

# Animal Diversity I



## ANIMAL DIVERSITY

EVOLUTION THEORY INTRODUCED.

CRITERIA USED for CLASSIFICATION of ANIMALS.

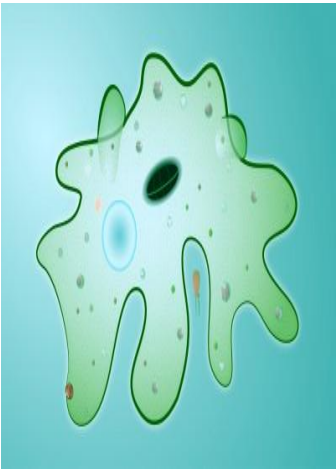


# INTRODUCTION



**THEORY** of Evolution: All living things came from one cell that formed *nearly* 4 bya. **Different** conditions across the world killed some of their **different** plans – the survivors (and their specific plans) carried on living in that area. This resulted in new variations of that original plan. (Evolution = Change).

Some (like some *Protists*) have survived in that simple form until now. Others have had to adapt (evolve) to become more complex so as to survive.



*Can this claim be proved right?* **NO.**

*Can it be proved wrong?* **NO.**

So it remains an unproved **THEORY** of what might have happened.



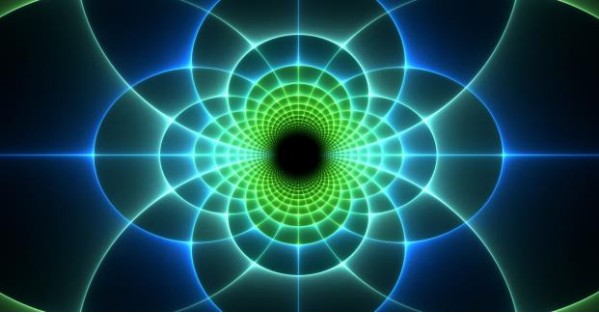


# BODY FEATURES USED FOR CLASSIFICATION (Table p. 38)

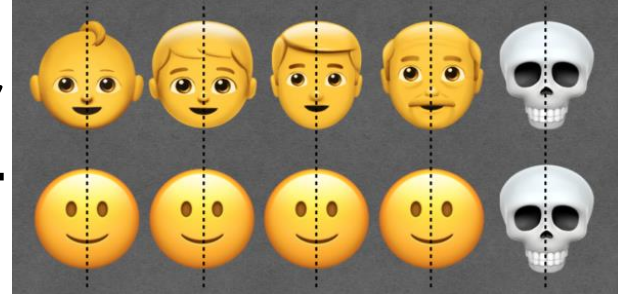


There are **30** Animal *Phyla*. We will study only **6**. We will start with the simplest, and build up to the most complex. Classification is based on **6** characteristics:

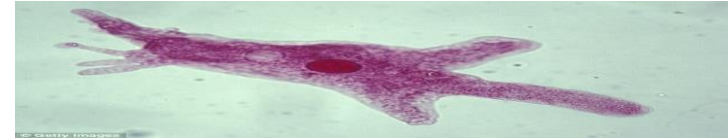
1. Symmetry = how **geometric** is its shape?
2. Cephalization = how developed is its **head/brain**?
3. Does its **embryo** have 2 layers of tissue, or 3?
4. Does it have a coelom cavity in its middle layer?
5. Does its gut have one opening, or two?
6. If it has blood, is its system **open**, or **closed**?



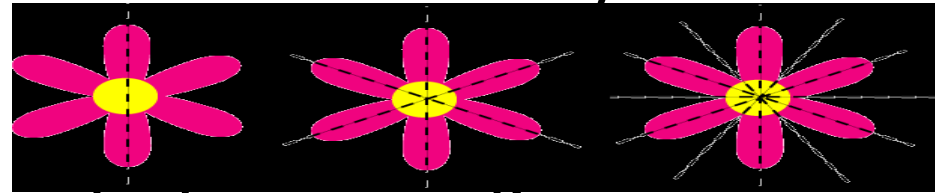
# 1. SYMMETRY



- **Asymmetry** = No fixed shape = no symmetry. Simplest. Often sessile = stuck in one place.

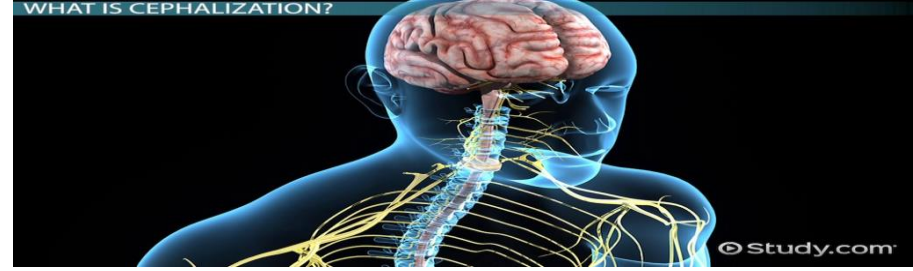


- **Radial Symmetry** = Body is built around a central point. Mirror images result if you slice through this point in any direction. These animals are often sessile (= *stay in one spot and do not move*).



