Room brochure
(Please read and return)

the world of seashells

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Tasmanian Government

TASMANIAN MUSEUM & ART GALLERY

Mollusc diversity

Though we often talk of molluscs as 'shellfish', they are definitely not fish!

The Phylum Mollusca is the second-largest taxonomic group of animals, after the Phylum Arthropoda (insects, spiders, crustaceans and other 'creepy-crawlies').

There are thought to be up to 200,000 mollusc species. Most of the big and obvious ones, such as those in this exhibition, have already been given scientific names, but that still leaves perhaps 100,000 that haven't. Most of these unnamed species are *micromolluscs*—miniature snails or clams only a few millimetres long.

Mollusc fossils first appear in rocks from the 'Cambrian explosion', some 540 million years ago. This was a time when the ocean was becoming an increasingly dangerous place, full of active predators, and animals were evolving all sorts of ways to avoid getting eaten. The early molluscs evolved protective external shells, setting the stage for today's wondrous seashell diversity.

We now recognise eight Classes of molluscs:

Members of two of these Classes, jointly known as **aplacophorans**, are marine, worm-like creatures that seemingly never evolved shells.

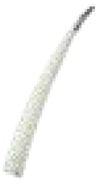
The other six Classes all include lineages with shells. Least-known are the **monoplacophorans**, which live only on the deep ocean floor and produce cap-shaped shells resembling small limpets.

The remaining five Classes are all represented in this exhibition:

- **Scaphopods**, better known as tusk-shells;
- **Polyplacophorans**, better known as chitons or coat-of-mail shells;
- **Cephalopods**, including nautilus as well as octopus, cuttlefish and squid;
- **Bivalves**, better known as clams;
- **Gastropods**, including snails, sea-snails, slugs and sea-slugs.

Most seashells are either bivalves or gastropods.

Scaphopods
Also known as tusk-shells. Filter-feeders. Always shelled—a single tube, open at both ends. Entirely marine.



1. Elephant tusk-shell
Dentalium elephantinum
Linnaeus, 1758
Dentaliidae
Indian Ocean—W Pacific

2. a giant tusk-shell
Fissidentalium species
Dentaliidae

Scaphopods
Also known as coat-of-mail shells. Grazers. Always shelled—the shell is composed of eight plates. Entirely marine.

3. Chitons
three unidentified species

Cephalopods
Nautilus, squid, cuttlefish and octopuses. Only the chambered nautilus retains an external shell, like its extinct relatives, the ammonites; others may have an internal shell or no shell at all. Predators and scavengers. Entirely marine.

4. Knobbly argonaut
Argonauta nodosus
Lightfoot, 1786
Argonautidae
Southern Indo-Pacific

The female argonaut octopus creates the brood chamber, made of calcium-magnesium carbonate and known as a paper nautilus, using secretory organs on two of her eight tentacles.

5. Chambered nautilus
Nautilus pompilius
Linnaeus, 1758
Nautilidae
SW Pacific

The many-tentacled animal lives permanently within its chambered shell, made of calcium carbonate, and for buoyancy can adjust the gas-to-fluid ratio in the outermost three chambers (the inner ones are permanently gas-filled, mostly with nitrogen).

6. Ramshorn squid
Spirula spirula
(Linnaeus, 1758)
Spirulidae
Warm seas worldwide

The internal shell, made of calcium carbonate, helps to control the animal's buoyancy as it can adjust the gas-to-fluid ratio in all of the shell's chambers; it uses this ability to migrate at night from the ocean depths to the shallows to feed.

7. Southern calamari
Sepioteuthis australis
Quoy & Gaimard, 1832
Loliginidae
Southern Australia—NZ

The 'pen', or gladius, is its internal skeleton, made of chitin, providing support for muscle attachment, particularly for jet propulsion.

8. Giant cuttlefish

Ascarosepion apama
(Gray, 1849)
Sepiidae
Southern Australia

The 'cuttlebone', or sepion, is the animal's internal buoyancy chamber, made of calcium carbonate, allowing the animal to control its depth by adjusting the structure's gas-to-fluid ratio.

Bivalves

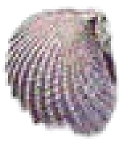
A general term for these is 'clams'. Examples include cockles, mussels and oysters. Always shelled—composed of two valves. Mostly filter-feeders. Marine and freshwater.

9. Horse-hoof clam

Hippopus hippopus
(Linnaeus, 1758)
Cardiidae
Tropical Indo-Pacific

10. Noble scallop

Mimachlamys crassicostata
(Sowerby II, 1842)
Pectinidae
Indian Ocean—NW Pacific



11. Pearly brooch-shell

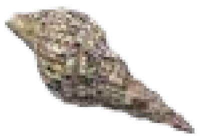
Neotrigonia margaritacea
(Lamarck, 1804)
Trigoniidae
Southern Australia

Gastropods

General terms are 'slugs' for the species without obvious shells, and 'snails' for the species with shells. There are many more common names for particular gastropod groups, such as whelks, winkles, limpets and cowries. The shell, when present, comprises a single unit. Herbivores, detritivores, predators and parasites. Marine, freshwater and terrestrial.

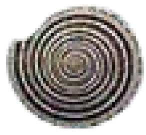
12. Tapestry turban

Turbo petholatus
Linnaeus, 1758
Cardiidae
Tropical Indo-Pacific



13. Triton's trumpet

Charonia tritonis
(Linnaeus, 1758)
Charoniidae
Tropical Indo-Pacific



14. Perspective sundial-shell

Architectonica perspectiva
(Linnaeus, 1758)
Architectonicidae
Tropical Indo-Pacific

15. Channelled babylon-whelk

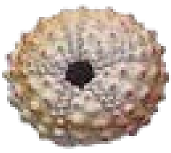
Babylonia areolata
(Link, 1807)
Babyloniidae
Tropical Indo-Pacific

Sure, they're seashore shells, but they're surely not seashells!

These shelly treasures may be found on beaches, but they aren't made by molluscs and so don't really count as seashells.

Sea urchins

Sea-urchin tests—all that is left once the animal that lived within the protective case has died and the spines have dropped off.



16. Oblong urchin

Echinometra oblonga
Blainville, 1825
Echinometridae
Tropical Indo-Pacific

17. Flower urchin

Toxopneustes pileosus
(Lamarck, 1816)
Toxopneustidae
Indian Ocean—W Pacific

Barnacles

The empty shelly plates of barnacles are cemented to their rock and can last a long time once the filter-feeding crustaceans that both made and used to live within them have died.

18. Titan acorn-barnacle

Megabalanus coccopoma
(Darwin, 1854)
Balanidae
Tropical E Pacific

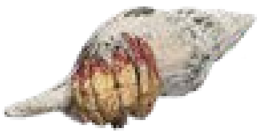
Lamp-shells

These may look like clams, but they have very different internal anatomy and are not even molluscs—they're brachiopods. Though uncommon today, fossils show that, for hundreds of millions of years, they were more abundant than clams.

19. a lamp-shell

A second-hand seashell home

Hermit crabs squeeze their bodies into empty seashells and carry these around to protect themselves from predators. Because they cannot 'grow' their seashell, they must periodically vacate their existing home and find a bigger one. No mollusc does that!



20. Stridulating hermit-crab

Strigopagurus strigimanus
(White, 1847)
Diogenidae
Southern Australia

BASE

21. Australian trumpet

Syrinx aruanus
Röding, 1798
Turbinellidae
N Australia—S New Guinea

The world's largest gastropod species.

Growing a shell: the basics

A clam or snail starts life as a fertilised egg. It may be many months before the hatchling produces its first shell—or it may be born with one.

Sometimes the eggs are deposited on a solid substrate such as a rock. However, in many species, the eggs are released into the water, where they drift among the plankton until hatching. The newly hatched larva may already bear a tiny embryonic shell (its *protoconch*) and immediately settle onto the seafloor, or it may start life without a shell, going through *trochophore* and *veliger* developmental stages before growing a protoconch and settling down.

The main shell that sees the mollusc through to adulthood is usually very different from the original protoconch. Different growth pathways determine overall shell shape. In theory, just three mathematical growth 'rules' can give rise to most of the basic seashell shapes that we see in real life—from fans and cones to ramshorns and needles. Sometimes it is possible to see growth ridges, which plot the history of alternating growth spurts and pauses or setbacks as the shell expands.

Shell composition

Nearly all seashells are made of *calcium carbonate*, mixed with a small amount of protein.

Calcium and carbonate ions are abundant in seawater. The calcium carbonate that molluscs make from these raw ingredients comes in two main crystalline forms:

- Most seashells have at least their outer layers made of *calcite*, which is hard and resistant to corrosion.
- Many species employ an inner layer of *aragonite*, which is stronger than calcite but is less resistant to corrosion. It is aragonite that gives some seashells their pearly appearance—at least when the outer layer of calcite is worn or etched away.

Right-handed and left-handed gastropods

Most species of snail coil only in a single direction.

Hold a snail shell in your hand with the spire (the pointy bit) directed upwards and with the shell's aperture ('mouth') opening towards you.

- If the aperture is off to the right of the main axis of the shell, then its coiling is *dextral* ('right-handed').
- If the aperture is off to the left of the main axis, it is *sinistral* ('left-handed').

