]**
K. live is schools **[squid]**
L. live on the sea floor **[octopus]**
M. live solitary lives **[octopus]**
N. no backbones **[both]**
O. Order Octopoda **[octopus]**
P. Order Teuthida **[squid]**
Q. Phylum Mollusca **[both]**
R. prominent heads and arms or tentacles that extend from their bodies **[both]**
S. round head **[octopus]**
T. symmetrical bodies **[both]**
U. triangular head **[squid]**
V. two tentacles **[squid]**
W. use their two long tentacles to catch their prey and bite it into chunks **[squid]**

Connect to Curriculum

http://www.corestandards.org

https://artinaction.org/standards/

https://www.nextgenscience.org/

https://www.positiveaction.net/blog/sel-competencies

https://www.learningforjustice.org/frameworks/social-justice-standards

https://www.socialstudies.org/system/files/2022/c3-framework-for-social-studies-rev0617.2.pdf

Information/Activity	Core Idea	Learning Standards
p.2 Get Set to Listen; What Did you Learn?	Recount or describe key ideas or details from (a text read aloud or) information presented orally or through other media.	Common Core ELA: SL 2
p.3 Ecosystem diagram	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. Gather relevant information from multiple print and digital sources, using search terms effectively…	Science: MS-LS2-2 Common Core ELA: WHST 8 (6-8)
p.4, 5, 6, 8, 11	Read and comprehend informational texts, including history/social studies, science, and technical texts...	Common Core ELA: RI 10
p.4, 5, 9 Coloring & Drawing	Create art that represents natural and constructed environments. Describe what an image represents.	NCAS Creating #2 K Responding #7 K
p.6 Jet Water Balloon activity	Conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. Analyze data to determine if a design solution works as intended to change the speed or direction of an object… Use materials to … mimic how plants and/or animals use their external parts to help them survive, grow, and meet their needs.	Science: K-PS2-1 K-PS2-2 1-LS1-1
p.7 Venn diagram	Gather relevant information from multiple print and digital sources, using search terms effectively… Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions Integrate … technical information expressed in words in a text with a version of that information expressed visually	Common Core ELA: WHST 8 (6-8) RST 1 (6-8) RST 7 (6-8)
p.12 Crossword Puzzle	Use precise language and domain-specific vocabulary to inform about or explain the topic.	Common Core ELA: WHST 2 (6-8)

About Us

The Children's Hour Inc is a New Mexico-based non-profit organization that produces an award-winning children's radio program that is educational, entertaining, and engaging, and includes kids who participate in its creation. The program is internationally syndicated broadcasting on more than 120 public radio stations worldwide. Program themes focus on civics, STEM, culture, and music education, featuring New Mexico children as co-hosts and lead interviewers. Katie Stone has been the executive producer of *The Children's Hour* for more than two decades.

For more information, contact: Katie Stone | (505) 850-3751 | katie@childrenshour.org

Tell us about you!

We at the Children's Hour would like to know:

1. How old are you?
2. Was this your first time listening to a radio show or podcast for kids?
3. Was this radio show less fun or more fun compared to other things you do for fun, like playing video games or watching TV?

   ☐ Less fun ☐ More fun
4. Would you listen to a radio show again if you could?
5. Of everything you heard in the radio show, what will you remember most?

_____

_____

_____

If you would like to draw a picture about anything you learned on the radio show, we would like to see it. Scan and email it to us, and we may display it on our online space.

If you would like to tell the creators of this radio show something in your own voice, you can send a voice message to *The Children's Hour* here: https://www.childrenshour.org/contact-us/.

Look for the orange button and click to record.