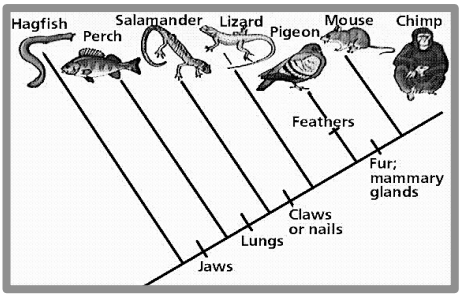
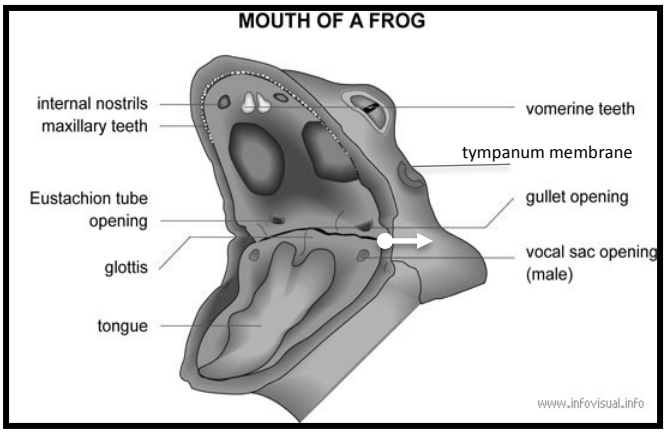
Objective: To compare and contrast the structure and function of the frog's organs and organ systems to those of other organisms by finding and labeling parts according to organ system.



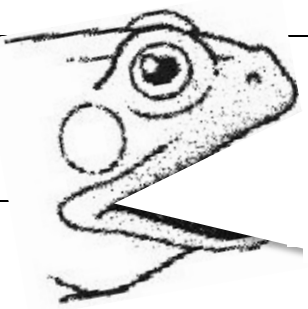
Frogs are Chordates (nerve cord)**, Vertebrates** (back_ _ _ _) and **Amphibians** (live on w_ _ _ _ and then land)**. Their development → is between the f _ _ _ and the reptiles** (liz_ _ _ _ and snakes).

I. Frog External and Mouth: ☑ Mark organs as you find them!



1. Describe the color of the frog:
   ☐DORSAL SIDE_____
   ☐VENTRAL SIDE_____
2. The ☐DORSAL markings would camouflage it from _____in_____; the ☐VENTRAL markings help it hide from _____in_____.
3. Frogs have w_____feet for swimming and strong back legs for leaping.
4. Count the ☐TOES. To be a toe, it has to have a bone. Frogs do not have claws. Front___Back___
5. Hold the frog as if it were sitting just below water level. Look at the placement of the ☐EYES. It's EYES work like periscopes (as in a submarine). When it is just under water the eyes are _____and might look like two _____from the bank.
6. The frog's has transparent ☐EYELID (that the frog can see through) used like built-in gog _ _ _ _ .
7. Find the flat ☐TYMPANUM MEMBRANE near the eye. It picks up sound waves as does our _____.
8. Try to open the large ☐MOUTH. Can the frog grab and hold food like the crayfish?_____
9. **Find the TEETH by holding your pinky finger, fingernail down, in the frog's mouth. Describe the top ☐MAXILLARY TEETH.**_____ **Which way do they point?**_____**Why?**_____
   Find the ☐VOMERINE TEETH. What do they do?_____ **What about the lower jaw?**_____
10. **Safely use dissecting scissors. Cut both sides of mouth (see white arrow above) to open it wide.**
11. Find the ☐NOSTRILS inside and out. Are the NOSTRILS above water in question #5 above?_____
12. Where is the ☐TONGUE attached?_____. It is more elastic than ours and gets much longer when alive. How much longer would **yours** be if attached in front?_____
13. ☐EUSTACHIAN TUBES help equalize pressure inside and outside their heads. You can feel yours work in your ears when you go up a mountain where the air pressure is lower. (Think about your ears...Now swallow.) When would the frog's pressure need equalized? _____
14. **Watch videos: ☐Frog Tongue Projection** & **☐The fastest Animal (Tongue) BBC** (Science→Life→Animals)
15. **DRAW your frog's TONGUE:**

Draw the top view of your frog's TONGUE.	Look from the side to draw the TONGUE in this frog. Show the attachment. Label.



