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## Invertebrates

Heather Brennan 17.4K reads

Although humanity has a tendency to focus on the vertebrate species, those that have a backbone or bony skeleton, there are many many more invertebrates than vertebrates.

In fact, 97% of all species are invertebrates. Invertebrates are believed to have been the first animals to evolve. It is thought that they developed from unicellular, food eating microorganisms.

There is fossil evidence of invertebrates as far back as 600 million years ago in the late Precambrian era. There is tremendous diversity among invertebrates. The category includes everything from protozoans and sponges to insects, squid, and spiders.

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## Types of Invertebrates

There are more than 30 different phyla of invertebrate but the most common eight are listed below.

### Cnidaria

This includes the freshwater hydra, sea anemones, jellyfish, corals, sea pansies, and sea wasps. There are about 11,000 species of Cnidaria.

They are relatively simple organisms that are radially symmetrical. They are found exclusively in aquatic environments, with the majority of species found in marine environments.

## **Porifera**

These are the sponges, the simplest of all organisms. Although they are the least advanced from an evolutionary perspective, they are highly successful and have been around for over 600 million years.

They can be found in all aquatic environments. There are about 10,000 known species.

## **Annelida**

Annelids are segmented worms such as earthworms, leeches and ragworms. There are approximately 17,000 species of annelid. They can be found in terrestrial and aquatic environments.

They are bilaterally symmetrical vermiform animals with a nervous system and a true closed circulatory system and organs.

## **Nematoda**

Roundworms are referred to as nematodes. The approximately 12,000 species of nematodes can be found in most environments. Many are endoparasitic.

Unlike annelids they lack a true circulatory system.

## **Platyhelminthes**

There are about 20,000 species of flatworm. They include the flukes, tapeworms, and planarians.

While the turbellarians, which includes the planarians, are free-living, most of the remaining species are parasitic.

## **Mollusca**

The mollusks are one of the most diverse groups. They include snails, clams, mussels, squid, octopi, oysters and chitons. Most are soft-bodied with either a hard shell or chitinous plates.

They are found in virtually every environment on the planet. At least 50,000 known species exist and it is believed that there may be as many as 200,000.

## **Arthropoda**

This is the most successful phyla on the planet with over 1 million known species and estimates that there are millions of species yet to be discovered.

Most are very small and many inhabit very small environments. Ninety percent of arthropods are insects. The phylum also includes spiders, crustaceans, scorpions, centipedes, millipedes,

and many microscopic animals.

All arthropods have jointed legs and segmented bodies which are usually covered with a hard chitinous exoskeleton or cuticle. They can be found in virtually every environment on Earth.

## **Success of Invertebrates**

Invertebrates have evolved a wide number of unique adaptations that have allowed them to become so successful. They also form a crucial part of many environments.

For such small animals, they can cause a lot of damage to crops, plant life, and aquatic life when they are introduced as an invasive species. They have also been successfully introduced to areas as a control mechanism to eliminate or reduce invasive species.

Although a lot of research looks into physiology, phylogeny, and behavior, there is a lot of research into practical applications of insects and invertebrates in general that is applied to agriculture and conservation.

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