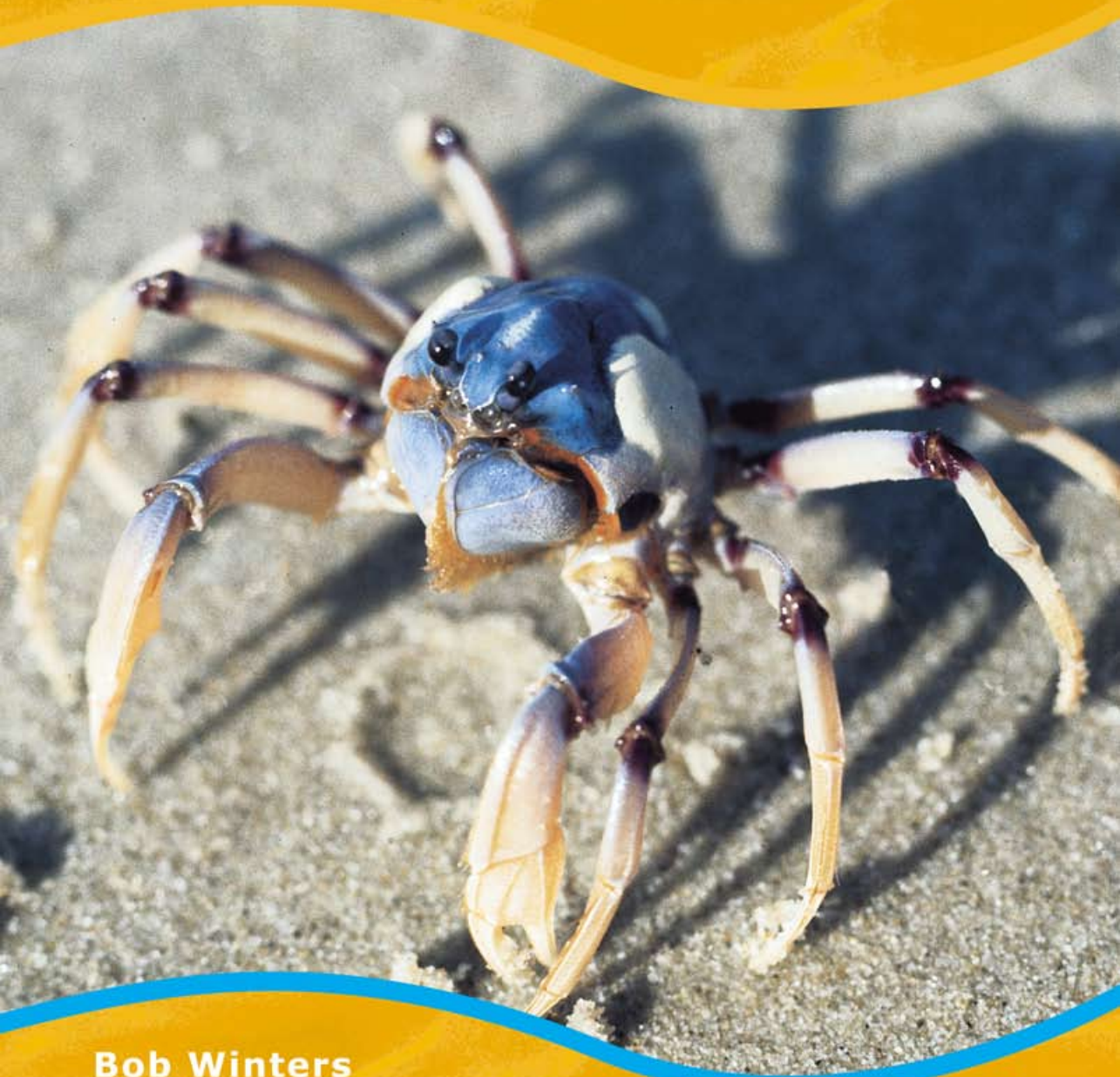




Marine Reader Series

Classification and Survival



Bob Winters

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www.wetpaper.com.au



ISBN 978-1-86283-218-3
(EPub) January 2025

National Library of Australia HARD COPY Cataloguing-in-Publication data

Winters, Bob
Marine Classification and Survival
Includes index
ISBN 1 86283 065 7 (bk. 15).

1. Marine animals - Juvenile literature. 2. Readers (Primary) - Marine animals.
I. Title. (Series: Kids and Water; bk.15).

428.6

Marine reader series creators: Bob Moffatt and Jim Grant.

Printing: Heaneys Performers in Print, Gold Coast, Australia.

Editing: Rosemary Lancaster, Paula Moffatt and Barbara McKenzie.

Cover: Trent Moffatt Designs.