Most snail shells coil dextrally, and this seems always to have been the case. However, some species only coil sinistrally—and there exist entire families of snails whose member species only ever coil sinistrally.

Sometimes, two closely related species coil in opposite directions; and occasionally, a usually dextral species will produce the odd sinistral individual (or *vice versa*). Avid shell collectors may pay high prices for the very rare snails coiling the 'wrong' way for their species.

A snail with its internal anatomy on the wrong side for its shell or its species might face all sorts of problems in life, including finding it hard to mate with another snail whose anatomy is the 'right' way round. This may be why the trait doesn't spread more widely through the population. It may also explain why very few species are 'ambidextrous', in which both sinistral and dextral individuals co-exist.

You don't have to look far to see depictions of sinistral snails: check those shower curtains, bathroom tiles and other seashell motifs and the chances are high that the images will have been reproduced the wrong way round! Once you spot them, it is hard not to 'unsee' them.

Even the distinguished Dutch Master painter Rembrandt painted a cone-shell coiling the wrong way, which he later justified on grounds of aesthetics (he was an artist, not a conchologist).

TMAG is not immune: the Museum once produced seashell-themed gift-wrapping paper in which the coiling direction of all the shells was inadvertently reversed!

Early life

Even before the baby mollusc grows a shell, there is a lot going on.

The eggs and larvae of some marine mollusc species may drift in the ocean for months. Such species tend to end up with very wide geographical ranges.

Other species stay local, hatching as fully formed baby snails from eggs laid nearby. Such species often have very narrow geographical ranges.

1. **Reddish rock-whelk**

   Charonia lampas
   (Linnaeus, 1758)
   Charoniidae
   Widespread in the temperate zones of both hemispheres

   The planktonic stage in this species may last for months before the juvenile snail settles on the seafloor, hence the wide geographical range of the species.

2. **Roadnight's volute**

   Livonia roadnightae
   (McCoy, 1881)
   Volutidae
   SE Australia

   The enormous, bulbous protoconch indicates that the juvenile snail developed directly from a very yolky egg and did not travel far from its parents.

Protoconchs

The embryonic shell, or protoconch, usually looks very different from the adult shell. Sometimes protoconchs have been mistakenly described as species in their own right! Usually, the protoconch is gradually absorbed or corrodes away. But in some species, the protoconch persists into adulthood, still attached to the tip of the shell.

3. **Australian trumpet**

   Syrinx aruanus
   Röding, 1798
   Turbinellidae
   N Australia—S New Guinea

   The long, multi-whorled protoconch was originally described as a separate species until its true nature was understood.

Nacre

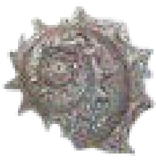
The calcium carbonate crystals that shells are made from come in two forms with different structural properties. Many shells are composed almost entirely of *calcite*. In the case of some top-shells, star-shells and abalones, etching away the outer calcite layer (typically using acids) will reveal a hidden layer of *aragonite*, or nacre, beneath. Nacre is also known as 'mother-of-pearl' and also coats the inside of some bivalves' shells, including those of pearl oysters.

4. **American wavy turban-shell**

   Megastraea undosa
   (W. Wood, 1828)
   Turbinidae
   Temperate NE Pacific

5. Chambered nautilus

Nautilus pompilius
Linnaeus, 1758
Nautilidae
Tropical SW Pacific



6. a star-shell

Astralium species
Turbinidae

Snails don’t have hands, but they can still be right-handed or left-handed!

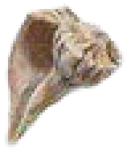
Most snails coil the same way—dextrally, or right-handedly. A small number coil in the opposite direction (sinistrally, or left-handedly), though nobody knows why.

These variants are generally unable to reproduce successfully because their reproductive structures are incompatible with those of potential partners. This means the trait doesn’t increase in future generations.

Sometimes, among closely related species one will coil dextrally and the other sinistrally..

7. Atlantic pear-whelk

Fulguropsis pyruloides
(Say, 1822)
Busyconidae
Gulf of Mexico—N Carolina



8. Sinistral lightning-whelk

Sinistrofulgur sinistrum
(Hollister, 1958)
Busyconidae
Gulf of Mexico—N Carolina

9. Common whelk

Buccinum undatum
Linnaeus, 1958
Buccinidae
NE and NW Atlantic

The shell on the left is dextral (the normal condition for this species); the one on the right is sinistral.

From buttons to needles, and (almost) everything in between

Growth involves a special shell-secreting tissue, unique to molluscs, called the *mantle*. Nearly all growth happens at the leading edge, or margin or lip, of the shell, which is the main place that the mantle can deposit fresh shell.

As a gastropod’s shell grows, the angle of expansion and degree of overlap of successive whorls determine its ultimate shape. Rapid expansion and a high degree of overlap lead to button-shaped or globose shells. More gradual expansion and a low degree of overlap lead to needle-shaped shells. Intermediate rates lead to cone-shaped or turban-shaped shells, or to shells with channelled spires. An alternative mode of overlap can give rise to sunken spires. No overlap at all gives rise to ‘uncoiled’ shells, while no coiling at all gives rise to either tubular or conical shells, depending on the concomitant degree of widening.

Among the cephalopods, a nautilus shell also follows simple spiral growth rules—to beautiful effect.

10. Giant baler-shell

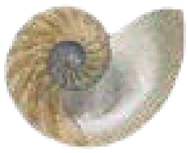
Melo amphora
(Lightfoot, 1786)
Volutidae
Tropical SW Pacific

A section of shell has been removed to reveal the earlier-grown whorls within the main body whorl of the adult shell.

11. Telescope snail

Telescopium telescopium
(Linnaeus, 1758)
Potamididae
Tropical Indo-Pacific

The walls of the shell's whorls have been stripped away to reveal the spiral pattern of growth around a lengthening axis (*columella*), requiring progressively larger whorls while maintaining the same shell shape.



12. Chambered nautilus

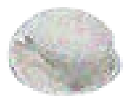
Nautilus pompilius
Linnaeus, 1758
Nautilidae
Tropical SW Pacific

The shell has been cut in half to reveal the 'logarithmic' spiral nature of its growth (getting bigger at a constant rate), requiring progressively larger buoyancy chambers while maintaining the same shell shape.

13. Belly-button cowrie

Umbilia hesitata
Iredale, 1916
Cypraeidae
SE Australia

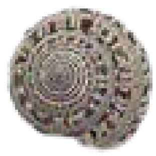
The juvenile shell's sunken spire is eventually enveloped into a greatly expanded adult whorl but is still visible as an *umbilicus* or 'belly-button'.



14. Pacific nut-sheath bubble-shell

Atys naucum
Linnaeus, 1758
Haminoeidae
Tropical Indo-Pacific

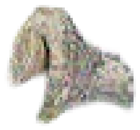
In most bubble-shells, the whorls expand in all directions and so there is no visible external spire—in fact, there is often an internal 'inverse' spire.



15. Perspective sundial-shell

Architectonica perspectiva
(Linnaeus, 1758)
Architectonicidae
Tropical Indo-Pacific

In sundial-shells, the whorls expand outwards with little gain in shell height.



16. Mawe's coral-snail

Latiaxis mawae
(Gray, 1833)
Muricidae
SE Asia

In this species, the whorls are flattened while showing little gain in shell height.

17. Japanese wonder-shell

Thatcheria mirabilis
Angas, 1877
Raphitomidae
Japan—W Australia

The whorls are flattened while still showing a substantial gain in shell height.

18. Granite limpet

Cymbula granatina
(Linnaeus, 1758)
Patellidae
S Africa

A limpet's shell can be considered as one that never bothered coiling, expanding outwards and downwards instead to accommodate the growing animal within.

19. Grimwood's auger-shell

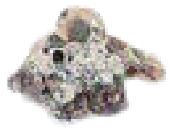
Terebra grimwoodi
Terryn, 2022
Terebridae
SE Asia

There is little overlap in successive whorls, and little expansion in whorl width, resulting in a needle-shaped shell.

20. West Indian worm-shell

Vermicularia spirata
(Philippi, 1836)
Turritellidae
Gulf of Mexico—NW Atlantic

These worm-shells start life resembling typical screw-shells, but once they embed themselves in sponge their growth strategy changes and they appear to 'uncoil', perhaps to keep pace with the growth of the sponge so that the open end of the shell still protrudes into the water for suspension-feeding.



21. a vermetid worm-shell

Vermetidae

Vermetid worm-shells start out with a typical snail-like protoconch, but once they cement themselves to a hard substrate, they adopt a very different growth form, seemingly extending their tube-shaped shell in random directions rather than coiling.

Symmetrical or asymmetrical growth

Compared to gastropods, there are fewer ways in which a bivalve can grow its shell. Uniform rates of growth lead to symmetrical, fan-shaped or heart-shaped shell valves. Non-uniform rates of growth can give rise to asymmetrical shells that may be lop-sided or twisted, or one valve might be flat and the other convex.

22. Noble scallop

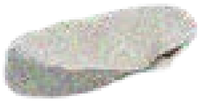
Mimachlamys crassicostata
(Sowerby II, 1842)
Pectinidae
Indian Ocean—NW Pacific

The fan shape indicates relatively symmetrical radial growth along the same plane as the shell's origin or *umbo*.

