



SUBMARINE STEM

Explore life in the deep sea
Deep sea coloring booklet

[digital explorer]

NEKTON
DEEP OCEAN EXPLORATION



About XL Catlin

XL Catlin, is the global brand used by XL Group PLC's (NYSE:XL) insurance and reinsurance companies which provide property, casualty, professional and specialty products to industrial, commercial and professional firms, insurance companies and other enterprises throughout the world. Clients look to XL Catlin for answers to their most complex risks and to help move their world forward.

XL Catlin is proud to sponsor research and educational programmes which explore how our planet's oceans may be changing. The XL Catlin Deep Ocean Survey is its third major scientific sponsorship following the Catlin Arctic Surveys, (2009 – 2011) that investigated the impacts of changes to the Arctic Ocean, and the XL Catlin Seaview Survey (2012-2016) which created the world's first digital baseline of coral reef health. To learn more visit XLCatlinOceansEducation.com.

About Digital Explorer

Digital Explorer is an award-winning education social enterprise based in London. A pioneer in the development of innovative real-world learning programmes, Digital Explorer supports teachers and students internationally to understand and engage with critical global issues from the oceans to cultural understanding.

About Nekton

Nekton combines world-class experience across multi-disciplinary marine research expeditions, submersible operations, multi-platform content creation and distribution, marketing and communications, scientific research, international collaborative networks and sustainable organisational development.

WELCOME



Welcome to the Submarine STEM (Science, Technology, Engineering & Math) Deep sea coloring booklet. We hope you enjoy learning more about the amazing creatures that live in the deep ocean.

You can find out more about deep sea life and exploring the deep from other Submarine STEM resources, available for free download from **nektonmission.org/education**.

These are just some of the animals that the expedition team may encounter as they explore this dark, unknown world.

Over the next five years, scientists and explorers will be using robotic submarines and exciting new submersibles to investigate this least known part of our planet.

We have only explored 5% of the deep ocean and have already discovered the different life forms that you will see on the following pages.

Maybe, we will discover some new animals. Can you can imagine what might live down there and draw your own deep sea creature?

We would love to see examples of your coloring in and your own drawings of ocean animals, real or imagined. Please send photos to our education partner, Digital Explorer, at **info@digitalexplorer.com**.

Happy exploring, coloring and drawing!

The Nekton Mission team



This zone flourishes with life, powered by the sunlight and resulting algae and other marine plants. 90% of all known ocean life lives here, although it makes up only about 10% of the ocean.

Although there is some sunlight that penetrates through to this layer, there is not enough to power photosynthesis and for most plants to grow.

Most of the world's seafloor lies in this zone. Within the midnight zone, there are sea mounts, ocean ridges, hydrothermal vents. Some animals dive down to these depths to feed or breed. Others live in this zone relying on food to fall from above, or using lures to attract their prey. Only about 1% of all known ocean species live in the Midnight Zone.

The abyssal plain is the single largest environment on the planet. The pressures are immense and there is little oxygen in these deep waters. It covers over 85% of all ocean basins. Covered in layer of thick sediment, it is home to a strange variety of creatures.

Sunlight zone

Twilight zone

Midnight zone

zone

200m

1000m

4000m



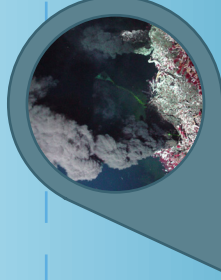
305m

Triton Submersible



318m

Nuno Gomes 2005
(deepest scuba dive)



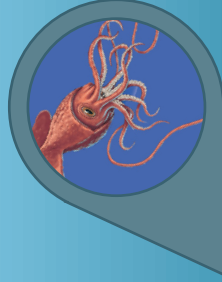
1700m

Hydrothermal vent
field



1850m

Sixgill shark
(deepest shark)



2197m

Colossal squid



2992m

Cuvier's beaked whale
(deepest whale)



2000m
ROV



3962m

Dumbo Octopus



4500m

Anglerfish

3790m : Average depth of the ocean

Abyssal

6000m

This is the realm of the ocean trenches, taking their name from Hades, the ancient Greek name for hell. These depths descend from the abyssal plain, with only 37 such valleys or trenches found across the oceans. We know little about the life in these trenches, although it seems you might find a sea cucumber or two!



6800m
Cusk Eel

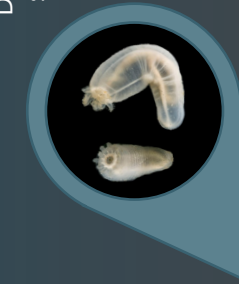


8145m
Hadal snailfish
(deepest fish)

8605m : Deepest point in the Atlantic Ocean



9316m
Deep sea
shrimp



10150m
Sea cucumber

10994m
Bathyscape Trieste 1960
(first human voyage to
deepest point)



Hadal Zone

10994m

The volume of the ocean is an estimated
1.3 billion cubic kilometres of water



of the planet's living
space is in the ocean



of the ocean is
unmapped



of the Earth's surface
is water

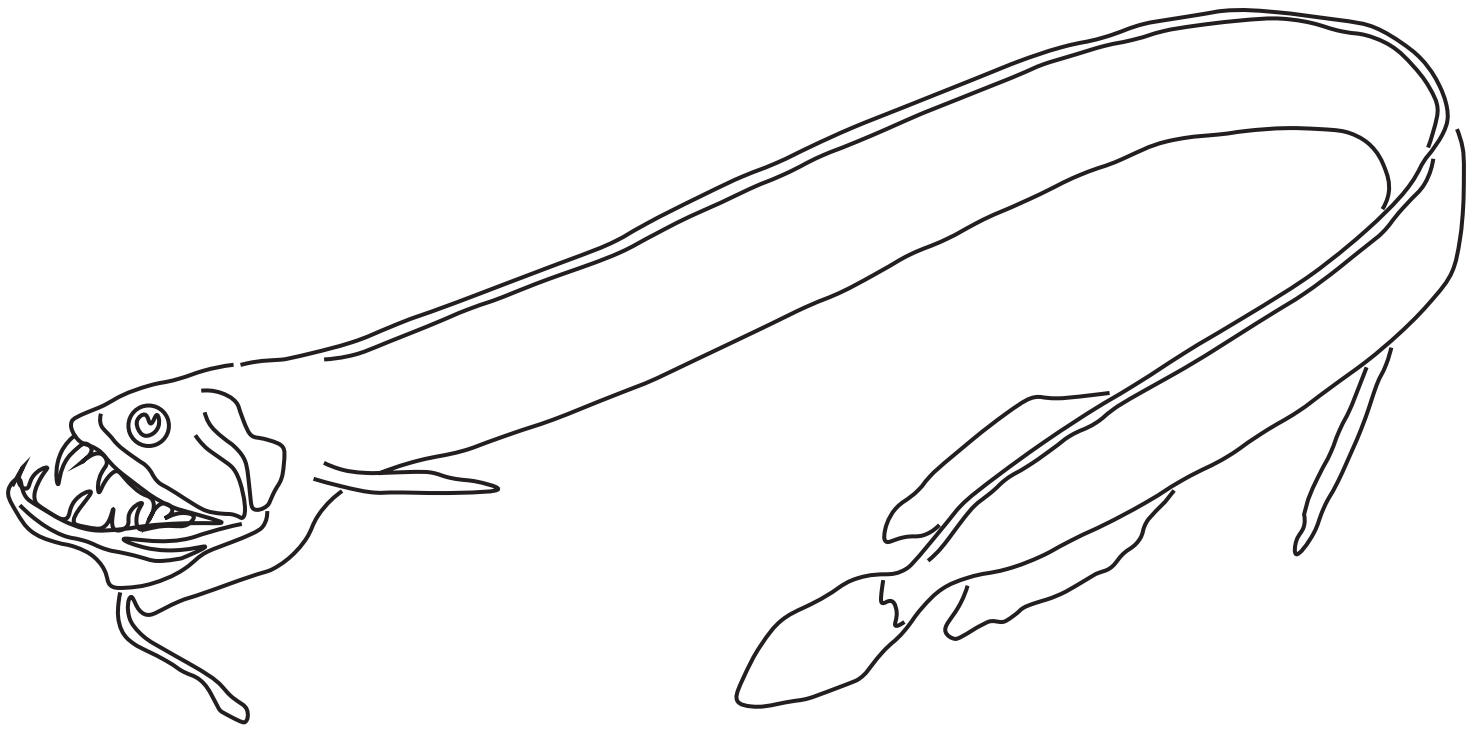
AMPHIPOD



Did you know?

Amphipods are small marine crustaceans, related to shrimp, lobsters and crabs. They eat bits of dead animal and algae that have fallen from the upper parts of the ocean. Normally, they are quite small, just 1cm to 2cm long, but a huge specimen, 34cm long, was found by scientists at a depth of over 7000m.

