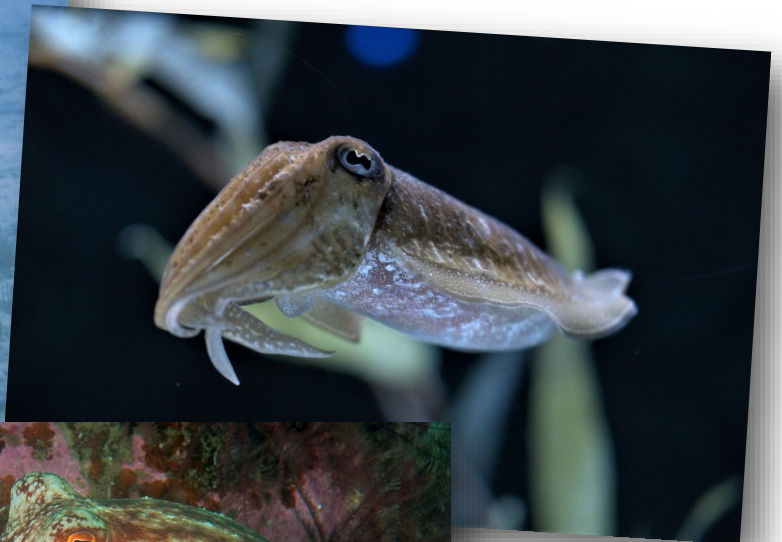
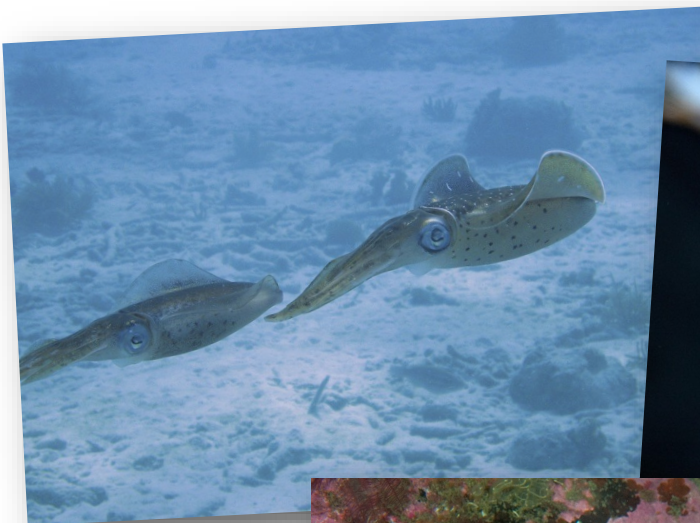




SSC DIVE IN! CEPHALOPODS





WELCOME!

Hello, and welcome to “SSC Dive In!”. Packs of resources providing some seaside fun directly into family homes and classrooms.

This pack’s theme: Cephalopods

Octopuses, squid and cuttlefish are all types of cephalopods. These are highly intelligent marine creatures that look so unusual that they are often described as the ‘aliens of the sea’. Cephalopods are found all around the oceans of the world including several species in Scotland’s seas.

Dive into this pack to discover more about the weird world of squid, octopuses and cuttlefish!

Inside this pack:

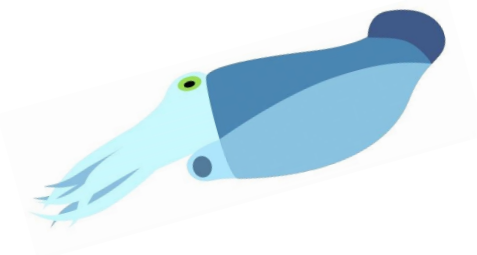
- **Fact file: Cephalopods**
- **Discovery sheets: Species information**
- **Experiment: Octopus Squeeze**
- **Cephalopod Wordsearch**
- **Craft instructions: Octopus Headband**
- **Glossary**

We’d love to hear from you! If you’ve had fun having a go at activities, experiments and crafts, let us know. Any comments or pictures can be sent to marineengagement@seabird.org. More resources are available on our [website](#).

Enjoy using our packs and want to see more? The Scottish Seabird Centre is an environmental conservation and education charity. Every penny we raise helps us deliver our important education and conservation work. If you enjoy using our resources and would like to support our work, please consider making a donation to the our [JustGiving page](#). Thank you.

We hope you enjoy diving in to the pack!

Scottish Seabird Centre Learning Team



Hint: The meaning of words in **purple** can be found in the Glossary at the end of the pack. Words in **blue** contain links to websites.

FACTFILE

CEPHALOPODS

WHAT ARE CEPHALOPODS?

