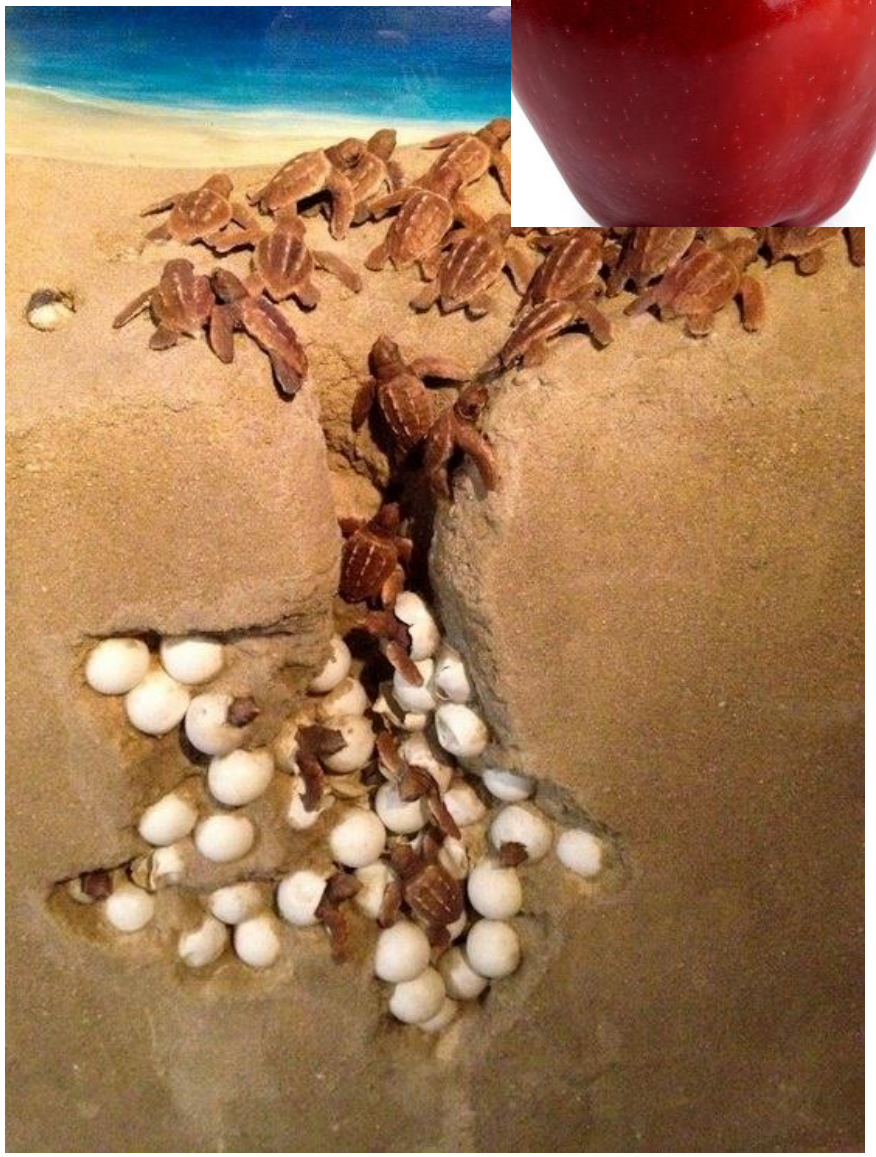
Developing Zygote

Seeds, Eggs, Embryos

How do organisms protect their developing embryos?

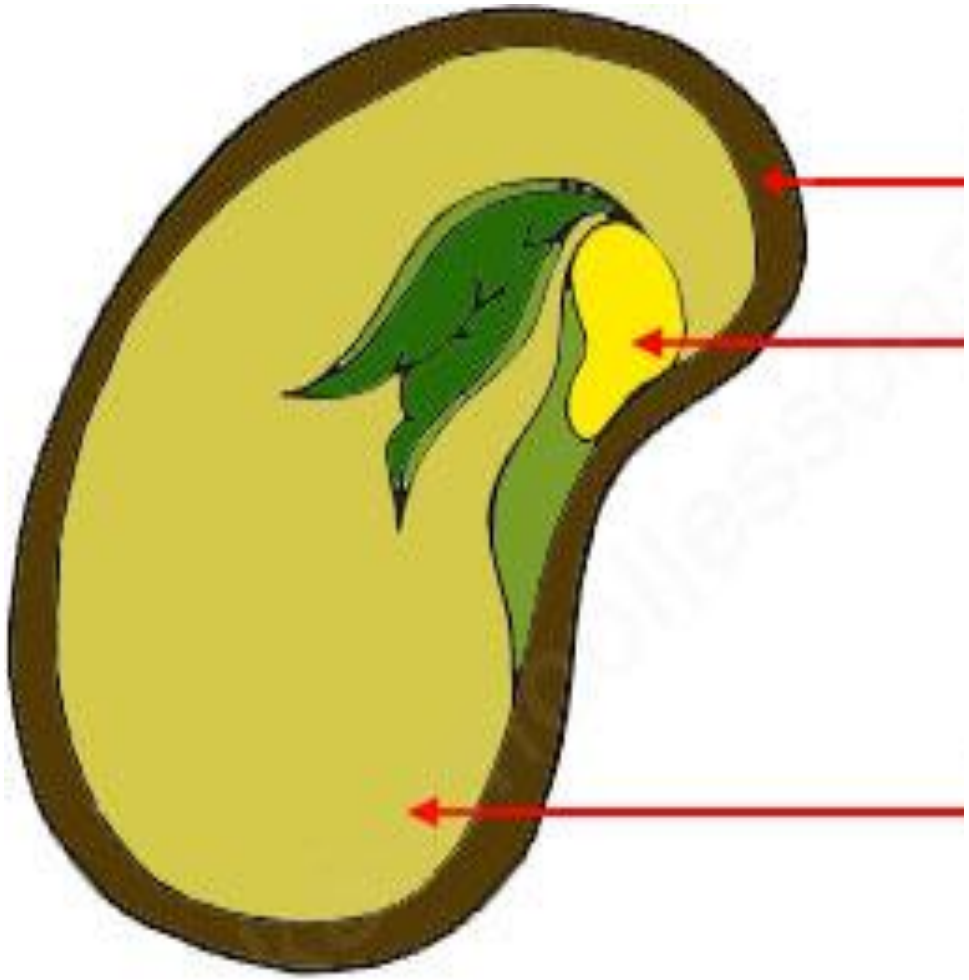


Developing Embryo

- *Once sperm and egg have fused (fertilization) a zygote forms,* the zygote divides and becomes an **embryo** (developing organism).
- Embryos must be protected inside:

1. Seeds eg. plants
2. Eggs, eg. Birds, reptiles, amphibians, insects, monotremes
3. Mother eg. mammals

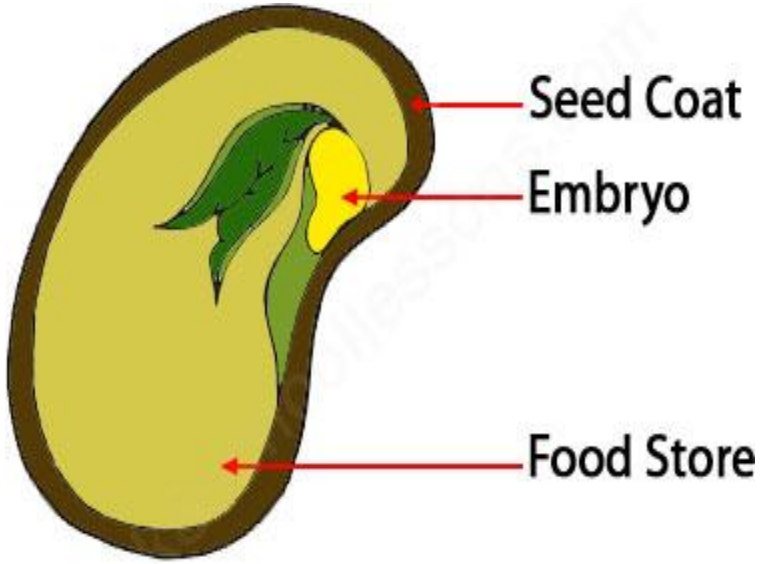
A seed is a fertilized **ripened ovule** of a flowering plant and has 3 basic parts:



