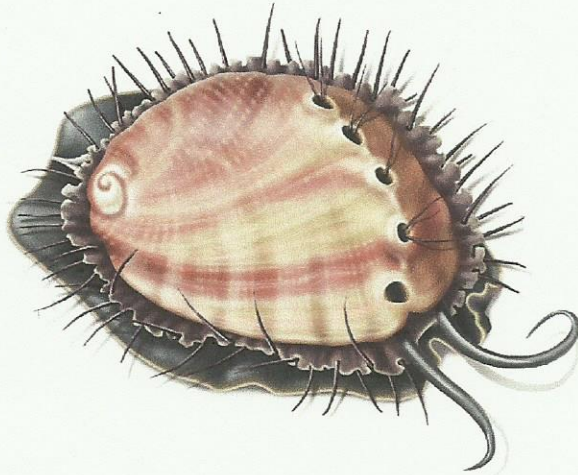


Abalones (Station 1)



Abalones are marine snails (gastropod molluscs), known worldwide for their beautiful, mother-of-pearl shell and their large muscular foot, a prized delicacy. An abalone has a single shell that covers its body and has many holes called apertures. The holes help circulate water over the gills. Abalones attach themselves strongly to rocks, using a muscular foot. They feed by trapping algae under their foot and scraping it off with their radula.

A thirteen-year-old abalone is about eighteen centimeters long and has a muscular foot able to exert a grip of about one hundred eighty kilograms. The black abalone's shell can grow up to twenty centimeters wide. An abalone's blood contains properties useful against penicillin-resistant bacteria. But abalones have no blood-clotting mechanisms and will bleed to death if they are injured. They belong to the class Gastropoda.



Abalones require and thrive in water well oxygenated by strong waves and currents. Abalones are slow movers. They like to hide in crevices during the day and hunt at night.



Some surveyed abalone populations are documented to have declined by nearly 80% since 1992. Many species of Abalone are becoming very rare indeed: over-fishing, poaching, and habitat destruction are to blame.

Diet	algae and seaweed
Size	six to twelve inches
Color	dark blue, lavender, green, brick red, or black
Predators	cabezon fish, moray eels, crabs, octopi, sea stars, and sea otters
Neat Facts	Abalone divers are not allowed to use SCUBA when diving for abalone.
Types	pink abalone, black abalone, green abalone, pinto abalone, red abalone, white abalone, flat abalone,
Relatives	nudibranchs, sea hares, octopi, squid, scallops, mussels, oysters, clams, chitons, snails, limpets

Scaphopoda

By Seymour Scaphopoda (Station 2)



Hello, my name is Seymour Scaphopoda and I'm here to tell you about my Class, the Scaphoda. We are often known and called by our more common name, the "Tusk Shells".

I, as do all the members of my Class, live in the marine environment (salt-water habitat) only. We all live in a shell house that we build to protect our very soft body. There are about 350 different species in our Class living in shallow to relatively deep (2,000 meters) water. We range in size from 2 millimeters to about 15 centimeters (1/16th of an inch to 6 inches).

Some of our shells look like an elephant's tusk, while others look like a swollen cucumber. Whichever shape we take, our shells are open at both ends making us look like a fat drinking straw that has swallowed a big lunch. This tube-like shell usually has several heavy ribs running the length of it and it is most often coloured white and brown or white and green.

We tusk shells have a spade-shaped (like a shovel) foot that we use to dig ourselves into the soft muddy or sandy ocean bottom. Here we stay all our lives.

We draw water in through the small tip of our shell that sticks out of the sand or mud where we live. This water flows into our mantle cavity (remember, the mantle is the organ that builds our shells) where oxygen is just absorbed directly into our blood. We do not have gills for breathing, nor do we have a heart or blood vessels to carry and pump our blood. We are what scientists call "a very primitive and simple organism".

My cousins and I always live head down in the sand or mud. We have many skinny thread-like tentacles that have a tiny sticky pad at their tip. These captacula project from our heads and wiggle through the surrounding mud or sand in search of food. These fine threads, called captacula, latch onto very small food items (called detritus) found in the sand or mud and then they pull them in to our mouth. From there, the food is rasped by the radula (which looks and acts much like a fingernail file) into finer particles and is then digested.

Both the females and males of my Class release their eggs and sperm directly into the surrounding water. If, by chance, the eggs and sperm get together, fertilization occurs and a baby scaphoda is born.

Some interesting Scaphopoda facts:

- Scaphoda live all their lives head down or in other words, upside down!
- Scaphopoda shells (many of them from Vancouver Is, British Columbia) were the shells used to make the North American Indian trade money "Wampum"

The Sea Scallop (Station 3)

A **scallop** is a marine bivalve mollusc of the family **Pectinidae**. Scallops are a cosmopolitan family, found in all of the world's oceans. Many scallops are highly prized as a food source. The brightly colored, fan-shaped shells of some scallops, with their radiating fluted pattern, are valued by shell collectors.