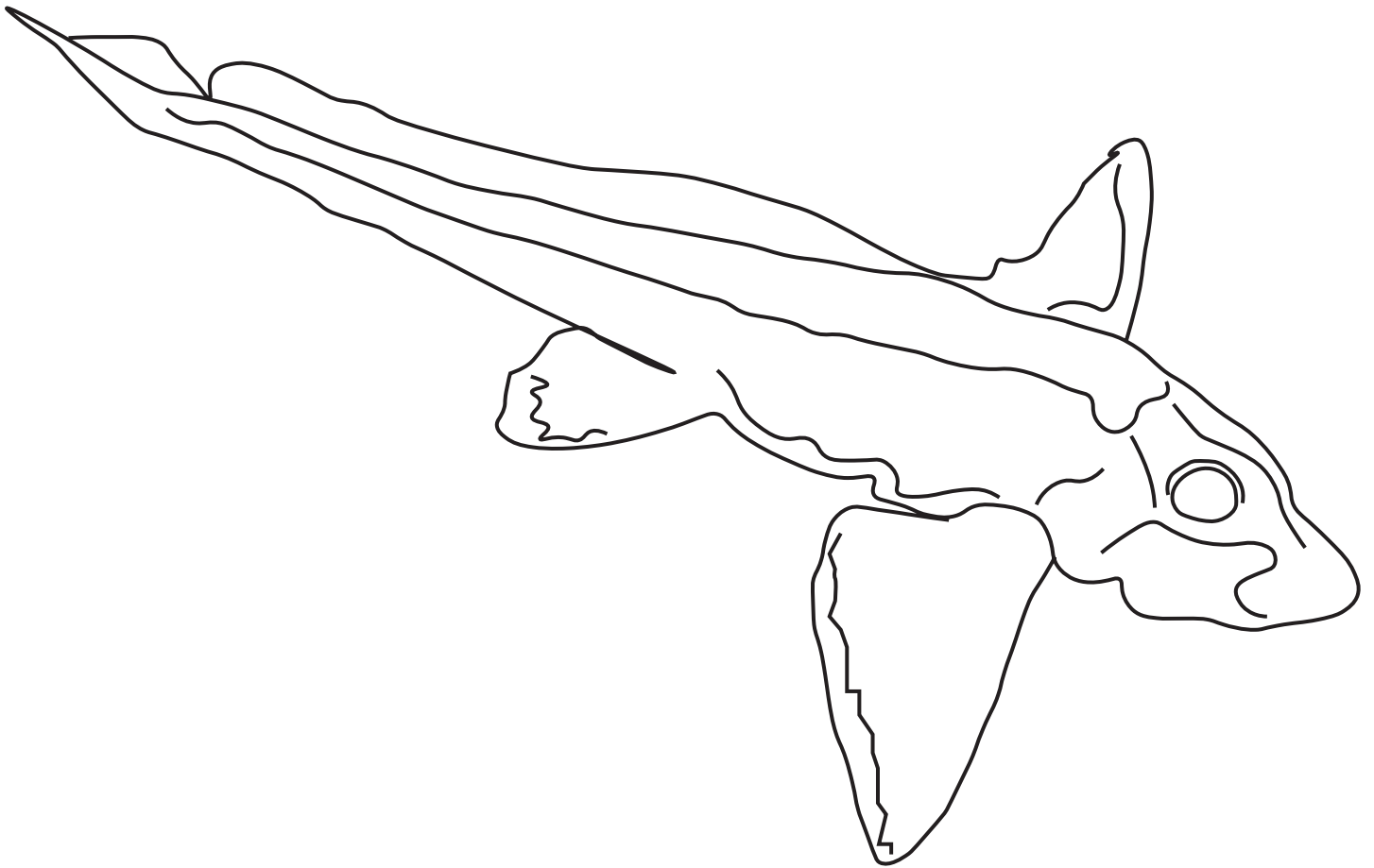
DEEP SEA DRAGONFISH



Did you know?

Deep sea dragonfish are fearsome looking creatures that live in the deep ocean. They have a glowing barbel attached to their mouths that attracts prey, like small fish. They would not be dangerous to humans as they only grow to about 15cm long, but they look very frightening with their double row of sharp teeth.

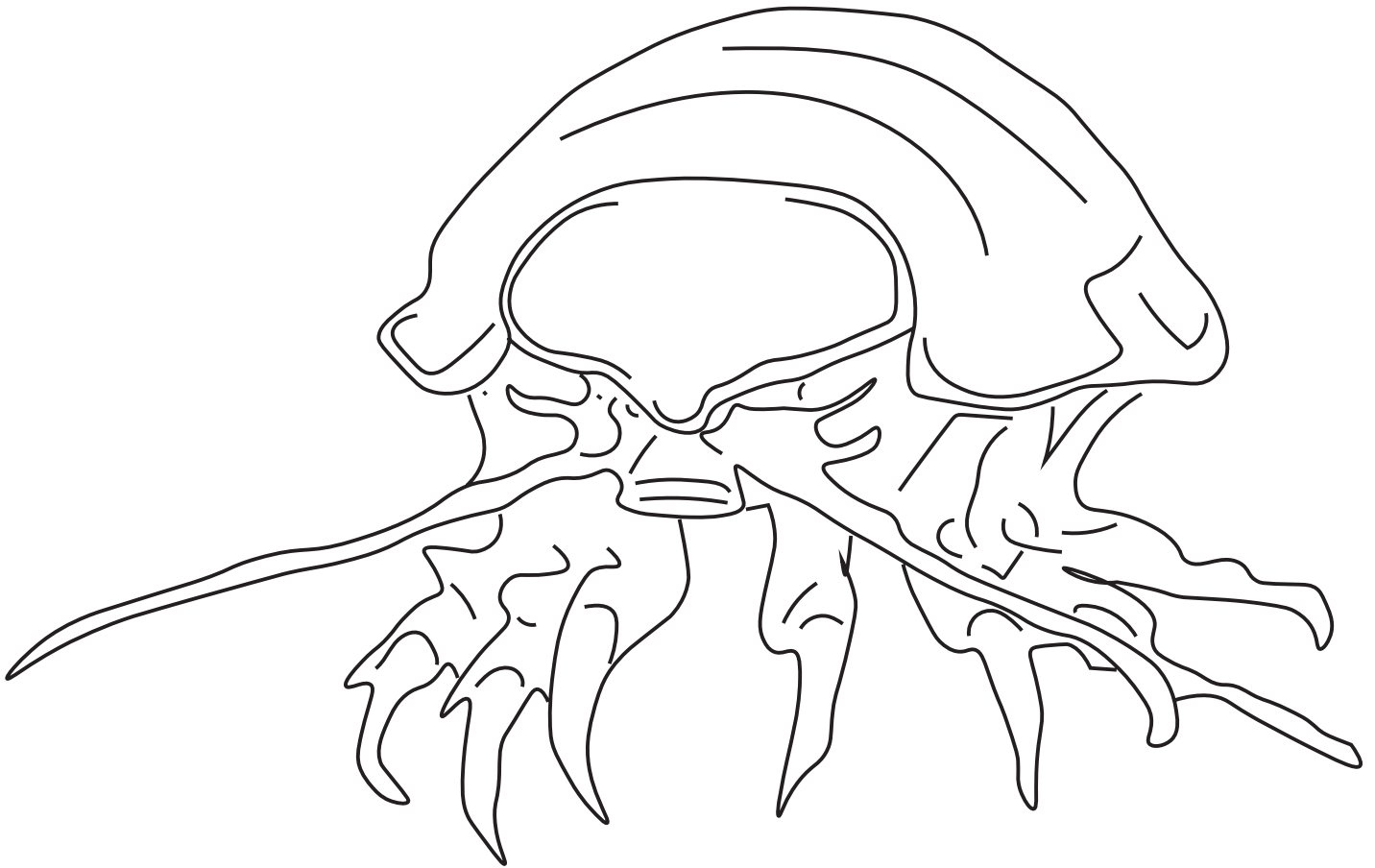
GHOST SHARK



Did you know?

Ghost sharks, also known as ratfish, are like living fossils. They are not true sharks, which separated off from these ghost sharks about 340 million years ago. They might be the oldest type of fish alive today and find their food sensing for electrical pulses emitted by creatures living on the ocean floor. They can grow up to 150cm long, and live at depths down to 2600m.