1. **Seed coat (protection)**
2. **embryo**,
3. **stored nutrients,**

Stored Nutrients:

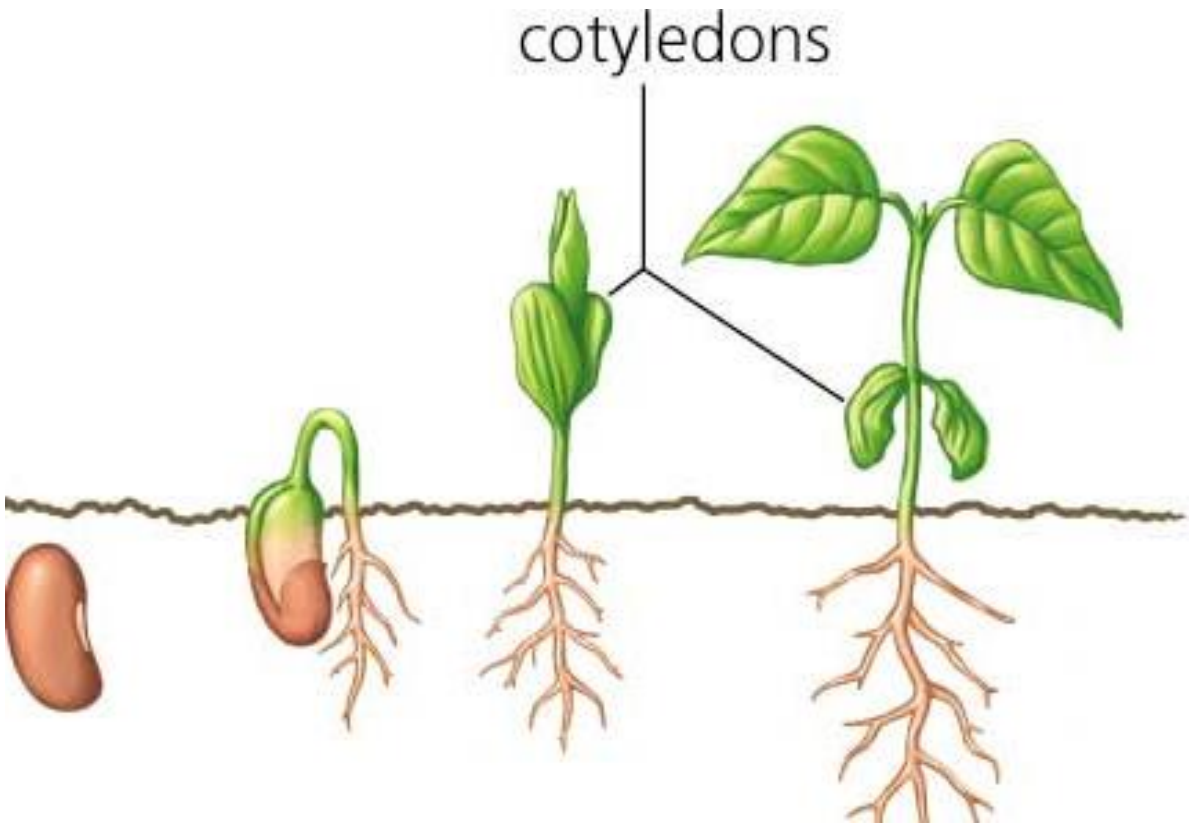
- The stored nutrients supply **energy** for the **embryo** to develop until it can produce its own food by photosynthesis.
- The nutrients are in the form of either **sugar** or **starch**
- *Most of the world's food comes from seeds of three plants: corn, rice, wheat.*



Germination

- The seed will **germinate** (start to grow) if conditions are right (sun, warmth, moisture).

- Once the seed germinates, the energy for further growth comes from the *first leaves* called **cotyledons.**




Cotyledon
Cotyledon
1st True Leaf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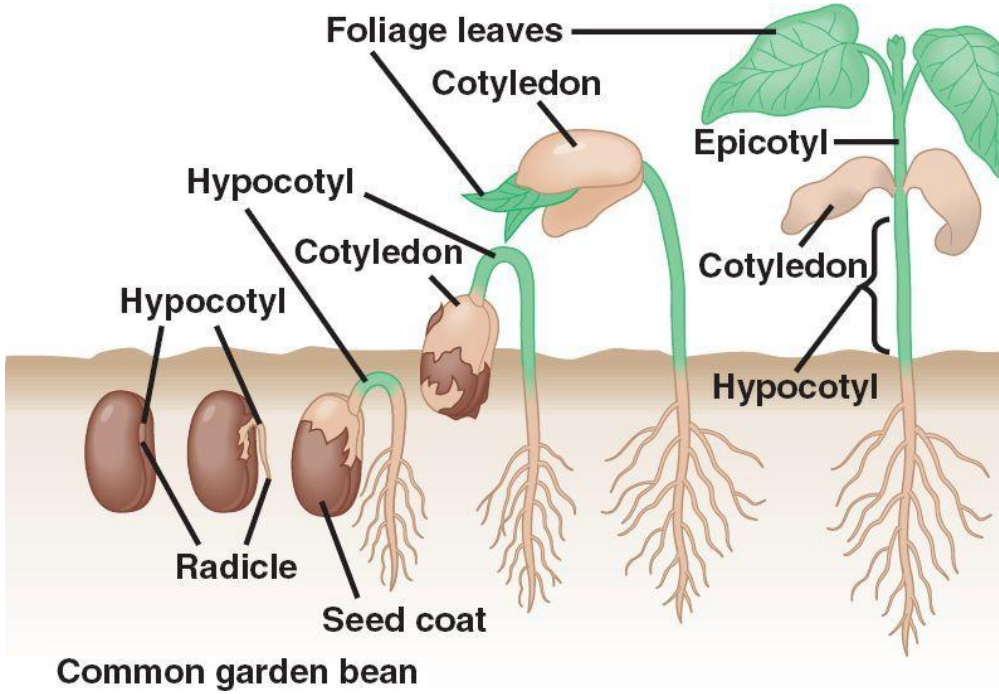
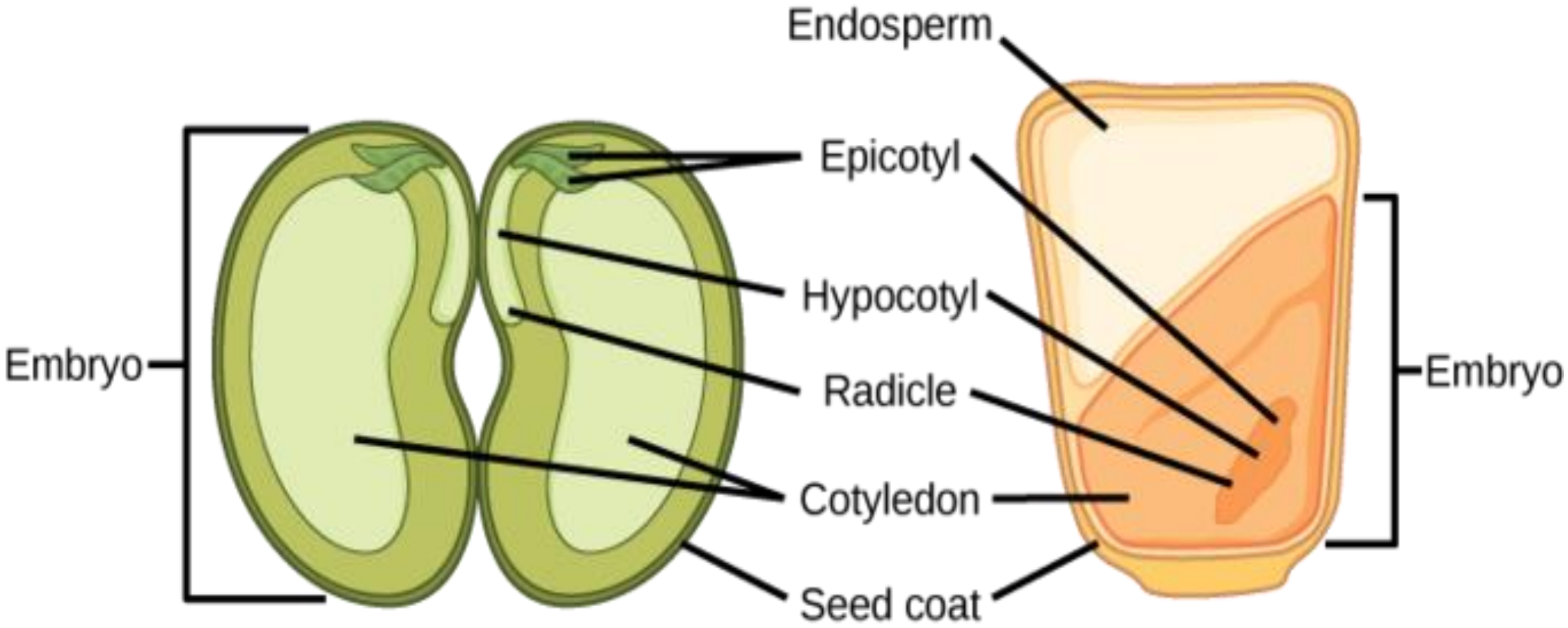
Embryo – precursor to seedling plant