The name "scallop" is derived from the Old French *escalope*, which means "shell".

Anatomy

Like the true oysters (family *Ostreidae*), scallops have a central adductor muscle, and thus the inside of their shells has a characteristic central scar, marking the point of attachment for this muscle. The adductor muscle of scallops is larger and more developed than that of oysters, because they are active swimmers; scallops are in fact the only migratory bivalve. Their shell shape tends to be highly regular, recalling one archetypal form of a seashell, and because of this pleasing geometric shape, the scallop shell is a common decorative motif. They also possess eyes with a lens and retina, which are more complex than those of other bivalves. Scallops cannot resolve shapes, but can detect light and motion.^[2]

Food and digestion

Most scallops are filter feeders, and eat plankton. Coincidentally, the plankton can include scallop larvae. Siphons bring water over a filtering structure, where food becomes trapped in mucus. Next, the cilia on the structure move the food toward the mouth. Then, the food is digested in the stomach and digestive gland. Waste is passed on through the intestine and exits via the anus.

Life habits

Most scallops are free-living, but some species can attach to a substrate by a structure called a byssus, or even be cemented to their substrate as adults (e.g. *Hinnites spp.*). Other scallops can extend a "foot" from between their valves (shell). By then contracting the foot, they can burrow themselves deeper into sand. A free-living scallop can swim, by rapidly opening and closing its shell. This method of locomotion is also a defensive technique, protecting it from threatening predators. Some scallops can make an audible soft popping sound as they flap their shells underwater, leading one seafood vendor to dub them "singing scallops".

Reproductive cycle

The scallop family is unusual in that some members of the family are dioecious (males and females are separate), while other are simultaneous hermaphrodites (both sexes in the same individual) and a few are protoandrous hermaphrodites (males when young then switching to female). Red roe is that of a female, and white, that of a male. Spermatozoa and ova are released freely into the water during mating season and fertilized ova sink to the bottom. After several weeks, the immature scallop hatches and the larvae drift in the plankton until settling to the bottom again to grow, usually attaching by means of byssal threads. Some scallops, such as the Atlantic bay scallop *Argopecten irradians* are short lived, while others can live 20 years or more. Age can often be inferred from annuli, the concentric rings of their shells.

Scallop



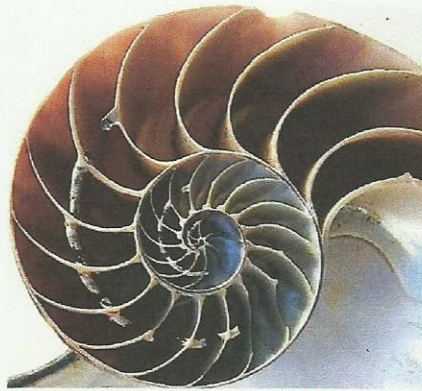
Scientific classification

Kingdom:	Animalia
Phylum:	Mollusca
Class:	Bivalvia
Order:	Ostreoida
Suborder:	Pectinina
Superfamily:	Pectinoidea
Family:	Pectinidae Rafinesque, 1815

Genera

See Pectinidae

The Chambered Nautilus (Station 4)



Description of Animal

The Chambered nautilus is a mollusk, related to the octopus, squid, clam and snail.

A nautilus, along with the cuttlefish, squid and octopus, are all in the class cephalopods, meaning 'head-foot,' so named because the feet (tentacles) are attached to the head.

The nautilus is the only cephalopod that has a fully developed shell for protection. Unlike a squid, cuttlefish or an octopus, the nautilus has poor vision and its primitive eyes have no lenses. The nautilus has more than ninety suckerless tentacles. Grooves and ridges on the tentacles are used to grip prey and deliver food to a crushing, parrot-like beak.

Unlike snails, the spiraled shell of the nautilus is divided into chambers with the animal occupying the outermost chamber. A newly hatched nautilus begins life with about four chambers and develops an average of 30 chambers by adulthood. The inner chambers are filled with gas and help the nautilus to maintain neutral buoyancy. The nautilus adds liquid to the chambers in order to dive.

A nautilus is considered to be a "living fossil" as they have undergone little change in over 400 million years. They dominated the ancient seas before the rise of fishes and appeared about 265 million years before the first dinosaurs. In prehistoric times there were about 10,000 different species of the nautilus, but only a few species survived to the present day.

Diet

A newly hatched nautilus (about the size of a quarter) feeds on small shrimp and other small prey.

Adults feed on crabs, shrimp, and fish, and scavenge on dead animals. Food is most likely located by smell.

Size

Adults grow to about 8 inches (20 cm) in length.