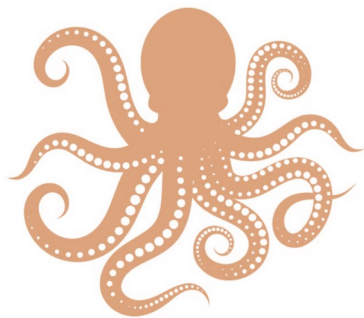
'Cephalopod' (pronounced "sef-uh-luh-pods") is the name given to the group of animals containing octopuses, squid and cuttlefish. Cephalopods are a type of **marine mollusc**. They are cold-blooded and breathe using gills underwater.

They are grouped together because they share a lot of the same characteristics, including:

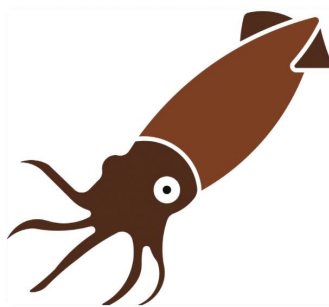
- They have at least eight arms or **tentacles**
- They use **jet propulsion** to move through water.
- They have a muscular casing called a **mantle** which contains and protects their organs.

WHAT IS THE DIFFERENCE BETWEEN OCTOPUSES, SQUID AND CUTTLEFISH?

Octopuses have round heads and eight arms each with one or two rows of suckers.



Squid have torpedo-like heads with two fins at the back of their body. They have eight arms and two tentacles.

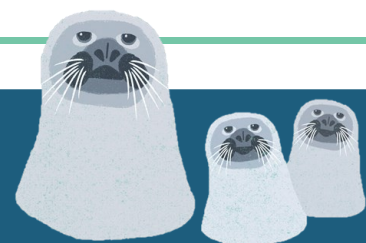


Cuttlefish have short broad bodies with long wavy fins on the sides. They have eight arms and two tentacles.



WHAT DOES 'CEPHALPOD' MEAN?

The word 'cephalopod' means 'head-footed'. The name refers to the way that the cephalopod's head connects to its many arms. However, these animals don't really have any feet. They have arms or tentacles. Arms have suckers all the way along and are used for moving and grasping, whilst tentacles are longer than arms, only have suckers at the ends, and are used for catching prey.





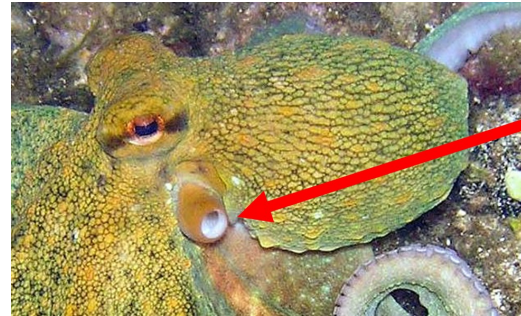
FACTFILE

CEPHALOPODS (CONTINUED)

HOW DO CEPHALOPODS BREATHE?

All living things require oxygen. Oxygen is found both in the atmosphere and in water. Marine animals must filter the oxygen out of water and then get rid of the water. A cephalopod breathes through gills like fish do (its gills are located inside the **mantle** cavity).

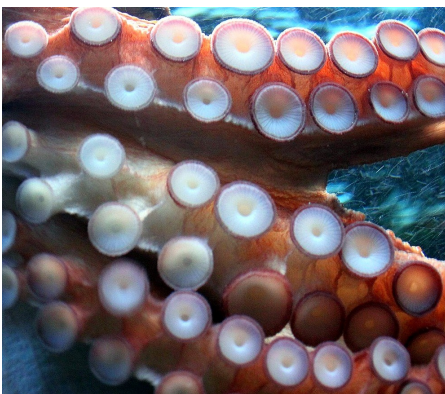
After taking in water through the mouth, it passes over the surface of the gills, where oxygen is picked up by blood vessels. Water is then expelled through a tube called a siphon on the mantle (see image above).



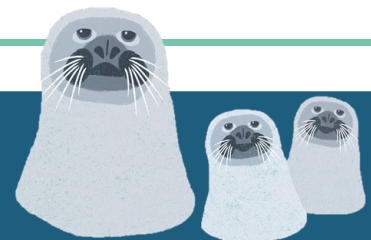
HOW DO CEPHALOPODS MOVE?

All cephalopods can move using **jet propulsion**. They do this by sucking water into the body and quickly expelling it out through the siphon (which can also help them to steer). However, different species have variations in how they move. Octopus arms are more flexible than those of a squid or cuttlefish, allowing them to 'walk' over the seabed. Squids can use fins on their heads to propel themselves when swimming at low speeds. These fins steer the squids when moving slowly but will wrap around the body when moving fast. Cuttlefish have a fin fringe running along their sides. By waving these fins cuttlefish are able to hover, crawl and swim. Watch the different ways cephalopods move [here](#).

HOW DO CEPHALOPODS SENSE THE WORLD AROUND THEM?