Have drawings checked while you have the frog. ☐

II. Frog Internal: The Dissection ☑ Mark organs as you find them!

1. Place your frog VENTRAL side up on your paper towel.

2. **Using the "Empty Frog" drawing on page 3 as a guide. Use a scissors to carefully cut the SKIN ONLY as pictured. You will have to trim off some skin to get it to match.**

3. **Have checked, BEFORE YOU GO ON (when you get your frog to match the drawing).**

4. **Cut off the flaps of SKIN. Then, cut the MUSCLE the same place as you did the SKIN. You will have to cut through BONE between the front legs. Cut off all flaps.**

6. **<u>Observe</u>, but DO NOT REMOVE ANYTHING. You will find the organs first. Some organs will have to be moved gently aside to see other organs.**

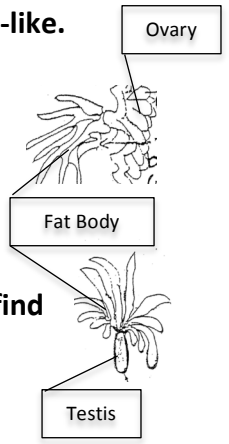
7. **Find the yellow □<u>FAT BODIES</u> first. Frogs don't have fat all over their bodies like we do. Their fat is in yellow finger like <u>FAT BODIES</u> and is attached on each side by the reproductive organs.**

8. **Move the FAT BODIES until you find where they are attached. Reproductive parts and yellow <u>FAT BODIES</u> are attached at almost the same place. Look and read!**

   8.1 Females: If the female has no EGGS, the □<u>OVARY</u> will be white and almost lace-like. If the female has black and white EGGS in enlarged <u>ovaries</u>, the coiled □<u>OVIDUCT</u> will be also enlarged preparing to deliver the EGGS to water.

   IF THE EGGS are in the way, ASK FOR HELP to remove them. They will remove all at once if you cut where the OVARY is attached.

   8.2 Males: The male has a tan bean-shaped □<u>TESTIS</u> by each fat body. You may find small curly tubes which are vestigial or useless oviducts that have no use.



9. **Is your frog a male or female? _____ Have checked.**

10. **Use the paper FROG PARTS images, on page 3, to IDENTIFY each organ. As you identify an organ, write the name of the organ ON the paper organ.**

11. **Have your "Paper Frog Organs" CHECKED.**

ONLY if all dissection is done:

EXTRA: Color the paper organs similar to the actual frog.

EXTRA: Ask for another copy of paper organs. Use small flaps of clear tape to place the organs in your "empty frog" paper. (If you color, color before you tape.) Always **tape on the left side as much as possible**. This allows the organs to be lifted to add or look at the deeper organs.

III. Empty Frog and Paper Frog Organs

Identify each organ in your frog. As you find an organ, write the organ NAME ON the organ below.

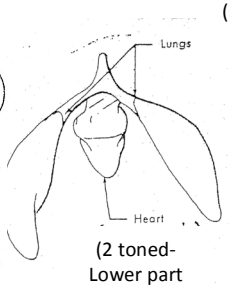
New Frog Species:

A new species of grassfrog was discovered in 2015 by Brian Kubicki on the Caribbean Slopes of Costa Rica.

Like the famous Muppet Kermit the Frog, it has bulging white eyes, Kelly green skin, the works.

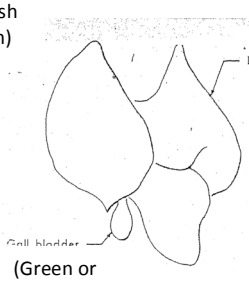
☐**Watch the video: Science→Life→Animals**

Diane's Bare-Hearted Glassfrog's scientific name is ***Hyalinobatrachium dianae***. You can call it ***H. dianae*** for short.