Reviewers: Graham Anderton, Annaliese Caston, Christine Cougan, Jeremy Currie, Taffy Evans, Ralph James, Barbara Jensen, Jim Kneale, Steve Langlands, Kym McKauge, Steve Parsons, Anna Redlich, Nigel Ridgway and Stephanie Smith.

Illustrations: Wet Paper, Rose Bedford, Bob Moffatt.

Acknowledgements:

The Moffatt Group Australia Pty Ltd, ACN 086 521 084, is grateful to the following for permission to reproduce photographic material:

Department of Primary Industries - Queensland Fisheries Service Cover, 1, 3 (top), 6 (top), 7 (bottom), 11 (bottom), 15; Underwater Realms 2; Wet Paper 3, 4 (top), 13, 8 (bottom); Mike Sudgen 4 (bottom); Barry Bruce 5 (top); Neville Coleman 5 (bottom), 10 (top); Gary Lewis 7 (top); The Gould League 9 (bottom), 10 (bottom), 12 (bottom); Peter Kinchington 8 (top), 12 (top); Australian National Antarctic Research Expedition 14 (top).

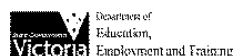
The publishers also wish to thank Nick Sandalis for photography for page 13.

This publication was supported by grants from Queensland Transport, NSW WaterWays, Australian Maritime Safety Authority, Marine Board Victoria, South Australia Transport, Western Australian Transport, Marine and Safety Tasmania, Northern Territory Transport and Queensland Government State Development.

The Gould League is supported by staff and other resources supplied by Department of Education, Employment and Training, State Government, Victoria.

Gould League: Genoa St, Moorabbin, Vic, 3189. Telephone: (03) 9532 0909 Fax: (03) 9532 2860. www.gould.edu.au

The Kids and Water Project was printed and published in Australia.





Classification and Survival



Bob Winters

Contents

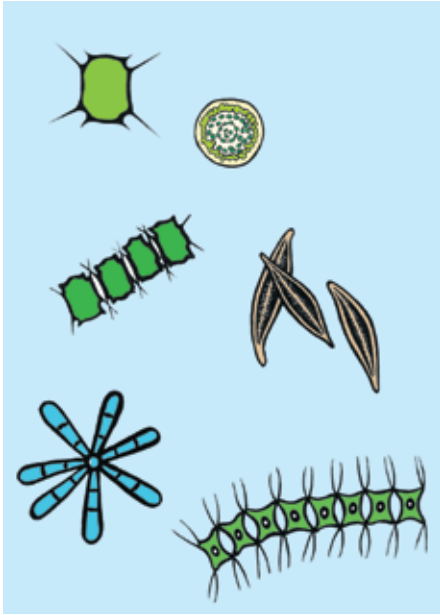
Living in the sea	3
Fish	4
Sharks and rays	5
Marine mammals	6
Sea birds	7
Sea stars, brittle stars, urchins and sea cucumbers	8
Molluscs	9
Crayfish, shrimps and barnacles	10
Crabs	11
Sea anemones, corals and sea jellies	12
Seaweed	13
Zooplankton	14
Fish hatcheries	15
Index	16



Living in the sea

The oceans and seas cover 70 per cent of the Earth. It would make more sense if we called Planet Earth 'Planet Ocean'.

Life started billions of years ago in the sea. Fossils, the remains of dead animals in rocks, show that animals lived in the sea before they lived on land.



The marine environment is very different to land or fresh water. The ocean is salty so sea plants and animals must be able to live in this salt.

Most sunlight only reaches into the top 200 metres of the sea where microscopic plant plankton grow. Below that depth, the water starts to become dark. Plants need sunlight to grow. They can only survive near the surface.

Most sea plants grow close to the coast because more nutrients are there. There are shallow places where seaweeds can attach to rocks and sand. There are many places for animals to feed and hide.

Living close to the sea edge can be difficult. Waves batter the seashore and the water level changes with the tides. Many sea creatures cannot survive this hard environment so they live under the sea in protected places.

For example, fish live in caves under rocks.