- The embryo is the "**baby plant**" in the seed consisting of precursor tissues the will become the seedling:
- Cotyledon → **first leaves**
- Radical → **Roots**
- Epicotyl → **Stem and Leaves**
- Hypocotyl → **stem below** cotelydon



Anatomy of a seed



Bean seed
(dicot)

Corn seed
(monocot)

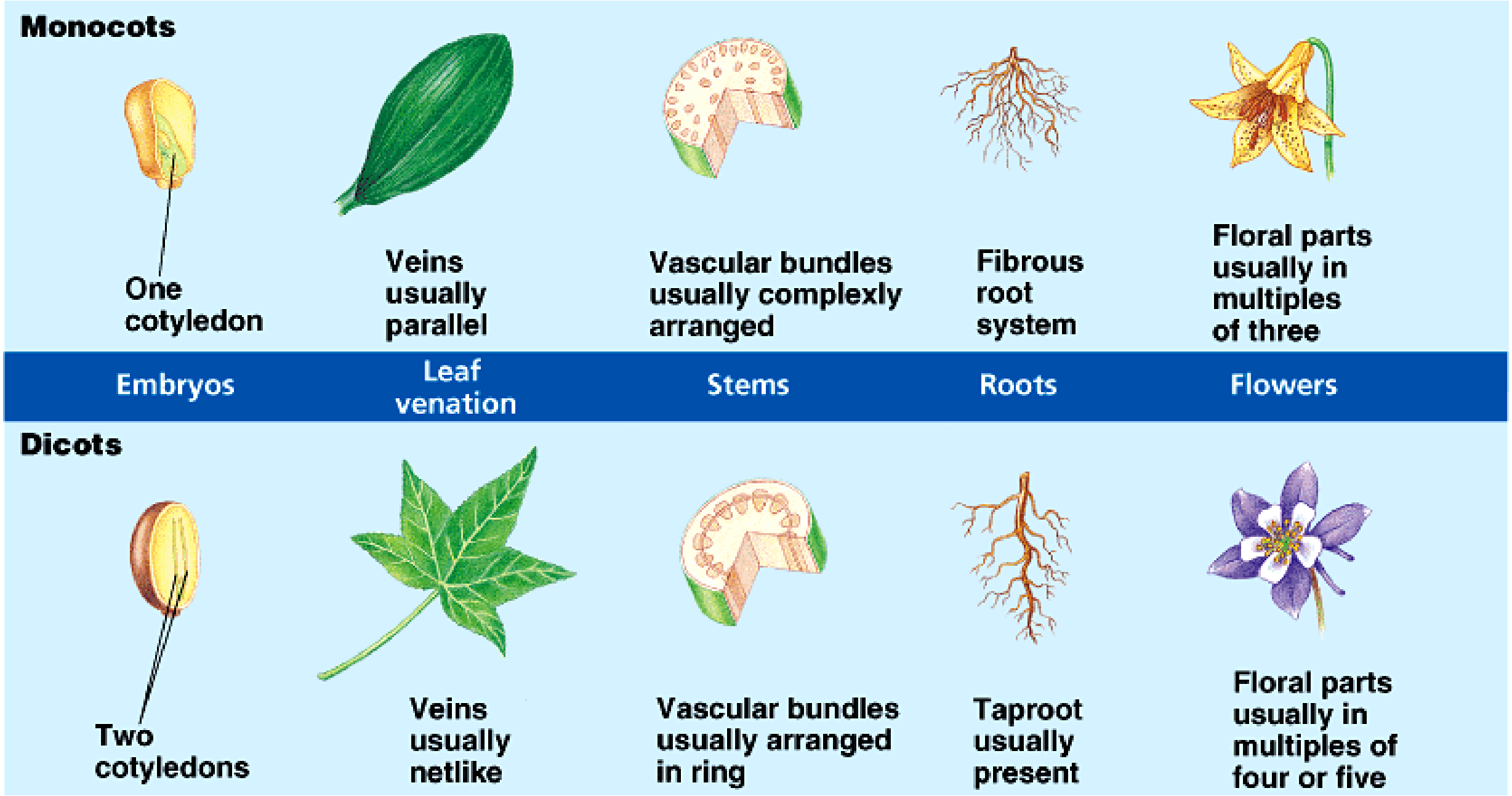
Two types of seeds

Monocotyledon Plants produce only **one** seed leaf.
Eg. **Corn**

Dicotyledon plants produce ***two*** *seed leaves*