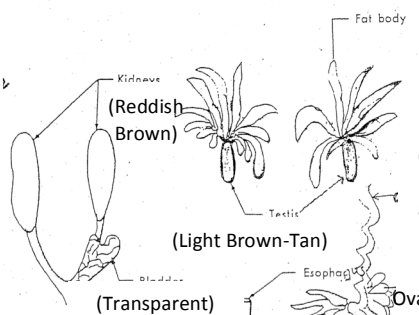
(Reddish Brown)

(2 toned- Lower part is lighter)



(Brown)

(Green or Transparent)

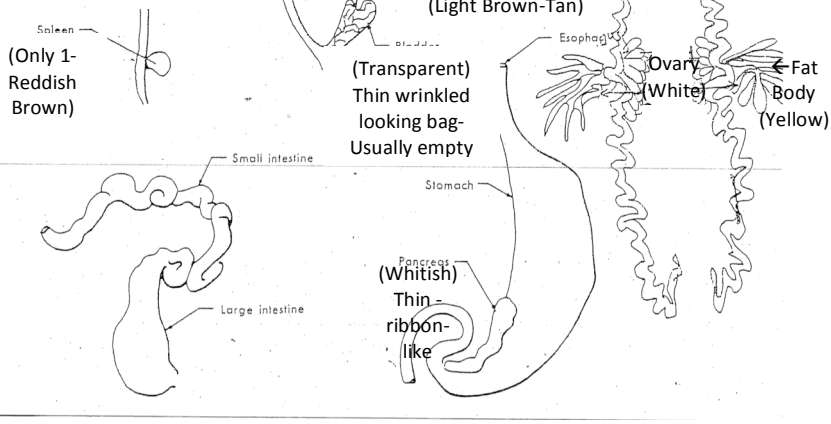


(Yellow)

(Reddish Brown)

Oviduct (White) May have black and white eggs.

(Light Brown-Tan)



(Only 1- Reddish Brown)

(Transparent) Thin wrinkled looking bag- Usually empty

Ovary (White)

Fat Body (Yellow)

(Whitish) Thin - ribbon-like

IV. DIGESTIVE SYSTEM

1. Use the drawings on the previous page to identify the digestive parts as you go.

2. **Remove the □STOMACH from the frog by cutting 1) at the □ESOPHAGUS and 2) where it meets the □SMALL INTESTINE. Remove it to your paper towel.**

3. **Cut lengthwise to open the STOMACH.** Remember, the frog eats it food whole. Did your frog eat just before it died? _____ If so, what? _____Have checked ☐ Observe the thick muscle and grooves of the stomach lining. It gives off strong digestive juice that or **gastric acid** (hydrochloric acid (HCl)), which dissolves food. The muscles m_____and mash the food so it is ready for the small intestine.

4. Gently tug the □SMALL INTESTINE. Notice the blood vessels and the □clear membrane (skin). Do the blood vessels or membrane keep it from coming out? _____ Remember, the food is needed at the cells for energy. The blood picks up liquid food here and takes it to every c_ _ _ .

5. BILE from the □LIVER is stored in the □GALL BLADDER. It digests fat. INSULIN from the □PANCREAS digests sugar. (People with diabetes take insulin to digest their sugar or their cells can't use it for energy.) BILE & INSULIN are released to the food at the small intestine. They help finish digestion.
   5.1 DIGESTION: Food is changed to a Li _ _ _ _ and useable form.
   5.2 ABSORPTION: digested food is moved into the b_ _ _ _ stream.

6. Are the INTESTINES named small and large because of their length or width?_____ **Measure and estimate their length in centimeters. □SMALL INTESTINE__cm. □LARGE INTESTINE ____cm** An estimate for the length of the human small intestine is 7 meters (23 feet). Our large intestine is about 1.5 m or 5 feet long. Because of folds and bumps (villi) the surface area is about 2,700 square feet for producing digestive juice and for absorption of food by the blood.

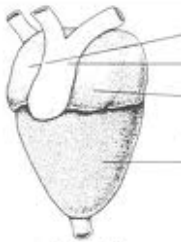
7. The digested food is picked up by the b_____at the s_____. The □LARGE INTESTINE has the undigested substances to store and _____ .