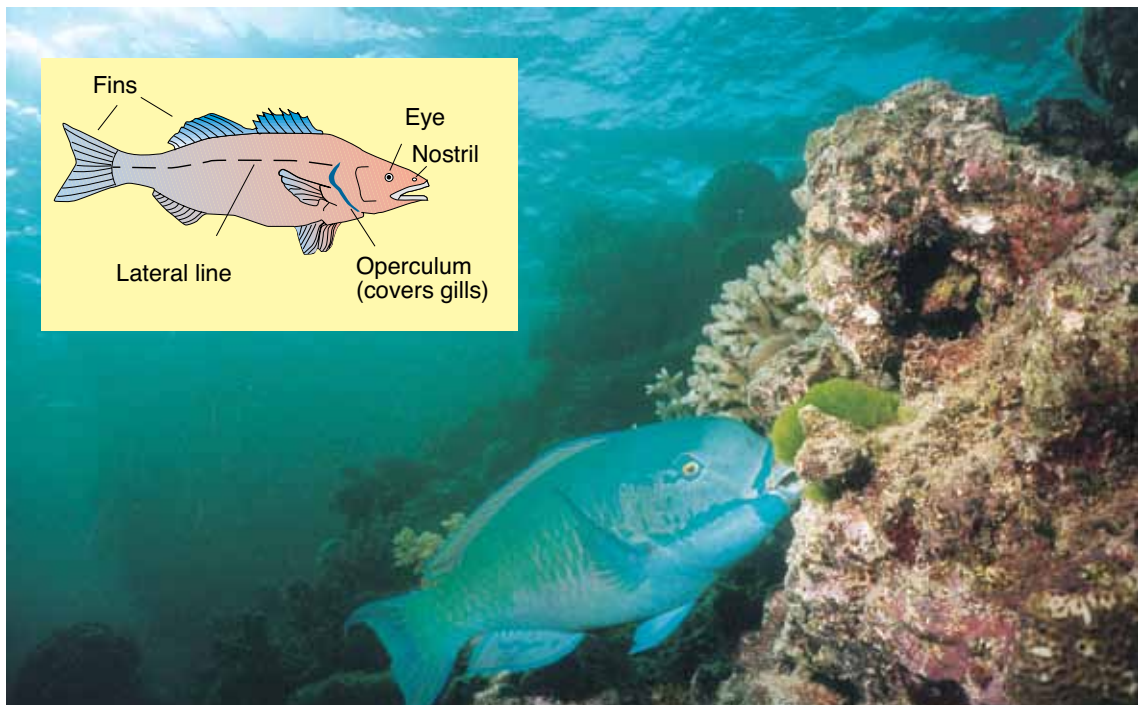
The place an animal lives is called its habitat. The plankton's habitat is the top 200 metres of the sea. The butterfly fish's habitat is near underwater rocks.

The way an animal's body has developed and how it behaves are called its adaptations. The soldier crab's adaptations include long legs to help it scamper over the mudflat in all directions.



Can you think of some fish adaptations?





A reef fish

Fish

Fish, amphibians, reptiles, mammals and birds have backbones; they are vertebrates. Most fish have fins. They use their gills to get oxygen from the water.

Fish can be all sizes. The largest fish species is the whale shark. It can grow up to 18 metres long. Thousands of kinds of fish are smaller than a person's finger. The most colourful fish live along reefs in shallow water. The colours help them group together in schools or find a mate. Colours help some male fish to fight for territory.

Most large fish eat smaller fish. The smaller fish may eat even smaller fish or other kinds of sea creatures or seaweed.

Different kinds of fish have different ways of protecting themselves. Flounder hide in the sand. Pilchards group into schools of many thousands. Flathead have sharp spines on their fins. Toadfish are poisonous to eat.

Most fish can swim and dart quickly to escape.



Mike Suggen

A puffer fish

*What is the largest species of fish?
How big does it grow?*



Sharks and rays

Sharks and rays have soft skeletons made from cartilage. They also breathe through gills like other fish, but they have more than one gill slit for the water to pass through.

Many large sharks are hunters with sharp, slicing teeth. But the biggest sharks, the whale sharks, filter ocean waters for microscopic animal life called zooplankton. Whale sharks are found in tropical waters.