Imagine if you could taste something simply by touching it. Octopuses have a unique "touch-taste" sense, which allows them to do that using the suction-cup-like suckers along their eight arms. Although they also have a tongue-like organ in their mouths called the radula, which they use to cut and scrape **prey**, this does not seem to be able to taste. Despite being colourblind, cephalopods can sense colour and are able to change their own colour to reflect their environment.





FACTFILE

CEPHALOPODS (CONTINUED)

WHAT IS THE LIFE CYCLE OF A CEPHALOPOD?

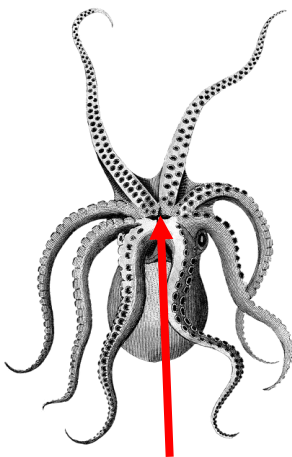
Cephalopods start life growing inside eggs, laid by females. Eggs are laid in clutches on hard surfaces, like the photo to the right. When the babies are developed enough, they hatch out of the eggs and start life on their own. Watch a video of baby cephalopods [here](#).

Cephalopods have a short life span and tend to **reproduce** only once during their lifetime. Most cephalopod parents do not provide any care for their young and usually die shortly after reproducing. Squid and cuttlefish females die after laying their eggs. Their bodies provide food for other animals, including their young when they hatch. In contrast, some octopus mothers will keep guard over their eggs for months after laying, keeping them clean and **aerated** until they hatch.



Squid eggs © Graham Saunders

WHAT DO CEPHALOPODS EAT? AND WHAT EATS THEM?



Cephalopod beaks are found in the centre of their heads, surrounded by arms.

Cephalopods are both **predator** and **prey**. Connecting different levels of the food web, they are key to the health of the entire marine **ecosystem**. Octopuses eat a range of food including starfish, shellfish, snails, small fish and even other octopuses. Squid and cuttlefish have a preference for fish and crustaceans. All cephalopods have a hard, sharp **beak** (a bit like a parrot's) that help them break open the hard shells of crustaceans and break their food up into smaller pieces. Some species use **venom** to paralyse their prey.

Cephalopods are preyed upon by fish, birds and marine mammals, including seals and whales. They do however have a range of clever ways to protect themselves. Their flexible bodies which have no bones can squeeze into very small spaces to hide. They can use **camouflage** to blend in with their surroundings. Also, to confuse predators and make an escape, they are also able to squirt **ink**—a thick, black liquid that looks like a puff of smoke in the sea. Watch cephalopods squirting ink and find out more about this defence mechanism [here](#).



FACTFILE

CEPHALOPODS (CONTINUED)

WHAT OTHER THREATS DO CEPHALOPODS FACE?

As well as the possibility of being eaten by other animals in the marine environment, cephalopods face a number of other threats. These include pressure from fishing, from **pollution** and from damage to their habitats (the place that they live) and underwater noise. **Climate change** is also a concern as it is for many marine species. Cephalopods are very sensitive to changes in their environment including a change in temperature and changes to the chemistry of the sea.



Cephalopods, like all marine animals, need a clean, healthy environment to survive and struggle to live in polluted water. They are also at risk of being overfished, when too many are taken out of the sea.

HOW CLEVER ARE CEPHALOPODS?

They are very clever. In fact, cephalopods are considered the most intelligent of the invertebrates (animals without skeletons) and can display some very advanced behaviours. They have large and complex brains—in fact they are described as having nine brains. As well as a central brain between the eyes, they have separate “mini-brains” at the base of each of their eight tentacles.

As well as being masters of disguise and skilled escape artists, some cephalopods have been seen to learn and adapt their behaviours, to use tools and to be sneaky mischief makers. One marine laboratory told a story about fish going missing from one of their tanks. The staff set up a video camera to try to solve the mystery. They found that one of the octopuses was getting out of its tank, going to the fish tank, opening it, eating the fish, closing the lid, returning to its own tank and hiding any evidence!



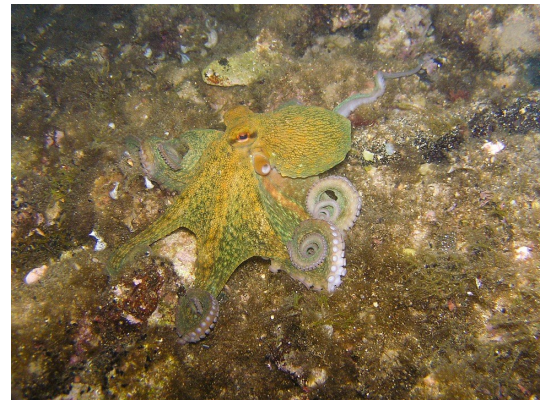


FACTFILE

CEPHALOPODS (CONTINUED)

CAN I SEE THEM IN THE WILD?