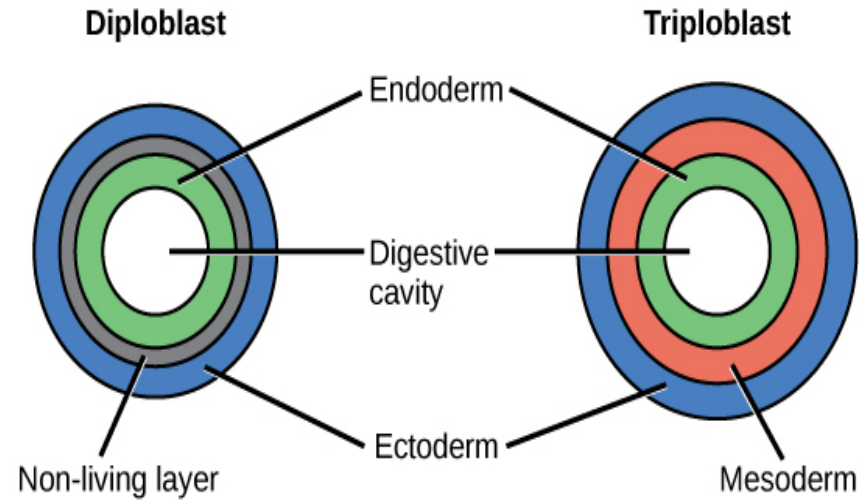
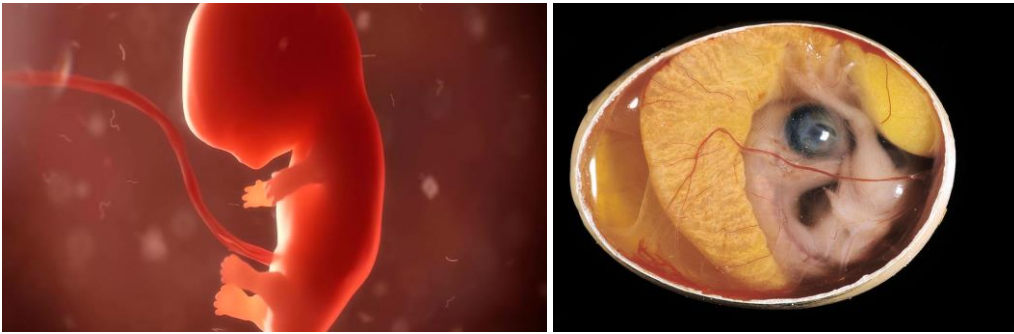
- **BiLateral Symmetry** = It only has one line you can slice through to get a mirror image of left and right.

## 2. CEPHALIZATION



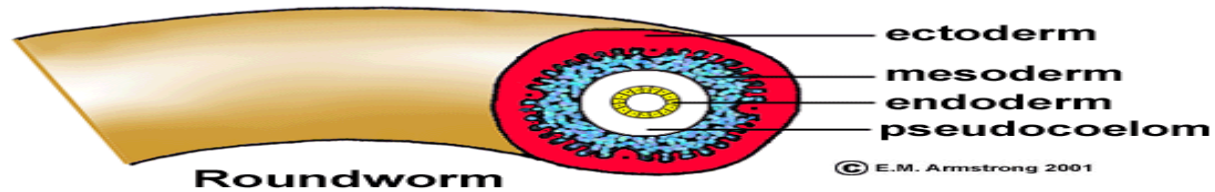
- This refers to having nervous tissue (brain tissue) centralised into a head.
- Only **bilaterally symmetrical** animals have some form of head.
- It occurs at the ***anterior*** (**front**) part of the body.
- **Nerve** cells make up the “brain” component.
- Many **sense organs** are concentrated here.
- Designed for the animal to detect **food** and **danger** - animal can respond quickly.

# 3. EMBRYO TISSUE



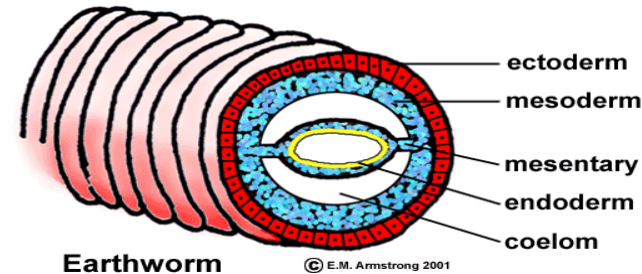
- The embryo has the full **plan** of that animal.
- Simple animals have **two** tissue layers around the gut. So a Diploblast has an Outer **EctoDermal** layer and an Inner **EndoDerm**.
- The more advanced embryos have **three** tissue layers around the gut. Triploblasts have the middle **MesoDerm**, in which organs can develop.

# 4. COELOM



- It is only found in the more advanced triploblasts.
- It is a fluid-filled cavity inside the **mesoderm**.
- This allows muscles around the gut to operate separately from the outer muscles of the body.

## Advantages:



1. Can act as a **Hydrostatic Skeleton**.
2. Easy for diffusion to happen through this liquid.
3. Helps with locomotion: *consider the earthworm.*
4. Organs are now more free to develop in an unrestricted way.

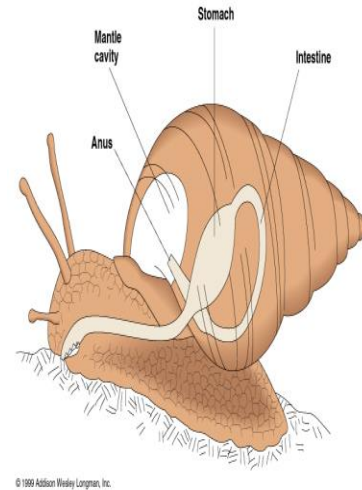
# 5. GUT OPENINGS

- Simple animals have a **blind gut** – food (and wastes) come in (and leave) through the same hole.
- Advanced animals have a **through gut**: food goes from mouth → gut → anus.



