

# Jellyfish

Jellyfish wander the ocean, drifting with the currents wherever the water takes them. Despite their name, they are not fish but invertebrates as they don't have a skeleton. Their soft, bell-shaped bodies are around 95 per cent water and contain neither brain nor heart. They have limited movement but can push themselves gently through the water by filling their body (the bell) with water and squeezing it back out again.

Along with coral and anemones, jellyfish belong to the group Cnidaria. All cnidarians are carnivores and use stinging cells to catch prey and to defend themselves. Most jellyfish have long tentacles, which are lined with harpoon-like stings. When jellyfish dangle their tentacles into the water, the sting fires venom into the victim the moment they brush against it. Several species of jellyfish are translucent, meaning other animals will not see the danger ahead until it is too late, whereas others use bright colours to attract prey. For instance, flower hat jellyfish have fluorescent-tipped tentacles, which may look like green algae to unsuspecting fish. The fish approach the tentacles in the hope of food, but instead swim into a fatal trap. Incredibly, some young fish and crabs seek shelter in the tentacles. They rely on a thick mucus coating to protect them or nimbly dodge the tentacles as they sway in the water.

## Key to plate

### 1: Box jellyfish

Bell diameter: Up to 35cm  
Tentacle length: Up to 3m  
Also known as the sea wasp, this species has deadly venom.

### 2: Lion's mane jellyfish

Bell diameter: Over 2m  
Tentacle length: Up to 37m  
This is the largest known species of jellyfish.

### 3: Common kingslayer

Bell diameter: 5mm  
Tentacle length: Up to 100cm  
The sting of this tiny box jellyfish can be fatal.

### 4: White-spotted jellyfish

Bell diameter: Up to 50cm  
Tentacle length: Up to 1cm  
This species are filter feeders.

### 5: Pacific sea nettle

Bell diameter: Up to 30cm  
Tentacle length: Up to 4.5m  
Sea nettles provide shelter for young fish and crabs.

### 6: Flower hat jellyfish

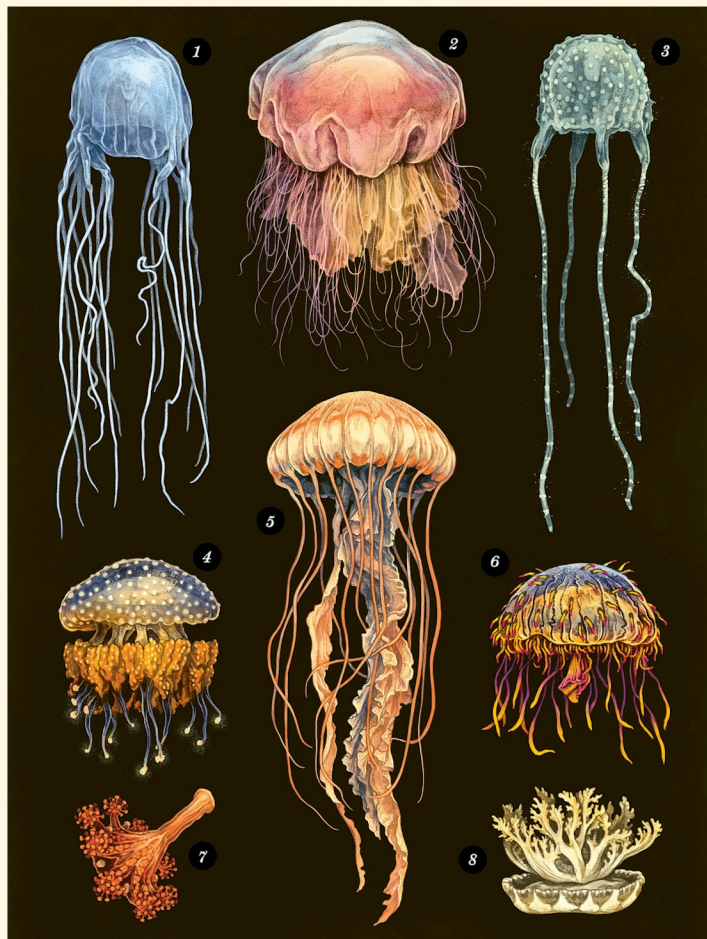
Bell diameter: Approx. 15cm  
Tentacle length: Up to 12cm  
This species lives near the seafloor and has tentacles all over its bell (body).

### 7: Kaleidoscope jellyfish

Height: Up to 2.5cm, including tentacles  
This stalked jellyfish spends its whole life in one place, attached to seagrass or seaweed.

### 8: Upside-down jellyfish

Bell diameter: Up to 36cm  
Tentacle length: Up to 26cm  
This peculiar species sits upside down on the seabed with its tentacles waving above it.



# Habitat: Rock Pool

Rock pools are the small pockets of seawater left behind in the rocky holes of the shoreline at low tide. A very changeable habitat, nothing stays the same for long in a rock pool. Wildlife has to deal with varying temperatures and differing amounts of oxygen and space depending on who they are sharing the rock pool with.

Tides are the rise and fall of the planet's ocean. They are caused by the sun and moon's gravitational pull on Earth, making the ocean 'bulge' around its middle and pulling water away from the coasts. High and low tides therefore change over the course of a month. To avoid getting caught out by the tide and finding themselves high and dry, creatures must carefully time their activities to fit around the tides' schedule. Some have handy 'backup' plans, too. Limpets leave a trail of mucus, or slime, behind them when they search out food at high tide. They use the trail to return to the safety of the rocks where they clamp down ready for low tide, locking water inside their shell.

## Key to plate

### Rock pool at low tide, United Kingdom

#### 1: Montagu's blenny

Length: Up to 8.5cm  
Blennies can survive out of the water entirely. If they stay damp, they can breathe through their skin.