It is very difficult to see these fascinating animals, as they live under the water, sometimes deep down. Even divers find them tricky to see as they don't tend to be active during the day and are great at hiding themselves away—either in small spaces or by blending in with their surroundings.



CEPHALOPOD FOSSILS

Cephalopods were among the Earth's first swimming animals and they took over nearly every part of our oceans. Scientists know this because they have found fossils—hardened remains of cephalopods that were alive millions of years ago. By studying fossils, scientists have discovered around 17,000 extinct species of cephalopod (species that no longer exist today). There are now just over 800 species of cephalopod alive worldwide and scientists think the same event that wiped out the dinosaurs killed many of the extinct cephalopods. The few species that survived evolved into the cephalopods that exist today.



Ammonite fossils —an extinct shelled cephalopod

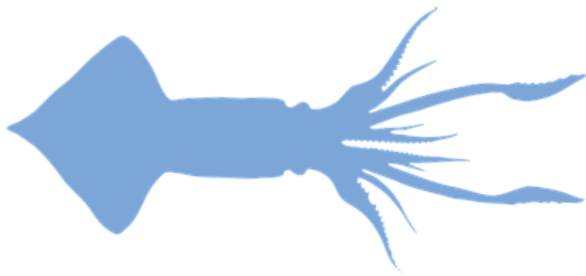
How did these ammonites become fossilised? Find out [here](#).





FACTFILE

CEPHALOPODS (CONTINUED)

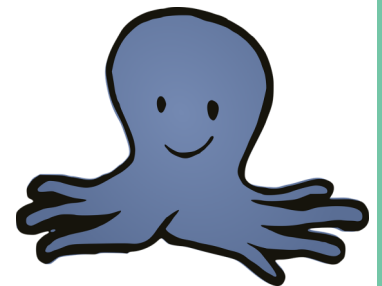


GIANTS OF THE DEEP

The giant squid is the largest cephalopod in the world. They can grow to a whopping 10m in length—that's the same size as a bus! Only a few of these huge squids have ever been seen because they live deep in the ocean. Discover what we know so far about these mysterious creatures [here](#).

HOW CAN I HELP CEPHALOPODS?

There are lots of ways you can help octopus, squid and cuttlefish. One of the best things you can do is reduce the amount of plastic in the ocean by picking up litter, recycling or cutting down your own plastic use or by (safely) picking up litter. Learn about our beach clean hub here: www.seabird.org/projects/community-clean-up-hub. These actions will help keep their homes clean and tidy.



Sadly cephalopods can be washed ashore in a storm. If you ever spot a living cephalopod out of water, ask for help to pop it back into the sea.

Another thing that can make a big difference is carefully choosing where your seafood has come from. Octopus and squid are commonly found on menus in seafood restaurants around the UK but sometimes the way they have been caught, or the location they have come from, isn't good for wild populations. The best way of checking if it's OK to eat a particular type of fish or cephalopod is by checking the Marine Conservation Society's [Good Fish Guide](#).

For more ways to protect the ocean, check out our handy Take Action for Our Seas guide [here](#).



CEPHALOPODS



Common octopus

OCTOPUS VULGARIS

SIZE: 60-100 cm

DIET: Crabs are a favourite of this octopus. They also eat bivalve molluscs (snails with 2 shells sealed together). It can use its beak to break shells.

WHAT DOES IT LOOK LIKE?

The Common octopus is a large octopus with a warty bag-like body. It has eight long thick arms, each with 2 rows of suckers. Its colour varies from grey-yellow-brown-green and can change according to both the environment and the animal's mood.

WHERE DOES IT LIVE?

Widely distributed around the world, this octopus is present in all Scotland's seas all year round but is most frequently sited on the west coast.

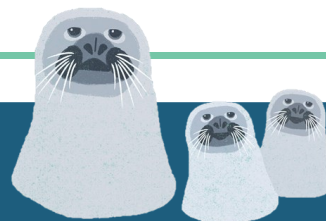
FUN FACTS:

Common octopus can weigh up to 10kg—the same weight as a medium sized dog.

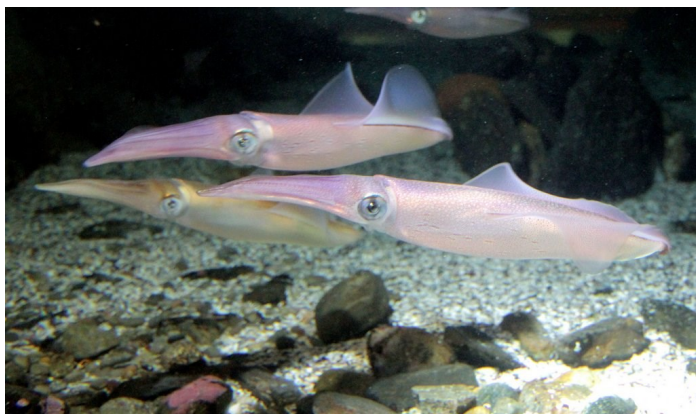
The female common octopus will watch over her eggs night and day, flushing them with water to keep them aerated and protecting them from predators. Once they hatch, she normally dies.

