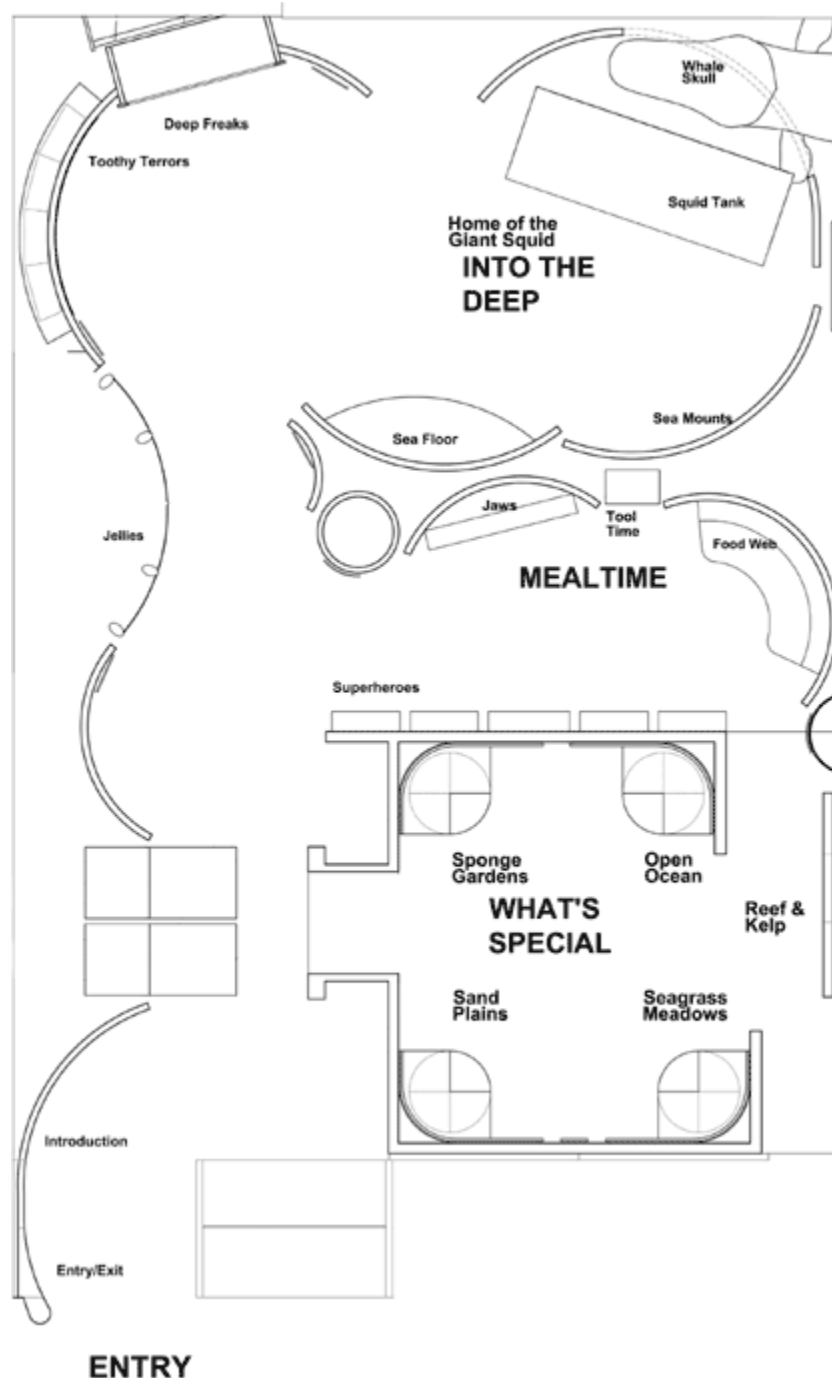


Marine Life Exhibition notes

Victoria's marine world has it all—dramatic underwater cliffs, colourful sponge gardens, tall kelp forests, vibrant seagrass beds, vast rich sand plains, surging waves and tranquil coves. About 12 000 species of marine animals and plants live in Victorian waters. This extraordinary diversity is protected in no less than thirteen Marine National parks and eleven Marine Sanctuaries along the Victorian coast.