Range

The chambered nautilus can be found along the slopes of coral reefs of the tropical Indo-Pacific.

The nautilus moves to deeper waters (600 – 2,000 feet deep) during the day to avoid predators. At night they ascend up to the coral reefs (300 feet deep) to hunt for prey.

Population Status

Some nautilus populations are in decline due to over collection for their beautiful shells. While the export of chambered nautilus shells is banned in some countries, other countries continue to allow commercial trade. To help curtail the demand for their shells, do not purchase a nautilus shell.

Predators

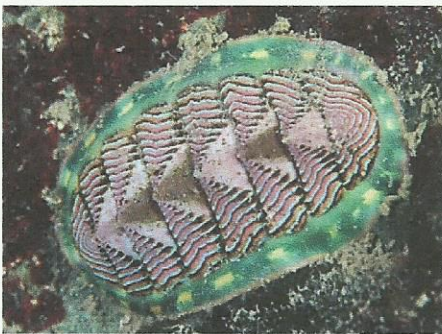
The Octopus, shark, triggerfish and sea turtle

Polyplacophora (Station 5)

By Paul Polyplacophora

Hello, my name is Paul and I'm here to tell you about my Class, the Polyplacophora. In the Latin language, poly means many. I have a shell made out of eight separate, but overlapping, plates or valves. You may also know me by my common name, the Chitons.

I only live in the ocean and am generally found clinging tightly onto the rocks in the intertidal zone (the area in the ocean where waves wash in and out and where water from the tidal changes wash in and out of). A few of my Class do live in very deep (more than 5,000 meters) ocean places. The members of my Class range in size from 2 millimeters to 40 centimeters (1/16 inch to 16 inches), and there are about 800 living Species represented in my Class.

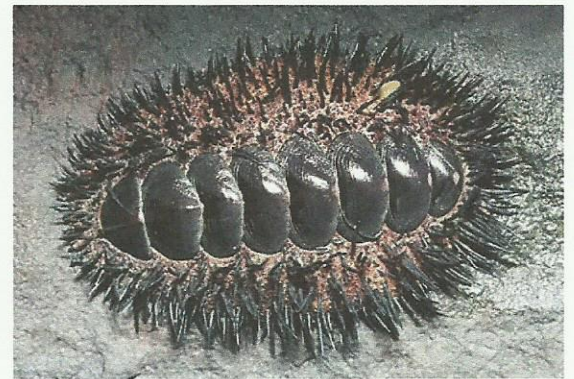


By having several valves that can be moved separately, we are able to change the shape of our bodies to fit onto the uneven hard rocky places we like to live on. Our broad, fleshy foot holds us to the rocks so tightly that neither the violent ocean waves nor an enemy can dislodge us easily. You would have to take a sharp object, like a knife, to pry us off our rock and if you did succeed in getting me off, I would curl up into a ball. My hard plates would be on the outside of this ball and my soft vulnerable body parts protected on the inside of the ball.

Most of the members in my class are herbivores (we eat plants). In our mouths is a special mechanism known as a radula. This radula is like a ribbon of tiny hard teeth (think of something very rough like a piece of sandpaper or a fingernail file). By licking the rock with this radula, we rasp off pieces of plant material or algae growing there. We then swallow and digest these food particles.

We breathe in oxygen from the water through six to eighty-eight pairs of gills.

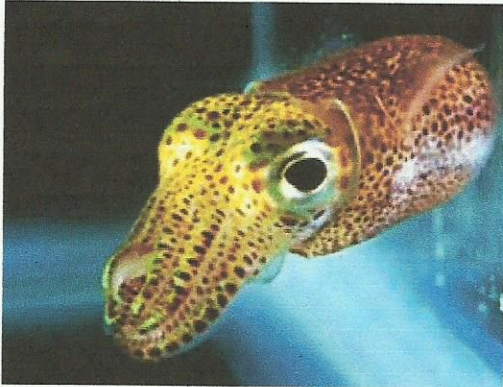
Both the male and females of my class generally release their eggs and sperm directly into the water. When they meet, a new baby polyplacophora is born. However some of the females in my class do keep their eggs inside their body (in the mantle cavity). When they draw in water to breathe, they also draw in the sperm and thus fertilize their eggs. They then give live birth to their young, all ready to fend for themselves in the sea!



Some interesting things about Polyplacophoras:

- Most polyplacophora are nocturnal, that is, they move around and eat mostly at night.
- A polyplacophora may spend its entire life in the very small area of a few feet.
- Polyplacophora often show a "homing behavior". If they get knocked off their rock, they can usually find their way back.

Common squid - *Loligo vulgaris* (Station 6)



Squid Facts

The common squid is a carnivorous mollusk belonging to the same class as the nautilus, cuttlefish, and octopus.