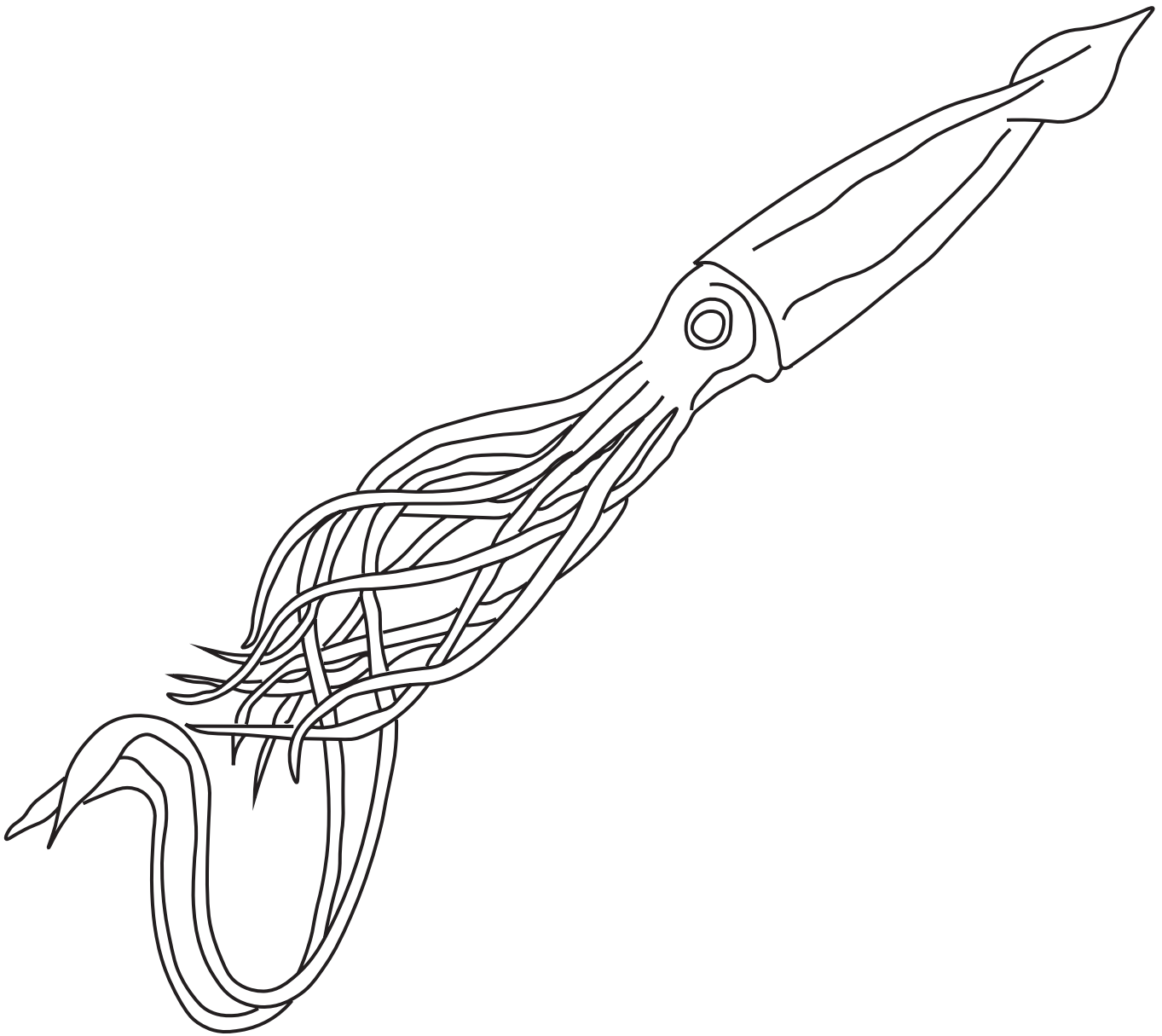
GIANT ISOPOD



Did you know?

The giant isopod is like a huge, underwater roly poly or woodlouse. Imagine getting to the bottom of the sea and finding one of these creatures up to 75cm long. They scavenge for dead matter on the seafloor, but one giant isopod was found eating the head of a shark caught in a deep sea trap.

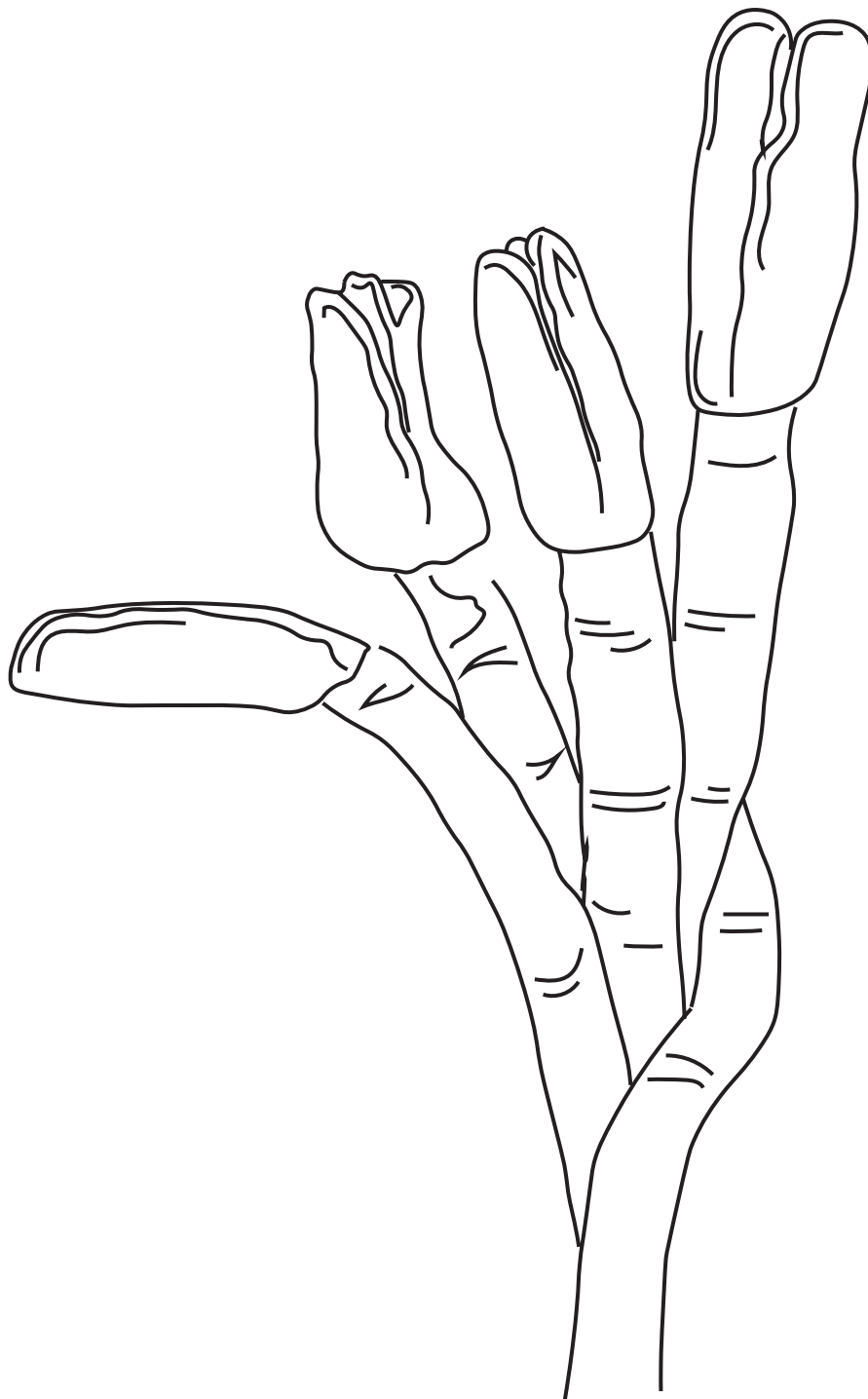
GIANT SQUID



Did you know?

The giant squid is one of the most fearsome creatures in the deep. It is the longest squid in the world, with its body and tentacles measuring up to 13 meters combined. It has huge eyes, the size of beach balls and hunts for its prey in the dark deep of the ocean down to 1000m. It uses its tentacles to catch sharks, octopus and other squid, then bites into them with its sharp beak.