## Advantages of a Through-gut:

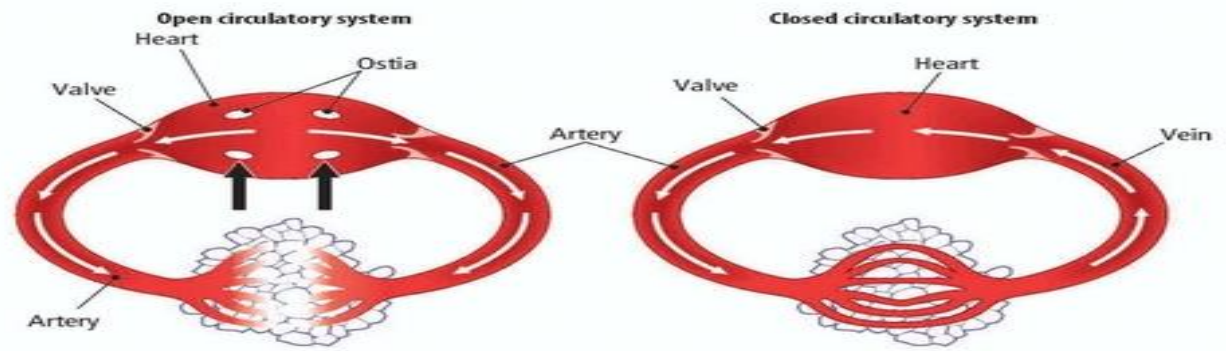
1. Can **ingest** and **egest** at the same time.
2. Food and wastes are **not** mixed together.
3. **Systems** can operate throughout the full process.
4. Different parts are **specialised** for different jobs.



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# 6. BLOOD



- Some animals are so simple that diffusion is adequate.
- The more advanced animals need **blood** to transport substances through their body.
- All organs in the **simpler** of these animals are in contact with a room/chamber called their *haemocoel* – they get all their needs and excretion through this **OPEN** **blood system**. The heart pumps blood from there to the intake or excretion areas.
- Blood for more advanced animals is **CLOSED** – it never leaves its blood-vessels. Substances diffuse in and out of the blood. It is easier to circulate the blood, so is more efficient.



# QUESTIONS Page 26



## Question 1

6 X [1] = [6]

1. Radial
2. Diploblast
3. Coelom
4. Through-gut
5. Open
6. Cephalisation

## Question 2

1. 1=EctoDerm    2=Coelom    3. EndoDerm    4. Gut  
5=MesoDerm    [5]

2. ***See table page 38 for specific examples:***

*A = TriploBlastic Coelomates*

*B = DiploBlastic*

*C = TriploBlastic Acoelomate*

3. A: Triploblast. Has coelom.



[3]

[3]

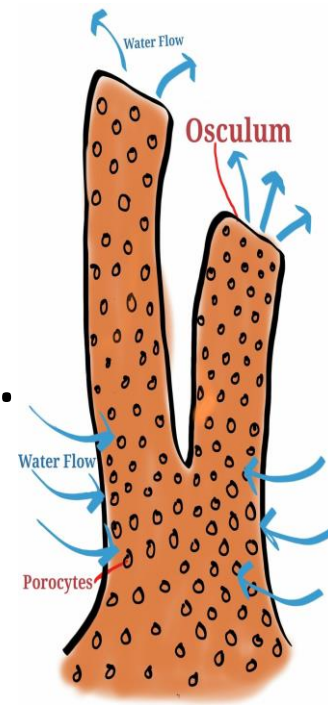


# PHYLUM: PORIFERA

EXAMPLE: SPONGE

# Sponge CLASSIFICATION FEATURES

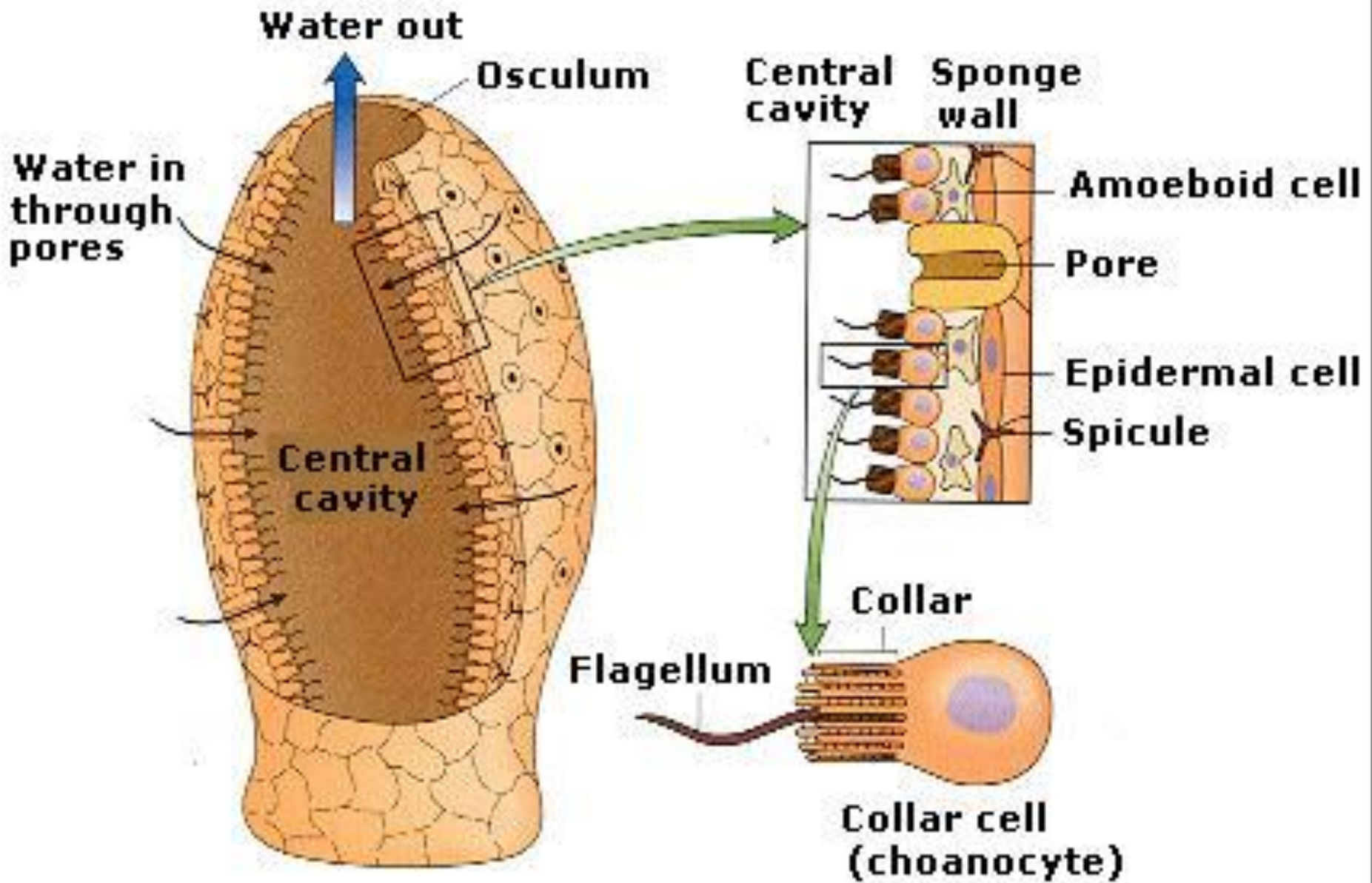
- **SYMMETRY** – Asymmetric = no symmetry.
- **CEPHALIZATION** – No head = no centralised nerves.
- **EMBRYO TISSUE** – **Diploblast** = **two** layers in the embryo (ectoderm and endoderm).
- **COELOM** – Acoelomate = has no coelom.
- **GUT OPENINGS** – Has no gut at all.
- **BLOOD** – Has no blood = relies on diffusion.