23. Redish venus-clam

Callista erycina
(Linnaeus, 1758)
Veneridae
Tropical Indo-Pacific

The oval shape reflects slightly asymmetrical growth along the same plane as the shell's origin or *umbo*.



24. Twisted ark-shell

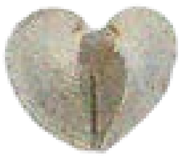
Trisidos tortuosa
(Linnaeus, 1758)
Arcidae
Tropical Indo-Pacific

The twisted shape reflects a more extreme form of asymmetrical growth in more than one plane.

25. Ivory heart-clam

Meiocardia vulgaris
(Reeve, 1845)
Glossidae
Tropical Indo-Pacific

A consistently curved pattern of growth gives rise to the almost coiled appearance of the adult shell.



26. Heart-cockle

Corculum cardissa
(Linnaeus, 1758)
Cardiidae
Tropical Indo-Pacific

A consistently curved pattern of growth, coupled with a gradient of increasing expansion from the fringes to the central part of the shell's margin, gives rise to the compressed, heart-shaped appearance of the adult shell.

BASE

27. Giant baler-shell

Melo amphora
(Lightfoot, 1786)
Volutidae
Tropical SW Pacific

28. Giant baler-shell

Melo amphora
(Lightfoot, 1786)
Volutidae
Tropical SW Pacific

29. Giant baler-shell

Melo amphora
(Lightfoot, 1786)
Volutidae
Tropical SW Pacific

Shell sculpture and ornamentation

As a shell grows, it may become adorned with spines, ridges or flanges, or sculpted with grooves.

A spine is produced when the animal's mantle temporarily extends outward from the shell's lip to form a mould, into which it secretes calcium carbonate, which then hardens. Continuous extensions of the mantle can give rise to ridges instead of spines. The mantle is also able to reabsorb spines from earlier whorls so that they don't block the shell's aperture as growth continues.

Spines and ridges increase the size of the shell relative to the size of the animal within. This makes the animal less vulnerable to being eaten: to a predator, the reward may simply not be worth the effort. Spines and ridges may also help with camouflage or may strengthen the shell against mishaps without adding greatly to its weight. Flanges can function like snowshoes, by increasing the surface area of a shell relative to its mass, making it less likely to sink into the sediment.

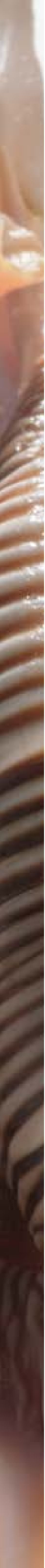
Sometimes the shell changes shape as it grows. Coiled gastropods will often produce a thickened outer lip once they reach adulthood.

Shell colours

Seashells often sport blotches, stripes, spots, waves and zigzags in a range of colours that, to our eyes, are often startlingly beautiful. But is there a reason for all this beauty?

There is no single explanation.

The mantle is responsible for laying down the shell's colours. It contains numerous pigment-producing cells, all lined up along the part of the mantle where new shell is being laid down. These switch on and off in turn according to simple molecular 'rules', influencing their neighbours to do likewise and creating a 'Mexican wave' of activation, all while the shell's lip continues to grow. Rather like an inkjet printer gradually turning out a photo line-by-line, this process can give rise to stripes, spots or waves, depending on for how long each cell is activated and the sequencing of activation in nearby cells relative to the rate of deposition of fresh shell.



The pigments involved include *melanins*, which give rise to reds, yellows, browns and blacks, and *porphyrins*, which can produce red-brown, purple and yellow-brown hues. These pigments may be surprisingly cheap for the mollusc to make. Some may be merely metabolic waste products, though others are derived more directly from the mollusc's food.

A recent 'neutral' theory is that the mollusc's mantle can 'see' the pigments it has laid down, and it uses these as 'registration markers' to judge where to line up which bits of its mantle. So long as the patterns help the mollusc to figure out how to continue laying down more shell in the right places, it may not matter exactly what those patterns look like: different species have merely adopted distinct, but equally useful, patterns.

In some species, the patterns help the shell to blend in with its background. In others, they form 'disruptive' markings that break up the shell's outline.

Patterning is unlikely to be about attracting mates—the animals usually don't even have the sort of eyes that could see their own patterns.

Perhaps the bright and contrasting markings on the shells of venomous cone-snails are a warning to would-be predators.

Not all shells are brightly coloured: some are as white as the calcite composition of their shell allows, while others are covered in a dark, proteinaceous skin or *periostracum*. Among seashells, species living in cooler or deeper waters tend to have less-brightly marked shells than those living in warmer, shallower waters.

In cowrie shells, different rules apply, because the animal's extensible mantle can lay down complex pigment patterns—as well as a layer of protective glaze—across almost the entire shell surface simultaneously.

Spines, ridges and other outgrowths

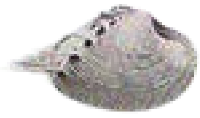
In both bivalves and gastropods, spines and ridges may help with camouflage, strengthen the shell, or make it less at risk of sinking into the sediment. They also make the animal within less vulnerable to predation: too awkward to access for smaller predators, and not worth the effort or risk for larger ones. In gastropods, narrowing or partly blocking the shell's aperture with 'teeth' or other outgrowths can also deter predators.

1. **Wedding-cake venus**
Bassina disjecta
(G. Perry, 1811)
Veneridae
SE Australia

2. **Fluted giant-clam**
Tridacna squamosa
Lamarck, 1819
Cardiidae
Tropical Indo-Pacific

3. **Lazarus jewel-box**
Chama lazarus
Linnaeus, 1758
Chamidae
Tropical Indo-Pacific

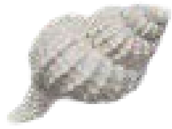
4. **Atlantic thorny-oyster**
Spondylus americanus
Hermann, 1781
Spondylidae
Tropical W Atlantic



5. **Panamic comb-venus**
Hysteroconcha lupanaria
(Lesson, 1831)
Veneridae
Tropical E Pacific

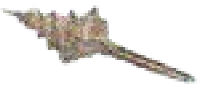
The direction of the spines suggests that their function is to protect the animal's siphons from being nibbled by fish.

6. **Great ribbed-cockle**
Cardium costatum
Linnaeus, 1758
Cardiidae
Tropical W Africa



7. **Oregon hairy-triton**
Fusitriton oregonensis
Redfield, 1846
Cymatiidae
Temperate NE Pacific

8. **Triumphant star-shell**
Guildfordia triumphans
(Philippi, 1841)
Turbinidae
Tropical W Pacific

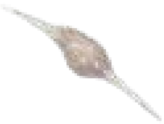


9. First pagoda-shell

Columbarium pagoda
(Lesson, 1831)
Columbariidae
Japan—East China Sea

10. Spindle tibia

Tibia fusus
Linnaeus, 1758
Rostellariidae
Tropical W Pacific



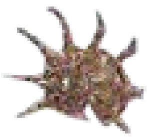
11. Elongated egg-cowrie

Volva volva
(Linnaeus, 1758)
Ovulidae
Tropical Indian Ocean

12. Long-spined limpet

Scutellastra longicosta
(Lamarck, 1819)
Patellidae
S Africa

Limpets have limited options for armoury but can grow a jagged outline to help deter predators.



13. Kiener's delphinula

Angaria sphaerula
(Kiener, 1838)
Angariidae
Tropical W Pacific

14. Girgyllus star-shell

Bolma girgyllus
(Reeve, 1861)
Turbinidae
Tropical W Pacific

15. Venus-comb murex

Murex pecten
Lightfoot, 1786
Muricidae
Tropical Indo-Pacific

16. Imperial harp-shell

Harpa costata
(Linnaeus, 1758)
Harpidae
Western Indian Ocean

17. Loebbecke's murex

Pterynotus loebbeckei
(Kobelt, 1879)
Muricidae
Tropical W Paciic

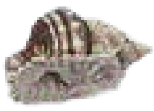
18. Atlantic carrier-shell

Xenophora conchyliophora
(Born, 1780)
Xenophoridae
Tropical Western Atlantic

Carrier-shells attach other shells to their own, both as camouflage and to decrease their attractiveness to predators.

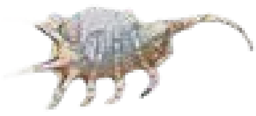
19. Florida crown-conch

Melongena corona
(Gmelin, 1791)
Melongenidae
Tropical W Atlantic



20. Common distorsio

Distorsio anus
(Linnaeus, 1758)
Personidae
Tropical Indian Ocean



21. Scorpion spider-conch

Lambis scorpius
(Linnaeus, 1758)
Strombidae
Tropical Indo-Pacific

22. Winged triton

Gyrineum perca
(Perry, 1811)
Cymatiidae
Tropical Indo-Pacific

The flanges help prevent the shell from sinking into the soft substrate on which it lives.

The paint job

As the mollusc expands its shell, pigment cells in the mantle are activated to add spots of colour. Rather like how an ink-jet printer produces a photo, the on-off sequencing pattern of these special cells along the mantle edge is what gives rise to spots, waves, zigzags and all the other arrangements of colour seen on mollusc shells.