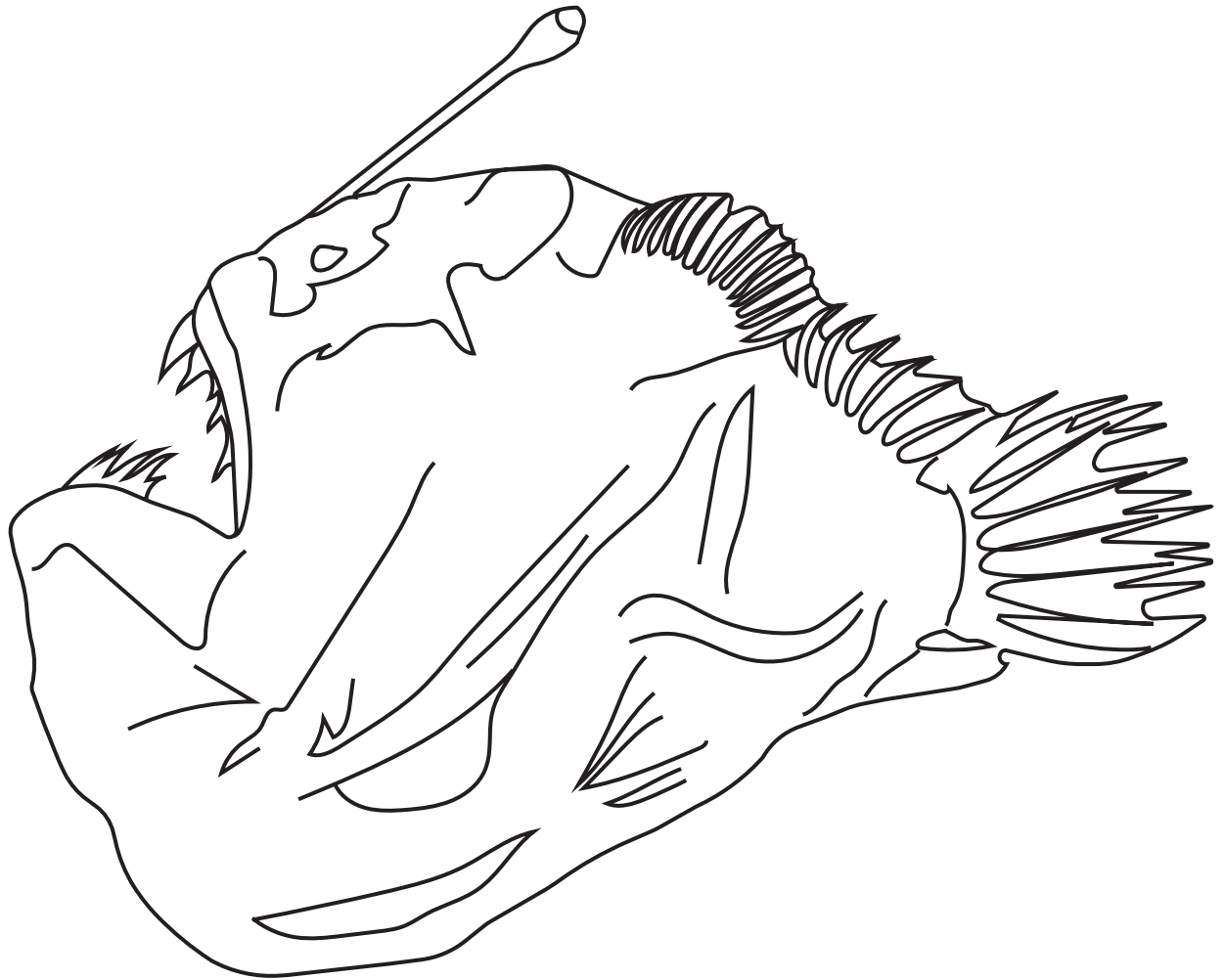
GIANT TUBE WORM



Did you know?

The giant tube worm is one of the fastest growing worms in the ocean, growing to lengths of over two meters in just a few years. It has no eyes, mouth, stomach or legs. It lives near hydrothermal vents in the deep ocean and has a strange way of feeding. Tiny bacteria live inside its body and create sugars using the chemical energy spewing from the seafloor.

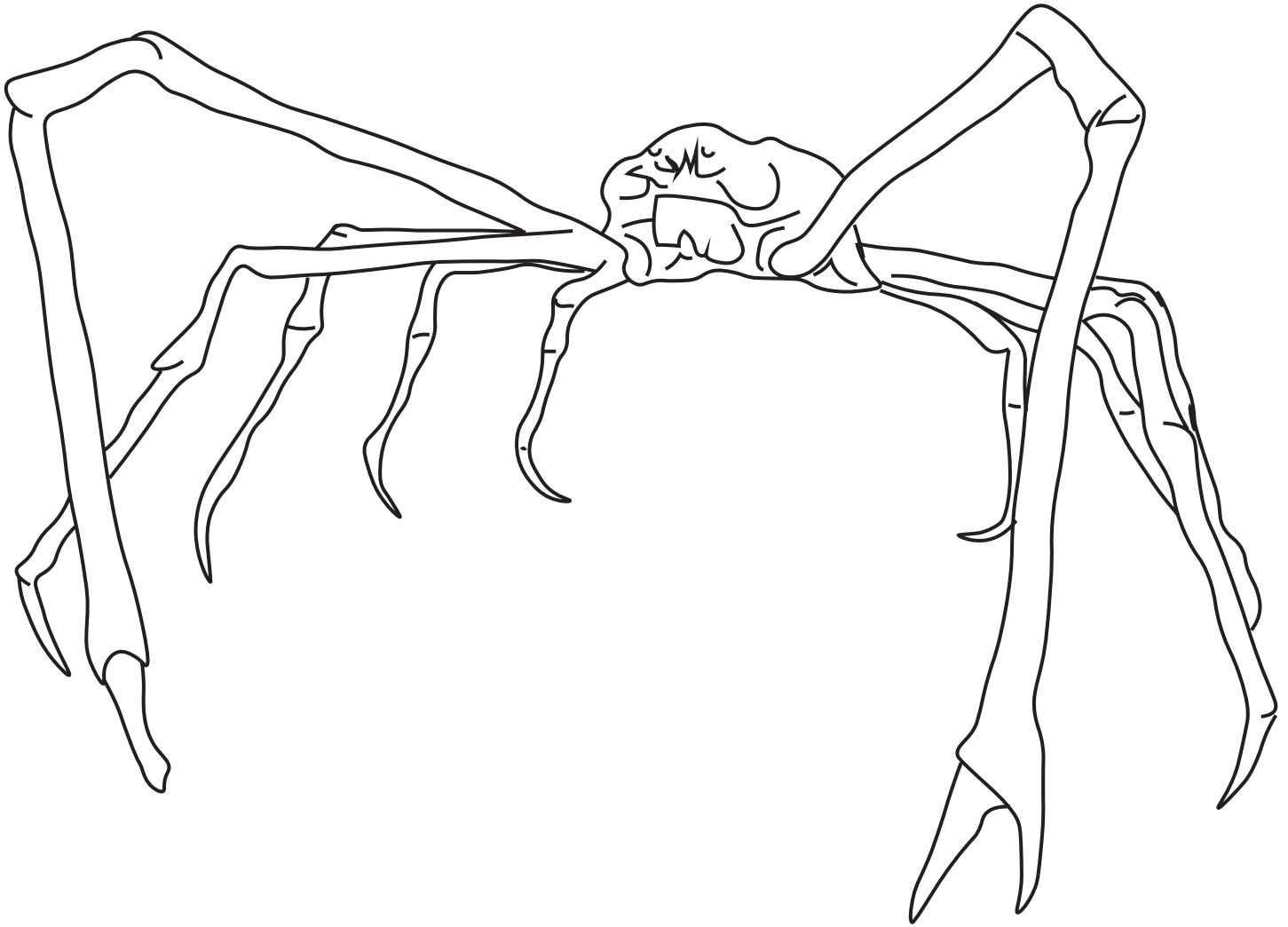
ANGLERFISH



Did you know?

The anglerfish remains motionless in the deep ocean and moves the glowing lure attached to its head to attract small fish and other animals towards its sharp teeth and then gobbles them whole. Although it may appear to be a huge monster of the deep, it is in fact only about 15cm long, but can expand its body to fit larger animals inside its stomach.