8. Review: Think of the frog eating a fly. Of the parts you found in the frog, list the DIGESTIVE ORGANS in the order starting with the first to deal with the fly.

a) m_____	e) s_____	i) p_____
b) t_____	f) s_____	j) l_____
c) t_____	g) l_____	
d) e_____	h) g_____	

9.
   a) The s_____ produces gastric acid, which is part hydrochloric acid (HCl).
   b) The l_____ makes BILE which digests fat in the small i_____.
   c) The p_____, near the stomach, produces insulin, which digests s_____.
   d) The g_____b_____ is a green bubble that stores bile from the LIVER

V. CIRCULATORY SYSTEM



1. **Notice that the □HEART has 2 main parts, the darker blood-filled upper □ATRIUM and the lower muscular (and lighter in color) □VENTRICLE. The □HEART is covered by a clear sac that may have torn. Locate the large □ARTERIES on the □ATRIUM (top) of the HEART.**

2. **Remove the □HEART by cutting above the □ARTERIES at the top of the h Then cut under the HEART and put in on a paper towel.**

3. **To see a VALVE, you need to cut the HEART from side to side, so it opens like a heart-shaped candy box. Hold the HEART with a small paper towel, turn your scissors sideways and then cut the HEART from side to side to get 2 parts.**

4. **A VALVE is a <u>one-way gate</u>. Inside the □HEART, find some "strings". These strings operate the □VALVE by catching blood and closing the blood vessel so the blood can't go the backwards.**

5. **Show your teacher (or another student) how a valve works using your palms and fingers.**
   - **__a. Hold your hands flat & tight together in front of you. Have someone else pretend to use a garden hose to run water between your hands and away from you. Then toward you.**
   - **__b. Which works? From palms toward fingers? ____ From fingers toward palms? _____**
   - **__c. Your palms represent the vessel to the VENTRICAL. Your fingers are the VALVE.**
   - **__d. Your fingers represent the strings of the frog HEART VALVE, which is almost like yours.**

6. **Show your teacher the □VALVE in your frog □HEART. Have Checked** ☐

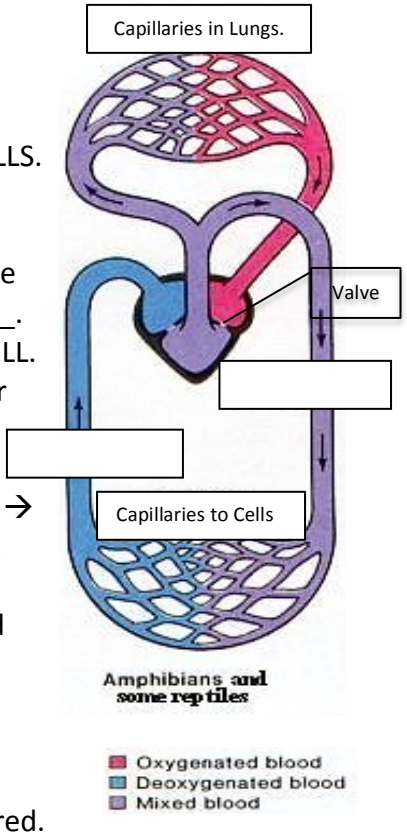
7. This is an artificial "ball and cage" heart valve. → Add arrows to show the direction of the blood flow.

8. **A**RTERIES take blood **A**WAY from the HEART. **C**APILLARIES take blood to **C**ELLS. VEINS take blood back to the HEART.

9. Along the way, BLOOD picks up liquid F_ _ _ at the SMALL INTESTINE to leave at each CELL. In the LUNGS, blood exchanges carbon dioxide for o_ _ _ _ _. KIDNEYS remove liquid wastes (urine). Food and oxygen is left at each CELL. At each CELL, BLOOD picks up wastes including carbon _ _ _ _ _ _ _, water and chemicals that are in urine.

10. Label: __ARTERIES __VEINS.→ __Add 3 direction arrows inside the heart. → __Add strings to a valve. __If not in color, add color according to the key.

11. Review: The HEART has two main parts. The upper A_ _ _ _ _ stores blood until the muscular V_ _ _ _ _ _ _ _ is ready for it. The VENTRICAL pumps (squeezes) the blood out. The V_____ closes so the blood has to go out the A_ _ _ _ _ _ _ the C_ _ _ _ _ _ _ _ _ _ to the CELLS, The ATRIUM is divided into 2 parts, making a 3-chambered HEART. In humans, the VENTRICAL is also divided in 2, so our HEART is 4-chambered.



VI. RESPIRATORY SYSTEM

1. Frogs hatch as TADPOLES with gills for O_2. As they grow their □LUNGS develop. Then they can get oxygen from the a_ _ . They also get some oxygen from their moist skin. The crayfish obtained oxygen from the w_ _ _ _ using gills. The earthworm took in oxygen through moist s_ _ _.