The squid has a large head and a relatively large brain. Its body, stiffened by an interior cartilaginous skeleton, is spherical or cigar-shaped, with two lateral fins. Around the mouth are eight sucker-bearing arms and two contractile tentacles with spatulate tips; on the latter are four rows of suction cups encircled by rings of chitinous (horny) hooks. The contractile tentacles, longer than the rest, are used to seize the prey and pass it to the shorter arms, which hold it to be torn by strong jaws shaped like a parrot's beak. Squid can swim faster than any other invertebrate by rapidly expelling water from the mantle cavity through the ³funnel,² which can be turned to direct movement. Many deep-sea squid are bioluminescent. They shoot out a cloud of dark ink when pursued; one genus secretes luminescent ink.

In the male squid, one smaller arm is modified for the purpose of planting a packet of sperm (a spermatophore) in the female's oviduct. In some squid, such as the common squid of the east North Atlantic coast, the sperm can also be deposited in a vesicle below the female's mouth; the spermatophore, already opened by the male, releases the sperm as the eggs are produced. The females fasten their eggs to seaweed or to the ocean bottom by a viscous filament. The eggs of deep-water squid are free-floating.

Squid species vary greatly in size. The common squid of the east North Atlantic coast is 30 to 45 cm (12 to 18 in) long, and the giant squid, at least 18 m (60 ft) long, is the largest aquatic invertebrate. It lives at depths of 300 to 600 m (985 to 1970 ft), where it is the prey of sperm whales. Scientific classification: Squid belong to the order Teuthoidea of the class Cephalopoda. Squid that secrete luminescent ink are classified in the genus *Heteroteuthis* of the family Sepiolidae. The common squid of the east North Atlantic coast belongs to the family Loliginidae and is classified as *Loligo vulgaris*. The giant squid is classified in the genus *Architeuthis* of the family Architeuthidae.

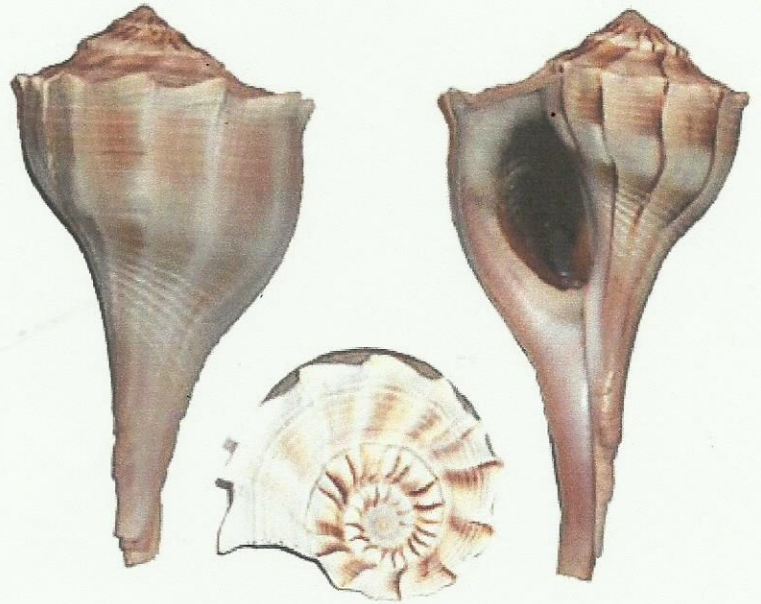
"Squid," Microsoft® Encarta® Online Encyclopedia 2003

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Texas State Shell (Station 7)

Lightning Whelk

Texas designated the lightning whelk as the official state shell in 1987. Large and distinctive; the lovely Lightning Whelk is found only in the Gulf of Mexico and Southeast Atlantic coast of the USA. Most spiraling shells open to the right with a rare specimen opening to the left. The Lightning Whelk's Latin name (*Busycon contrarium*) indicates its contrary nature, as it normally opens left. Lightning Whelks grow to one foot in length, though 15 inches has been recorded. Strong summer storms often wash large shells ashore - if you should find a live Whelk, please put it back in the water where it belongs.



These shells have inhabited our waters for 60 million years and have been significant to cultures in our history. Indians used whelks as food, housewares and weapons; remains have been discovered in burial grounds. The natural shape of the shell lends itself to practical uses (for instance, large whelks of all kinds have been used worldwide as lamps).

Even Whelk egg cases were utilized. Long ago, sailors used sandy clumps of egg strands to scrub themselves. Left-handed shells are considered sacred in parts of Asia and India, where a left-hand Whelk is very rare, so sailors visiting the Western hemisphere collected the common left-handed Lightning Whelk to sell for a profit in the East. This commerce continues today.



Lightning Whelk with egg casing. It is in the class: Gastropoda