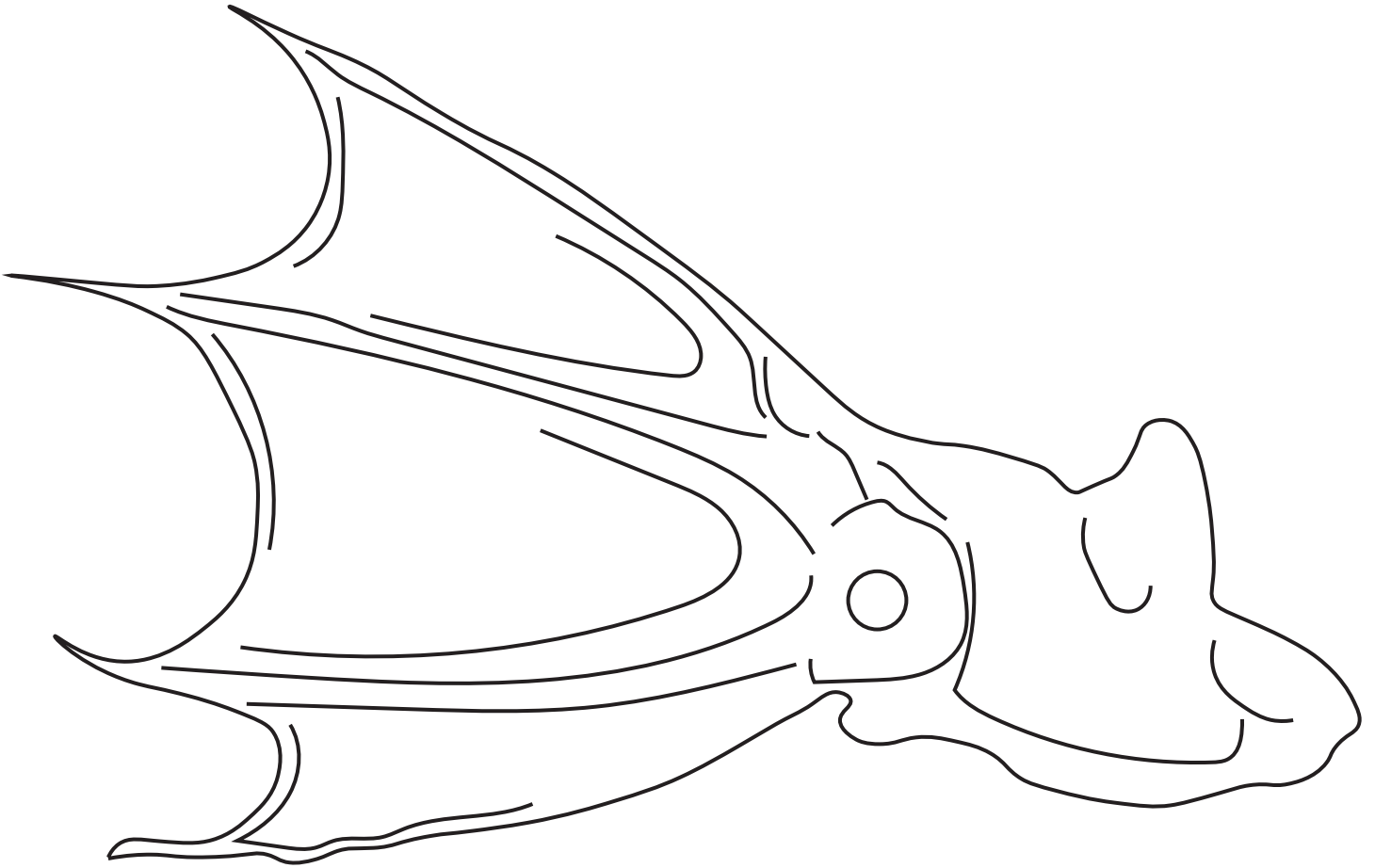
JAPANESE SPIDER CRAB



Did you know?

These scary looking spider crabs prowl the seafloor around Japan. Their legs can reach up to 1.6 meters long, giving them a total width of about 3.8 meters, more than the combined height of two average men. They are not fussy eaters and attack any kind of food they can find on the bottom of the ocean and it has been rumoured that they have even eaten the bodies of dead sailors lost at sea.

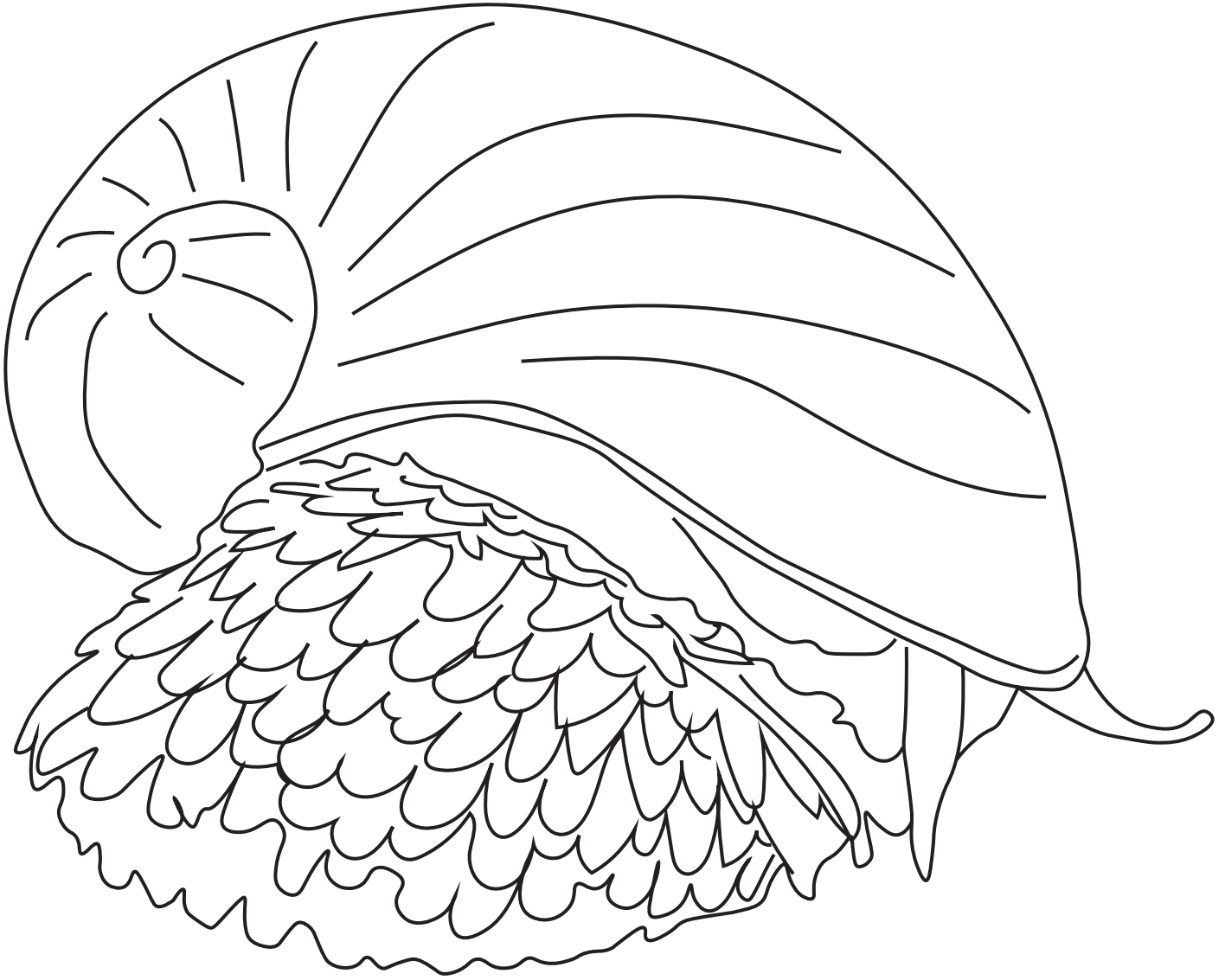
VAMPIRE SQUID



Did you know?

The vampire squid is not really a vampire but gets its name from the deep red webbing between its tentacles which resemble Dracula's cape. These small squid, measuring just 15cm long, feed on small crustaceans, like amphipods and copepods. They capture marine snow, the falling flurries of dead tiny animals and algae, combining it with mucus, to create 'tasty' slime balls.