# ADDITIONAL INFORMATION



- Are all aquatic. Have pores to let water in.
- Are a collection of cells, in two layers (separated from each other by jelly), with no tissue. Have the shape of a vase.
- Larvae move (are motile), adults do not (sessile).
- Flagella of the spongocoel bring water flowing **in** through pores, and **out** through the osculum.
- *Bacteria* are filtered out of this water as food.
- Sponges are used by humans for washing and cleaning.



**OUR EXAMPLE: SPONGES**

# QUESTIONS Page 27

## Question 1

4 X [2] = [8]

1. D

2. C

3. B

4. C

## Question 2

1.



Osculum

Flagellum

SpongoCoel

Pores

[4]



2. **A** lets water out.

[1]

**C** acts as the HydroStatic skeleton, in which ExtraCellular digestion occurs.

[1]

3. Asymmetry

[1]

4. No – it has no head, so no centralised brain.

[2]

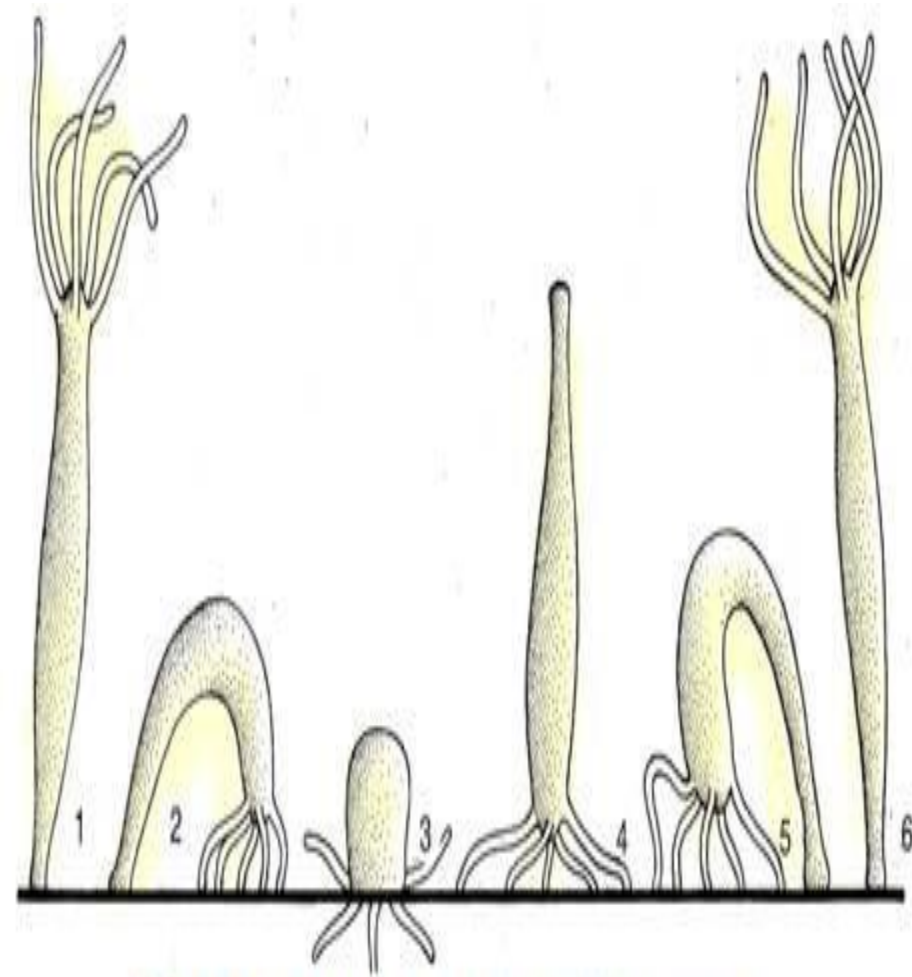
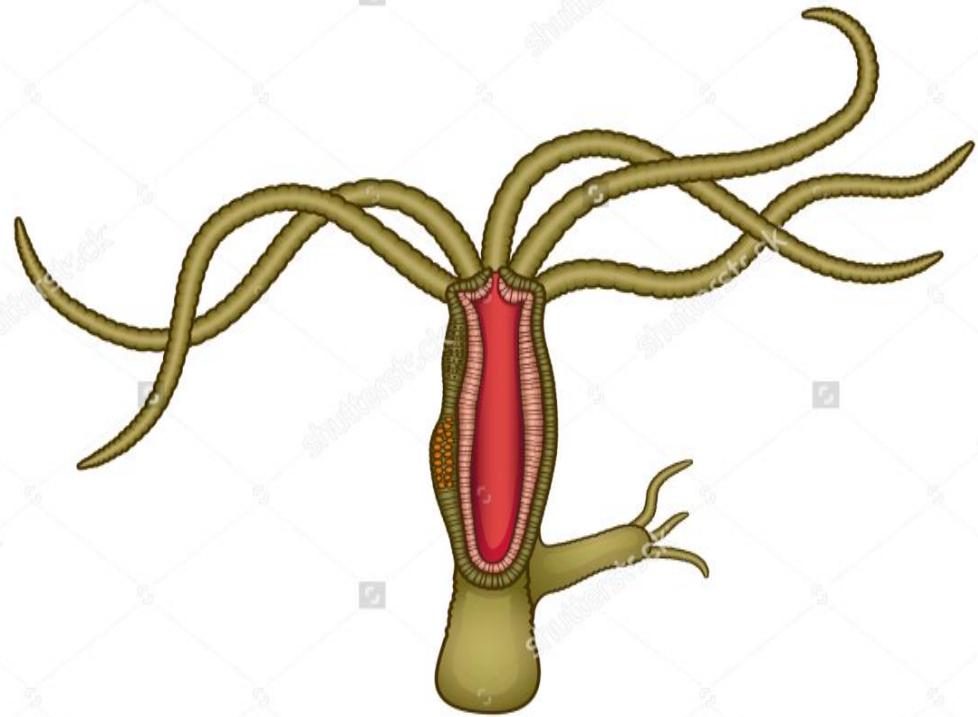


