Name _____ Hour___

Early Embryology

Directions:

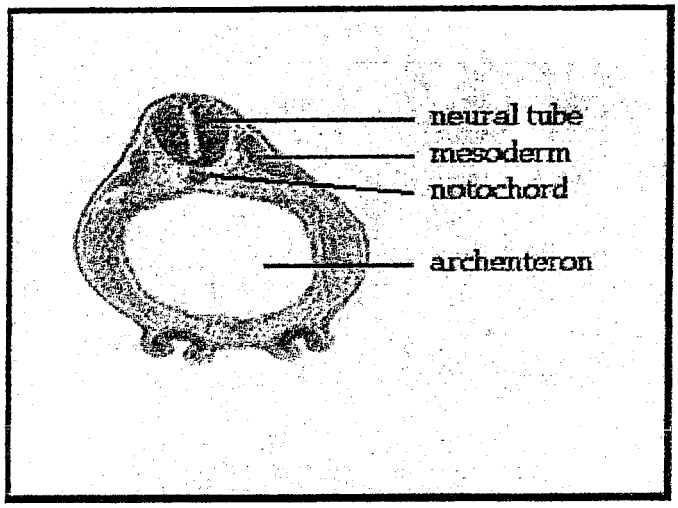
Part I

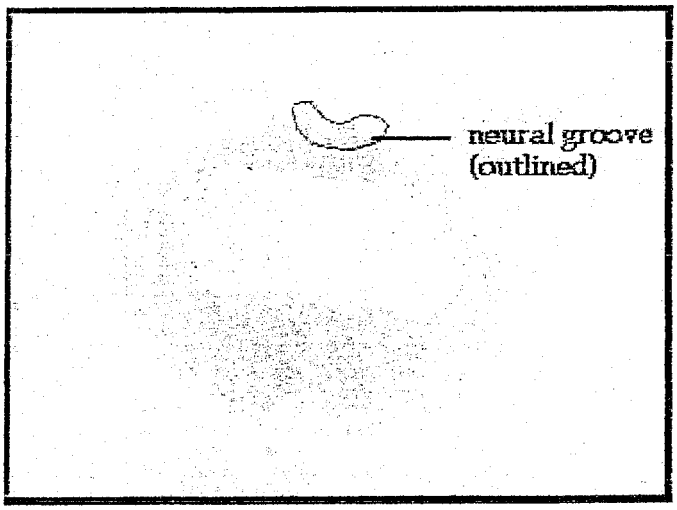
1. Read page 37 in lab manual.
2. Turn to page 40 and read Radial Cleavage: Early Embryology of the Sea Star.
3. Set up your microscope and pick-up a prepared slide from the front of the room. Make sure to use the different objective lens to produce the best image. List the magnification used in your drawing (example 40X).
4. Fill in the table below.

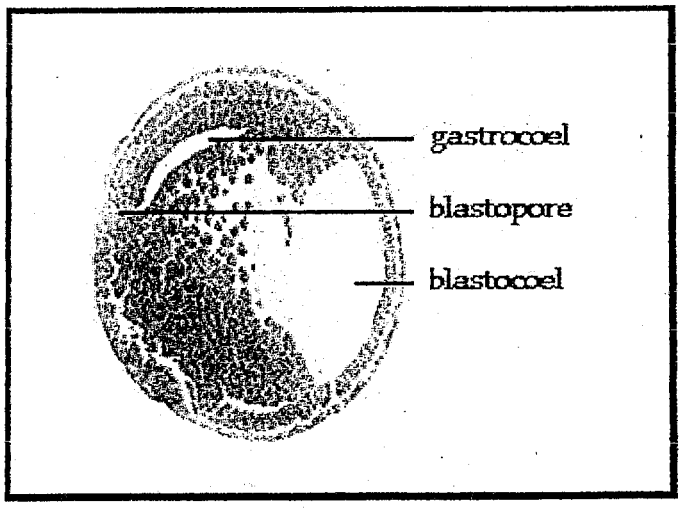
Sea Star Asterias	List Distinguishing Features
Unfertilized egg	
Fertilized undivided egg	
Eight-cell stage	
Blastula	
Gastrula	

Part II

1. Turn to page 45 of the lab book. Read Exercise 3C on Frog Development.
2. Pick-up a prepared slide from the front of the room.
3. Examine the cross sections of various stages of development.
4. Sketch the stages of the frog development below. Use page 46, Figure 3-10 to help you in labeling the necessary parts. Make sure to use the different objective lens to produce the best image. List the magnification used in your drawing (example 40X).