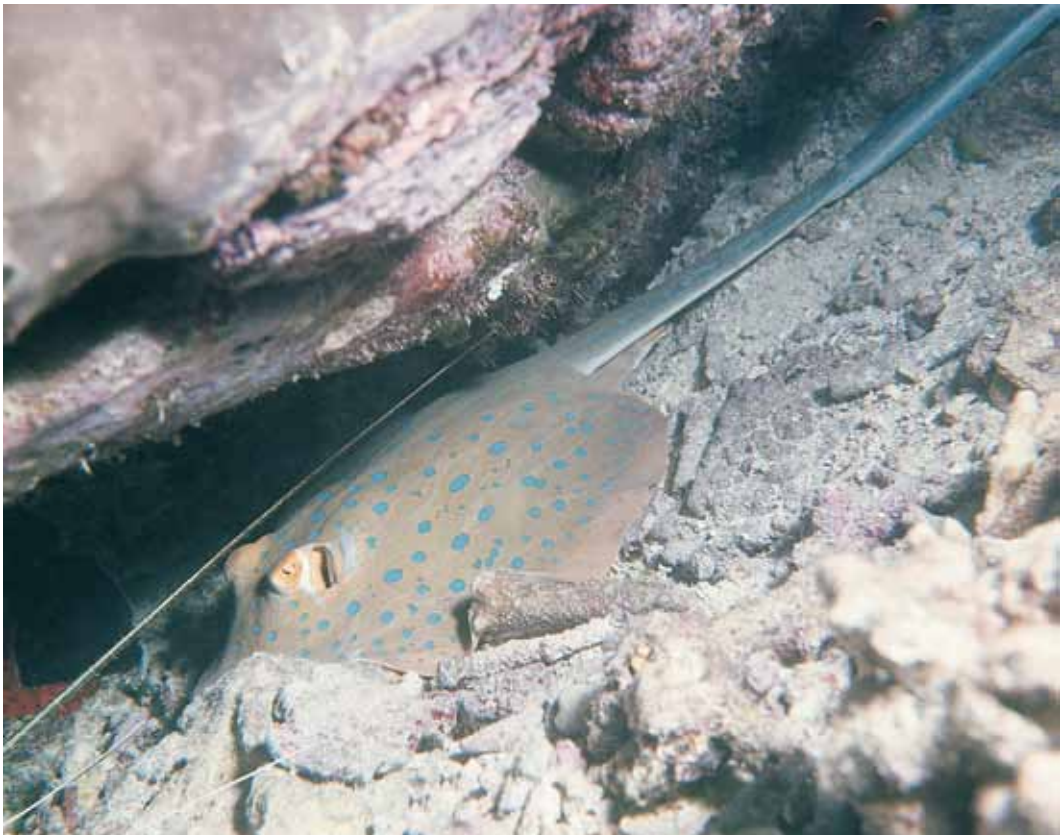
Sharks help the marine environment because they quickly eat any dying or dead animals. This stops the dead bodies polluting the water. Sharks thrash their tails to move through the water.

Rays use their fins to 'fly' through the water.

They find their food on the seabed. A stingray has a barb on its tail for protection. The poison in the barb is very painful and can sometimes kill humans.



Photo courtesy of Barry Bruce



A stingray



These mammals are dugongs

Marine mammals

Warm-blooded marine mammals include whales, seals and dugongs. Like all mammals, they feed their young milk. Some large whales can squirt 200 litres of milk into their calve's mouth. Mammals that live on land keep themselves warm with hair or fur.

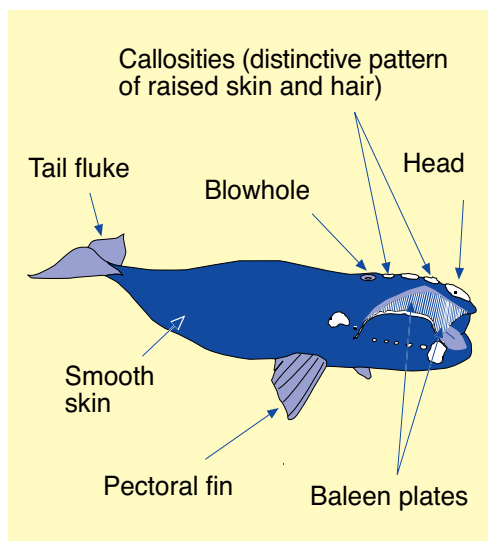
Whales have blubber, a thick layer of fat, for insulation.

There are two types of whales: toothed and baleen. Toothed whales include dolphins and killer whales. They eat large fish and other swimming marine animals. Baleen whales use a curtain of baleen (a horny plate) to sift small crustaceans called krill from sea water.

Gentle dugongs graze on seagrasses. A dugong has a body like a whale, and a face like a pig. It comes to the surface to breathe through its nose. The nose has valves to keep out water when it dives.

Whales and dugongs give birth to their calves in the sea. Seals come to land to give birth and raise their pups.

Human hunting, pollution and development are harming marine mammals. They are losing their habitats and their feeding grounds. However, now that most hunting of whales and seals has stopped, some species are increasing in numbers.



Sea birds

Birds are warm-blooded. They have feathers to help them stay warm. Most birds also use their feathers for flying. The feathers are often different colours, forming patterns. This helps the birds to know their own species. Their call or song can also help tell their own species, their mate and young.

Birds find their food in different ways. Penguins cannot fly. They swim and dive to catch fish and squid. Most other sea birds fly to find and catch their food. Many sea birds have webbed feet to swim on the surface or dive under water. They catch food in their beaks and swallow it whole. Sea eagles catch fish with their sharp talons and perch on tall trees to tear the fish apart.