Fig. 31.16. Hydra showing somersaulting movements.



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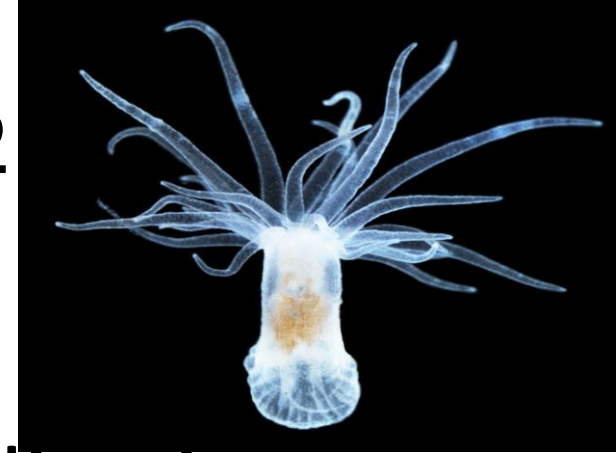
# PHYLUM: CNIDARIA

EXAMPLE: HYDRA

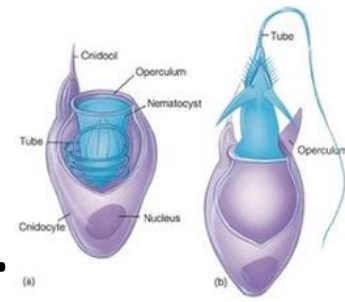


# CLASSIFICATION FEATURES

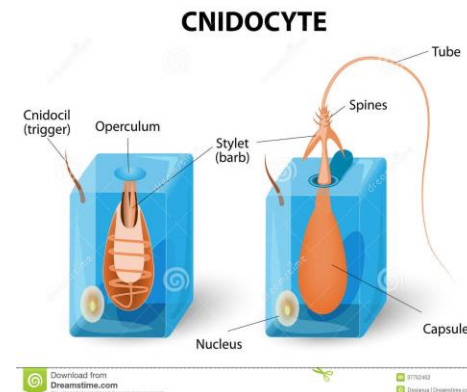
- **SYMMETRY** – Radial.
- **CEPHALIZATION** – No cephalization.
- **EMBRYO TISSUE** – Diploblastic.
- **COELOM** – Acoelomate.
- **GUT OPENINGS** – Blind gut = one opening.
- **BLOOD** – No blood system.