Exhibition floor-plan

This presents the names and locations of the main exhibits; background information for each is provided in the following pages. Together they can provide teachers, supervising adults and students with an overview of the *Marine Life: Exploring our seas* exhibition.



Exhibition Overview

Marine Life: Exploring our seas takes students on an exciting journey through Victorian marine waters, presenting a simulating range of exhibits where they can learn about the fabulous worlds found along our coasts and in the eerie depths of Bass Strait.

Three themes occur throughout the exhibition:

- Our seas contain hidden and unfamiliar worlds which are spectacular, diverse, vulnerable and unique.
- There is a battle for survival among the bizarre and beautiful animals that exist in our seas.
- Museum Victoria is actively studying our State's marine life and habitats, and holds extensive collections of the region's marine fauna.

The exhibition has three main sections.

What's special about Victorian seas? presents five spectacular marine habitats together with some of the bizarre and beautiful creatures that live in them.

Mealtime! investigates the relationships between marine plants and animals—food chains, food webs and adaptations for survival.

Into the deep explores the depths of the southern ocean, the dark world of fish that give off light and home to the mighty giant squid.

Each section contains a number of exhibits, named on the exhibition floor-plan and described in the following outlines, with audio-visuals and collection displays or live specimens.

1. What's special about Victorian seas?

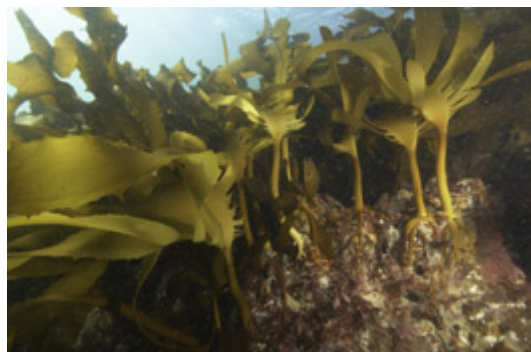
Marine habitat types commonly found in Victorian waters are: rocky reefs, sponge gardens, seagrass meadows, sand plains and the open ocean. These are not the only types found near Victoria. For example, exploration by Parks Victoria off our western coast has found extensive beds of rhodoliths—red seaweeds that look like round pink rocks. Museum Victoria's marine scientists are actively involved in discovering more about the habitats and creatures found in our region.

Rocky reefs

These reefs provide hard surfaces and crevices where seaweeds and animals can anchor or hide. They are home to kelp forests, seaweed gardens and diverse communities of fishes and other creatures. How many different kinds of fish can you see swimming in the aquarium?



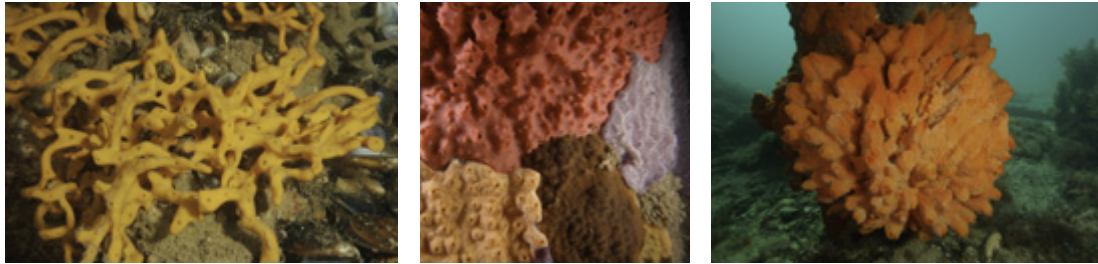
Orange Sea Star; photographer Mark Norman.



