Difference Between Acoelomate and Coelomate

Key Areas Covered

Key Terms: Acoelomate, Coelom, Coelomate, Deuterostomia, Enterocoelom, Haemocoelom, Invertebrates, Mesoderm, Protostomia, Schizocoelom, Vertebrates

The coelom is a cavity present between the gut and the outer body wall. It is found in animals and serves as a basis of classification for the animal kingdom.

The presence of a body cavity that is lined by mesoderm is referred to as coelom, the presence of patches of mesoderm in the body cavity is termed pseudocoelom, and the total absence of body cavity is referred to as acoelom. The animals possessing the cavity are known as coelomates or eucoelomates, and those that do not have a cavity are known as acoelomates.

The coelomic activity is usually filled with a fluid called the coelomic fluid. In the fluid, many organs such as the kidney, heart and reproductive organs are suspended.

Let us now discuss the differences between a coelomate and an acoelomate animal in the table below.

Main Difference – Acoelomate vs Coelomate

A group of animals with bilateral symmetry is referred to as bilateria. The bilaterians comprise a head and tail, a back and belly as well as a left side and a right side. Deuterostomia and protostomia are the two

divisions of the bilaterians. Protostomia is the group of animals whose blastopore develops into the archenteron. The Protostomia mostly comprises invertebrates with three germ layers. The three divisions of the Protostomia are the acoelomates, pseudocoelomates, and coelomates. Deuterostomia is the group of animals whose blastopore develops into the anus. All Deuterostomia are coelomates. The **main difference** between acoelomate and coelomate is that acoelomate is **an invertebrate that doesn't have a coelom whereas coelomate is an invertebrate that has a true coelom**. A coelom is a fluid-filled body cavity, which is completely lined by the tissues derived from the mesoderm.

What is Acoelomate

An acoelomate is an invertebrate with three germ layers that lack a body cavity or a coelom. That means acoelomates do not possess a fluid-filled cavity between the body wall and the digestive tract. Therefore, the middle layer of the acoelomates is completely filled with organs and tissues. The middle layer of the body of the acoelomates is derived from the mesoderm. The other two germ layers are the endoderm and the ectoderm. Since acoelomates do not have a coelom, the internal organs, which are derived from the mesoderm, are not protected against the external pressure and shocks. In addition to the coelom, acoelomates also do not comprise a cardiovascular system and a respiratory system. Since acoelomates consist of thin and flat bodies, the gas exchange occurs by simple diffusion. The acoelomates comprise simple organized digestive tracts, nervous, and excretory systems. The elimination of the wastes is achieved through the specialized cells and tubules. A single orifice serves as both the inlet of food and the exit point of wastes. In addition, acoelomates comprise a defined head region with sensory organs to detect light as well as food sources.

Figure 1: A planarian

Platyhelminthes (unsegmented flatworms) are the most precise example of acoelomates. They are free-living animals in the freshwater habitats. Some Platyhelminthes are parasitic. Ribbon worms, tapeworms, flukes, and planarians are examples of Platyhelminthes. The planarian is shown in *figure 1*.

What is Coelomate

A coelomate is either a triploblastic vertebrate or invertebrate with bilateral symmetry that possesses a true coelom. Coelomates are also called **eucoelomates**. A coelom is a fluid-filled cavity, which lies between the body cavity and the gut. It develops from the mesoderm. The coelom serves as a cushion to internal organs of the animal body. Moreover, the coelomic fluid found inside the coelom serves as a hydrostatic skeleton. It opens to the exterior through coelomoducts such as oviducts. Based on the formation of the coelom during embryonic development, coelomates can be divided into three types. They are schizocoelom, enterocoelom, and haemocoelom. **Schizocoelom** is formed by splitting the mesoderm. Mollusks, arthropods, and annelids consist of a schizocoelom. **Enterocoelom** is formed from the wall of the embryonic gut. Echinodermata and Chordata consist of an

enterocoelom. **Haemocoelom** is a blood-filled cavity, which is found in arthropods and mollusks.
Coelomates can be found in both protostomes and deuterostomes.
Protostomes such as annelids, mollusks, and arthropods are coelomates.
Deuterostomes such as Chordata, Echinodermata, Brachiopoda, Ectoprocta, and Phoronida are coelomates. Acoelomates, ceolomates, and pseudocoelomates are shown in *figure 2*.