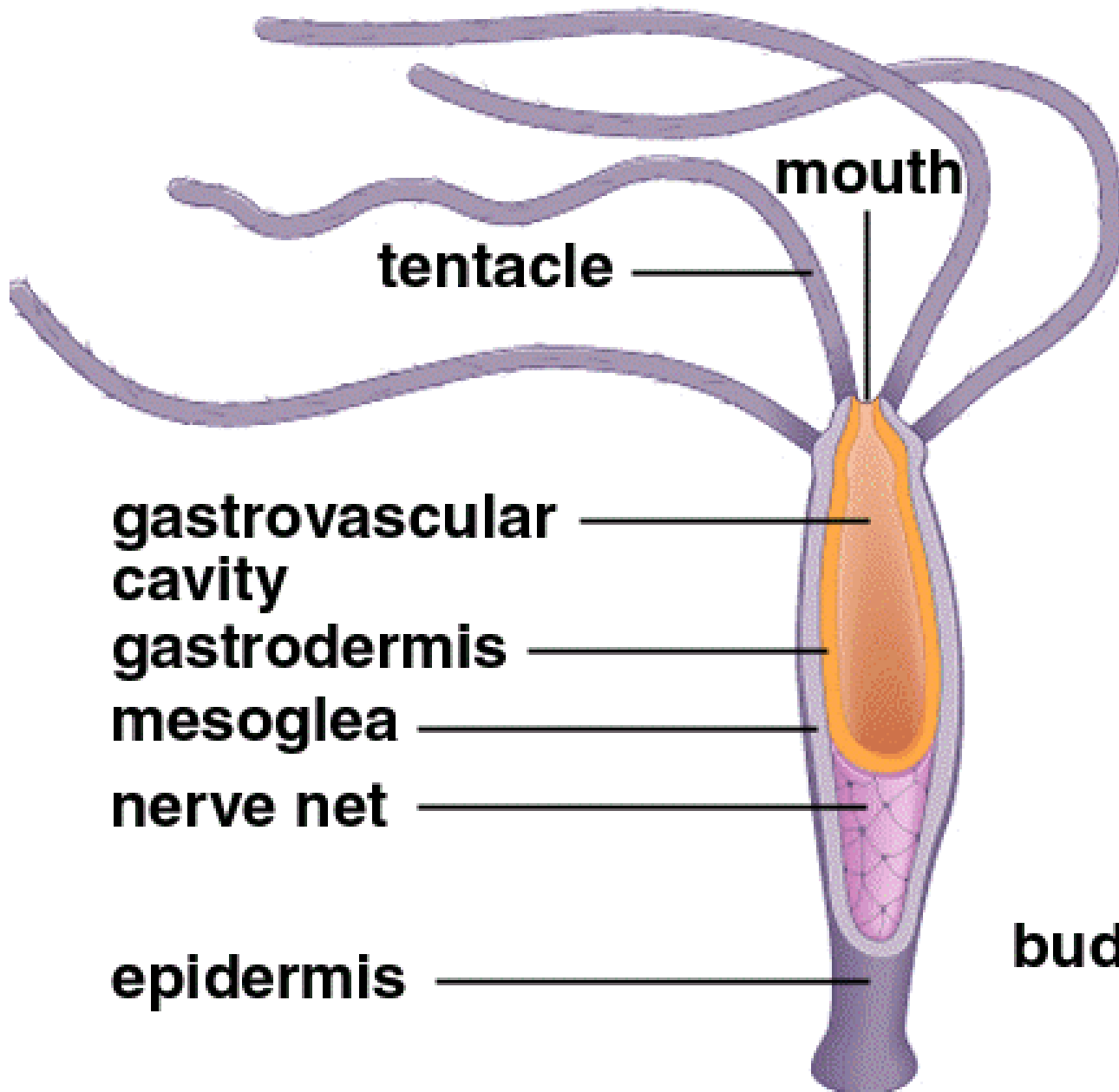
# ADDITIONAL INFORMATION



- Being aquatic, *Hydra* can only live in water.
- Nematocysts (on their **ectoderm**) sting their prey, and the tentacles bring them to the mouth. The **endoderm** then digests it.
- Nerve cells are spread evenly, and can respond to stimuli all round.
- This explains their radial symmetry **equally** aware of food or dangers all around their body.
- Movement remains random, without sensory organs linked to a central brain.



# Anatomy of hydra (2)



# QUESTIONS Page 28



## Question 1

5 X [1] = [5]

1. *Cnidaria*

2. HypoStome

3. Coelenteron

4. Nematocysts

5. Mesoglea

## Question 2

1. A=tentacle    B=Mouth    D=EctoDerm    H=Basal Disc

[4]

2. **A** takes food to mouth; and locomotion. [1]

**G** is HydroStatic skeleton; and ExtraCellular digestion. [1]

[1]

3. (a) Radial [1]