Rocky reef; photographer Mark Norman.

Sponge gardens

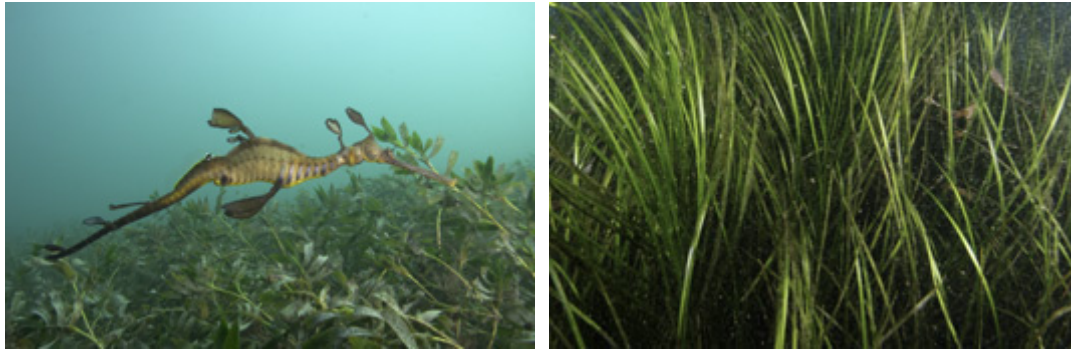
Where there are strong currents, the sea floor can be covered in sponges, sea fans, lace corals and feather corals. These animals feed on the tiny organisms and nutrients carried in the currents. They often form dense and colourful gardens.



Sponge gardens; photographer Mark Norman.

Seagrass Meadows

Seagrass meadows look like underwater fields of grass. These meadows grow in sand and mud in shallow areas that are protected from crashing waves. Unlike seaweeds, which are algae, seagrasses are flowering plants—they produce flowers and seeds, although these are often small and difficult to see. The meadows support a diverse range of animals.



Common Seadragon, *Phyllopteryx taeniolatus*; photographer Mark Norman.

Seagrass; photographer Mark Norman.

Despite their fierce name, seadragons are graceful, timid animals that use their tiny fins to hover over seagrass meadows. Their paddle-like flaps of skin are not used for swimming, but help to camouflage them among seagrass or seaweeds. They use their long straw-like mouth to suck up small shrimps.

When seadragons mate, the female glues her eggs to the underside of the male's tail. Like their relatives the seahorses and pipefishes, male seadragons carry their eggs until they hatch.

The Common Seadragon is Victoria's Marine Faunal Emblem and occurs across all of southern Australia. It is related to the bushier Leafy Seadragon, which is found off the coasts of far western Victoria and South and Western Australia.

Sand plains

Sand and mud plains cover much of the sea floor in Victoria's bays and the offshore areas of Bass Strait. Although these plains look barren, they are home to a multitude of buried and camouflaged animals, many of which emerge at night to hunt.



Stargazer buried in the sand; photographer Mark Norman.



Sand plains; photographer Mark Norman.

Common Stargazer *Kathetostoma laeve*

Stargazers are ambush predators. They bury themselves in sandy sediments, with only their eyes and a jagged outline of their mouth visible. An unsuspecting fish that misses these clues will make a tasty meal. Although stargazers are common in sandy areas, they are rarely seen. A frilled fringe around its mouth stops the stargazer swallowing sand as it secretly sucks water into its gills. Strong spines just behind the head help protect it from being attacked.

Open ocean

The surface waters of the open ocean teem with tiny animals (zooplankton) and plants (phytoplankton). They are eaten by larger animals—from shrimps, jellyfishes and fishes to whales. Barracoutas and sharks also cruise here in search of food.



Argonaut; photographer Rudie Kuiter.