CONSERVATION STATUS:

Common but could be threatened by potential overfishing. Marine Conservation Society's Good Fish Guide, 2022 says: "Avoid all octopus caught in British waters. There is not enough information on populations here and no real controls on fishing to protect them". Find alternatives and check its status [here](#).



CEPHALOPODS



© Calamares, Aquarium Finisterrae, A Coruña

Common squid

LOLIGO VULGARIS

SIZE: 15-40cm long

DIET: Small fish, crabs and shrimp.

WHAT DOES IT LOOK LIKE?

A bit like torpedoes! Squid have long, slender bodies with two triangular fins either side at the back. They have 8 arms on the head and 2 long tentacles for catching prey. The common squid is a medium-sized squid that can be pink to pale white in colour with reddish-brown specks on its back.

WHERE DOES IT LIVE?

Found around all UK coasts in waters 0-500m deep. They can be found in many different habitats but need hard surfaces, such as rocks, to attach their egg to. They are found in shallower water in the summer and deeper water in the winter.

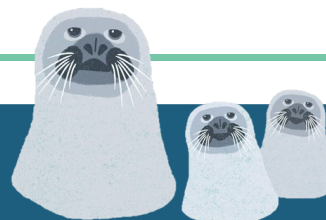
FUN FACTS:

Squid is a popular choice of seafood in the UK and huge numbers are caught in British waters each year.

Squid ink can also be used in food, including black pasta, seafood sauces and some sushi dishes. Squid ink is apparently good for you, as it contains a number of nutrients.

CONSERVATION STATUS:

Scientists aren't sure exactly how many there are but generally they are considered Common in UK seas. However, in 2021 the Marine Conservation Society added UK squid to their list of 'Red' species in their [Good Fish Guide](#), meaning people should try avoid eating any caught from British waters. Find alternatives and check its status [here](#).



CEPHALOPODS



Common cuttlefish

SEPIA OFFICINALIS

SIZE: Up to 45cm

DIET: Crabs, fish & small cuttlefish

WHAT DOES IT LOOK LIKE?

Apart from their heads, cuttlefish have flattened bodies with two fins running along either side. Their well-developed heads with large eyes and eight arms at the front with suckers. Their mouths also have two tentacles around the outside for catching prey and beak-like jaws inside for slicing it up. Cuttlefish are incredibly variable in colour because they can change their appearance, but are usually blackish-brown, mottled or striped.

WHERE DOES IT LIVE?

Cuttlefish are typically found on sandy and muddy habitats 0-200m deep. They prefer warmer water so are mostly found along the south coast and west coast of England and Wales, but are also recorded off the west and north coast of Scotland, including the Hebrides.

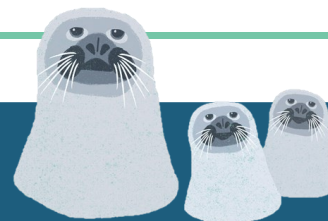
FUN FACTS:

Cuttlefish have a white, surfboard-looking structure inside their bodies called a 'cuttlebone' which helps them control their buoyancy. Cuttlebones wash up on beaches and are a favourite treat for pet parrots (see photo on the right).



CONSERVATION STATUS:

A common species listed as 'Least Concern' on the **IUCN red list**, meaning there is very little risk of extinction for this species.



CEPHALOPODS

Little cuttlefish

SEPIOLA ATLANTICA

SIZE: Up to 6cm long.

DIET: Crustaceans such as shrimp

WHAT DOES IT LOOK LIKE?

A small cephalopod with a cup-shaped body and large, bulgy eyes. They mostly appear pale white with brown and black splotches so they can blend in with their environment but, like other cephalopods, they can change colour.

WHERE DOES IT LIVE?

Often found in rockpools and sandy, gravelly areas off the coast. Most common on the South and South West coasts but found all around the UK.

FUN FACTS:

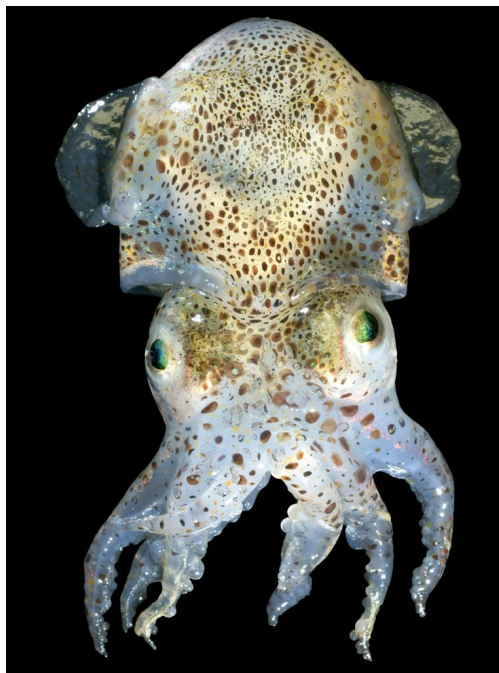
Little cuttlefish are nocturnal hunters, meaning they only hunt at night.