2. **Air from the mouth goes through the slit-like □GLOTTIS just in front of the ESOPHAGUS to the LUNGS. (See page 1.) Use a dry dropper to gently inflate the lungs through the □GLOTTIS**.

3. **Use a scissors to remove a □LUNG. Cut it open from side to side so it opens like a book.** It is a network of blood vessels where the bloods picks up **O_2** (from the air) and gives off _____.

4. **Look at the inner lining of the □LUNG with one of the handheld microscopes. Describe the network of □BLOOD VESSELS.**_____ **Have checked while you have the □LUNG**. ☐

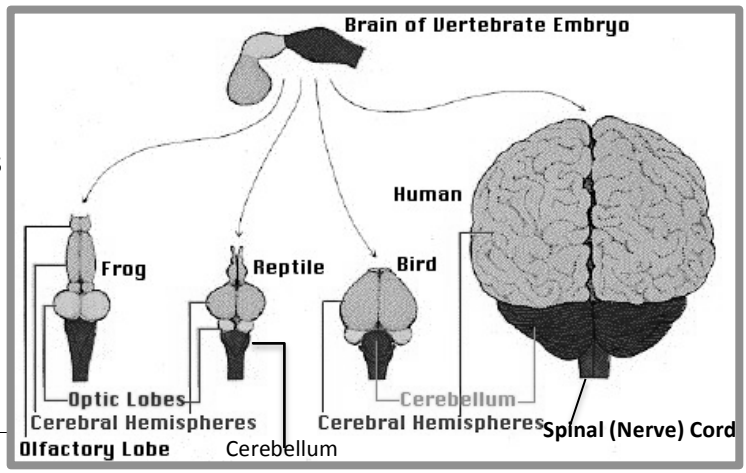
5. The oxygen is taken to the CELLS where it is combined with food to release en_ _ _ _. That process is CELLULAR RESPIRATION. RESPIRATION (cellular respiration) actually happens in the c_____ when cells combine (or burn) food with o_____ to produce energy. One waste product of this reaction is c_____d_____ which is picked up by the b_____and taken back to the LUNGS to be breathed out.

VII. NERVOUS SYSTEM

1. The frog's (and your) SPINAL (NERVE) CORD is found in the _____, protected by the backbone or □VERTEBRAE. Find it.

2. Vertebrates have internal □SEGMENTS obvious in the bones of the vertebrae and the GANGLIA (lumps) in the SPINAL CORD. NERVE BRANCHES take messages to the _____. GANGLIA direct _____ .

3. Name three of the frog's □SENSE ORGANS. _____ _____ _____



4. **IF TIME, ask for help to find the □BRAIN. Draw below what you find. Label. Have checked while you have the frog.** ☐

5. OLFACTORY LOBES deal with _____, OPTIC LOBES with _____, & the CEREBRAL HEMISPHERES (or the CEREMBRUM) deal with movement and decisions based on incoming messages.

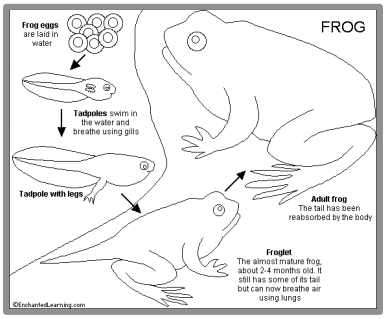
VIII. EXCRETORY SYSTEM

1. **Find the 2 main EXCRETORY SYSTEM parts, the □K_____ and □B_____.**
2. The _____ filters waste from the blood and are on each side of the backbone. What color are they?_____ Tubes lead from them to the _____ that stores liquid wastes. It is near the LARGE INTESTINE on the shelf of the LEGS.
3. **Find and describe the □URINARY BLADDER.**_____ **Have Checked** ☐

IX. REPRODUCTIVE SYSTEM: Reproduction and Development

1. You should have found the reproductive ☐OVARIES and ☐TESTES when you dissected. (See page 2.)

2. Frogs have external fertilization, meaning the SPERM is deposited on the EGGS as they are laid in the water. When the frog hatches it is still in EMBRYO form and called a TADPOLE. The change to adult is called METAMORPHOSIS (change-form).