23. Juno's volute

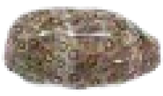
Scaphella junonia
(Lamarck, 1804)
Volutidae
Gulf of Mexico

24. Wavy volute

Amoria undulata
(Lamarck, 1804)
Volutidae
Southern Australia

Adding the finishing touches

The animals that make cowrie shells employ an extra trick: an expandable mantle that can cover almost the entire shell surface. The mantle not only secretes extra layers of shell to thicken the whole structure but also deposits pigments and then glaze.



25. Eyed cowrie

Arestorides argus
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

26. Pacific deer cowrie

Lyncina vitellus
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

27. Tiger cowrie

Cypraea tigris
Linnaeus, 1758
Cypraeidae
Tropical Indo-Pacific

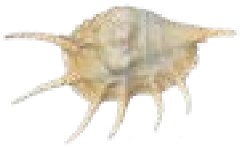
BASE

28. Imperial volute

Cymbiola imperialis
(Lightfoot, 1786)
Volutidae
Philippine

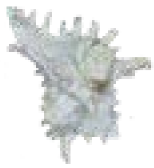
29. Imperial volute

Cymbiola imperialis
(Lightfoot, 1786)
Volutidae
Philippine



30. Giant spider-conch

Lambis truncata
(Humphrey, 1786)
Strombidae
Tropical Indo-Pacific

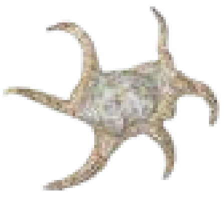


31. Ramose murex

Chicoreus ramosus
(Linnaeus, 1758)
Muricidae
Tropical Indo-Pacific

32. Horned helmet-shell

Cassis cornuta
(Linnaeus, 1758)
Cassidae
Tropical Indo-Pacific



33. Arthritic spider-conch

Harpago arthriticus
(Röding, 1798)
Strombidae
Tropical Indo-Pacific

Molluscan innovations: the radula

Most molluscs don't so much chew their food as shred it, using lots of tiny, raspy teeth. And they can keep making fresh ones, so even in old age they never end up toothless!

Molluscs (other than bivalves) possess a unique rasping, ribbon-like organ called the radula (plural: *radulae*). Embedded within the radular ribbon are chitinous denticles ('teeth')—sometimes thousands of them in multiple rows. The rasping motion of the ribbon makes it perfect for grazing or scraping, or, depending on the species, even for drilling into the shells of other molluscs to prey on them. As the denticles get worn out, so the ribbon shunts fresh denticles forwards to replace them.

The cone-snails have extremely specialised radulae. Each denticle has become a hollow, barbed, harpoon-like projectile that also serves as a hypodermic needle. Once 'launched' at potential prey, it penetrates the flesh and injects a deadly cocktail of conotoxins stored in a venom sac in the snail's proboscis. Since the harpoon remains attached to the proboscis, the snail can then 'reel in' its catch. The used harpoon is then replaced by a new one.

Some tropical cone-snail species prey on fast-moving fish, requiring a quick-acting and powerful venom and 'strike first, ask questions later' attitude. In cases where a cone-snail mistakes a passing human's ankle for a fish, or where someone has startled the animal by picking it up, the consequences for the person involved can sometimes be fatal.

Grazers

Many gastropods opt for a herbivorous, grazing lifestyle, feeding on marine algae. Others have taken to grazing on encrusting mats of microorganisms instead, and still others are carnivorous, grazing on colony-forming animals such as corals.

1. Northern abalone

Haliotis kamtschatkana
(Jonas, 1845)
Haliotidae
British Columbia—California

Abalones graze on algae on subtidal rocks and can also 'capture' fragments of seaweed passing by in the currents. With the animal often clamped tightly to the rock, the small holes in the shell enable it to dispose of waste and to spawn.

2. Common spider-conch

Lambis lambis
(Linnaeus, 1758)
Strombidae
Tropical Indo-Pacific

Spider-conchs inhabit coral lagoons, using their prominent, beady eyes and an elongated proboscis to find algae and detritus to eat.

3. Snakes-head cowrie

Monetaria caputserpentis
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

An intertidal grazer of algae on rocky and coral reefs.

4. a keyhole-limpet
Fissurellidae

In keyhole-limpets, the animal is often too big for its shell, carrying it like a cap while it wanders around grazing. The hole is the exit vent for water taken in under the shell lip, enabling it to dispose of waste without contaminating its inflow.

5. Tapestry turban-shell
Turbo petholatus
Linnaeus, 1758
Turbinidae
Indian Ocean—SW Pacific

The protective 'front door' or operculum of this species is particularly beautiful and is known as a 'cat's eye'.

6. Pacific bubble-shell
Bulla ampulla
Linnaeus, 1758
Bullidae
Tropical Indo-Pacific

A grazer on bacterial films and algal mats on soft sediments.

7. Striated limpet
Cellana strigilis
Hombron & Jacquinot, 1841
Nacellidae
New Zealand

A grazer of algal mats growing on intertidal rocks.

8. Bubble coral-snail
Rapa rapa
(Linnaeus, 1758)
Muricidae
Tropical Indo-Pacific

Specialises in feeding on coral polyps and can sometimes destroy entire coral colonies.

9. Poached-egg cowrie
Ovula ovum
(Linnaeus, 1758)
Ovulidae
Tropical Indo-Pacific

In life, the white shell is often hidden under the black mantle of the animal as it grazes on soft-corals.

10. Telescope snail
Telescopium telescopium
(Linnaeus, 1758)
Potamididae
Tropical Indo-Pacific

A grazer on bacterial films and algal mats in mangrove forests.

11. Rough creeper
Rhinoclavis aspera
(Linnaeus, 1758)
Cerithiidae
Tropical Indo-Pacific

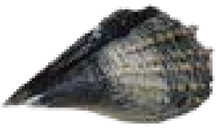
Creepers inhabit silty areas, grazing on bacterial films and algal mats on the sea floor.

Waste not, want not!
Filter-feeders, detritivores and scavengers are the recyclers of the mollusc world, feeding either on particles of organic matter extracted from water or sediment, or on dead animals.

12. Giant screw-shell

Turritella terebra
(Linnaeus, 1758)
Turritellidae
Tropical Indo-Pacific

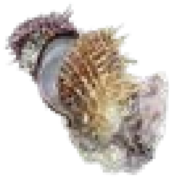
Screw-shells are specialised ‘ciliary suspension-feeders’. They exude a sticky mucus into their mantle cavity, which entraps food particles in the water brought in on the currents created by the animals’ hair-like cilia; the balls of mucus are then passed to the mouth.



13. Rigid pen-shell

Atrina rigida
(Lightfoot, 1786)
Pinnidae
Caribbean

Pen-shells are filter-feeders which live buried vertically in sediment on the seafloor, usually with only the shell’s outer lip exposed.



14. Butler’s thorny-oyster

Spondylus butleri
Reeve, 1856
Spondylidae
Philippines

Thorny-oysters are filter-feeders which embed themselves in amongst corals and sponges.

15. Leafy jewel-box

Chama macerophylla
Gmelin, 1791
Chamidae
Caribbean

Jewel-box clams are filter-feeders which cement themselves to hard corals and rocks.

16. Angel-wing clam

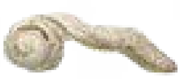
Cyrtopleura costata
Linnaeus, 1758
Pholadidae
Brazil—E Canada

The shape of this shell enables the animal to use its muscular foot to bore a burrow for itself into solid clay using a rotating, grinding motion. Related species bore into submerged wood or soft rock. All are filter-feeders.

17. Castus mud-snail

Nassarius castus
(Gould, 1835)
Nassariidae
Indian Ocean—Red Sea

Sometimes called ‘sea vultures’, mud-snails are active scavengers, seeking out dead fish, crabs and other carrion with their long proboscis.



18. a worm-shell

Tenagodus species
Siliquariidae

Worm-shells are suspension-feeders. The strange shape of the shell enables its growth to keep pace with the sponge in which it is usually embedded.

Symbionts

Some clams have given up filter-feeding in favour of internally ‘farming’ microorganisms; these provide them with nutrition instead.

19. Southern date-clam

Solemya australis
Lamarck, 1818
Solemyidae
Southern Australia

Date-clams live buried in oxygen-poor sediments, obtaining their nutrition from symbiotic bacteria in their gills which are able to use hydrogen sulphide as an energy source.

20. Red-lipped codakia clam

Codakia tigerina
(Linnaeus, 1758)
Lucinidae
Tropical Indo-Pacific

Codakias and other lucines live buried in oxygen-poor sediments, obtaining their nutrition from symbiotic bacteria in their gills which are able to use hydrogen sulphide as an energy source.

21. Fluted giant-clam

Tridacna squamosa
Lamarck, 1819
Cardiidae
Tropical Indo-Pacific

Giant-clams host symbiotic dinoflagellates in their colourful mantles, enabling them to obtain nutrition from the sugars produced from photosynthesis.

22. Heart-cockle

Corculum cardissa
(Linnaeus, 1758)
Cardiidae
Tropical Indo-Pacific

Heart-cockles live on the seafloor rather than within sediment. Their shells feature translucent ‘windows’ to enable light to reach symbiotic algae embedded in their tissues. These algae generate sugars that sustain the host cockle.