Knobbed Argonaut *Argonauta nodosus*

Argonauts are a family of octopuses that spend their entire lives in the open ocean. They are best known by the beautiful brittle white shells or 'paper nautilus' that are occasionally found on beaches. Only the female builds a shell, using special webs on her first pair of arms. The shell provides protection for her eggs until they hatch. The male is tiny—less than two centimetres in length—and does not have a shell. Sometimes argonauts are washed ashore in their thousands. These mass strandings are irregular and their causes are unknown; they do not appear to be linked to the animals life-cycle.

2. Mealtime!

This section explores the relationships between the inhabitants of marine environments and some of their fascinating physical features. Exhibits include food chains, food webs and adaptations for survival—how animals catch their food and how they avoid ending up as a meal!

Speed demons

The best way to escape from attackers is to outrun them. Speedy sea creatures use fast, muscular tails or jet propulsion. Some can even launch themselves into the air.



Eastern King Prawn *Penaeus plebejus* on sand; photographer Mark Norman.

Prawns are experts at high-speed reversing. One flick of their powerful, muscular tail shoots them backwards out of reach of danger. That is why prawn tails have so much muscle.

Spikes and spines

The sea contains many spiky creatures. The spikes can be fixed on solid armour, hinged from sockets, in detachable clumps or tipped with poison.



Illustrator Mark Norman.

Poison Potions

Many sea creatures make their own poisonous chemical potions to protect themselves. The poison can be in their flesh, on spines or in their saliva. For some, these poisons can also help them catch a meal.



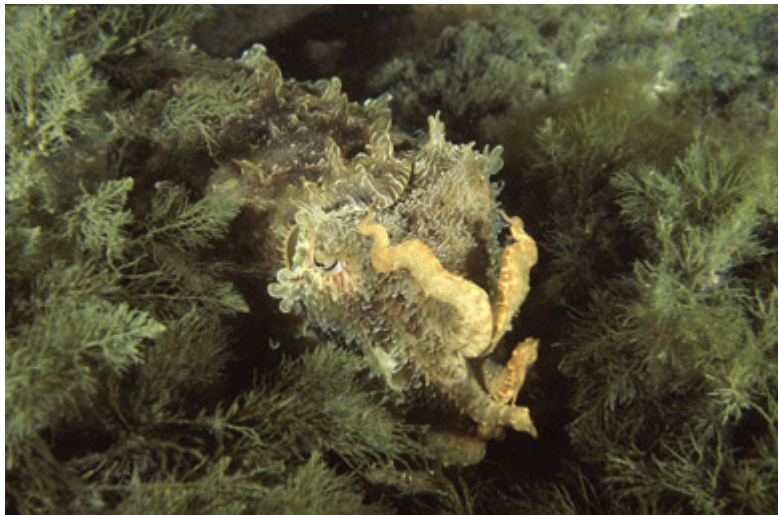
Blue-ringed octopus; photographer Mark Norman.

Blue-ringed Octopus *Hapalochlaena maculosa*

This tiny octopus packs a poisonous punch. It has a parrot-like beak that it uses to bite and inject deadly saliva. The venom is used in both hunting and defence. Known as 'tetrodotoxin', it blocks nerve messages and causes paralysis; if a person is bitten they have trouble breathing and can die.

Masters of camouflage

Many sea creatures stay safe by blending in with the background. Some grow body parts that look like weed or rocks; others attach living seaweeds or sponges. A few can even change colour and shape.



Giant Cuttlefish; photographer Mark Norman.

Giant Cuttlefish *Sepia apama*

Cuttlefishes can change shape and colour. Their skin has millions of tiny sacs containing coloured liquids. The sacs can be expanded and contracted to turn colours on and off, creating different patterns like pixels on a TV screen. Cuttlefishes can also raise branched flaps of skin over their bodies to look like seaweed.

Tool time!

Teeth are not the only way to grab a meal. This exhibit shows different ways that marine animals feed on other creatures. Many creatures use amazing devices, some very similar to tools we have lying around our houses—these natural ‘tools’ evolved millions of years ago.