Eg. **beans**

- In corn, food is also supplied by the **endosperm.**



Time lapse bean sprouting 3 min

- https://www.youtube.com/watch?v=w77zPAtVTuI

Embryos in EGGS

Birds, Reptiles, Amphibians, Invertebrates, Monotremes

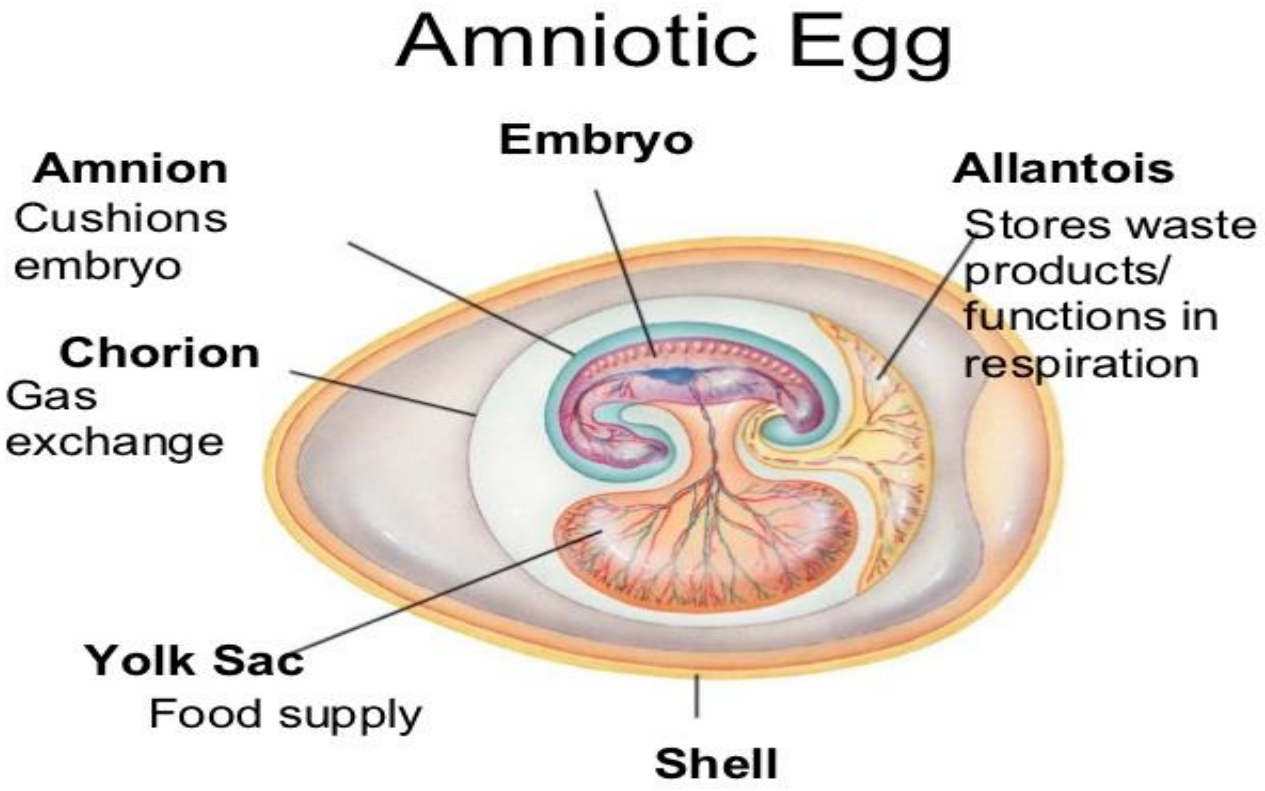
Eggs contain:

- embryo,
- nutrients,
- protection (shell, jelly-like substance, or egg case).

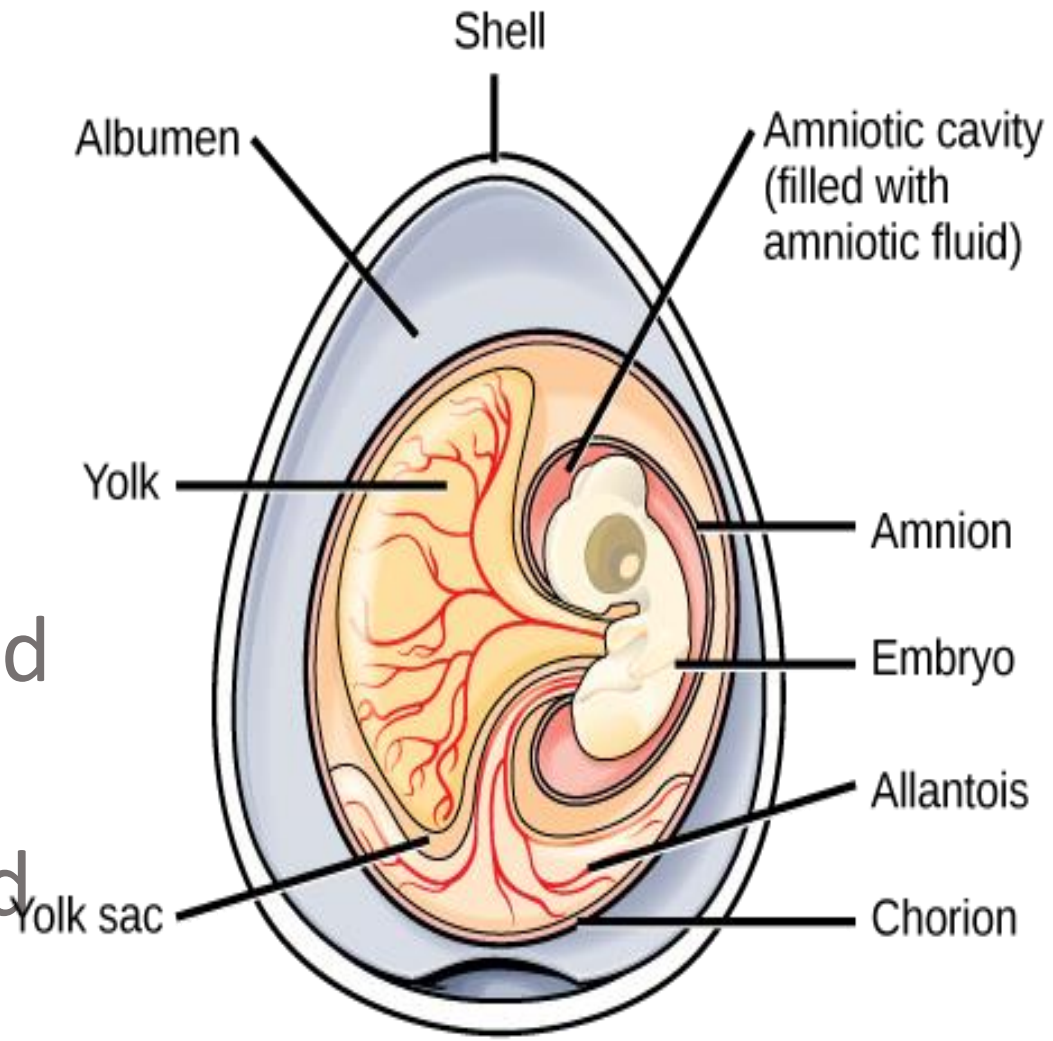
Cyst of *Taenia multiceps* exposed to show numerous white heads of immature tapeworms.