Parasites

A parasitic way of life has developed among some members of both the bivalves and the gastropods.

23. Perspective sundial-shell

Architectonica perspectiva
(Linnaeus, 1758)
Architectonicidae
Tropical Indo-Pacific

Sundial-shells act as external parasites or predators, using their long proboscis to feed on anemones and solitary corals, while a tough cuticle lines the mouth to shield it from stings from the prey’s tentacles.

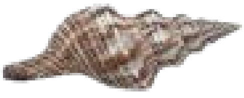
Active predators

From the depths of the oceans to the ocean surface and shallows, predatory snails are on the prowl…

24. a murex snail

Rapana rapiformis
(Born, 1778)
Muricidae
Tropical Indian Ocean

An active predator of other molluscs, enveloping its prey with a muscular 'foot'.



25. a tulip-shell

Filifusus filamentosus
(Röding, 1798)
Fasciolariidae
Tropical Indian Ocean

An active predator of other molluscs.

26. Common violet-snail

Janthina janthina
(Linnaeus, 1758)
Epitoniidae
Worldwide in warm seas

Floats at the ocean surface attached to a bubble raft, relying on wind and currents to propel it into the path of bluebottles, on which it preys.

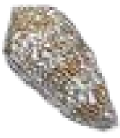
The ultimate hunters of the gastropod world

Cone-snails and their relatives, the augers, have taken predation to the next level. In these gastropods, the microscopic teeth (denticles) that most other snails used for rasping at their food have each been modified into a miniature harpoon attached by a long thread to a venom sac. When the snail determines that prey is within striking distance, the harpoon is fired, and the prey is soon immobilised by the venom. The snail then hauls in the harpoon and envelops its prey.

27. Geography cone-snail

Conus geographus
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

The toxins in the harpoon of this fish-feeding species can also be fatal to humans.



28. Cloth-of-gold cone-snail

Conus textile
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

The toxins in the harpoon of this fish-feeding species can also be fatal to humans.

29. Marlinspike auger-shell

Oxymeris maculata
(Linnaeus, 1758)
Terebridae
Tropical Indo-Pacific

Though it lacks the harpoon of most of its relatives, it still exudes toxins from its proboscis. The intended target is other invertebrates, but the toxins can also be fatal to humans.

BASE

30. Horned helmet-shell

Cassis cornuta
(Linnaeus, 1758)
Cassidae
Tropical Indo-Pacific

31. West Indian chank-shell

Turbinella angulata
(Lightfoot, 1786)
Turbinellidae
Caribbean

32. Giant horse-conch

Triplofusus giganteus
(Kiener, 1840)
Fasciolariidae
Gulf of Mexico

Will seashells be around forever?

We are not doing very well at looking after the natural world —and many molluscs are feeling the effects. Their future is in our hands.

The molluscs that make these wondrous seashells, and the ecosystems in which they live, are under increasing threat from habitat destruction, pollution, global warming and ocean acidification.

And then there is overexploitation. We have eaten some species to the brink of extinction, while in other cases, we are loving our seashells to death through buying curios and specimen seashells.

Many coastal communities throughout the tropics have come to depend on harvesting seashells for the curio trade, but they are paid very little compared to the profits made by the traders. The rarer a collectible shell becomes, the higher the price it commands among collectors and the greater the financial incentive for more harvesting and trading.

National threatened species laws, and international trade restrictions such as the Convention on International Trade in Endangered Species, can ease some of these threats, but seldom eliminate them.

Many of the specimens on display in this exhibition represent once-common species which are now rare or declining. We should all be thinking twice before making that next impulsive purchase.

Food

Traditional cultures have long valued shellfish, as evidenced by the presence of shell middens along shorelines the world over. Today, some of the larger, slow-growing species have been overharvested to the point of commercial extinction, while others, such as oysters and mussels, are now cultured commercially and constitute some of our most sustainably produced sources of animal protein.

1. Red abalone

Haliotis rufescens
Swainson, 1822
Haliotidae
British Columbia to Baja California

Once abundant, but decades of intense harvesting for the food cannery industry brought the species close to commercial extinction; it is now slowly recovering in places.

2. an ark-shell

Anadara species
Arcidae

Many species in this genus are harvested for subsistence or commercially.

3. Maxima clam

Tridacna maxima
Röding, 1798
Cardiidae
Tropical Indo-Pacific

Threatened by over-harvesting for food, but also increasingly cultured.

4. Queen conch

Aliger gigas
(Linnaeus, 1758)
Strombidae
Caribbean

Pre-Columbian societies used the shells as boxing gloves or knuckle-dusters during gladiator-style combat rituals. Today, severely overharvested for both food and the ornamental shell, except where strictly protected.

5. Pacific oyster

Magallana gigas
(Thunberg, 1793)
Osteidae

Widely cultured for food in temperate waters of both hemispheres.

6. New Zealand green-lipped mussel

Perna canaliculus
(Gmelin, 1791)
Mytilidae
New Zealand

One of several mussel species that is widely cultured for food but can also establish nuisance feral populations beyond its natural range.

7. King scallop

Pecten fumatus
Reeve, 1852
Pectinidae
Southern Australia

Subject of a commercially valuable bottom-trawling industry in many parts of its range.

Dyes

Since at least Roman times, Mediterranean species of murex snails have been the source of reddish-purple dyes from the mucus used in self-defence by the snails, and known as Tyrian purple, royal purple and imperial purple. It takes more than 10,000 snails to make one gram of dye, so it was only used to dye garments for the likes of emperors. Overexploitation eventually led mariners to venture out into the Atlantic in search of new sources of snails—triggering technological advances in ship and sail designs that ultimately led to the rise of the great European seafaring nations and then to their colonial expansion across the globe.

8. Banded dye-murex

Hexaplex trunculus
(Linnaeus, 1758)
Muricidae
Mediterranean

The animal secretes a mucus which was the source of the 'royal purple' dye used for clothes worn by the highest-ranking aristocracy in ancient Mediterranean cultures.

9. Spiny dye-murex

Bolinus brandaris
(Linnaeus, 1758)
Muricidae
Mediterranean

The animal secretes a mucus which was the source of the 'imperial purple' dye used for clothes worn by the highest-ranking aristocracy in ancient Mediterranean cultures.

Building materials

Since at least the time of the Romans, oyster reefs and middens have been exploited as sources of lime mortar for building. Many of Tasmania's early colonial buildings were built this way. Even windows can be made from seashells!

10. Flat oyster

Ostrea angasi
Sowerby, 1871
Ostreidae
Southern Australia

Vast reefs were destroyed to supply lime mortar to Australia's early colonial buildings.

11. Windowpane oyster

Placuna placenta
(Linnaeus, 1758)
Placunidae
Tropical Indo-Pacific

The shells have been widely used as 'windows' in traditional buildings and are also made into mobiles.

Buttons

Before the rise of plastics, buttons were often made of bone or shell. Even today, large turban and top-shell species are exploited for this purpose, with acid baths employed to first remove the outer, non-pearly layer of shell.

12. Commercial top-shell

Rochia nilotica
(Linnaeus, 1767)
Tegulidae
Tropical Indo-Pacific

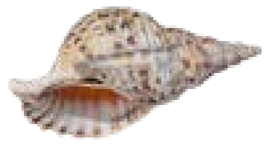
Its common name reflects the shells' former commercial importance as a source of pearly buttons. Upper shell is natural; lower one has been acid-treated to reveal nacreous layer valued for buttons.

13. Green turban-shell

Turbo marmoratus
Linnaeus, 1758
Turbinidae
Tropical Indo-Pacific

Still harvested for both food and buttons; large specimens are now rare in some regions. Upper shell is natural; lower one has been polished or acid-treated to reveal nacreous layer valued for buttons.

BASE

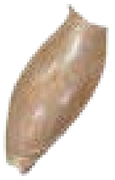


14. Triton's trumpet

Charonia tritonis
(Linnaeus, 1758)
Charoniidae
Tropical Indo-Pacific

15. Jourdan's turban-shell

Turbo jourdoni
Kiener, 1839
Turbinidae
SW Australia



16. Elephant's-snout volute

Cymbium glans
(Gmelin, 1791)
Volutidae
Tropical W Africa

17. Nippled volute

Livonia mamilla
(Sowerby I, 1844)
Volutidae
SE Australia

18. Green turban-shell

Turbo marmoratus
Linnaeus, 1758
Turbinidae
Tropical Indo-Pacific

Exploiting seashells

Humans have long exploited seashells and the molluscs that make them, whether as food, tools, clothing accessories, building materials, money or decorations.

Money

Many seashells have been used as currency. For centuries, the money cowrie played a pivotal role in commerce throughout the Indian Ocean and across Africa, with most of the cowries coming from the Maldives. European states monopolised the trade to destabilise established trade patterns by flooding the market and inducing inflation, while consolidating their own power. In West Africa, imported money cowries became integral to the financing and functioning of the slave trade. At the peak of the trade, the British imported about forty million money cowries into West Africa every year, and, in total, more than ten billion were shipped across the Indian and Atlantic Oceans.

1. Money cowrie

Monetaria moneta
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

Both its English and scientific names allude to the species' former commercial importance.