Pebble Crab, *Dittosa laevis*; photographer Michael Marmach.

Pebble crabs can be seen burrowing in the soft mud of intertidal seagrass meadows but move about in search of food when the tide is out.

The right jaws for the job

There are many types of sharks and rays, and 20 different shark jaws are displayed in this exhibit. Different species of shark feed on different animals and each has a specifically adapted set of jaws and teeth to help it capture and swallow its prey.



Blue Shark jaws; photographer John Broomfield.

3. Into the deep

This section explores the environments and inhabitants of the open ocean. It explains how things change dramatically the further we go down into the deep and the dark of the ocean.

Note: This 'deep sea' area is more dimly lit, and good preparation is essential for students to get the most out of the exhibits described below.

Toothy Terrors

A display of some bizarre fish and other animals found in the deeper parts of the ocean.



Fangtooth *Anoplogaster cornuta*; photographer Mark Norman.

The Fangtooth's huge teeth are used to grab fishes, squids and prawns. When its mouth closes, the two long teeth of the bottom jaw fit into sockets in the roof of the mouth on either side of the brain, so the fish doesn't stab itself.

Deep sea lights

It's not all black in the dark deep sea. Many deep-sea creatures give off light to hunt, hide or find mates. This light is produced by mixing chemicals called 'luciferins' with oxygen and enzymes known as 'luciferases'. This exhibit shows diverse examples of these animals.



Giant Hatchetfish; photographer Mark Norman.

Clash of the Titans

Two of Earth's largest creatures meet around one kilometre deep—sperm whales dive to great depths to hunt giant squid in the dark. A computer-animation provides a vivid account of how sperm whales use clicks and echo location to find prey in the complete darkness 1000 metres below the surface of the open ocean. The video runs for 2.5 minutes, presented adjacent to a Sperm Whale skull and a preserved specimen of the Giant Squid,

Students will benefit from prior knowledge of the protagonists before they view this exhibit. Brief descriptions of sperm whales, giant squid and the 'hunting' sequence are provided here.

Whales and dolphins belong to a group of mammals called Cetaceans. **Sperm whales** (*Physeter macrocephalus*) are the largest toothed animals in the world. Males grow to 20 metres in length and weigh 40 tonne; adult females are smaller, growing to about 11 metres and a maximum weight of around 12 tonne. Their lower jaw contains 18-25 large teeth on each side.

Sperm whales are found in all oceans of the world and are among the deepest diving cetaceans—they can dive kilometres down and hold their breath for two hours. They hunt squid, octopuses and fish consume about one tonne of food each day. One whale had 18,000 small squid in its stomach! They find their food using sound waves (echo-location). The whale sends out clicking sounds that bounce back from the prey and allow them to 'hear' its location. It's possible that whales may also use sound to stun their prey. The sperm whale's head contains a large internal organ full of oil—the spermaceti organ. It is thought to be an aid for buoyancy for the whale (oil being lighter than water) and also an acoustic lens for focusing sound waves.

Giant squid (*Architeuthis sanctipauli*) are the largest invertebrates (animals without a backbone) in the world. They can weigh up to 300 kilograms and reach more than 15 metres in length. They have huge eyes, eight legs and two very long tentacles and use a water spout as a jet for locomotion. They live mid-water, between 500 and 1500 metres deep, where they hunt fish and squid.

Very little is known of the lives of these deep-sea animals. In 2004 Japanese researchers were the first to capture images of a live adult giant squid, hooked on a tuna-line at 800 metres deep. When the camera was recovered, a five-metre piece of tentacle was still attached.



This female Giant Squid on Melbourne Docks was caught around 900 metres deep off western Tasmania by the commercial fishing vessel, *Empress Pearl*.

Photographer David Paul.