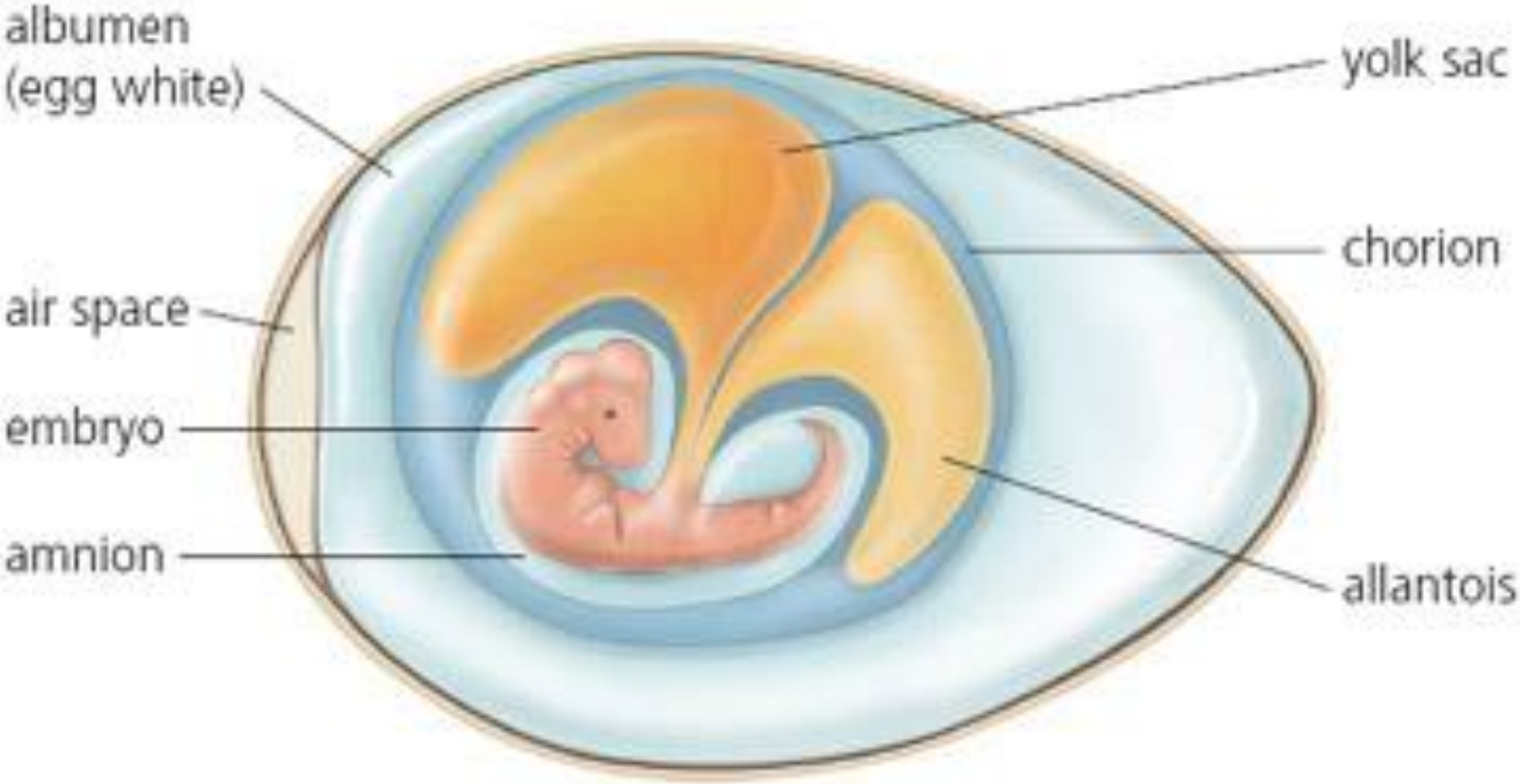
Amniotic Eggs contain a single embryo surrounded by a **shell.**

- Eg. **Birds, reptiles, monotremes**



- **Yolk sac** – stored nutrients
- **Amnion**- a fluid-filled sac, cushions the embryo
- **Allantois** holds waste produced by the embryo
- **Chorion** (along with allantois) controls the movement of gases and wastes in and out of egg.
- **Albumen** also cushions embryo and supplies additional nutrients
- **Chorion** – outermost membrane




albumen
(egg white)
yolk sac
chorion
air space
embryo
amnion
allantois

Monotremes

- Mammals that lay **eggs**.
- duck billed platypus, spiny anteaters
- https://www.youtube.com/watch?v=Ot-CUOidbFk

Embryos that develop in the Mother

- All mammals except monotremes

Marsupials

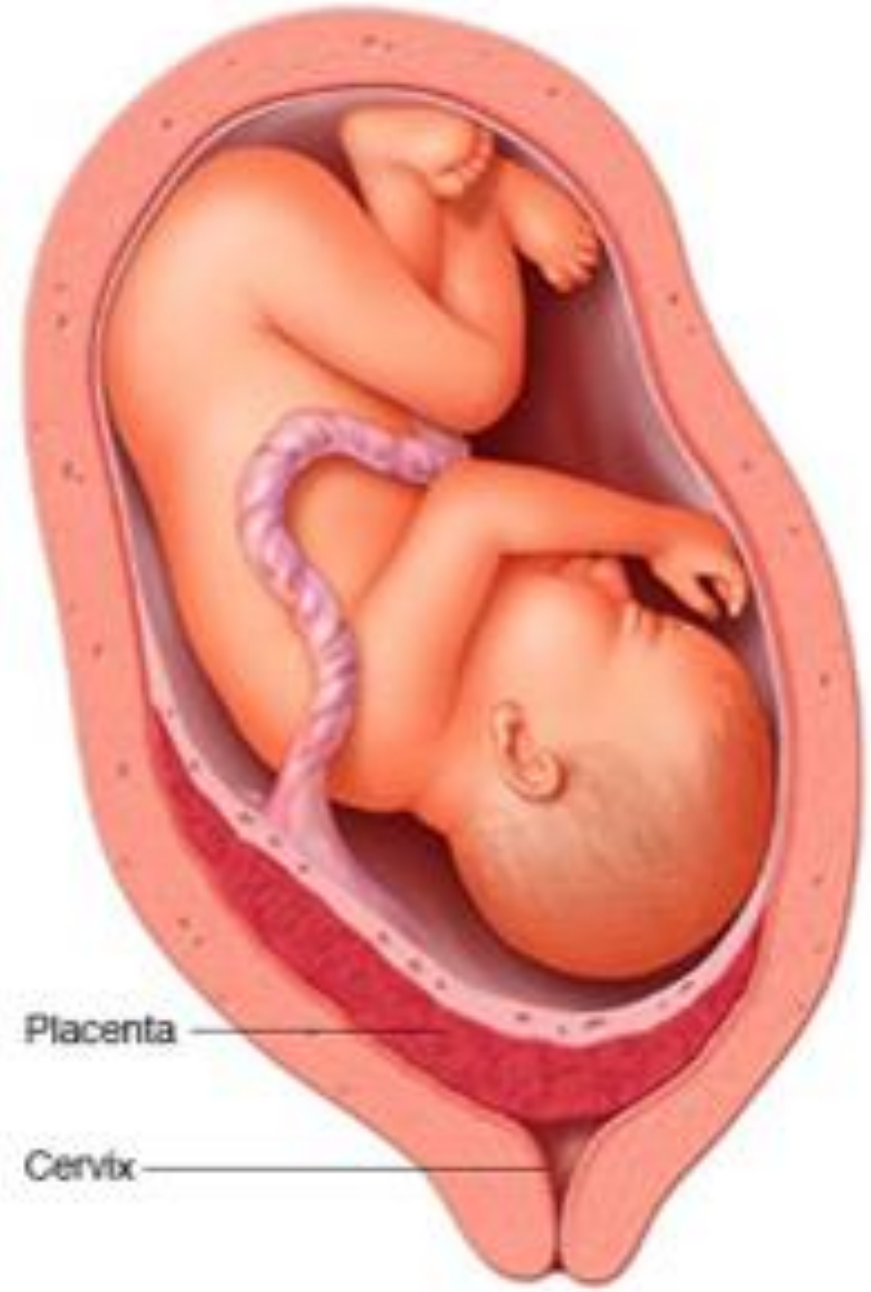
- Embryos are only <u>partially</u> developed when born, finish developing in mother's **<u>pouch</u>.**
- Eg. kangaroos, koalas, and opossums

Marsupials

- https://www.youtube.com/watch?v=7CAXe1NMQl4

Placental Mammals

- Embryo develops longer inside, where a **placenta** connects the fetus to the mother.
- The fetus is attached to the placenta via an umbilical cord, which carries wastes out and nutrients in.
- Eg. Humans, dogs, whales.