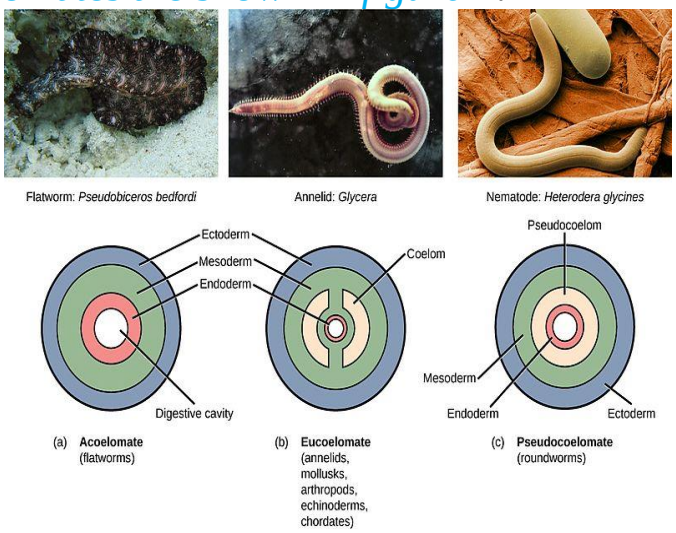

Figure 2: Acoelomates, coelomates, and pseudocoelomates

Similarities Between Acoelomate and Coelomate

- Most acoelomates and coelomates are invertebrates.
- Both acoelomates and coelomates are triploblastic animals with three germ layers.

Difference Between Acoelomate and Coelomate

Definition

Acoelomate: An acoelomate is an invertebrate that does not possess a coelom.
Coelomate: A coelomate is either a vertebrate or invertebrate that possess a coelom.

Vertebrates/Invertebrates

Acoelomate: Acoelomates are invertebrates.
Coelomate: Coelomates can be either vertebrates or invertebrates.

Protostomes/Deuterostomes

Acoelomate: All coelomates are protostomes.
Coelomate: Coelomates can be either protostomes or deuterostomes.

Mesoderm

Acoelomate: Mesoderm develops into internal organs in the acoelomates.
Coelomate: Mesoderm develops into internal organs and tissues as well as the coelom in coelomates.

Highly Developed Organ Systems

Acoelomate: Acoelomates lack a highly developed organ system.
Coelomate: Coelomates comprise comparatively developed organ systems than acoelomates.

Body Cavity

Acoelomate: The only body cavity of an acoelomate is the digestive cavity.
Coelomate: Coelom and the other cavities in the internal organs along with the digestive tract are the body cavities of coelomates.

Segmentation

Acoelomate: Acoelomates are unsegmented animals.
Coelomate: Coelomates are segmented animals.

Cushioning Effect

Acoelomate: Internal organs are not embedded in a fluid.
Coelomate: Since the internal organs of the coelomates are embedded in the coelomic fluid, the excessive pressure and shocks do not harm to the organs.

Examples

Acoelomate: Ribbon worms, tapeworms, flukes, and planarians like Platyhelminthes are the examples of acoelomates.

Coelomate: Chordata, Echinodermata, Brachiopoda, Ectoprocta,

Coelomate	Acoelomate
Description	
Coelomates are organisms with a fluid-filled cavity between the gut wall and the outer body wall.	An acoelomate is an organism that does not contain a fluid-filled cavity in their bodies.
Type of animal	
Both vertebrates and invertebrates.	Only invertebrates.
Organs	
The organs, such as the kidney and heart, are suspended in the coelomic fluid. The coelom compartmentalises the animal's body for the free movement and growth of the organs.	The organs are not suspended and cannot move freely for growth.
Protection	
The coelomic fluid acts as a shock absorber and protects the internal organs from crushing.	There is no protection of internal organs from crushing.
Classification	
The coelomates are divided into Protostomes and Deuterostomes on the basis of their embryological development.	No such classification.
Nutrients	
The coelom provides a space for the diffusion of gases and nutrients.	Nutrient transport occurs through passive diffusion.
Organ System	
The presence of coelom promotes complex organ systems in animals.	It does not promote complex organ systems.
Examples	
Annelids, molluscs, arthropods, echinoderms, hemichordates and chordates.	Platyhelminthes

Phoronida, Mollusca, Arthropoda, and Annelida are the examples of coelomates.