

Marine Arthropods Fact Sheet

Adaptable Arthropods

Phylum **Arthropoda** makes up more than 80% of all named animal species. And they are the most abundant group of animals in the ocean. Arthropods live in all marine habitats, from the **intertidal zone** to deep-sea **hydrothermal vents**. The key to their amazing diversity and success in the ocean is their adaptable body plan.

Shared Body Structures

Arthropods have many different shapes and distinct body parts. But all arthropods have **four structures in common**:

1. A Segmented Body

- All arthropod bodies are divided into **segments**.
- In many species, the segments are grouped into three functional units: the **head**, **thorax**, and **abdomen**.
- Some species have a **cephalothorax**, which is a fused head and thorax. **Crustaceans** (crabs, lobsters, and shrimp) have this type of fused segment.
- Usually, each segment has a pair of appendages.

2. Jointed Appendages

- Segmentation allowed these organisms to evolve specialized **appendages**. Appendages are limbs or other projecting parts.
- The appendages are jointed, which makes them flexible. They are controlled by tendons and powerful muscles.
- Jointed legs allow flexibility and range of motion. They can work as shock absorbers. The name arthropod means “jointed foot” in Greek.
- In primitive arthropods, each segment had a similar appendage. Through evolution, appendages adapted to become the legs, antennae, claws, and mouthparts we see today. These all perform different functions.

3. An Exoskeleton

- A rigid structure, called an **exoskeleton**, covers the body. This hard shell is made of a nitrogen-rich sugar called **chitin**. In contrast, **vertebrates** like birds, mammals, and reptiles have an internal skeleton.



A crab gathers food with its jointed appendages in the intertidal zone, where the land meets the sea.
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A lobster's body is grouped into the cephalothorax, which the jointed legs are attached to and most of the internal organs are housed in, and the abdomen. The abdomen is mostly used for swimming and escaping predators. Females also carry their eggs beneath their abdomen.



Leg flexing at joint
Crustaceans like crabs and lobsters are named for their crust-like exoskeletons, which protect them like armor and hold in water.

- The exoskeleton supports the body and provides protection, like armor. It also prevents water loss. Body parts and muscles attach to the inside of the exoskeleton.
- Because their exoskeletons are rigid, arthropods must shed them in order to grow. This process is called **molting**. The arthropod sheds its exoskeleton and grows a new one.

4. Bilateral Symmetry

- **Bilateral symmetry** describes a type of body plan. It means the left side of the body is basically a mirror image of the right side of the body.
- The number of appendages on the left side is equal to the number of appendages on the right side. Many other animals, including worms, snails and humans, have bilateral symmetry.



Screenshot from the “Arthropods: Blue Crab Molting” video from Shape of Life. Watch it emerge from its old exoskeleton: shapeoflife.org/video/arthropods-blue-crab-molting.

Life Cycle

All marine arthropods begin life as a fertilized egg. The majority of species then go through several juvenile **larval** stages. The larval stage is usually quite different from the adult stage. Some species, such as lobsters, emerge from eggs as a smaller version of their adult form. They molt to reach the adult stage.

Larvae of arthropod species are tiny **plankton** in the ocean. They are carried by currents until they settle out to become adults. This allows the larvae to colonize new areas. As tiny plankton, these larvae are an essential part of the food web.



A larval, free-swimming stage of a crab at 120x magnification. Immature forms of countless species play critical roles in marine food webs. Many of them are impacted by climate change and ocean acidification.
Photo by Josef Reischig, Wikimedia Commons

Classification

Animals in the phylum **Arthropoda** have a tremendous variety of body shapes and ways of living. They first evolved and diversified during the **Cambrian Explosion** 540 million years ago. Some distinct groups of marine arthropods are:

- **Crustaceans** include some of the most prized human foods, such as lobsters, king crabs (12-foot leg span!), and shrimp.
- **Trilobites** are an extinct group of marine organisms that were the top predators in the sea for millions of years. They are some of the earliest-known arthropod species.
- **Chelicerates** include terrestrial species like spiders and scorpions, the marine horseshoe crabs, and extinct sea scorpions called Eurypterids.
- **Pycnogonids** look like marine spiders because they have long legs and a small body.



Walliserops were ancient trilobites that had trident-like appendages.
Photo by Daderot, Wikimedia Commons

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- “Marine Arthropods: A Successful Design”: shapeoflife.org/video/marine-arthropods-successful-design
- “Marine Arthropod Animation: Body Plan”: shapeoflife.org/video/marine-arthropod-animation-body-plan
- “Arthropods: Blue Crab Molting”: shapeoflife.org/video/arthropods-blue-crab-molting
- “Arthropods: Horseshoe Crab”: shapeoflife.org/video/arthropods-horseshoe-crab