They aren't true cuttlefish but are in fact a type of bobtail squid that don't have a cuttlebone.

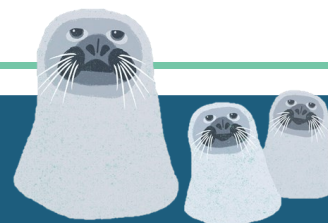
To hide from predators, Little cuttlefish bury themselves in sand on the seafloor. Watch footage of a cuttlefish burying itself and other behaviours in a video made by the Wildlife Trust [here](#).

CONSERVATION STATUS:

Unknown—Little cuttlefish are considered to be a common in British waters but there isn't enough data to know how many there are, so they have not been assigned a conservation status.



© Hans Hillewaert
<https://commons.wikimedia.org/w/index.php?curid=1798414>



CEPHALOPODS



Curled octopus

ELEDONE CIRRHOSA

SIZE: Up to 50cm long.

DIET: Crabs, other large crustaceans, fish.

WHAT DOES IT LOOK LIKE?

An octopus with a broad body and slender arms that curl when sat on the seafloor (giving it its name). The arms are also shorter than other species and only have one line of suckers underneath. They are mostly a red-brown colour on top and white underneath but can change colour quickly to match their background.

WHERE DOES IT LIVE?

Curled octopus are found all around the UK on rocky coasts to depths of 500m.

FUN FACTS:

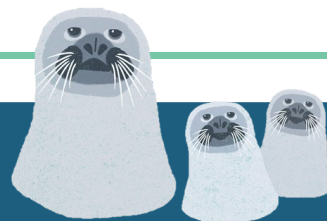
The curled octopus is also known as the lesser octopus or horned octopus.

They can live up to 5 years old—that's quite old for an octopus as common octopus only live up to 2 years.

When feeding on crabs, the curled octopus paralyses its prey by boring into the shell and injecting a toxin.

CONSERVATION STATUS:

A common species listed as 'Least Concern' on the **IUCN red list**, meaning there is very little risk of extinction for this species.



CEPHALOPODS

Lesser flying squid

TODAROPSIS EBLANAE

SIZE: Up to 22 cm long

DIET: These squid are an opportunistic predator, meaning they take a wide variety of prey, including fish, crustaceans and other cephalopods.

WHAT DOES IT LOOK LIKE?

A squid with a large, broad head and large triangular fins that make it look like an arrow head.



By © Hans Hillewaert, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=3485399>

WHERE DOES IT LIVE?

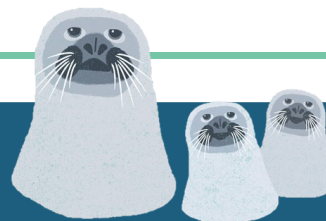
Lesser flying squid live close to the seafloor in areas with sandy and muddy bottoms at depths of 20m - 700m.

FUN FACTS:

This squid belongs to a group of squid where some have the ability to glide out of water, earning them the common name of "flying squid". Not all species can "fly" but the few that can glide for up to half the length of a football field! Watch a video about this fascinating behaviour [here](#).

CONSERVATION STATUS:

A common species listed as 'Least Concern' on the **IUCN red list**, meaning there is very little risk of extinction for this species.





PUZZLE

CEPHALOPOD WORDSEARCH



Can you find the words below in the word search?

SQUID

SUCKERS

OCTOPUS

CUTTLEFISH

CEPHALOPOD

TENTACLES

CAMOUFLAGE

MANTLE

MOLLUSC


INK

WOW!

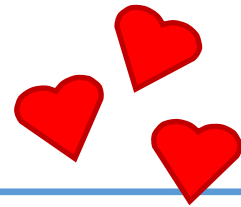
FUN FACTS

MORE ABOUT CEPHALOPODS

There are so many incredible things to say about cephalopods. Here are a few more fun facts that we couldn't squeeze into the other sections.



Cephalopods have **blue blood**! This is because their blood contains copper to help them cope with low oxygen levels in deep water.

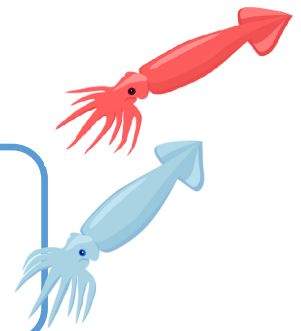


Octopuses have **three hearts**, two of which pump blood across the two gills.



Most species of octopus live in **dens** inside crevices and coral.

