ORGANIZATION OF COELOM AND ITS SIGNIFICANCE

❖ **Introduction**
A coelom is a fluid-filled body cavity found in most animals which is located in the mesoderm, derived from the splanchnic mesoderm, the middle germ layer only found in triploblastic (three-layered) organisms. Though the coelom developed in triploblastic animals, some of these animals have lost their coeloms.

In the past, zoologists grouped animals based on characters related to the coelom. The presence or absence of a coelom and the way in which it was formed was believed to be important in understanding the phylogenetic relationships of animal phyla. However, recent molecular phylogenies have suggested this characteristic is not as informative as previously believed: the coelom may have arisen twice, once in protostomes and once among the deuterostomes.

❖ **Types of coelom**
In Aceolomates, blastocoel is completely occupied by mesenchyme. In Pseudocoelomate, blastocoel is partly filled by mesenchyme and the unoccupied portion exists as pseudocoelom. In Coelomates, blastocoel is completely replaced by true coelom.

❖ **Evolution and development of the coelom**
The evolutionary history of the coelom is uncertain. There are two contending theories about the emergence of the coelom: the acoelomate theory and the enterocoel theory. The acoelomate posits that the coelom evolved from an acoelomate ancestor, while the enterocoel theory posits that the coelom evolved from gastric pouches of a cnidarian ancestor. While neither have been proven false, there is more research supporting the enterocoel theory.

The development of the coelom begins in the gastrula stage, and can be formed by one of two processes: schizocoely or enterocoely.

In schizocoely, a blind pouch called the archenteron forms as the embryo’s digestive tube beings to develop. The mesoderm splits into two layers, one attaching to the ectoderm (which becomes the parietal layer) and the other surrounding the endoderm (which becomes the visceral layer). The space between these two layers becomes the coelom of the organism.

In enterocoely, the mesoderm buds from the walls of the archenteron then hollows out to form the coelomic cavity.
Examples of Coelomates
Mollusks, Annelids, and Some Arthropods
Clams, snails, slugs, octopuses, earthworms, and are protostome coelomates, meaning they are formed from head to foot (or mouth to foot). The mouth first develops from the blastopore, which is the first developmental opening. Protostomes undergo spiral and determinate cleavage in the early embryonic stages, and the coelom is formed through the process of schizocoely.

Echinoderms and Chordates
Sea stars, sea urchins, fish, and humans are deuterostome coelomates, meaning they are formed from anus to head. The blastopore becomes the anus, and the mouth is formed later. Deuterostomes undergo radical and indeterminate cleavage in the early embryonic stages; the coelom is formed through the process of enterocoely.

❖ Significance
The advantages of the coelom are as follows:
1. The organs like that of the digestive tract need more space to grow. Coelom allows this extra space for such organs.
2. Some organs like gonads need more space only during the breeding season. Some animals which give birth to young ones need more space only during certain stage of their life. This space is arranged by the coelom.
3. Coelom also allows the formation of well-organized circulatory system with an efficient heart to draw blood from vessels.
4. Coelomic fluid transports materials faster than diffusion. Generally, animals fill food or waste products into the coelom. These products are distributed as required.

5. Coelomic fluid generates effective hydrostatic force against which the muscles of the animals act.