Three different ways animals give birth:

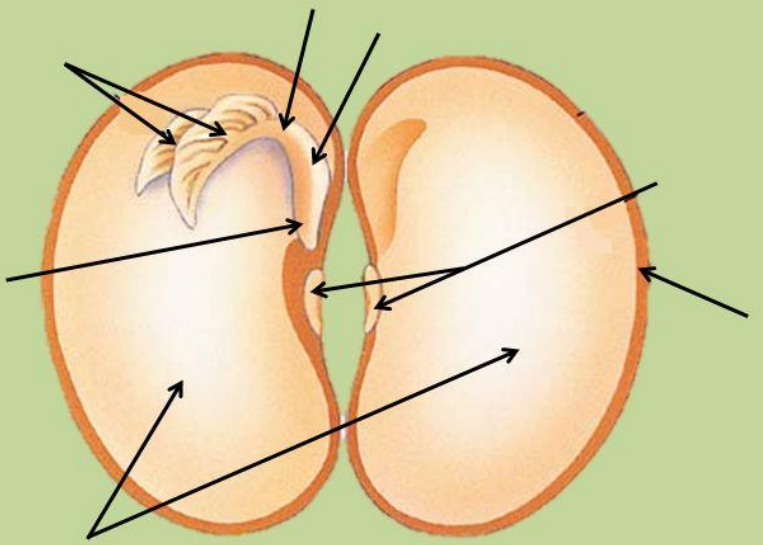
https://www.youtube.com/watch?v=sz3Yv3On4lE

HW: Zygote WS

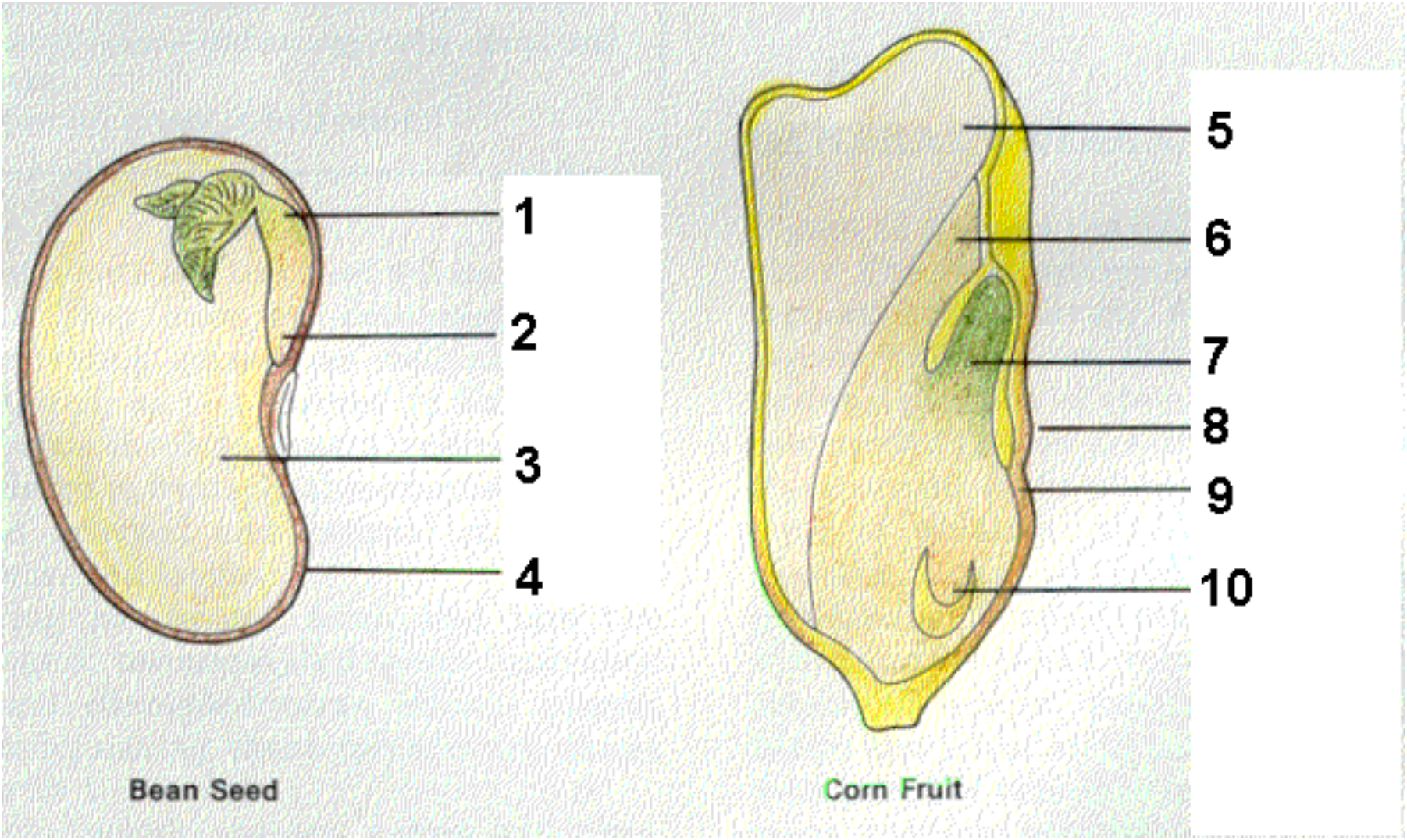
- Sex Determination – more complicated than you thought. Ted Ed video
- https://ed.ted.com/lessons/sex-determination-more-complicated-than-you-thought

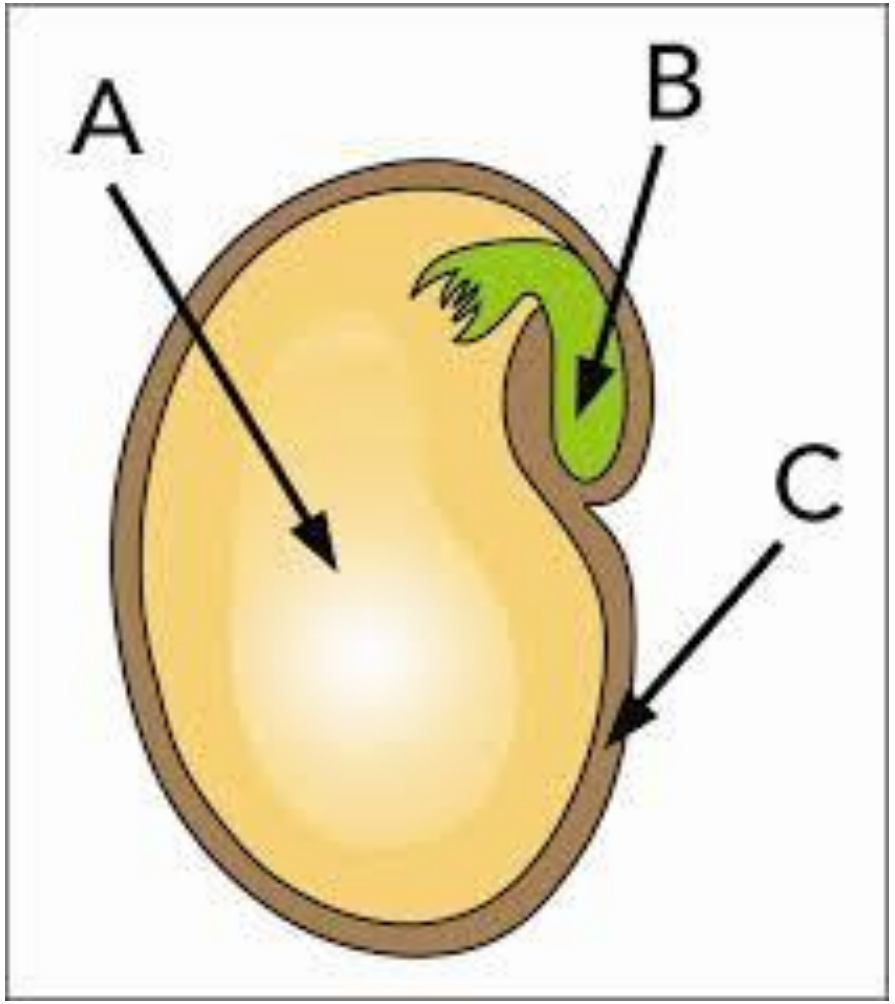
- Bean plant https://www.youtube.com/watch?v=w77zPAtVTuI