Status symbols

The rarity of some seashell species has led to their use as status symbols, available only to those of high rank. In traditional Samoan culture, tattoo patterns including top-shells identify chiefs and priests. For centuries, scallop shells were used as badges of honour for pilgrims across Europe. Rare shells traded among indigenous peoples in North America also denoted status among those able to afford to trade them.

2. Golden cowrie

Callistocypraea aurantium
(Gmelin, 1791)
Cypraeidae
Tropical SW Pacific

In traditional Fijian culture, the shell is termed a *bulikula* and is worn by chieftains on a string around the neck, as a symbol of status.

Pearls

Pearl oysters naturally produce pearls as a result of some irritating internal piece of grit, parasite or other 'nucleus' being encased in nacre (mother-of-pearl). Pearls can also be induced through deliberately implanting the clams with nuclei. Pearling has long been a major industry in tropical Australian waters.

3. Gold-lipped pearl-oyster

Pinctada maxima
(Jameson, 1901)
Pteriidae
Tropical Indo-Pacific

This species is the chief source of 'South Sea pearls', both from wild harvest and in culture.

Cameos

Seashells relief-carved with religious scenes were once a popular symbol of devotion and became more so during the neoclassical revival in 18th Century Europe. Today's mass-market carvings are more likely to reference a holiday destination.

4. Tiger cowrie

Cypraea tigris
Linnaeus, 1758
Cypraeidae
Tropical Indo-Pacific

A widespread species that stands up well to collecting pressure—so far, at least—and is often used for modern-day cameo carving. The specimen on the left is intact, while the one on the right seems to have been prepared for carving but the job was never completed!

5. Bull-mouth helmet-shell

Cypraecassis rufa
(Linnaeus, 1758)
Cassidae
Tropical Indo-Pacific

Also known as the 'cameo shell' because it was once a very popular species for religious carvings. This specimen is intact.

6. Triton's trumpet

Charonia tritonis
(Linnaeus, 1758)
Charoniidae
Tropical Indo-Pacific

Traditionally used as a trumpet, especially for rituals. Since these tritons feed on crown-of-thorns sea-stars, which otherwise feed on corals, their overcollection for the curio trade may have contributed to coral reef decline.

7. Chambered nautilus

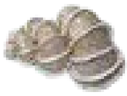
Nautilus pompilius
Linnaeus, 1758
Nautilidae
Tropical SW Pacific

Caught on baited lines for the curio trade, and now rare in many of its former haunts.

8. Snakes-head cowrie

Monetaria caputserpentis
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

Though widespread, the species lives in relatively accessible intertidal habitats and some places have seen drastic declines due to over-collecting.



9. Precious wentletrap

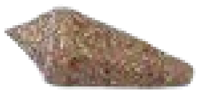
Epitonium scalare
(Linnaeus, 1758)
Epitoniidae
Tropical Indo-Pacific

Once considered so rare and in such demand that collectors were sometimes duped into buying rice-paste fakes. Now that its haunts are better-known, the shells no longer command such high prices.

10. Atlantic deer cowrie

Macrocypraea cervus
(Linnaeus, 1771)
Cypraeidae
Caribbean

The world's largest cowrie species, but large specimens are now rare due to over-collecting.



11. Glory-of-the-seas cone-shell

Conus gloriamaris
(Chemnitz, 1777)
Conidae
Tropical W Pacific

Once having the reputation as the rarest and most expensive seashell in the world, its haunts are now better-known, and so specimens are more widely available.

12. Glory-of-India cone-shell

Conus milneedwardsi
Jousseaume, 1894
Conidae
Tropical Indian Ocean

Once considered a great rarity that only the richest collectors could aspire to owning, its haunts are now better-known, and so specimens are more widely available.

13. Teuler's cowrie

Barycypraea teulerei
(Cazenavette, 1846)
Cypraeidae
Arabian Sea

Endemic to just a few islands in the Arabian sea and has disappeared from some of these within a few years of discovery due to uncontrolled collecting.

Australia's spectacular – but declining – *Zoila* cowries

All of the world's twelve *Zoila* cowrie species are endemic to Australia's western coastline, from the Northern Territory to western Victoria. They are specialist grazers on large sponges, and most have narrow geographical ranges. Those that live in shallow waters are easy pickings for snorkellers and divers, while those in deeper waters are sometimes dredged. Most are in decline through over-collecting.

14. Thersites cowrie

Zoila thersites
(Gaskoin, 1849)
Cypraeidae
SW Australia

15. Friend's cowrie

Zoila friendii
(J.E. Gray, 1831)
Cypraeidae
W Australia

16. Deceptive cowrie

Zoila decipiens
Smith, 1880
Cypraeidae
NW Australia

BASE

17. Indian baler-shell

Melo melo
(Lightfoot, 1786)
Volutidae
India – Philippines

18. Heavy baler-shell

Melo umbilicatus
(Broderip in Sowerby I, 1826)
Volutidae
Tropical Indo-Pacific

19. Giant tun-shell

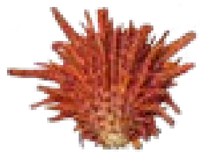
Tonna galea
(Linnaeus, 1758)
Tonnidae
Caribbean & Mediterranean

Beautiful bivalves and gorgeous gastropods

This cabinet features a range of bivalve and gastropod shells from the TMAG collections. The bivalves on the upper shelf were selected and arranged according to their colour gradations by visiting work-experience student Ruth Douglas.

UPPER SHELF

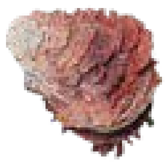
1. **Pacific lion's-paw scallop**
   Nodipecten subnodosus
   (G. B. Sowerby I, 1835)
   Pectinidae
   Tropical E Pacific



2. **Pacific thorny-oyster**
   Spondylus crassisquama
   Lamarck, 1819
   Spondylidae
   Tropical E Pacific

3. **Regal thorny-oyster**
   Spondylus regius
   Linnaeus, 1758
   Spondylidae
   Tropical Indo-Pacific

4. **Asian moon-scallop**
   Amusium pleuronectes
   (Linnaeus, 1758)
   Spondylidae
   Tropical W Pacific



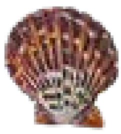
5. **Scaly thorny-oyster**
   Spondylus squamosus
   Schreibers, 1793
   Spondylidae
   Tropical Indo-Pacific

6. Bay scallop
Argopecten irradians
(Lamarck, 1819)
Pectinidae
NW Atlantic

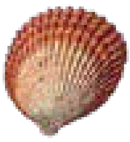
7. a thorny-oyster species
Spondylus species
Spondylidae

8. Asian hard-clam
Meretrix lusoria
Röding, 1798
Veneridae
Japan – Korea

9. European prickly-cockle
Acanthocardia echinata
(Linnaeus, 1758)
Cardiidae
NE Atlantic



10. Royal cloak scallop
Gloripallium pallium
(Linnaeus, 1758)
Pectinidae
Tropical Indo-Pacific



11. Reeve's cockle
Vasticardium vertebratum
(Jonas, 1844)
Cardiidae
Tropical Indo-Pacific

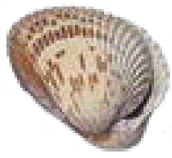
12. Backwater clam
Meretrix casta
(Gmelin, 1791)
Veneridae
Tropical Indo-Pacific

13. Partially-rough venus-clam
Iliochione subrugosa
(W.Wood, 1828)
Veneridae
Tropical E Pacific

14. Pacific lettered venus-clam
Tapes literatus
(Linnaeus, 1758)
Veneridae
Tropical Indo-Pacific

15. Striped sunset-clam
Tellinella virgata
(Linnaeus, 1758)
Tellinidae
Tropical Indo-Pacific

16. Pacific strawberry-cockle
Fragum unedo
(Linnaeus, 1758)
Cardiidae
Tropical Indo-Pacific



17. Atlantic giant-cockle
Dinocardium robustum
(Lightfoot, 1786)
Cardiidae
Gulf of Mexico

18. Noble scallop

Mimachlamys crassicostata
(Sowerby II, 1842)
Pectinidae
Indian Ocean – NW Pacific

19. Common pipi

Latona deltoides
(Lamarck, 1818)
Donacidae
Southern Australia

20. Northern lion's-paw scallop

Nodipecten fragosus
(Conrad, 1849)
Pectinidae
Caribbean

21. Cockscomb oyster

Lopha cristagalli
(Linnaeus, 1758)
Ostreidae
Tropical Indo-Pacific

22. a scallop

Pecten species
Pectinidae

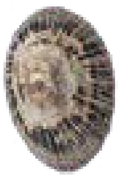
23. Swift's scallop

Swiftopecten swiftii
(Bernardi, 1858)
Pectinidae
Japan

24. Little white tellin

Tellinota albinella
(Lamarck, 1818)
Tellinidae
Southern Australia

LOWER SHELF



25. Giant limpet

Scutellastra laticostata
(Blainville, 1825)
Patellidae
SW Australia

26. Sunburst star-shell

Astraea heliotropium
(Martyn, 1784)
Turbinidae
New Zealand

27. Select top-shell

Maurea selecta
(Dillwyn, 1817)
Calliostomatidae
New Zealand

28. Chanelled top-shell

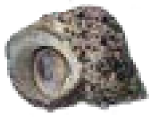
Calliostoma canaliculatum
(Lightfoot, 1786)
Calliostomatidae
New Zealand