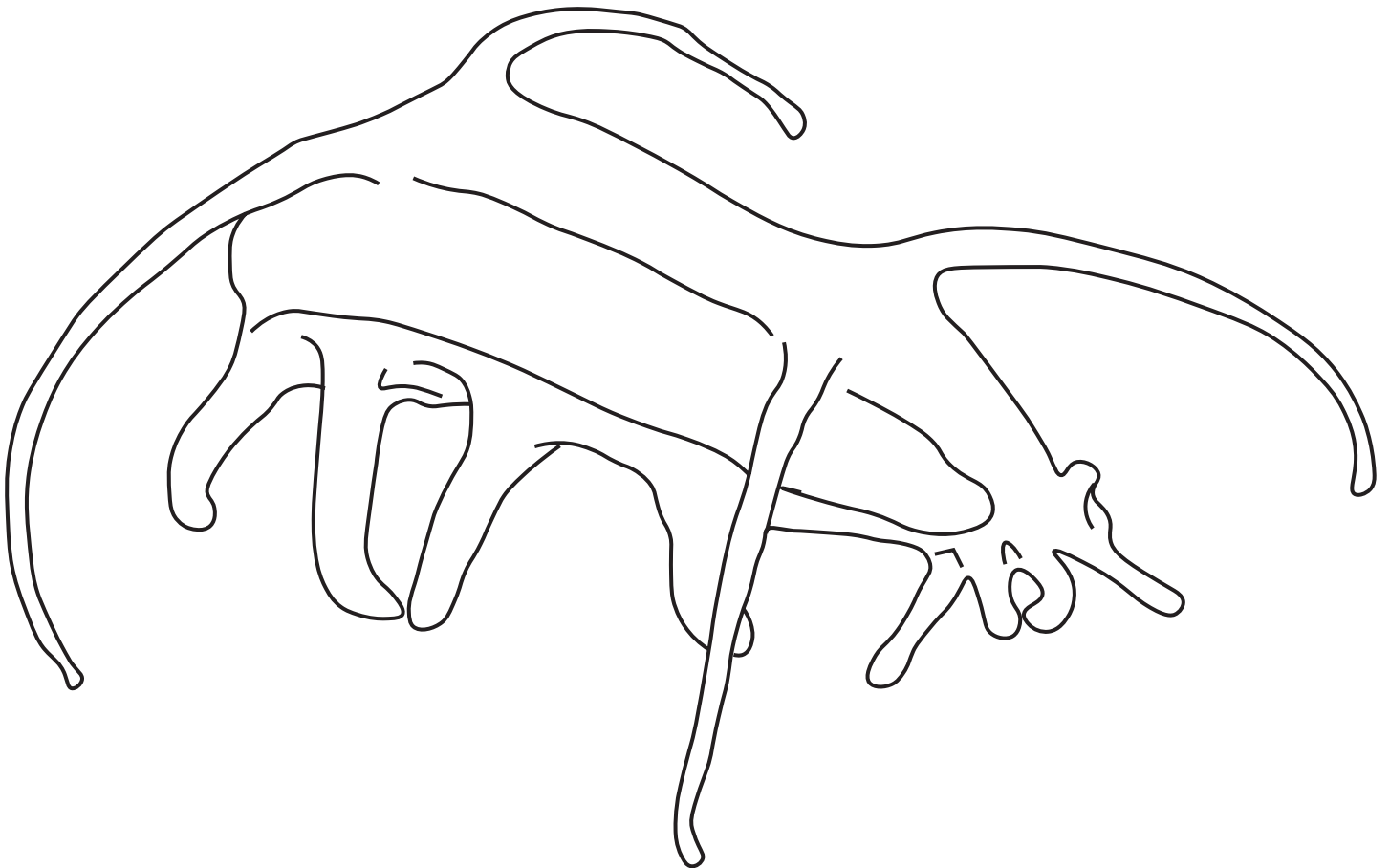
SCALY FOOT GASTROPOD



Did you know?

The scaly foot gastropod is a small marine snail, just 4cm across, that lives around hydrothermal vents in the deep ocean. It has found a special way of protecting itself from predators such as crabs. Using the dissolved iron in the water, it creates scaly armor. This armor is so effective that armies are looking at it to see how it can inspire better ways of protecting soldiers.

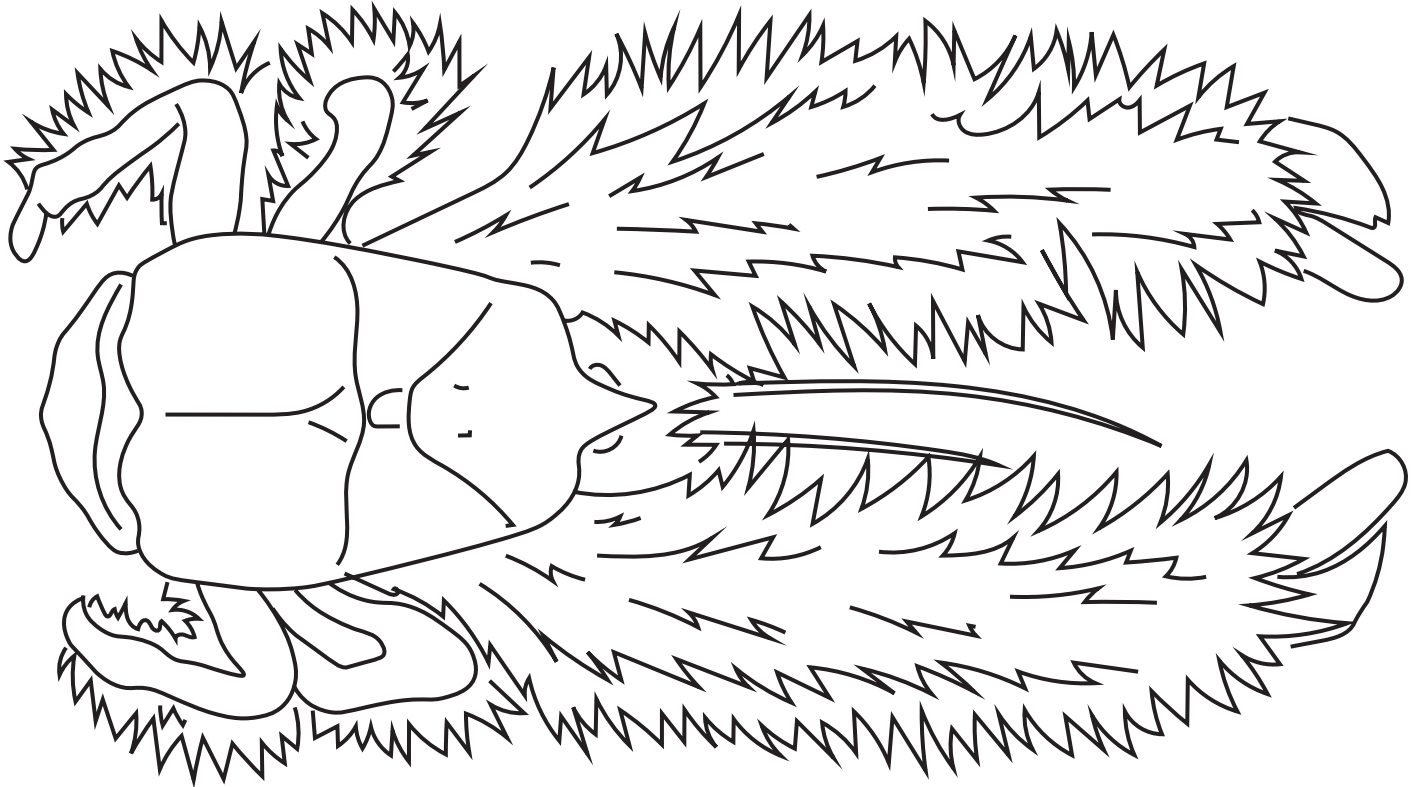
SEA PIG



Did you know?

The sea pig is a type of sea cucumber that can live up to 5 kilometers down in the ocean depths. It is the only sea cucumber that has 'legs'. These are not true legs, but water filled tubes attached to the side of the sea pig. These small animals, just 20cm long, wander along the bottom of the ocean, vacuuming through the sand, sucking up rotting tissue for food.

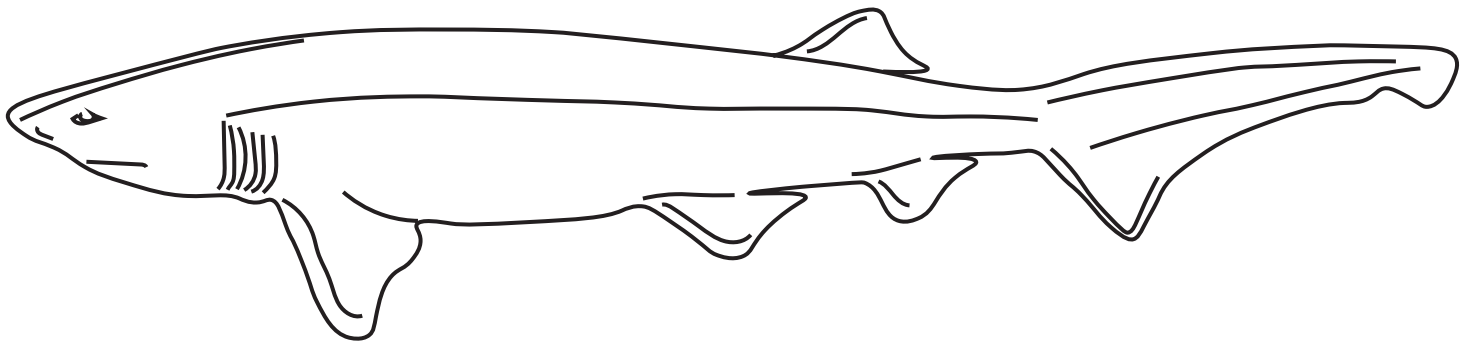
YETI CRAB



Did you know?

The yeti crab gets its name from its pale colour and hairy claws, giving it a similar style to the mythical Himalayan beast. They are the gardeners of the hydrothermal vents, where they live. The yeti crab grows colonies of bacteria on its hairs and feeds off them as it hunts for other small creatures.