All marine birds must come to land to lay their eggs and raise their young. Some sea birds, like albatrosses, only come to land to breed. Others come to land to sleep and rest.

All sea birds are badly affected if they are caught in an oil spill. Oil floats on the surface where birds swim. It gets into their stomachs and their lungs. It also coats their feathers.



Fairy penguins



Water birds

Sea stars, brittle stars, urchins and sea cucumbers

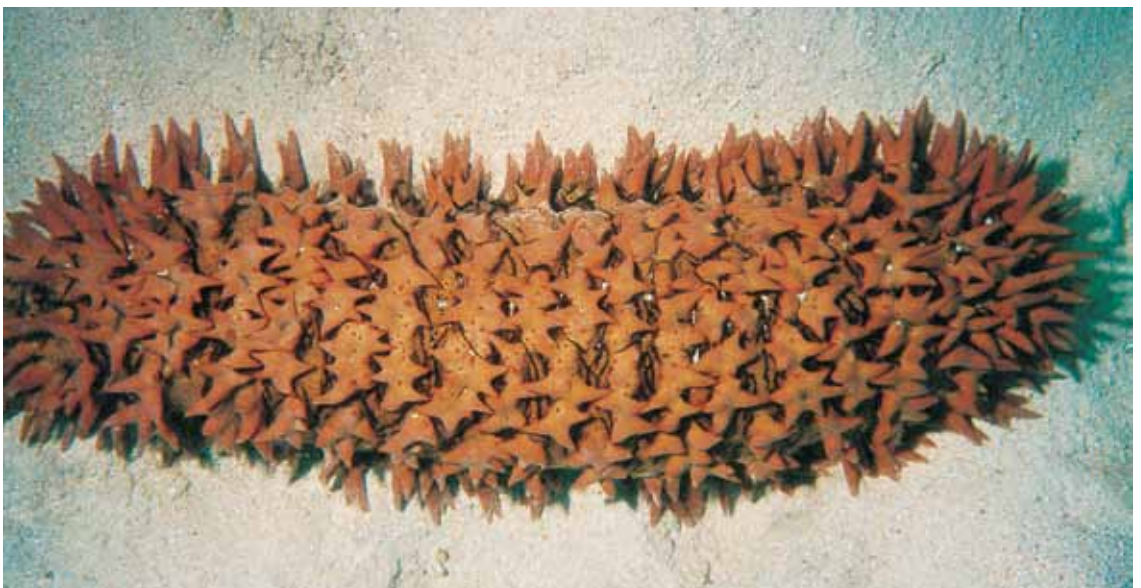
This group is called echinoderms. These animals have internal skeletons made of tiny plates joined together. They have no true eyes or ears. Their mouths are in the centre of their bodies. They move using hundreds of sucking tube feet. Although they can only move slowly, they can grip onto hard surfaces. Some echinoderms are protected by armoured spines or hardened plates.

To eat, an echinoderm pushes its stomach out through its mouth to cover the food. Chemicals released by the stomach digest the food outside the body. The stomach is eventually sucked back into the body.

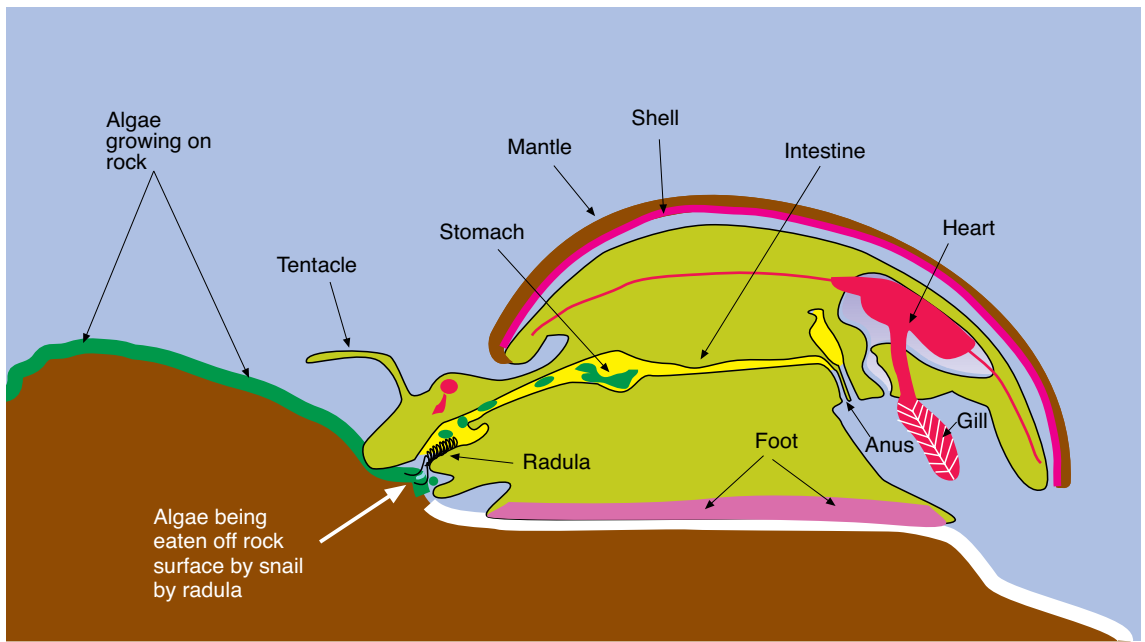
Sea stars can be many different shapes and colours. They can have five or more arms. Sea urchins have no arms and look like round spiky balls. Sea urchins move around using their sucking tube feet and spines. Sea cucumbers have long soft bodies and also use tube feet to move slowly on the sea floor.



