

Molluscs Fact Sheet

Beauty and Diversity

Beautiful spiral shells are a distinctive feature of this group of organisms. But the basic structure of all molluscs that drives their adaptability is a fleshy soft body. The word mollusc is from the Latin, *mollis*, which means soft. Many molluscs evolved hard shells to protect their delicate bodies. But some have shed the shell and developed features to both escape from and become fast-moving predators.

Molluscs evolved about 500 million years ago. They began as bottom feeders, but some evolved to swim, like the now-extinct **ammonites**. These large, spiral-shelled predators filled ancient seas. Their closest modern relatives are octopuses, squid, and cuttlefish.



A banded tulip snail (*Fasciolaria hunteria*) moves using its muscular foot. *James St. John, Flickr*

A Basic Body Plan Evolves

The diversity of molluscs shows how a basic body plan can evolve into a variety of different forms. They were able to adapt for survival on land, shallow waters, and in the deep ocean. Modern molluscs range from microscopic organisms the size of a grain of sand to the giant squid, which can be over 21 meters (70 feet) long! There are about 85,000 named living species of molluscs, and likely an astounding 200,000 species in all. They are the largest marine phylum.



One of many extinct species of ancient ammonites
Jürgen Sieber, Pixabay

What Body Structures Do Molluscs Share?

- **A Muscular Foot**

A **muscular foot** is used for moving and other tasks like obtaining food. In cephalopods, the foot evolved to become a jet propulsion system by pumping water through a funnel.

- **A Mantle**

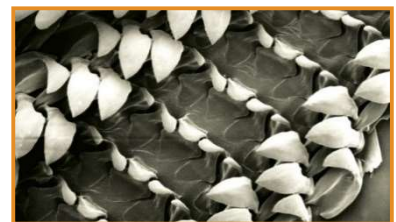
The **mantle** covers the body and secretes the shell (if there is one). The mantle cavity contains **gills** for absorbing oxygen.

- **A Radula in Many Species**

The **radula** is made of teeth-like structures that scrape food, slice flesh, and drill into shells. In some, the teeth have become dart-like structures for delivering venom. **Bivalves**, like clams, lack a radula.

- **A Shell in Many Species**

Made of calcium carbonate, shells are key for protection. Some molluscs, like squid, have greatly reduced, internal shells. Others have evolved to completely lose a shell, like slugs, nudibranchs, and octopuses.



Magnified radula with sharp teeth



One of many species of mollusc with a vibrant, spiral shell *Ralph Klein, Pixabay*

Magnificent Molluscs Include:

- **Bivalves** (clams, oysters, mussels, and scallops) have a pair of hinged shells and a single, muscular foot with which they move and burrow.
- **Cephalopods** (nautilus, squids, cuttlefish, and octopuses) are important predators. Cephalopod means 'foot-on-head.'
Some cephalopods have the following adaptations.
 - **Chromatophores:** These pigment-containing skin cells in cuttlefish, squid, and octopuses let them quickly change colors and patterns.
 - **Ink as a defense:** Cuttlefish, squid, and octopuses squirt out clouds of ink to mask themselves or to confuse a predator.
 - **Complex nervous systems:** Octopuses have one of the most advanced brains of all invertebrates. They are known to use tools, like coconut shells, and solve problems in lab experiments.
 - **Jet propulsion:** Cephalopods can pump water through their muscular foot to jet away from predators.
 - **Buoyancy control** to adjust depth in water: A nautilus does this by changing the amount of fluid in the chambers of its shell.
- **Gastropods** are very diverse. Gastropod means 'foot-on-stomach.' They live in almost all available habitats, including deserts and near the Arctic. Snails have shells for protection. Slugs lack a noticeable shell.

Life Cycle

- Most molluscs release eggs and sperm for external fertilization. Some molluscs, like **cephalopods**, have internal fertilization.
- The fertilized eggs of many marine molluscs hatch to become drifting larvae. These larvae are an important component of **plankton**, which is critical in marine food webs.
- Cephalopods and terrestrial molluscs (slugs and land snails) develop directly into juveniles. They do not have a larval phase.
- Female octopuses have unique breeding behaviors. After laying egg masses, they guard them until they are ready to hatch. The female then dies soon after.

Learn More with Shape of Life Videos

- "Molluscs: The Survival Game": shapeoflife.org/video/molluscs-survival-game
- "Molluscs: Pycnopodia Chases Abalone": shapeoflife.org/video/molluscs-pycnopodia-chases-abalone
- "Molluscs: Moon Snail Preys On Cockles": shapeoflife.org/video/molluscs-moon-snail-preys-cockles
- "Molluscs: Nautilus Regulates Its Buoyancy": shapeoflife.org/video/molluscs-nautilus-regulates-its-buoyancy
- "Molluscs: Octopus Camouflage": shapeoflife.org/video/molluscs-octopus-camouflage
- "Molluscs: Blue-Ringed Octopus Warning Coloration": shapeoflife.org/video/molluscs-blue-ringed-octopus-warning-coloration
- "Molluscs: Octopus Catching Crab": shapeoflife.org/video/molluscs-octopus-catching-crab
- "Peter Ward: The Ancient Nautilus": shapeoflife.org/video/peter-ward-paleontologist-ancient-nautilus
- "Mollusc Animation: Abalone": shapeoflife.org/video/mollusc-animation-abalone
- "Mollusc Animation: Shell Repair": shapeoflife.org/video/mollusc-animation-shell-repair
- "Mollusc Animation: Nautilus Body Plan": shapeoflife.org/video/mollusc-animation-nautilus-body-plan
- "Mollusc Animation: Squid Body Plan": shapeoflife.org/video/mollusc-animation-squid-body-plan



The dazzling blue mantle of a giant clam: The hole in the center is its siphon, a tube-like structure that draws water in and out of the mantle cavity. *Richard Ling, Flickr*



Can you see it? Cuttlefish know how to blend in. *Paul Kli, Wikimedia Commons*



A nautilus pumps water through its muscular foot for jet propulsion!
Profberger, Wikimedia Commons



A deep-sea octopus guards her eggs.
Ocean Exploration Trust / NOAA