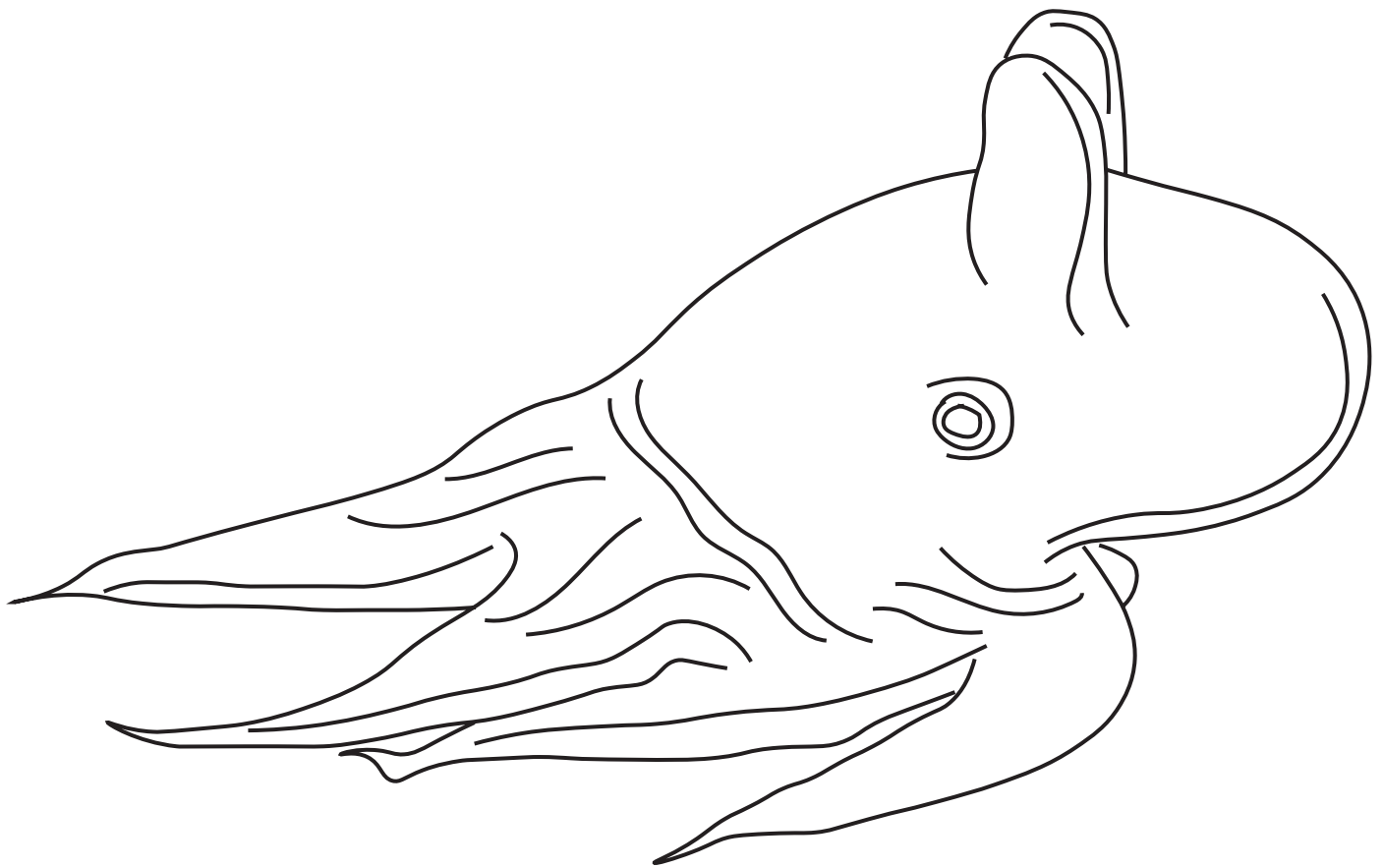
SIXGILL SHARK



Did you know?

The deepest shark and the largest of the deep sea sharks, the sixgill shark can measure nearly 5 meters long. It hunts in the deep for small fish and shellfish, as well as feeding on the carcasses of larger animals such as whales. The sixgill shark has few natural predators, but has ended up in the bellies of great white sharks and orcas.

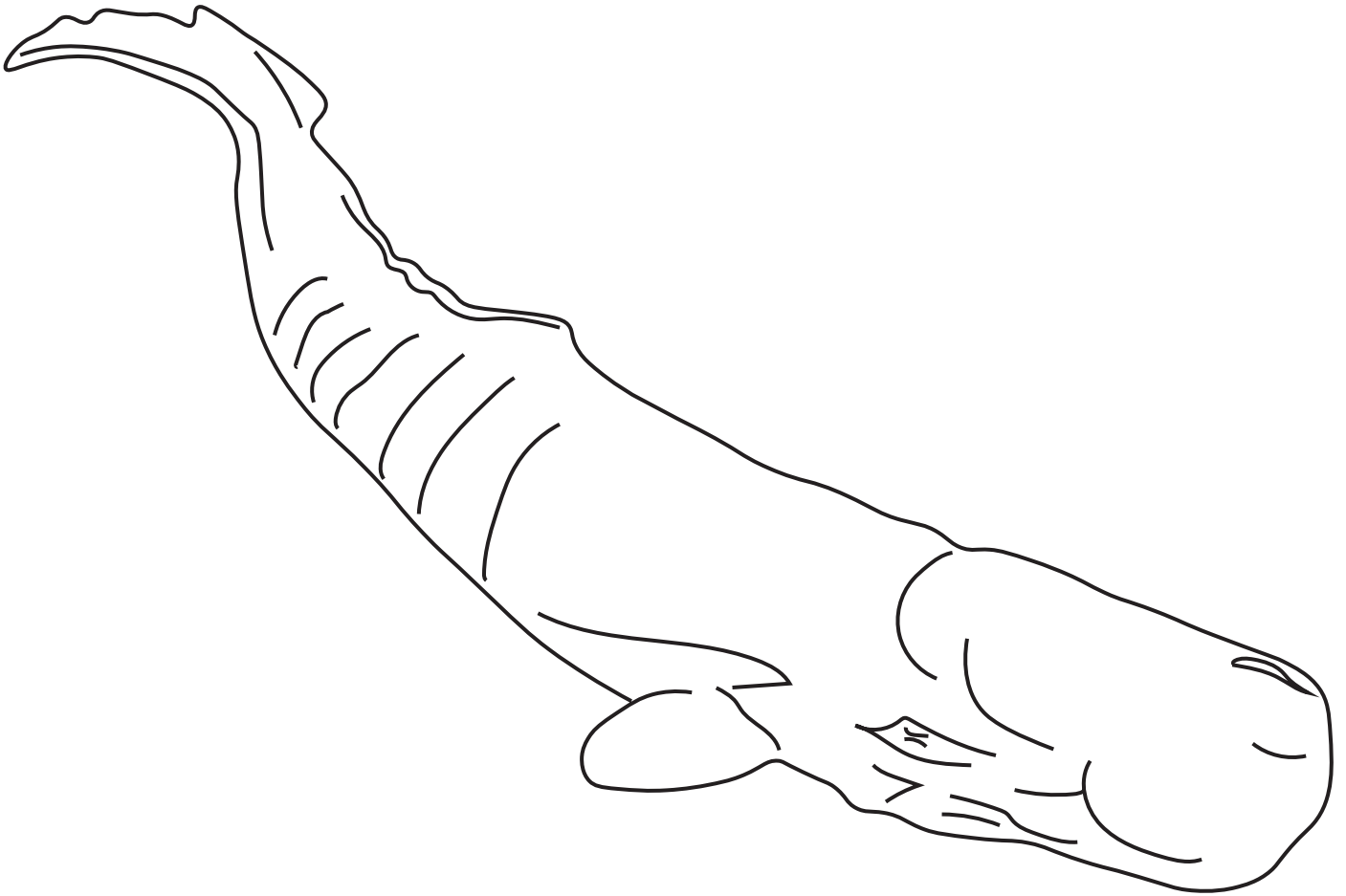
DUMBO OCTOPUS



Did you know?

The dumbo octopus gets its name from the ear-like fins on the side of its head, which make them look like Dumbo, the Disney flying elephant. They are the deepest living octopus, with some spotted at depths of 7000 meters. Some species are also terrifyingly big at 1.8 meters long, although most are around 25cm long.