Sea star



Sea cucumber



How a mollusc feeds

Molluscs

Molluscs are animals that usually live in shells made from calcium carbonate. Octopuses, squid and cuttlefish are also molluscs. Their ancient ancestors had shells.

Part of the mollusc's body surface is called the mantle. It produces the shell and adds more shell as the animal grows. Shellfish cannot leave their shells.

Molluscs like mussels, scallops and clams with two shells are called bivalves. Bivalves filter food from the water.

Most other molluscs have one large muscular foot that they use to creep over rocks, sand and plants. A chiton's shell is made up of eight plates. Snails and limpets have single shells. A snail and limpet's tongue is called a radula. It is long and is covered in something like teeth. It looks like a rasp or file. Some snails use their radula to scrape algae off the surface of rocks and plants. Others use their radula to prey on other molluscs. They drill a hole in other molluscs then suck out their flesh from inside the shell.



This mollusc has a large muscular foot



Lobster

Crayfish, shrimps and barnacles

Crustaceans have a hard external skeleton. The muscles and organs are on the inside of the skeleton. There are many kinds of crustaceans including crayfish, shrimps, barnacles and crabs.

Crayfish and shrimps can swim and walk. They each have 10 legs, a pair of antennae and their eyes are raised on short stalks. Crayfish and shrimps have long antennae to feel their way in the dark.

At breeding time, barnacles release their eggs and sperm into the water. The microscopic young float around in the water with many other tiny animals, then attach to a rock. All these small floating sea creatures are called zooplankton. Crabs, crayfish and prawns carry their fertilized eggs under their tails.

Barnacles are sessile crustaceans. This means they are fixed in one place and cannot move. A barnacle looks like a shell stuck to a rock. To feed, a barnacle must open its shell and use feathery legs to catch zooplankton.



Barnacles on a rock

Crabs

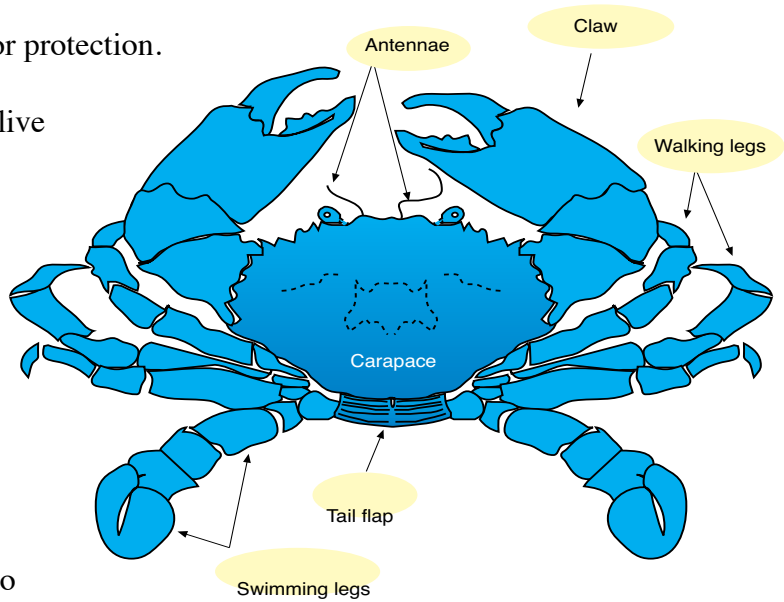
Crabs are crustaceans with 10 legs but the front pair are usually very powerful nippers. A crab's tail is very small and tucked under its body. Its antennae are short and many crabs have eyes on long stalks. Most crabs prefer to walk rather than swim. Some do have legs that look like paddles that help them to swim.

Crabs often hide under rocks for protection.