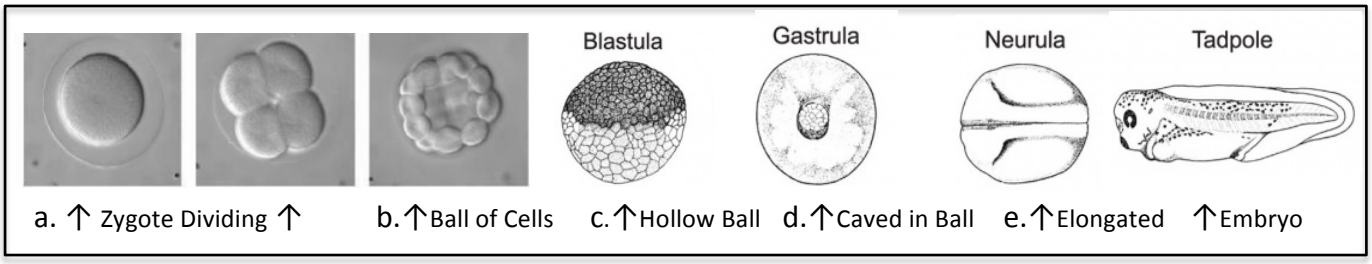


3. List the steps the frog development.
   1) EGGS laid and fertilized in water. 2) _____
   3)_____ 4)_____ 5)_____

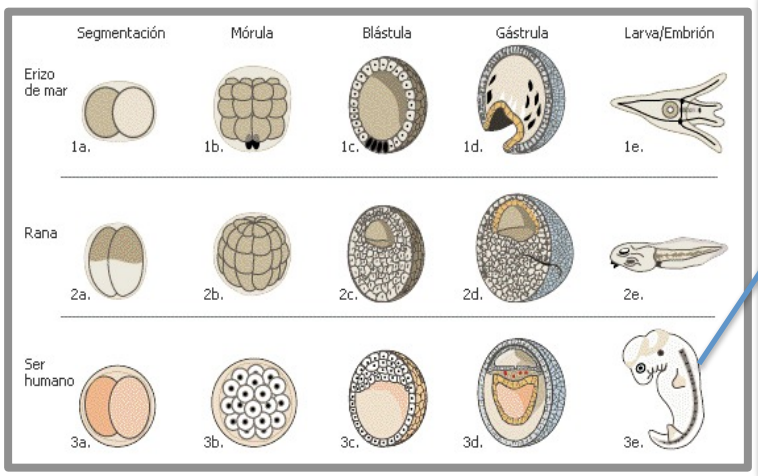
4. **Watch the videos**. ☐**Zebra Fish Development and** ☐**Sea Urchin….**
   (Science→Life→Animal→Embryo Development→Development→)

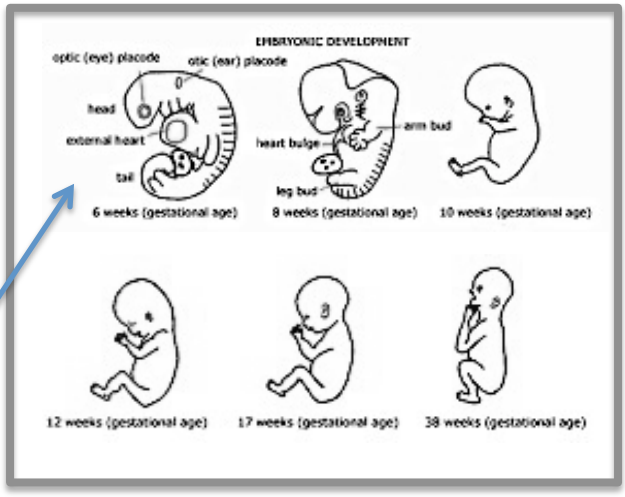
5. All animals and plants that have sexual reproduction start as fertilized e_ _ s or ZYGOTES.
   The ZYGOTE cell then divides into 2, 4, 8, ___, ___, ___ , ___ cells, and so on.
   We all soon became a ball of C_ _ _ S.

6. The drawings show how we all develop. The **ball of cells** turns into a **hollow ball (Blastula).**



7. Shown below are the above stages for the S**ea urchin, Frog and Human**.
   ↓**Label the 3 animal names in English.** The images on the right show more stages of the human





8. Write these terms in order. (Review #5 & 6 above.)
   __Ball of cells __embryo __fertilized egg __hatching(birth) __hollow ball __zygote
   1_____ 2 3 4 5 6_____