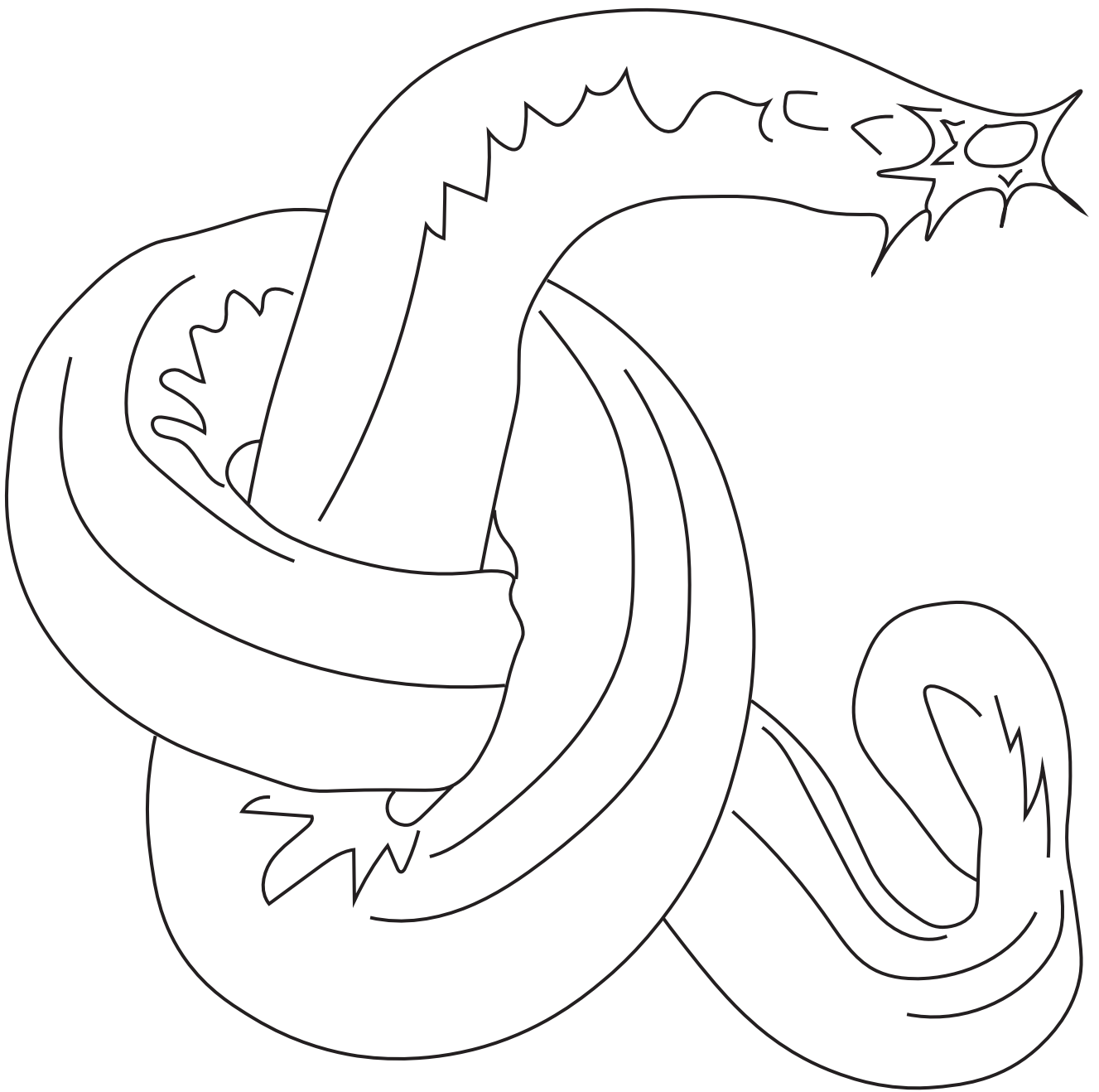
SPERM WHALE



Did you know?

The sperm whale is a toothed whale, with teeth weighing nearly 1 kilogram each. It hunts on squid, octopus and fish at depths up to 2250m. It is one of the only natural predators of the giant squid and sperm whales have been found bearing the scars from the giant squid's sharp tentacle suckers. A beautiful giant of the oceans, it can grow up to 12 meters in length.

HAGFISH



Did you know?

Hagfish burrow into the rotting carcasses of whales, sharks and squid on the seafloor, often eating these deep ocean feasts from the inside. Also known as slime eels, hagfish produce buckets of slime as a defence mechanism, up to 20 liters of goo at a time. Normally only 50cm long, they can grow to 127cm and are so well adapted to rotting food, they can absorb this through their skin as well.

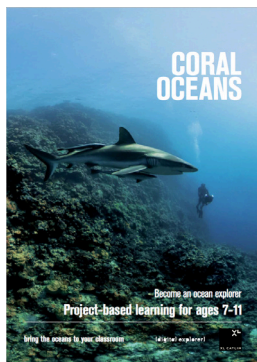
Did you know?

FURTHER INFORMATION



Submarine STEM is complemented by three existing oceans education programmes, all of which can be accessed for free via the Oceans Academy website, oceans.digitalexplorer.com.

Coral Oceans



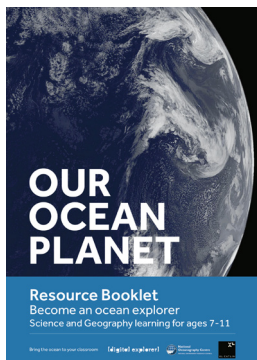
Based on the science and findings of the XL Catlin Seaview Survey, the Coral Oceans programme brings the wonder and complexity of the fragile reef habitats to young people in innovative ways. A series of virtual dives give children an insight into life on the reef, its interdependence and variety. It also introduces the uncertain future for coral ecosystems around the world and some of the actions that can be taken to secure vibrant coral reefs for future generations.

Frozen Oceans



The Frozen Oceans resources relate to the science of the Catlin Arctic Surveys from 2009 to 2011. The melting of the sea ice is one the most easily identifiable signs of climate change. But this is not the only change occurring in the region, with the chemistry of the Arctic Ocean changing faster than at any other point in the past 300 million years.

Our Ocean Planet



Our Ocean Planet is a comprehensive introduction to ocean topics for elementary school aged children. The resource aims to inspire a wonder about the ocean, explain our relationship with it and showcase careers that involve working closely with it. Children will become ocean explorers, sailing the oceans, learning from ocean experts as they visit the different oceans and seas around the world.

News and information on the ocean

National Geographic

ocean.nationalgeographic.com

Stories, background and beautiful imagery from the National Geographic team.

The New York Times

nytimes.com/topic/subject/oceans

News on the oceans from the New York Times.

Wired Magazine

wired.com/tag/oceans/

The weird, wonderful and wired from the oceans via the Wired team.

Deep Sea News

deepseanews.com

Specialist news website on the deep sea.

Ocean education websites

Sea and Sky presents Creatures of the Deep

seasky.org/deep-sea/deep-sea-menu.html

A wonderful overview of some of the strange mysterious life found in the deep.

NOAA education resources

education.noaa.gov/Ocean_and_Coasts/

Education resources on the ocean and coasts, including a background on ocean literacy.

National Geographic Ocean Education

nationalgeographic.org/education/programs/oceans-education/

Education resources on the ocean from the National Geographic team.

Smithsonian Institution Ocean Portal

ocean.si.edu/deep-sea

Education resources on the deep sea and more from the Smithsonian.

A little bit more...

Triton Submarines

tritonsubs.com

Learn more about the submersibles being used on the expedition.

Ocean Elders

oceanelders.org

Hear some of the voices speaking out on behalf of the ocean.

BBC Blue Planet

bbc.co.uk/programmes/b008044n/clips

A stand-out documentary series on the ocean. Watch clips online or buy the series.

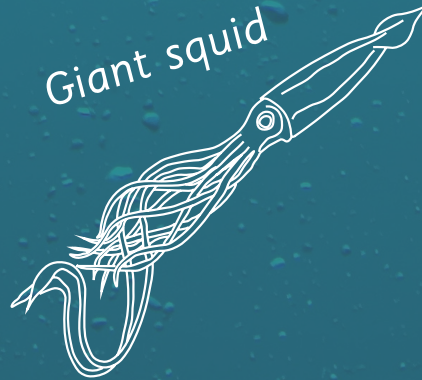
This Submarine STEM Deep sea coloring booklet introduces young children (and adults!) to the extraordinary life of the deep sea. Discover more about these alien-like creatures and enjoy coloring them in.

This booklet and other education resources are available for free download from **nektonmission.org/education**.

Here are just some of the creatures you will discover on the pages inside...



Angler fish



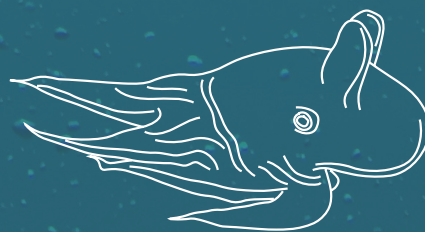
Giant squid



Giant isopod



Dragon fish



Dumbo octopus



Sea pig

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Cover photo: Dumbo octopus (credit NOAA)

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