Many smaller crabs can bury themselves in sand. Crabs that live along the beach and mudflats sometimes feed on dead and rotting animals.

All crabs have gills to get oxygen from water. As long as they are damp, many can survive out of the water for hours.

Some male crabs have interesting mating rituals. They wave their large nippers to fight other male crabs and attract females.



Mud crab

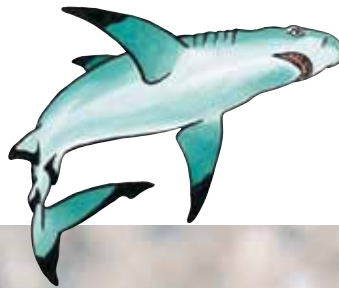
Sea anemones, corals and sea jellies

These animals are some of the simplest creatures that live in the sea. They don't have true skeletons, eyes, or even brains. They have mouths that open into their stomachs. The stomach has no exit and the waste comes out through the mouth. They have tentacles covered with stinging cells. When the tentacles are touched, the cells shoot out small poisonous stinging barbs attached to a tiny thread. These are used for protection and catching their prey. The stings of some sea jellies are very dangerous to people.

Sea anemones look like flowers in the ocean. They have 'sticky' stinging tentacles around their mouth to catch their prey. Most corals make a limestone home to live in and these homes can form large coral reefs. Sea jellies get carried around with the waves and currents, pumping water with their bodies. To breed, they release huge quantities of eggs and sperm into the water. Many die, but enough will survive to carry on the species.



Sea jelly



How does a sea jelly feed?

How do corals reproduce?



Sea anemone



What is a holdfast?

How does it help a seaweed stay on a rock?

Seaweed

Seaweeds are common sea plants. Some, like kelp, are large and grow as underwater forests. Some are smaller and grow attached to rocks in rock pools. Many seaweeds anchor themselves to hard surfaces. Seaweeds do not have roots, they have a holdfast that attaches to a hard surface. They do not need roots to draw up water because they are surrounded by water.

Different coloured seaweeds can be found washed up on the beach. All seaweeds belong to one of three groups: brown, green or red.

Brown seaweeds can also be olive or yellow-brown. Some look and feel like large leather straps, others look like beads on a necklace. Some look delicate and fan-shaped.

Few kinds of green seaweed are washed ashore though sea lettuce is a common type of green seaweed.

Red seaweeds range in colour from purple to red to pink. Red seaweeds are often delicate and beautiful.



This is a krill from Antarctic waters. Krill are the staple diet of many whales that visit our waters in summer. Krill form part of the zooplankton of our seas.

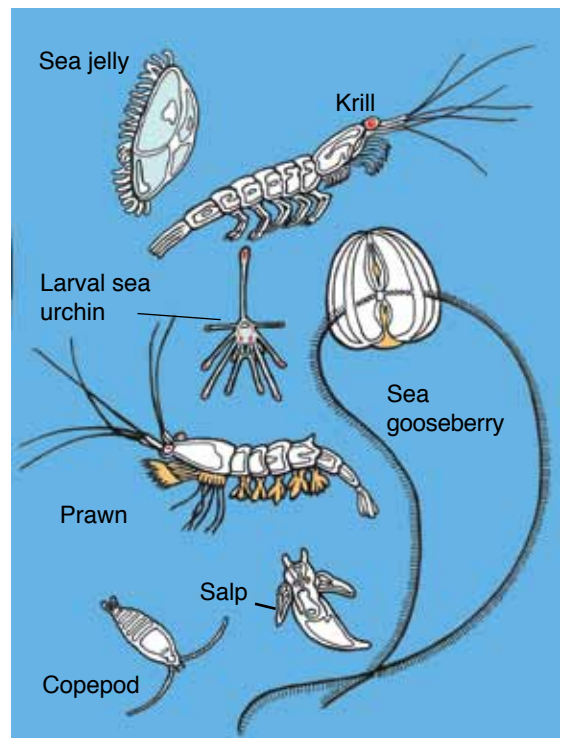
Zooplankton

Zooplankton are very small animals that live in the sea. Most zooplankton are microscopic animals.

A glass of seawater may have thousands of microscopic animals in it. Zooplankton feed on smaller marine animals and plants. Many of these animals will remain small like the krill in the photo above, but some will grow into bigger sea creatures.

Some zooplankton are the young of much larger sea creatures like snails, crabs, sponges, sea anemones, sea stars and even fish. Many don't look like their parents. For these types of animals, the adults often shed their eggs and sperm into the water. Fertilised eggs hatch and grow and the young float around with millions of other tiny creatures. If they are fortunate enough not to be eaten, they will eventually come to rest in a suitable home.