Anatomy of a Seed:

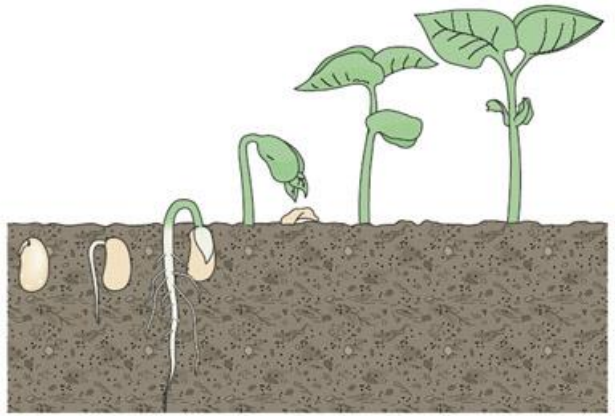


Label the parts of the seeds




A
B
C

3.5 Reproductive Technologies in Agriculture



Selective breeding is used to produce desirable traits in plants and animals.

Vegetative reproduction techniques are used to produce more plants faster.

Artificial insemination and in vitro fertilization are used in the breeding of many domestic animals.

Fish hatcheries increase the number of fertilized eggs.

Recombinant DNA technology is used to produce some drugs for humans.

Some genetically modified organisms (GMOs) may have desirable traits, but since they contain DNA from other organisms, their existence raises moral and ethical concerns.

VOCABULARY

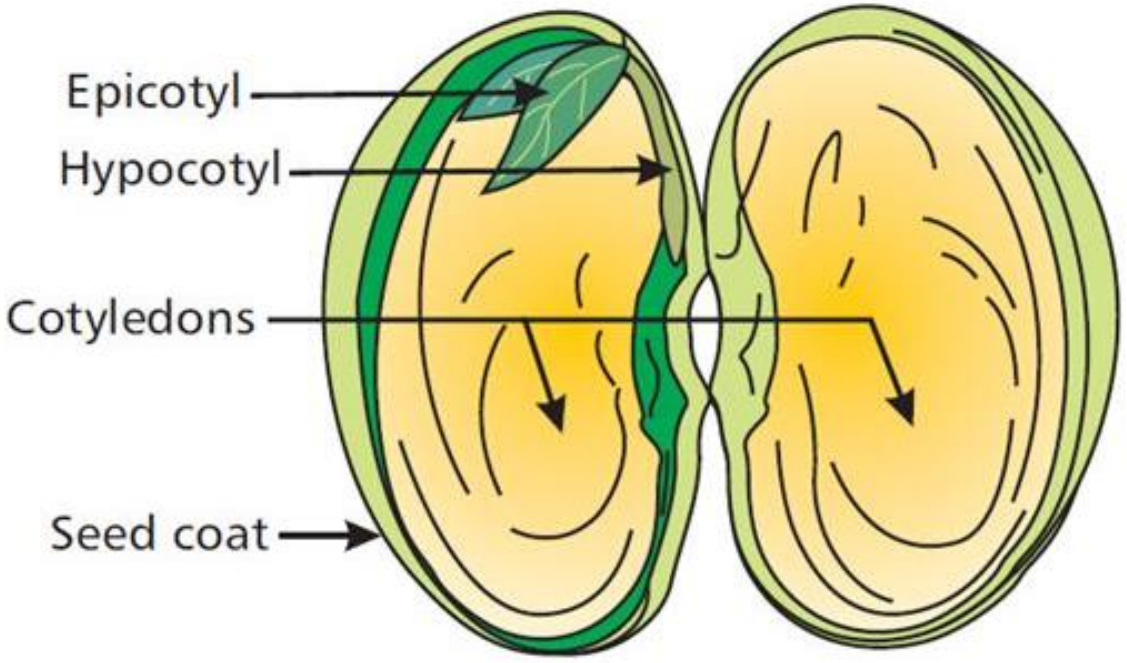
selective breeding

artificial insemination

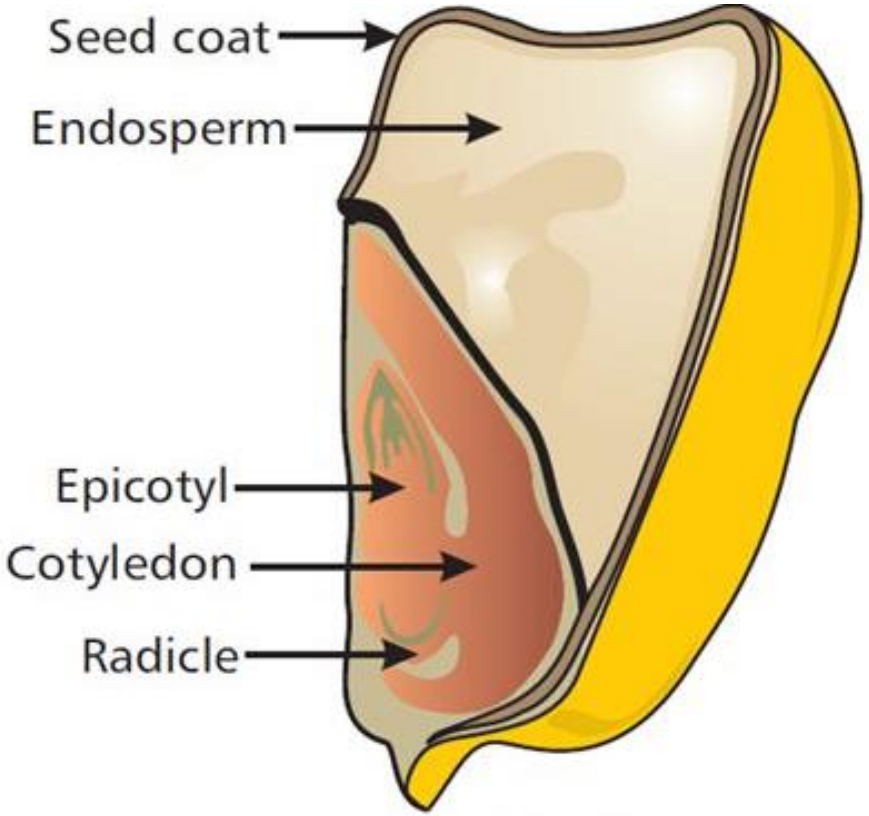
in vitro fertilization

recombinant DNA technology

genetically modified organisms (GMOs)