Stages of a sperm whale diving to hunt prey



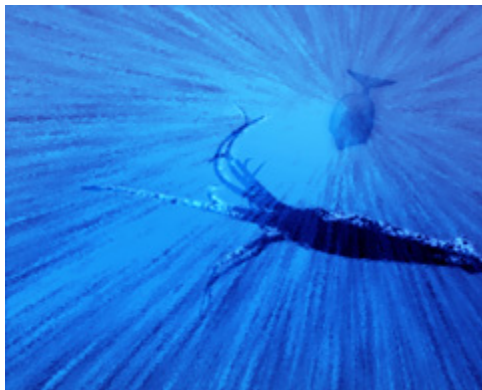
At the surface

Before diving a sperm whale breathes at the surface for 10 minutes to build up the oxygen levels in its blood. It will take six to seven big breaths, then breathe out to collapse its lungs and reduce the volume of gas before descending. The whale also tucks in its side fins to make itself more streamlined.



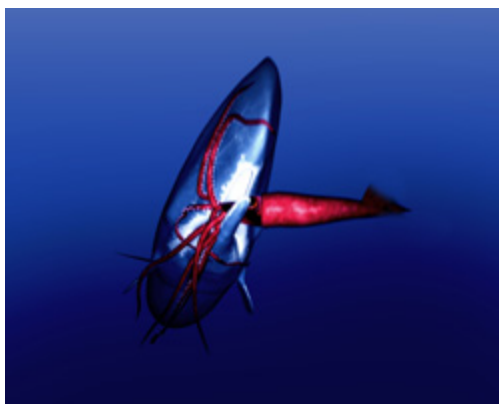
Searching for food

Once it has reached the depths, a sperm whale hunts for its prey by sending out clicking noises and detecting the echoes coming back. This is called 'echo-location'.



Grabbing its prey

The whale uses its big toothed lower jaw to seize giant squids. In the struggle the squid sometimes scars the whale around the mouth with its sharp-toothed suckers.



Coming back up

Some scientists suggest that sperm whales return to the surface by warming up the 'spermaceti organ' with blood. Oil in this organ would expand, making the whale more buoyant and this saves energy on the return trip to the surface.

Illustrations: Drew Berry.

The Deep Ocean Floor

Much of the deep sea floor is a cold, dark, muddy plain more than three kilometres below the surface.

These deep sea plains seem barren but the muddy sediments are home to a huge variety of crustaceans, worms, molluscs and other tiny organisms with remarkable adaptations to their unique environment.

Wide-angle image of seafloor; source CSIRO.



Larger animals are scarce on the deep sea floor. Some are scavengers such as giant sea lice and sea stars, and depend for food on a spasmodic rain of carcasses of animals that die in the waters above. Others, including many toothy fish, are predators that must find their scarce prey in the vast dark environment.

Whales are the largest sea animals, and their huge bodies usually sink when they die. This is a rare treat for many deep sea creatures, a long-lasting feast. It may take a decade or more for the carcass to be completely consumed, but when the food is gone the next feast may be a thousand days or a thousand kilometres away.

Hagfish are primitive fish that have no jaws or skeleton. They tear flesh off carcasses by gripping with their mouth, sliding a knot along their body and pulling their head through the loop.

Hagfish curled around rocks;
photographer Peter Batson.



Sea Mounts

Rising up from the plains, seamounts are magnets for marine life and attract swimming animals from far and wide. Shrimps and a variety of small fishes gather there to feed, and these in turn attract larger fishes, squids and Sperm Whales.

Some seamount fishes, such as Orange Roughy and oreodories, are very long-lived and slow to reproduce. Orange Roughy (also known as Deep Sea Perch) can live 150 years. They gather in huge numbers around seamounts to breed. This has made them extremely vulnerable to overfishing—up to 80 tonnes have been caught in a single trawl. Populations have been decimated on many seamounts. The huge fishing nets have also damaged the corals and large sponges on the tops of seamounts. In Australia and elsewhere, seamounts are now being included in marine protected areas.