The frog gastrula is composed of three germ layers: the **endoderm**, the **mesoderm** and the **ectoderm**. The endoderm is formed primarily from the region of the yolk plug and the floor of the archenteron. The dorsal roof of the archenteron forms endoderm and mesoderm. The sliding animal cells form ectoderm and ultimately cover nearly the entire gastrula. Endoderm tissue becomes the adult endocrine glands, digestive, respiratory and reproductive systems. The mesoderm forms the excretory tract, muscles, bone, blood and connective tissue. The ectoderm forms the skin and mucous membranes that line the various other systems and also, unexpectedly, forms the nerves and sense organs. The derivation of the nerves and sense organs from ectodermal tissue is a result of the next step in vertebrate development, **neural tube formation**. Sea urchins and other invertebrates do not go through this process.

Neurulation

During gastrulation a special layer of mesodermal tissue called the **chordamesoderm** develops along the dorsal longitudinal axis of the zygote (*i.e.* along the back). The ectoderm above this region thickens and forms the **neural plate** in a process called **neurulation**. The chordamesoderm itself becomes the **notochord**, the forerunner of the backbone. Later the edges of the neural plate rise and form a U-shaped groove, the **neural groove** or **neural fold**. Ultimately the rising edges grow inward, meet and form the hollow **neural tube**. The neural tissue becomes the brain and spinal cord, both retain the inner hollow areas of the neural tube. At this time, the embryo also begins to lengthen. The presumptive spinal cord is stretched and the tail begins to form.

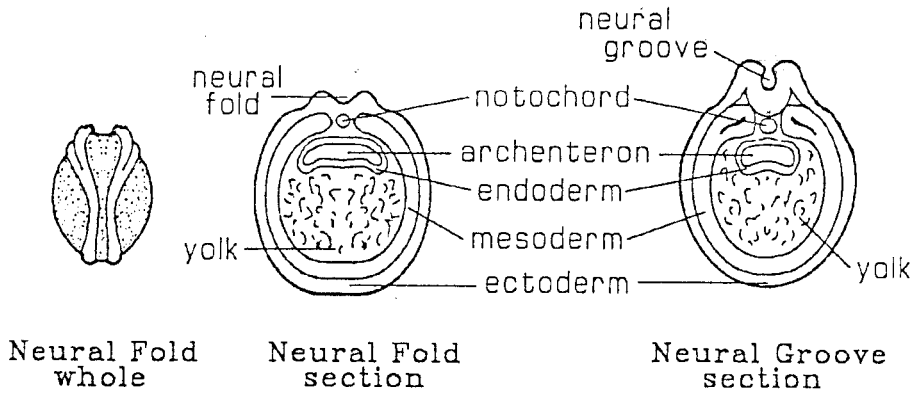


FIGURE 7.4: NEURULATION

Late Developmental Stages

Over time, further development occurs as cells differentiate into individual organs. This process is called **morphogenesis**. As long as a cell is in a primitive state it can develop into any tissue. Once the cell has become a presumptive tissue, mesoderm, for example, it can only become a type of cell associated with that tissue, *i.e.* bone, muscle or blood. A mesodermal cell cannot become nerve or digestive tissue. Once a cell is committed to becoming a blood cell it cannot become a bone cell. Several factors control the type of tissue a cell will become and at what level its fate is irreversibly sealed. These factors include hormones, other chemical messengers, the cellular environment and communication with neighboring cells.