#### 2: Common limpet

Diameter: 6cm  
Limpets clamp on to rocks until the tide comes in. Their strong tongue then allows them to move around and eat algae off the rocks.

#### 3: Bladder wrack

Length: Up to 100cm  
This seaweed has air bladders which make it look a bit like bubble wrap and allows it to float.

#### 4a: Beadlet anemone (open)

#### 4b: Beadlet anemone (closed)

Diameter: Up to 5cm  
These anemones will push others away that settle too close.

#### 5: Two-spotted goby

Length: Up to 6cm  
This fish swims above the seaweed rather than sheltering under rocks.

#### 6: Common starfish

Diameter: Up to 30cm  
These starfish are experts at opening shellfish using their tube feet.

#### 7: Lightbulb sea squirt

Height: Up to 2cm  
With a simple sac-like body and

a covering called a tunic, these sea squirts look like a clump of lighthulls growing on a rock. They are filter feeders so take in sea water and filter out the plankton.

#### 8: Common periwinkle

Height: Up to 5cm  
This sea snail can often be found in clusters around rock pools at low tide.

#### 9: Shore crab

Carapace width: Up to 9cm  
These crabs are usually green in colour but can also be orange or red. Their colour depends on age and whether it is breeding season.



# Coral Reef Fish

The coral reef is one of the most diverse and beautiful ecosystems in the ocean and the animals that live there all rely on it in some way for their survival.

Coral reef fish often have beautiful patterns and bright colours which means they can blend in, or camouflage, against the coral. The vibrant appearance of the fish might also be used to attract a mate and certain colours can also give a warning – reds and yellows often mean that an individual has venomous spines, poisonous skin or a sharp bite.

Many coral reef fish have clever ways to find food. With specially adapted mouths, surgeonfish and parrotfish graze on the algae that grows on the surface of coral. By removing the algae which would otherwise smother the coral, these herbivores help to keep the reef alive. Some fish, such as butterflyfish, consume the coral itself, clearing small patches so new coral can grow.

Predators, such as sharks, also roam the reef, hunting for food. Small coral reef fish, like damselfish and anthurias, use the reef's many hiding places such as caves and tunnels.

## Key to plate

### 1: Longnose butterflyfish

Length: Approx. 22cm

These fish use their long snouts to pick food such as small crustaceans from the coral crevices.

### 2: Mandarinfish

Length: Up to 6cm

Instead of scales, these fish have a mucus coating which protects them from bumps and bruises as well as parasites.

### 3: Powder blue surgeonfish

Length: Up to 23cm

This fish is named for the sharp scapel-like spine it has either side of its tail.

### 4: Coral hind

Length: Up to 50cm

These fish draw food into their mouths using powerful suction and then swallow their prey whole.

### 5a: Emperor angelfish (juvenile)

Length: Up to 40cm

These fish love to feast on sponges, helping to keep sponge growth down in coral reefs.

### 6: Clownfish

(seen inside anemone)

Length: Up to 11cm

This brightly coloured fish lures other fish into the anemone. The fish are then poisoned and eaten by the anemone (see page 20).

### 7a: Bicolour parrotfish (juvenile)

Length: Up to 80cm

Parrotfish are all born female, with some transforming into males later in life.

### 8: Bluestreak cleaner wrasse

Length: Approx. 10cm

These helpful 'cleaner fish' set up stations in the reef and 'clean' any fish who visit by eating any parasites on their bodies.



# Habitat: Kelp Forest

Kelp is a kind of seaweed that grows in cool coastal regions. Unlike plants on land, seaweeds have a holdfast instead of roots, which grips to the rocky seabed, ensuring the kelp is locked in place. Each holdfast has one or more stipes, or stalks, reaching up to the surface. Some types of kelp grow as tall as 45 metres, forming vast forests that tower above the seabed.

All ecosystems need a delicate balance between photosynthesising organisms (such as seaweed), herbivores and carnivores. In the kelp forest, this balance is best seen in the relationship between kelp, sea urchins and sea otters. Sea urchins graze on the kelp, making space for new plant growth. Sea otters then feed on the urchins, keeping their numbers down and ensuring they don't eat all the kelp.

Kelp forests are vulnerable to climate change as warming seas bring less of the nutrients needed for kelp growth and poor water quality reduces the light levels needed for photosynthesis. It is possible therefore that, as our ocean warms, kelp forests may move further north to cooler waters.

## Key to plate

### Kelp forest, Californian coast, United States of America

#### 1: Bull kelp

Length: Approx. 36m  
Bull kelp extract is used in food products, including ice cream.

#### 2: Southern sea otter

Length: Up to 1.4m  
Sea otters were hunted extensively for their fur in the 1700s and 1800s. Their numbers have slowly recovered, but they are still an endangered species.

#### 3: Garibaldi fish

Length: Approx. 30cm  
Male fish defend their nest year-round, and in the spring will clean

the nest and entice females in with swimming performances.

#### 4: Giant kelp

Length: Approx. 45m  
Giant kelp can grow as much as 45cm a day, making it one of the fastest-growing organisms on Earth. When detached from the seabed, it floats in mats, giving shelter to many animals.

#### 5: Leopard shark

Length: Approx. 1.6m  
Young sharks are experts at finding snails and crabs under the sandy seabed and often visit kelp forests.

#### 6: California sheephead

Length: Approx. 91cm  
This species starts out as a female and turns into a male later in life.

#### 7: Purple sea urchin

Length: Approx. 10cm  
These sea urchins are a threat to kelp forests. Since 2014, 95 per cent of the bull kelp forests in Northern California, USA, have been devoured by them.

#### 8: Rockfish

Length: 12–104cm, depending on species.  
Some rockfish can live for around 100 years.