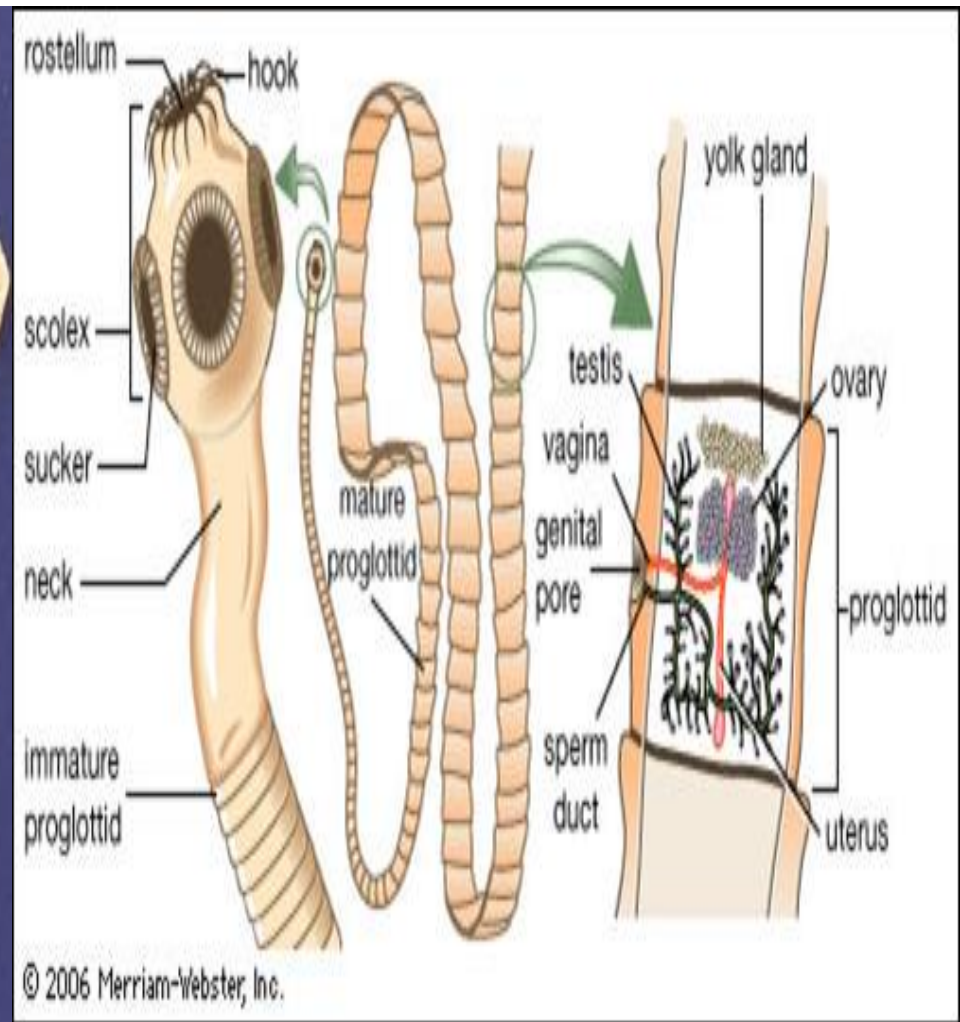
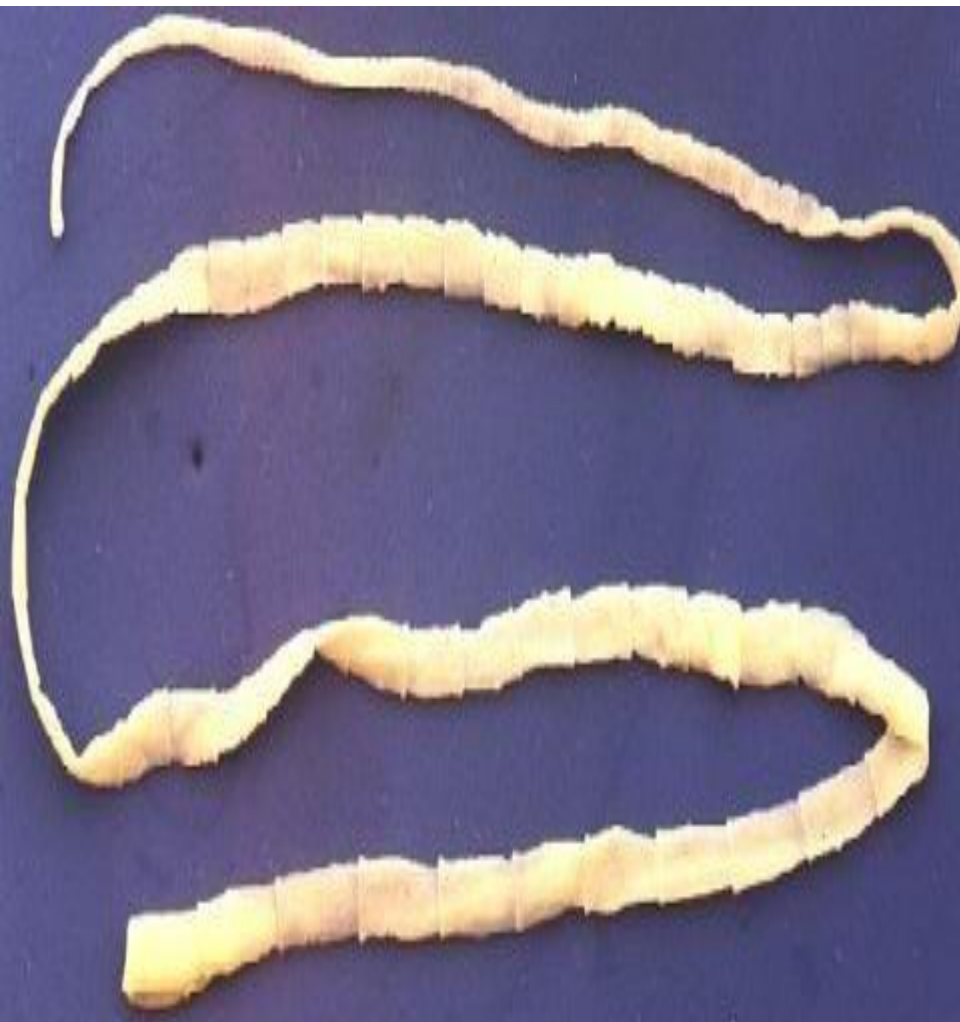
[1]

(b) Can react to food and danger in any direction. [3]

[3]

4. Diploblastic – it only has two tissue layers (EctoDerm and EndoDerm). [3]

[3]



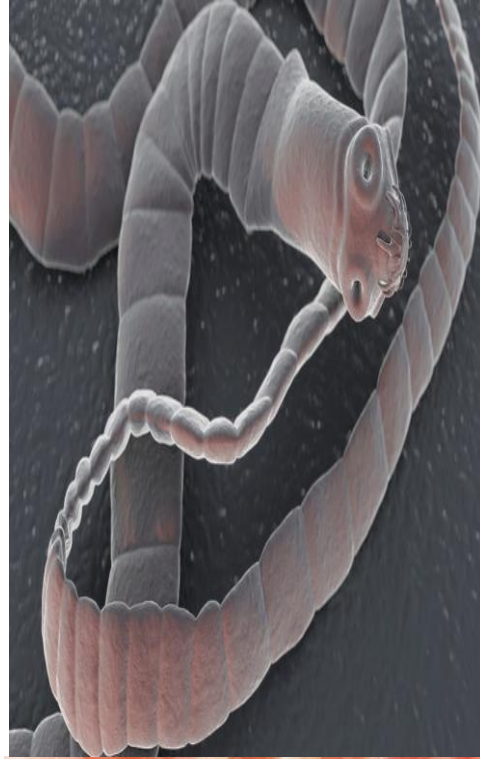
# PHYLUM: PLATYHELMINTHES

EXAMPLE: TAPEWORM

(*TAENIA SOLIUM*)

# CLASSIFICATION FEATURES

- **SYMMETRY** – Bilateral.
- **CEPHALIZATION** – Cephalized.
- **EMBRYO TISSUE** – Triploblast.
- **COELOM** – Acoelomate.
- **GUT OPENINGS** – Blind gut.
- **BLOOD** – No blood.