29. Common delphinula

Angaria delphinus
(Linnaeus, 1758)
Angariidae
Tropical Indo-Pacific

30. Modest bolma

Bolma modesta
(Reeve, 1843)
Turbinidae
Japan – Taiwan



31. Corded turban

Turbo sparverius
Gmelin, 1791
Turbinidae
Tropical Indo-Pacific

32. Commercial top-shell

Rochia nilotica
(Linnaeus, 1767)
Tegulidae
Tropical Indo-Pacific

33. Purple-banded angaria

Angaria tyria
(Reeve, 1842)
Angariidae
Tropical Indo-Pacific

34. Gold-mouth turban

Turbo chrysostomus
Linnaeus, 1758
Turbinidae
Tropical Indo-Pacific

35. Magpie top-shell

Cittarium pica
(Linnaeus, 1758)
Tegulidae
Caribbean

36. Bleeding-tooth nerite

Nerita peloronta
Linnaeus, 1758
Neritidae
Caribbean

37. Lined sand-snail

Tanea lineata
(Röding, 1798)
Naticidae
Tropical Indo-Pacific

38. a screw-shell

Turritella terebra
(Linnaeus, 1758)
Turritellidae
Tropical Indo-Pacific

39. Ruddy frog-shell

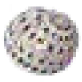
Tutufa rubeta
(Linnaeus, 1758)
Bursidae
Tropical Indo-Pacific

40. Common frog-shell

Bufonaria rana
(Linnaeus, 1758)
Bursidae
Tropical Indo-Pacific

41. a moon-snail

Neverita species
Naticidae

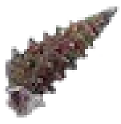


42. China sand-snail

Naticarius onca
(Röding, 1798)
Naticidae
Tropical Indo-Pacific

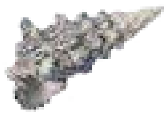
43. Common hairy-triton

Monoplex pilearis
(Linnaeus, 1758)
Cymatiidae
Tropical Indo-Pacific and Atlantic



44. West African mud-creeper

Tympanotonos fuscatus
Schumacher, 1817
Potamididae
Tropical W Africa

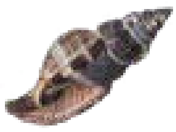


45. Knobbed creeper

Cerithium nodulosum
Bruguière, 1792
Cerithiidae
Tropical Indo-Pacific

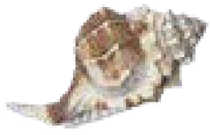
46. Black-spotted triton

Lotoria lotoria
(Linnaeus, 1758)
Cymatiidae
Tropical Indo-Pacific



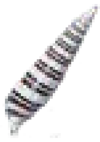
47. Common hairy-triton

Monoplex pilearis
(Linnaeus, 1758)
Cymatiidae
Tropical Indo-Pacific and Atlantic



48. Three-lined triton

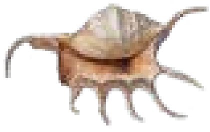
Ranularia trilineata
(Reeve, 1844)
Cymatiidae
Tropical Indo-Pacific



49. Banded creeper

Rhinoclavis fasciata
(Bruguière, 1792)
Cerithiidae
Tropical Indo-Pacific

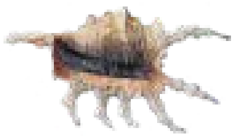
50. Flamingo-tongue cowrie
Cyphoma gibbosum
(Linnaeus, 1758)
Ovulidae
Caribbean



51. Orange spider-conch
Lambis crocata
(Link, 1807)
Strombidae
Tropical Indian Ocean

52. Lister's conch
Mirabilistrombus listeri
(T. Gray, 1852)
Strombidae
Tropical Indian Ocean

53. Black-mouth conch
Euprotomus aratrum
(Röding, 1798)
Strombidae
Tropical Indo-Pacific



54. Scorpion spider-conch
Lambis scorpius
(Linnaeus, 1758)
Strombidae
Indian Ocean – W Pacific

55. Elegant conch
Lentigo pipus
(Röding, 1798)
Strombidae
Tropical Indo-Pacific

56. Violet spider-conch
Ophioglossolambis violacea
(Swainson, 1821)
Strombidae
Mauritius

57. Dog conch
Laevistrombus canarium
(Linnaeus, 1758)
Strombidae
Tropical Indo-Pacific

58. Blood-mouth conch
Conomurex luhuanus
(Linnaeus, 1758)
Strombidae
Tropical Indo-Pacific

59. Lynx cowrie
Lyncina lynx
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

60. Pacific deer cowrie
Lyncina vitellus
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

61. Apricot-coloured cowrie
Umbilia armeniaca
(Verco, 1912)
Cypraeidae
Great Australian Bight

62. Panther cowrie

Cypraea pantherina
Lightfoot, 1786
Cypraeidae
Red Sea

63. Belly cowrie

Lyncina ventriculus
Lamarck, 1810
Cypraeidae
Tropical Pacific

64. Rat cowrie

Trona stercoraria
(Linnaeus, 1758)
Cypraeidae
Tropical W Africa

65. Reticulated cowrie

Mauritia maculifera
Schilder, 1932
Cypraeidae
Tropical Indo-Pacific

66. Onyx cowrie

Erronea onyx
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

67. Map cowrie

Leporicypraea mappa
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

68. Measled cowrie

Macrocypraea zebra
(Linnaeus, 1758)
Cypraeidae
Caribbean

69. Tortoiseshell cowrie

Chelycypraea testudinaria
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

70. Sieve cowrie

Cribrarula cribraria
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

71. Hump-back cowrie

Mauritia mauritiana
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

72. Thick-edged cowrie

Erronea caurica
(Linnaeus, 1758)
Cypraeidae
Tropical Indian Ocean

73. Chestnut cowrie

Neobernaya spadicea
(Swainson, 1823)
Cypraeidae
California

74. Mole cowrie

Talparia talpa
(Linnaeus, 1758)
Cypraeidae
Tropical Indo-Pacific

BASE

75. Giant clam

Tridacna gigas
(Linnaeus, 1758)
Cardiidae
Tropical Indo-Pacific

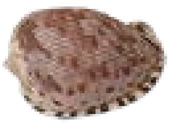
The world's largest bivalve species. Threatened by over-harvesting for food, but also increasingly cultured.

Gorgeous gastropods

This cabinet features a range of gastropod shells, selected to showcase their beauty and diversity.

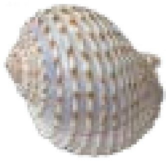
UPPER SHELF

1. **King helmet-shell**
   Cassis tuberosa
   (Linnaeus, 1758)
   Cassidae
   Caribbean



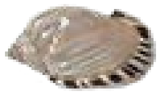
2. **Reticulated cowrie-helmet**
   Cypraecassis testiculus
   (Linnaeus, 1758)
   Cassidae
   Caribbean

3. **Checkerboard bonnet-shell**
   Phalium areola
   (Linnaeus, 1758)
   Cassidae
   Tropical Indo-Pacific

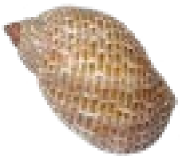


4. **Tessellated tun-shell**
   Tonna tessellata
   (Lamarck, 1816)
   Tonnidae
   Tropical Indo-Pacific

5. **Cancellate morum**
   Morum cancellatum
   (G.B. Sowerby I, 1824)
   Cassidae
   Tropical Indo-Pacific



6. **Common bonnet-shell**
   Casmaria erinaceus
   (Linnaeus, 1758)
   Cassidae
   Tropical Indo-Pacific



7. **Partridge tun-shell**
   Tonna perdix
   (Linnaeus, 1758)
   Tonnidae
   Tropical Indo-Pacific

8. **Ampoule tun-shell**
   Tonna ampullacea
   (Philippi, 1845)
   Tonnidae
   Philippines

9. **Pacific grinning tun-shell**
   Malea pomum
   (Linnaeus, 1758)
   Cassidae
   Tropical Indo-Pacific

10. **Striped bonnet-shell**
    Phalium flammiferum
    (P.F. Röding, 1798)
    Cassidae
    Tropical Indo-Pacific

11. Florida crown-conch

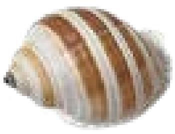
Melongena corona
(Gmelin, 1791)
Melongenidae
Tropical W Atlantic