Cephalopods change colour using '**chromatophores**' (pronounced "crow-mat-o-fours") - specialised cells under their skin. Find out more about the amazing colour changing abilities of cuttlefish [here](#).

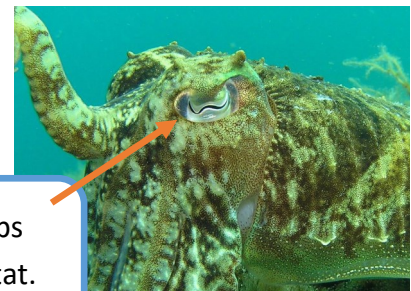


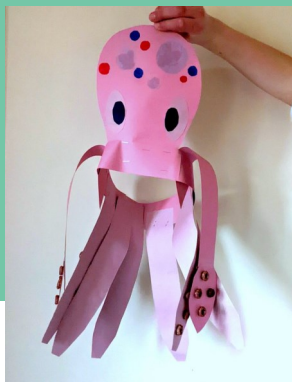
Octopuses have a **doughnut shaped brain**. It forms a ring around the oesophagus (food pipe) so when an octopus swallows, its food must 'pass through' its brain!



A **Nautilus** is another type of cephalopod that differs from octopus, squid and cuttlefish because they have a shell around the outside of their bodies. Nautilus live in the deep ocean.

The pupils of a **cuttlefish's eyes** are **W-shaped**. This helps them to balance out the uneven light levels in their habitat.





CRAFT

OCTOPUS HEADBAND



Turn heads with an octopus headband, complete with eight tentacles. Use our guide below or adapt to suit the materials that you have to hand and your own design ideas.

WHAT DO I NEED?

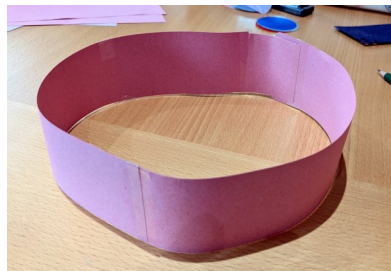
- Coloured paper of various shades
- Scissors
- Stapler (or sticky tape)
- Cereal hoops
- Pencil
- Glue

1



Cut strips of coloured paper to make the base of the headband. Make sure there will be enough length once joined together to fit your head.

2



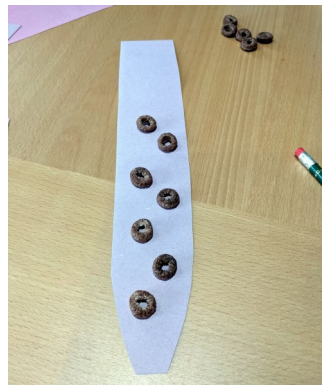
Using staples, glue or sticky tape, join the strips together and secure the ends so that it will fit your head comfortably.

3



Draw and then cut out the octopus head. Make sure that it will be a good fit for the headband. Add eyes and any other decoration that you would like. We added some spots at the top of the head.

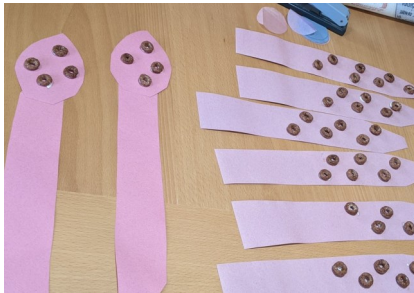
4



Next cut out some tentacles and glue on several breakfast cereal hoops to look like suckers. Leave to dry. If you don't have cereal hoops to hand, you can simply draw on some suckers.

Please always supervise children around scissors and staplers.

5



You can make tentacles in different styles and colours if you want to. Be creative!

6



Now you are ready to assemble your headband. Staple or stick on the octopus head and all of the tentacles—taking care to space them out well and not cover your eyes.



When you are not wearing your octopus headband, it looks great hanging up as a decoration.

EXPERIMENT

OCTOPUS SQUEEZE

Octopuses have an amazing ability to squeeze through tiny crevices, cracks and holes. This experiment allows you to model how the octopus's soft bag-like body can move through a tiny hole.

WHAT DO I NEED?

- Sealable plastic bag
- Scissors
- Water
- Food colouring (optional)
- Black pen
- Cardboard

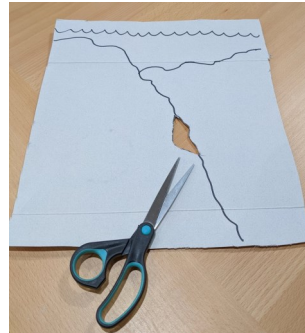


1



The plastic bag will represent the octopus, so begin by drawing an octopus on the bag with a thick black pen. Remember to include all eight tentacles!

2



Now cut a small hole in your piece of cardboard. If you like, you can make this look like a little crack between rocks under the sea. Make your own design and add some colour.