These tiny creatures are eaten by fish which are eaten by bigger fish that are eaten by sharks, whales and seals. Without zooplankton there would not be much life in the sea.



Zooplankton



Mangrove roots provide a place for young fish to grow up

Fish hatcheries

Nature has its own fish hatcheries that protect and feed young fish. These hatcheries are seagrass meadows and mangrove swamps.

The shallow waters in these areas are rich in nutrients. They hold an abundance of small creatures for small fish to eat.

Both seagrasses and mangroves can only grow in waters that are protected from heavy seas.

The seagrass shown in the picture below is similar to the grasses that grow on land. Many creatures cling onto these grasses so as not to be washed out to sea.

Most mangrove trees grow in shallow waters. The underwater roots of these trees must be exposed to the air every day so they can breathe. The underwater root system supports a great food supply for young fish and provides protection from larger predators.

What are the special conditions that mangroves and seagrasses need in order to grow?



Young mangrove

Why is it so important for seagrasses and mangroves to be conserved?



Seagrass

Index

A

adaptation 3
albatrosses 7
algae 9
amphibians 4
antennae 11
arms 8

B

baleen 6
baleen whales 6
barbs 12
barnacles 10
beach 13
beaks 7
birds 4, 7
birth 5
bivalves 9
breed 12
brittle stars 8

C

calcium carbonate 9
calve 6
cartilage 5
chemicals 8
clams 9
corals 12
crab 3, 10, 11, 14
crayfish 10
crustaceans 6, 10, 11
currents 12

D

dolphins 6
dugongs 6

E

earth 3
echinoderms 8
eggs 7, 10, 12, 14
eyes 12

F

feathers 7
feet 8
fertilised eggs 14
filter food 9
fins 4
fish 3, 4, 14, 15
fish hatcheries 15
flatheads 4
flounder 4
flying 7
food 5, 7
fossils 3

G

gills 4, 5

H

habitats 6
hatcheries 15
holdfast 13
humans 5

K

kelp 13
killer whales 6
krill 6, 14

L

larval stage 3
legs 11
limestone 12

M

male crabs 11
mammals 4, 6
mangrove swamps 15
mantle 9
marine birds 7
marine environment 3, 5
marine mammals 6
mating ritual 11
molluscs 9
mudflat 3, 11
muscular foot 9
mussels 9

N

nippers 10, 11

O

ocean 3
oxygen 11

P

paddles 11
penguins 7
phytoplankton 3
pilchards 4
plankton 3
poisonous 4
pollution 5, 6
predator 15

R

radula 9
rays 5
reptiles 4
rock pools 13

S

scallops 9
schools 4
sea anemones 12, 14
sea birds 7
sea cucumbers 8
sea eagles 7
sea jelly 12
sea plants 3
sea stars 8, 14

sea water 6
seabed 5
seagrass 15
seals 6
seaweed 13
sessile 10
sharks 5
shell 9
shellfish 9
shells 9
shrimps 10
skeletons 5, 8, 10, 12
snails 14
song 7
species 12
sperm 10, 12, 14
spines 8
sponges 14
squid 7
stinging cells 12
stingray 5
stomach 8, 12
sunlight 3
swim 7

T

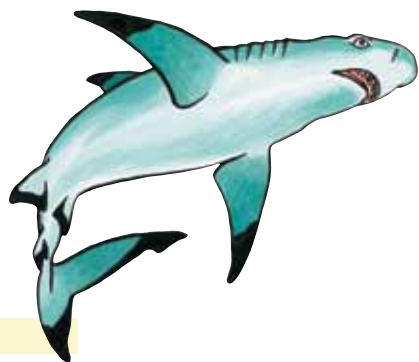
talons 7
teeth 9
tentacles 12
territory 4
toadfish 4
tube feet 8

U

underwater forests 13
urchins 8

W

warm-blooded 6, 7
webbed feet 7



A National Marine Education Program



Level 1

- Book 1 : Everyone Likes the Sea
- Book 2 : Sea Creatures
- Book 3 : At the Beach

Level 2

- Book 4 : Fun by the Sea
- Book 5 : Working at Sea
- Book 6 : Be Safe at the Beach

Level 3

- Book 7 : Tourists and the Sea
- Book 8 : All Kinds of Boats
- Book 9 : Rock Pool Life
- Book 10 : Creatures of the Deep
- Book 11 : Shipwrecks
- Book 12 : Our Day on a Research Boat

Level 4

- Book 13 : Let's Go Sailing
- Book 14 : Food from the Sea
- Book 15 : Classification and Survival
- Book 16 : Sea Creatures at Risk
- Book 17 : Better Boating Behaviour
- Book 18 : Don't Mess with the Sea



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