12. Noded spindle-shell

Nodolatirus nodatus
(Gmelin, 1791)
Fasciolariidae
Hawaii

13. American grinning tun-shell

Malea ringens
(Swainson, 1822)
Tonnidae
Tropical Eastern Pacific



14. Banded tun-shell

Tonna sulcosa
(Born, 1778)
Tonnidae
Tropical Indo-Pacific

15. Channelled babylon-whelk

Babylonia areolata
(Link, 1807)
Babyloniidae
Tropical Indo-Pacific

16. Japanese babylon-whelk

Babylonia japonica
(Reeve, 1842)
Babyloniidae
Japan – Taiwan

17. True tulip-shell

Fasciolaria tulipa
(Linnaeus, 1758)
Fasciolariidae
Caribbean

18. Thorn latirus

Opeatostoma pseudodon
(Burrow, 1815)
Fasciolariidae
Tropical Eastern Pacific

19. Indian tibia

Tibia curta
(G. B. Sowerby II, 1842)
Rostellariidae
Southern India

20. Distaff spindle-shell

Fusinus colus
(Linnaeus, 1758)
Fasciolariidae
Tropical Indo-Pacific

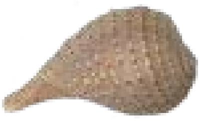
21. Banded tulip-shell

Cinctura lilium
(Fisher von Waldheim, 1807)
Fasciolariidae
Caribbean

22. Ostrich-foot shell

Struthiolaria papulosa
(Martyn, 1784)
Struthiolariidae
New Zealand

23. Fine-lined tulip-shell
Filifusus filamentosus
(Röding, 1798)
Fasciolariidae
Tropical Indian Ocean



24. Swollen fig-shell
Ficus ventricosa
(Sowerby I, 1825)
Ficidae
Tropical Eastern Pacific

25. Perspective sundial-shell
Architectonica perspectiva
(Linnaeus, 1758)
Architectonicidae
Tropical Indo-Pacific

26. Regal murex
Hexaplex regius
(Swainson, 1821)
Muricidae
Tropical Eastern Pacific

27. Root murex
Muricanthus radix
(Gmelin, 1791)
Muricidae
Tropical Eastern Pacific

28. Ramose murex
Chicoreus ramosus
(Linnaeus, 1758)
Muricidae
Tropical Indo-Pacific

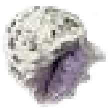
29. Pink-mouthed murex
Hexaplex erythrostomus
(Swainson, 1831)
Muricidae
Tropical Eastern Pacific

30. Staghorn murex
Chicoreus cornucervi
(Röding, 1798)
Muricidae
Tropical Indo-Pacific

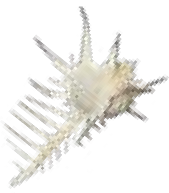
31. Woodcock murex
Haustellum haustellum
(Linnaeus, 1758)
Muricidae
Tropical Indo-Pacific

32. Wide-mouthed rock-shell
Plicopurpura patula
(Linnaeus, 1758)
Muricidae
Caribbean

33. Leafy hornmouth murex
Ceratostoma foliatum
(Gmelin, 1791)
Muricidae
California



34. Mulberry drupe-snail
Drupa morum
Röding, 1798
Muricidae
Tropical Indo-Pacific

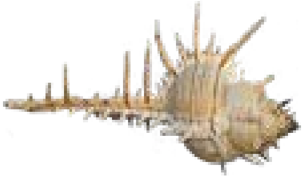


35. Strong-spined murex

Murex ternispina
Lamarck, 1822
Muricidae
Tropical Indo-Pacific

36. Endive murex

Hexaplex cichoreum
(Gmelin, 1791)
Muricidae
Tropical Indo-Pacific



37. Slender-billed murex

Murex tenuirostrum
Lamarck, 1822
Muricidae
Tropical Indo-Pacific

LOWER SHELF

38. Butterfly cone

Conus pulcher
Lightfoot in Solander, 1786
Conidae
Tropical W Africa

39. Leopard cone

Conus leopardus
(Röding, 1798)
Conidae
Tropical Indo-Pacific

40. Marbled cone

Conus marmoreus
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

41. Princely cone

Conus aulicus
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

42. Ermine cone

Conus mustelinus
Hwass in Bruguière, 1792
Conidae
Tropical Indo-Pacific

43. Imperial cone

Conus imperialis
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

44. Striated cone

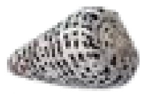
Conus striatus
Linnaeus, 1758
Conidae Tropical Indo-Pacific

45. Soldier cone

Conus miles
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

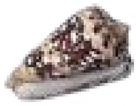
46. Birch cone

Conus betulinus
Linnaeus, 1758
Conidae
Tropical Indo-Pacific



47. Ivory cone

Conus eburneus
Hwass in Bruguière, 1792
Conidae
Tropical Indo-Pacific

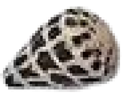


48. Admiral cone

Conus ammiralis
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

49. Fig cone

Conus figulinus
Linnaeus, 1758
Conidae
Tropical Indo-Pacific



50. Hebrew cone

Conus ebraeus
Linnaeus, 1758
Conidae
Tropical Indo-Pacific

51. Articulate harp-shell

Harpa articularis
Lamarck, 1822
Harpidae
Tropical Indo-Pacific

52. Swollen harp-shell

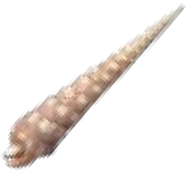
Harpa cabriti
Fischer, 1860
Harpidae
Tropical Indo-Pacific

53. Tent olive

Oliva porphyria
(Linnaeus, 1758)
Olividae
Tropical Eastern Pacific

54. Orange-mouthed olive

Oliva miniacea
(Röding, 1798)
Olividae
Tropical Indo-Pacific



55. Eyed auger

Terebra guttata
(Röding, 1798)
Terebridae
Tropical Indian Ocean

56. Chocolate-spotted auger

Terebra subulata
(Linnaeus, 1758)
Terebridae
Tropical Indo-Pacific

57. Crenulate auger

Oxymeris crenulata
(Linnaeus, 1758)
Terebridae
Tropical Indo-Pacific

58. Papal mitre

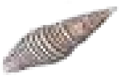
Mitra papalis
(Linnaeus, 1758)
Mitridae
Tropical Indo-Pacific

59. Ceramic vase-shell
Vasum ceramicum
(Linnaeus, 1758)
Vasidae
Tropical Indo-Pacific

60. Flinders vase-shell
Altivasum flindersi
Verco, 1914
Vasidae
SW Australia

61. Cardinal mitre
Quasimitra cardinalis
(Gmelin, 1791)
Mitridae
Tropical Indo-Pacific

62. Caffrum mitre
Vexillum caffrum
(Linnaeus, 1758)
Costellariidae
Tropical Pacific Ocean

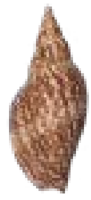


63. Supreme mitre
Domiporta praestantissima
(Röding, 1758)
Mitridae
Tropical Indo-Pacific

64. Plaited mitre
Vexillum plicarium
(Linnaeus, 1758)
Costellariidae
Tropical Indo-Pacific

65. Desirable volute
Amoria exoptanda
(Reeve, 1849)
Volutidae
Great Australian Bight

66. Noble volute
Cymbiola nobilis
(Lightfoot, 1786)
Volutidae
Philippines – Taiwan



67. Sowerby's volute
Ericusa sowerbyi
(Kiener, 1839)
Volutidae
SE Australia

68. Hebrew volute
Voluta ebraea
Linnaeus, 1758
Volutidae
Brazil

69. Carol's volute
Amoria maculata
(Swainson, 1822)
Volutidae
Eastern Australia

70. Bednall's volute
Volutoconus bednalli
(Brazier, 1878)
Volutidae
Northern Australia

71. Yellow volute
Cymbiola flavicans
(Gmelin, 1791)
Volutidae
Torres Strait

72. Princely volute
Cymbiola aulica
(G.B. Sowerby I, 1825)
Volutidae
Philippines

73. Lyre-shaped volute
Lyria lyraeformis
(Swainson,1821)
Volutidae
NE Africa

74. Noble volute
Cymbiola nobilis
(Lightfoot, 1786)
Volutidae
Philippines – Taiwan

75. Blotched snowflake volute
Cymbiola nivosa
(Lamarck, 1804)
Volutidae
Tropical W Australia

76. Cloverian volute
Lyria cloveriana
Weaver,1963
Volutidae
S India – Sri Lanka

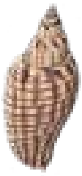
77. Gold-banded volute
Harpulina arausiaca
(Lightfoot, 1786)
Volutidae
India

78. False elephant's-snout volute
Cymbium cymbium
(Linnaeus, 1758)
Volutidae
NW Africa

79. Lapponica volute
Harpulina lapponica
(Linnaeus, 1767)
Volutidae
Tropical Indian Ocean

80. Zebra volute
Amoria zebra
(Leach, 1814)
Volutidae
Eastern Australia

81. Damon's volute
Amoria damonii
Gray, 1864
Volutidae
Western and Northern Australia



82. Kuroda's volute
Callipara kurodai
(Kawamura, 1964)
Volutidae
South China Sea

83. Beautiful volute
Cymbiola pulchra
(G.B. Sowerby I, 1825)
Volutidae
Eastern Australia

84. Pacific bubble-shell
Bulla ampulla
Linnaeus, 1758
Bullidae
Tropical Indo-Pacific

85. White-banded bubble-shell
Hydatina albocincta
(Van der Hoeven, 1839)
Aplustridae
Tropical Indo-Pacific

BASE

86. King helmet-shell
Cassis tuberosa
(Linnaeus, 1758)
Cassidae
Caribbean

87. Dannevig's volute
Livonia nodiplicata
(Cox, 1910)
Volutidae
SW Australia

88. Magnificent volute
Cymbiola magnifica
(Gebauer, 1802)
Volutidae
SE Australia

89. Giant clam
Tridacna gigas
(Linnaeus, 1758)
Cardiidae
Tropical Indo-Pacific