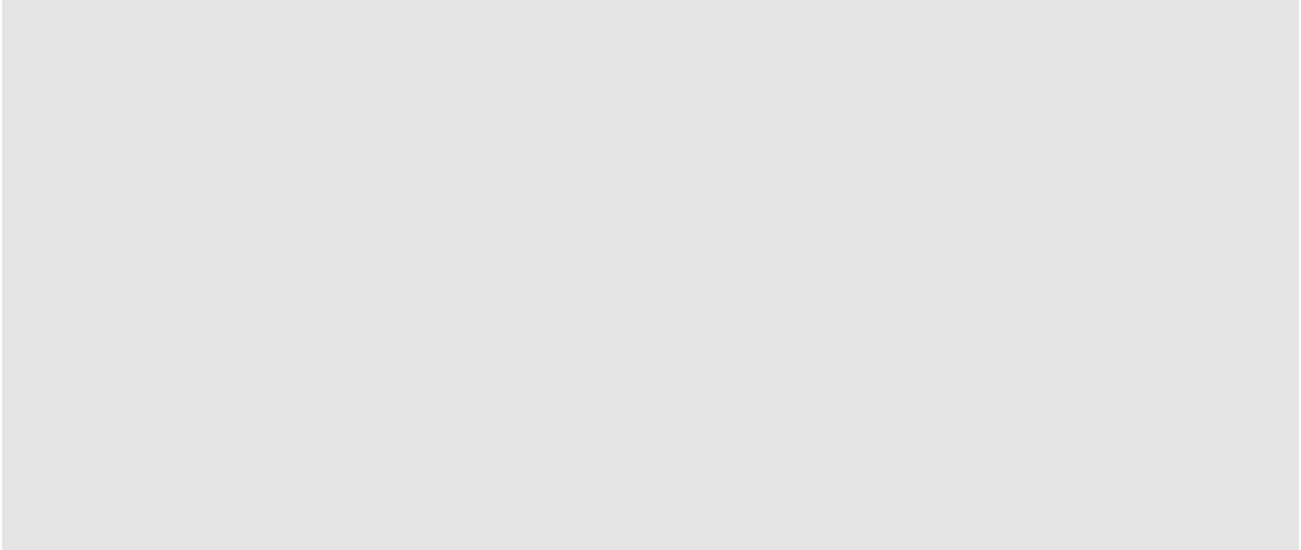


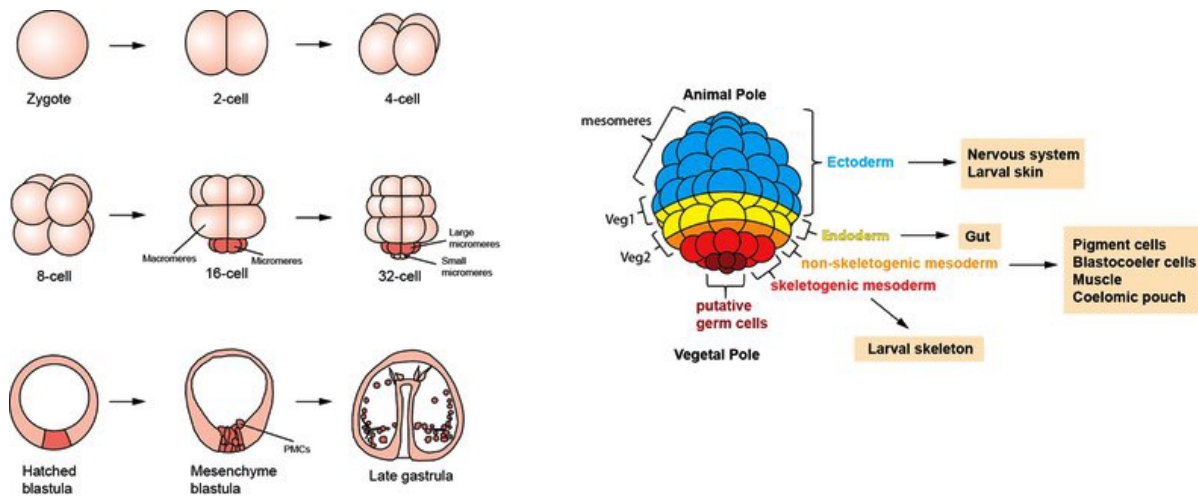
Embryo Development

After ovum is fertilized it will proceed to rapid cell division that will produce multiple cells. This is **cleavage stage** of early development. During the cleavage stage, dividing cells completes the S phase and M stages of mitosis. The absence of G1 and G2 phases in the cycle allows division to happen faster than normal. As a consequence of the absence, on the other hand, is the absence of growth of the daughter cells since there is no protein synthesis. Thus, the size of the fertilized ovum will be maintained by the total volume of the daughter cells during the cleavage. The ball of cells after the cleavage is called the morula.

In the process of the fifth to seventh cleavage division, a hollow space is produced in the middle of the ball of cells called the blastocoel. The **blastocoel** is a fluid-filled cavity



is made up of cellular and tissue-based processes that will mold the future body of the animal. Gastrulation will start morphogenesis. The cells on the surface of the blastula will move to the interior of the cell and establish the germ layers and the primitive digestive tract. The gastrula formed from the cellular movement may be 2-layered or 3-layered. Two-layered embryo has the endoderm and ectoderm while the 3-layered embryo will be made up of ectoderm, mesoderm and endoderm. These layers will give rise to respective organs in the body. Furthermore, during gastrulation cells at one end invaginate creating a depression. The depression is shallow initially but as it advances to the opposite pole, it forms a tube from where the depression began to the opposite pole where it will fuse with the endodermal cells and creates another opening. The initial opening is referred to as the **blastopore** while the mound of cells that moves to the opposite end is called the **archenteron**. The 2 openings of the gastrula and the tube that is in between is the embryonic gut. Based on the fate of the blastopore organisms are classified into two, **protostome** when the blastopore becomes the mouth and **deuterostome** when the blastopore becomes the anus. Humans are deuterostomes.



The list below gives some of the organs that will originate from the endoderm, mesoderm and ectoderm, respectively.

Ectoderm	Mesoderm	Endoderm
Epidermis of the skin Germ Cells Pituitary gland	Skeletal and muscular systems Excretory and	Epithelial lining of the gastrointestinal,
system	lymphatic systems Adrenal cortex Dermis of the skin	and ducts Thymus, thyroid and parathyroid

Zygote Development in Other Animals

Development of the fertilized ovum to become the zygote is different for different types of animals. The difference is usually driven by their habitat and the anatomy of the animal. There are 3 types of zygote development namely oviparous, viviparous and ovoviviparous. **Oviparous** is observed in fishes, amphibians, reptiles, bird and one mammal. This type is commonly known as the egg laying animal where the zygote is housed in calcium-rich shell that surrounds the egg. It is usually deposited in an appropriate environment and after a period of incubation is expected to hatch out young ones.

Viviparous is characterized as having internal fertilization as well as internal development. This type of development is common in mammals where an anatomical structure called uterus houses the fertilized ovum after fertilization and throughout its development. The uterus also supports the developing embryo by giving it nutrition and protection against harmful agents external to it. After a period of development, the offspring is delivered as a living young often smaller versions of the parents.

Ovoviviparous is partly oviparous and viviparous development. Initially, internal fertilization will result to