# ADDITIONAL INFORMATION



- Is a flat aquatic EndoParasite in pig and human.
- Both genders are on one worm = HermAphrodite.
- Its flat shape allows for easy diffusion all round.
- Cuticle stops the host from digesting it while it is in its small intestine.
- **Head** (*scolex*) with suckers and hooks. Then **neck**, and **strobila** - made up of segments called *proglottids*.
- Segments are **made** at its neck. Mature ones are in the middle. Older (gravid) ones at its end have fertilised eggs.
- These segments with eggs break off, and go out of the anus. A pig eats it, and the egg hatches and develops in the pig. A human eats the pig, and the cycle starts all over again in that human's intestines.

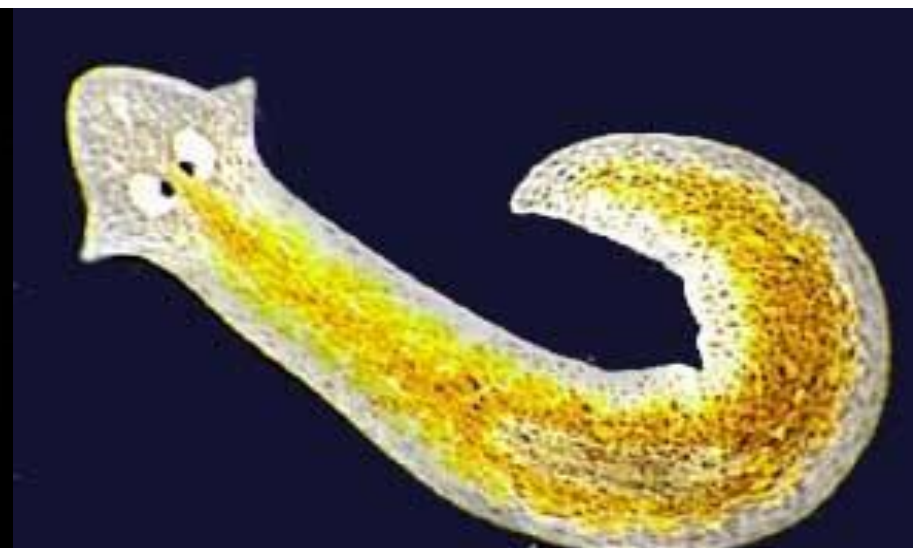
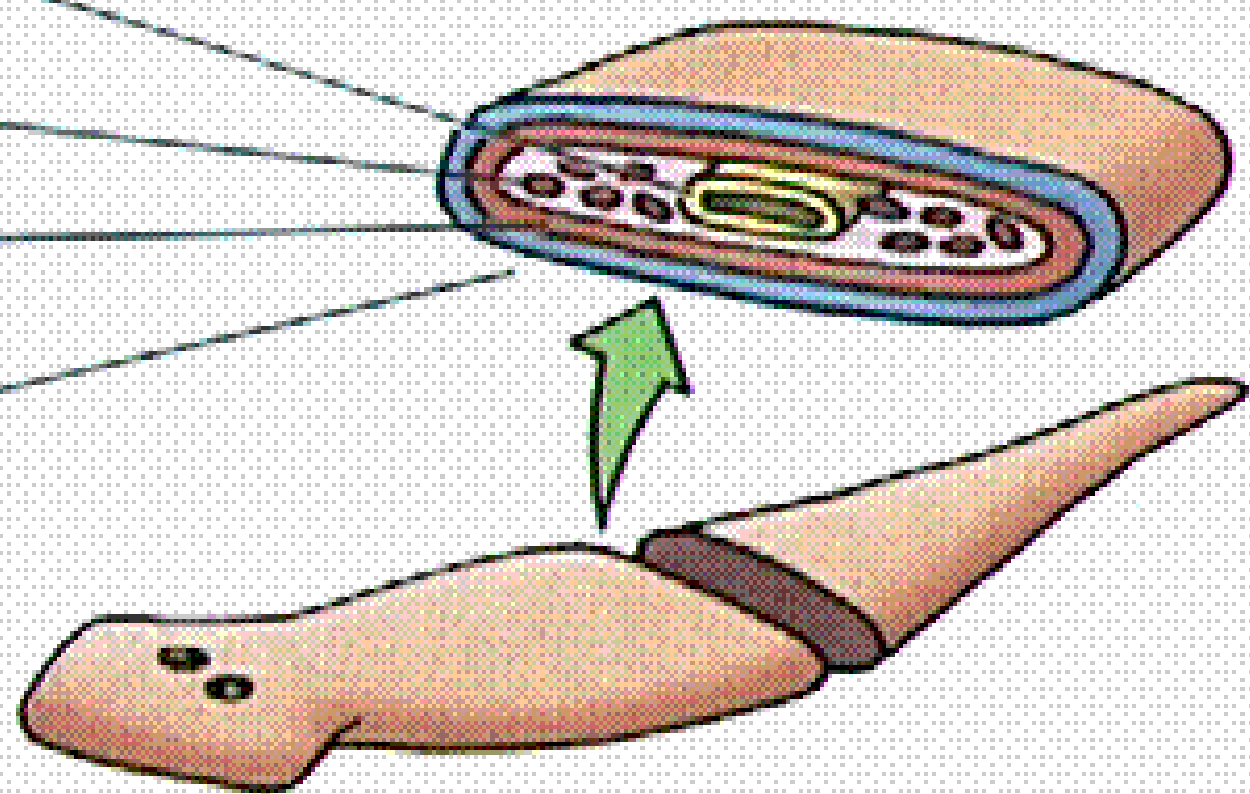
Gut (endoderm)

Mesenchyme

Muscle layer  
(mesoderm)

Ectoderm

Acoelomate





# QUESTIONS Page 29

## Question 1

1. HermAphrodite      2. Pig      3. Gravid/Strobila  
4. Scolex      5. Bilateral

$$5 \times [1] = [5]$$

## Question 2

1. D      2. D      3. B  
4. B      5. C

$$5 \times [2] = [10]$$