3

Carefully pour some water into your plastic bag until it's around a quarter full.



4

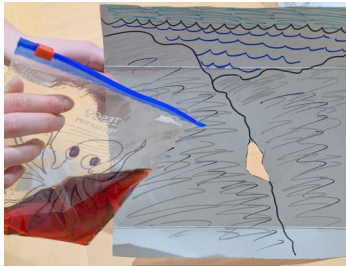
You can add a few drops of food colouring to make your octopus the colour of your choice.

Carefully make sure all the air is out of your bag and then firmly seal it shut.



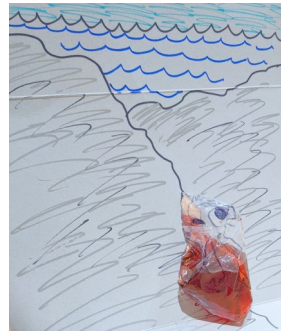
Sharp scissors are required to cut through card. Please always supervise children around scissors.

5



Now you are ready to see whether your big octopus can pass through the very small hole in the cardboard. What do you think will happen?

6

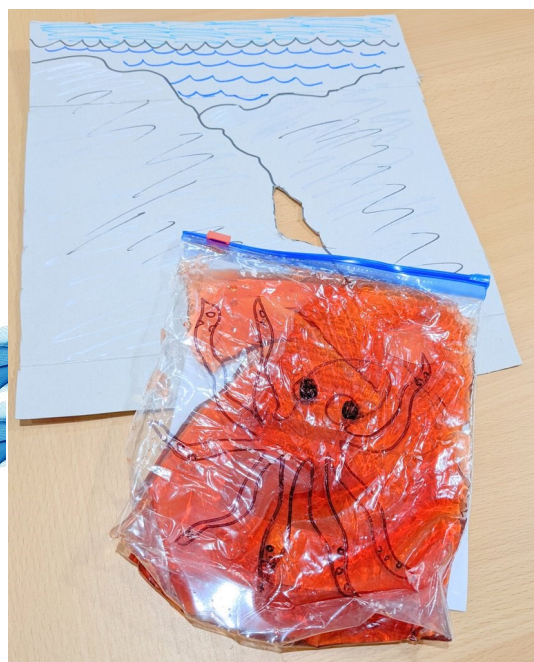


Slowly push a little bit of your octopus through the hole. Gently feed the whole thing through the gap, noticing how the water and the bag are very flexible.

Did your octopus make it all the way through the small space?

The only hard part of an octopus's body is its beak. The rest of the octopus is soft and flexible—so most octopuses can fit through a hole about an inch in diameter.

ADD ON: Go on-line and search for videos of octopuses squeezing through very small holes and gaps. It's an amazing sight!





ANSWERS

CEPHALOPOD WORDSEARCH



Can you find the words below in the word search?

SQUID SUCKERS OCTOPUS CUTTLEFISH CEPHALOPOD
TENTACLES CAMOUFLAGE MANTLE MOLLUSC INK

DISCOVER

GLOSSARY

AERATED

Providing something with a good supply of air. In the case of octopus eggs, mothers constantly push water over them so they have a constant supply of dissolved oxygen so the babies can breathe in the eggs.

CAMOUFLAGE

When animals conceal themselves by blending into their surroundings, either by the pattern, colour or texture of their skin, or the use of materials around them.

CLIMATE CHANGE

Changes including temperature, rainfall and wind patterns across the Earth that can be natural or caused by human activity.

ECOSYSTEM

Living things in a particular environment that rely on one another—for example for food or shelter.

JET PROPULSION

Moving forward using the backward ejection of a high-speed jet of gas or liquid.

IUCN RED LIST

A list made by the International Union for Conservation of Nature of species and their status (how at risk they are from extinction). Statuses range from 'Least Concern', where there is very little risk, to 'Critically Endangered', where there is high risk of extinction. Find out more [here](#).

MANTLE

A layer of tissue that covers the internal organs of a mollusc. The bulbous area above an octopus's head is known as its mantle.

MOLLUSC

A group of animals without skeletons that includes snails, slugs, oysters, mussels and cephalopods. Some molluscs live in the sea, others in fresh water and others on land. All molluscs have a mantle.

POLLUTION

Something harmful that gets into the air, a water source or soil.

PREDATOR

An animal that hunts other animals for food.

DISCOVER

GLOSSARY

PREY

An animal that is hunted or killed by another animal for food

REPRODUCE

To create a new living thing, such as a baby.

SUSTAINABLY

Something done in a way that doesn't damage the environment or cause a big decrease in the number of a species.

TENTACLES

A tentacle is a part of the body of an animal or plant that can move freely and act like an arm. As well as cephalopods, sea anemones and some meat-eating plants have them.

VENOM

A kind of poison used by animals. Made within an animal's body, venom is injected into the body of another animal by a bite or sting.