Dicotyledon

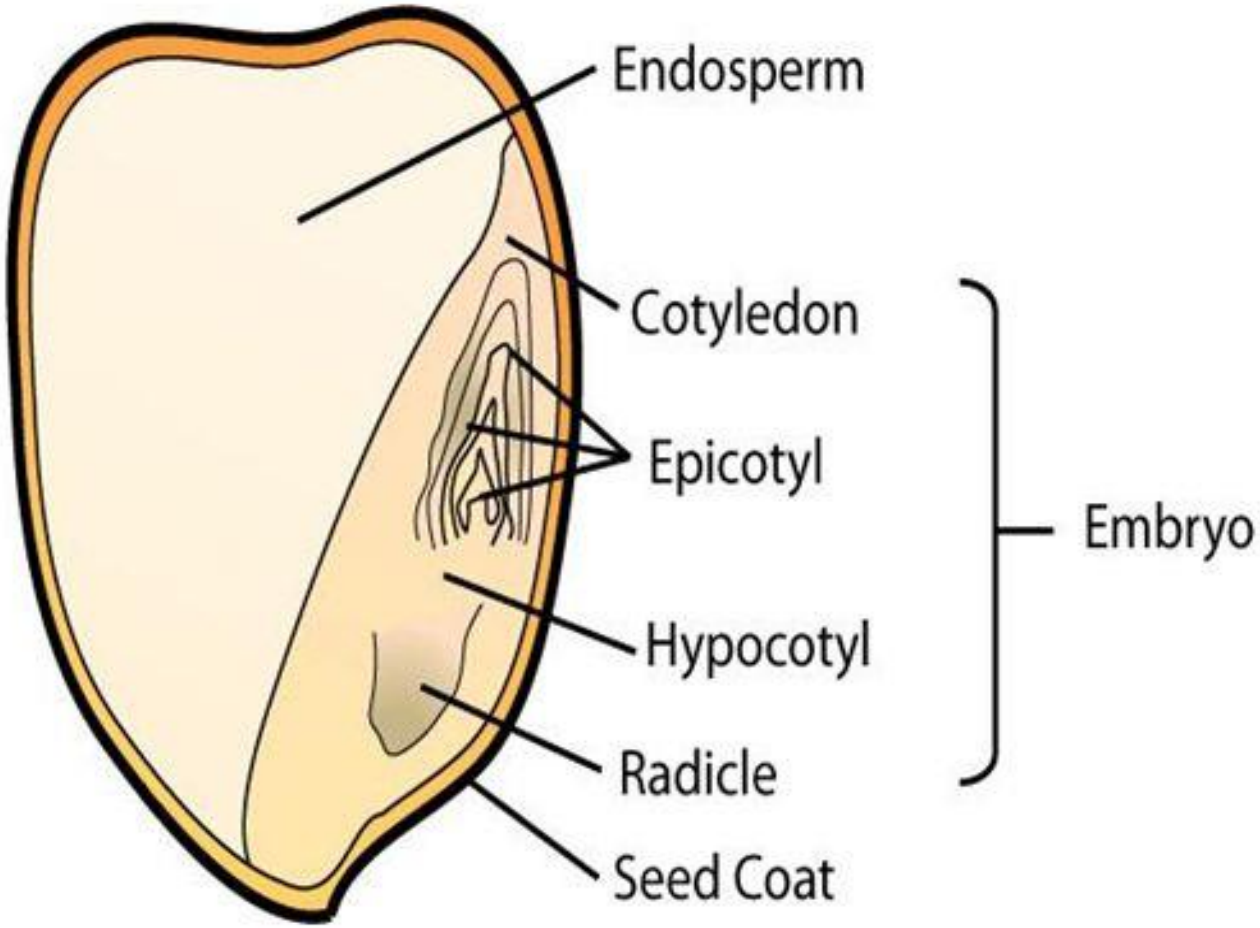


Monocotyledon

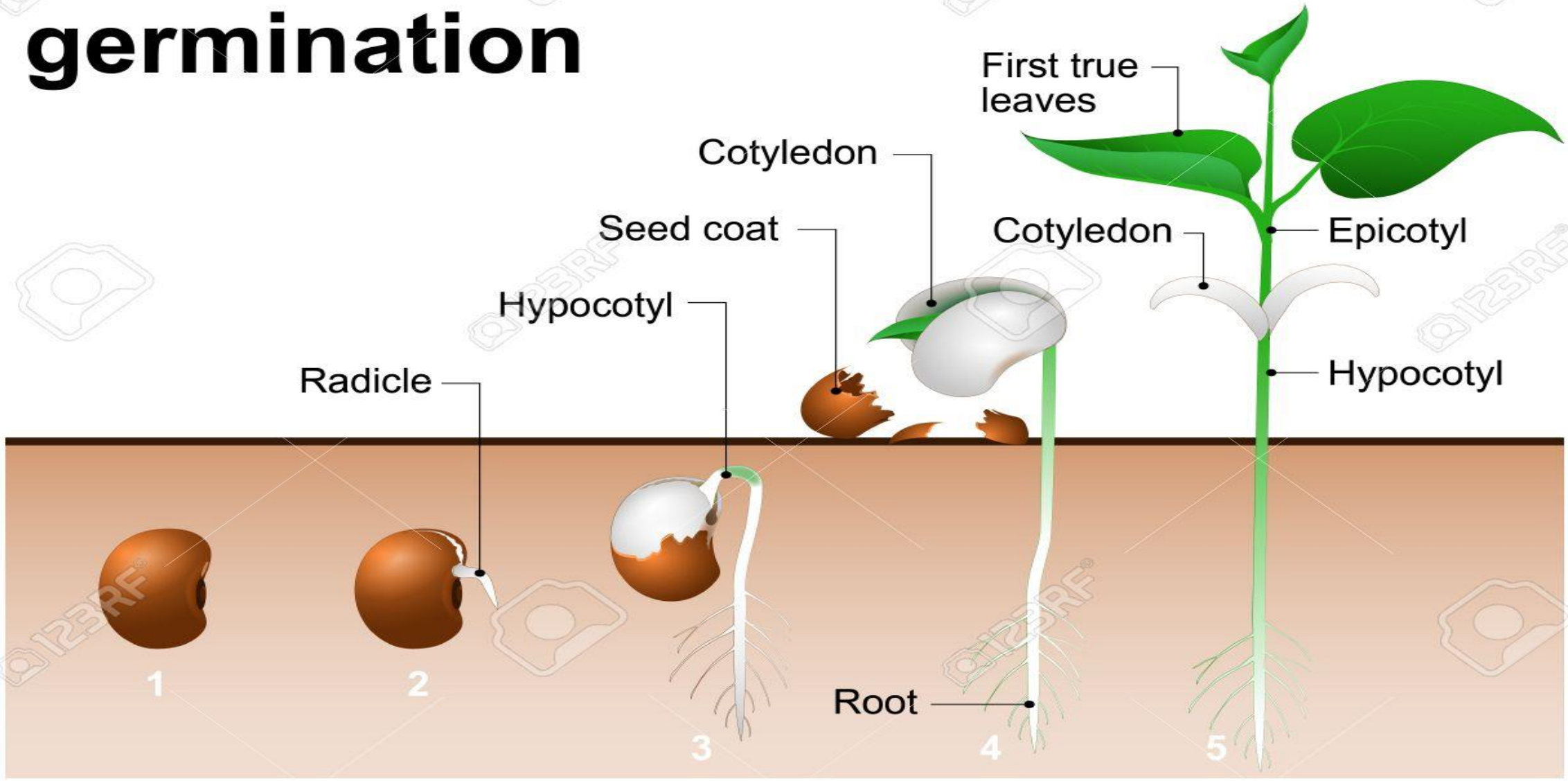
Monocot Seed

Parts:

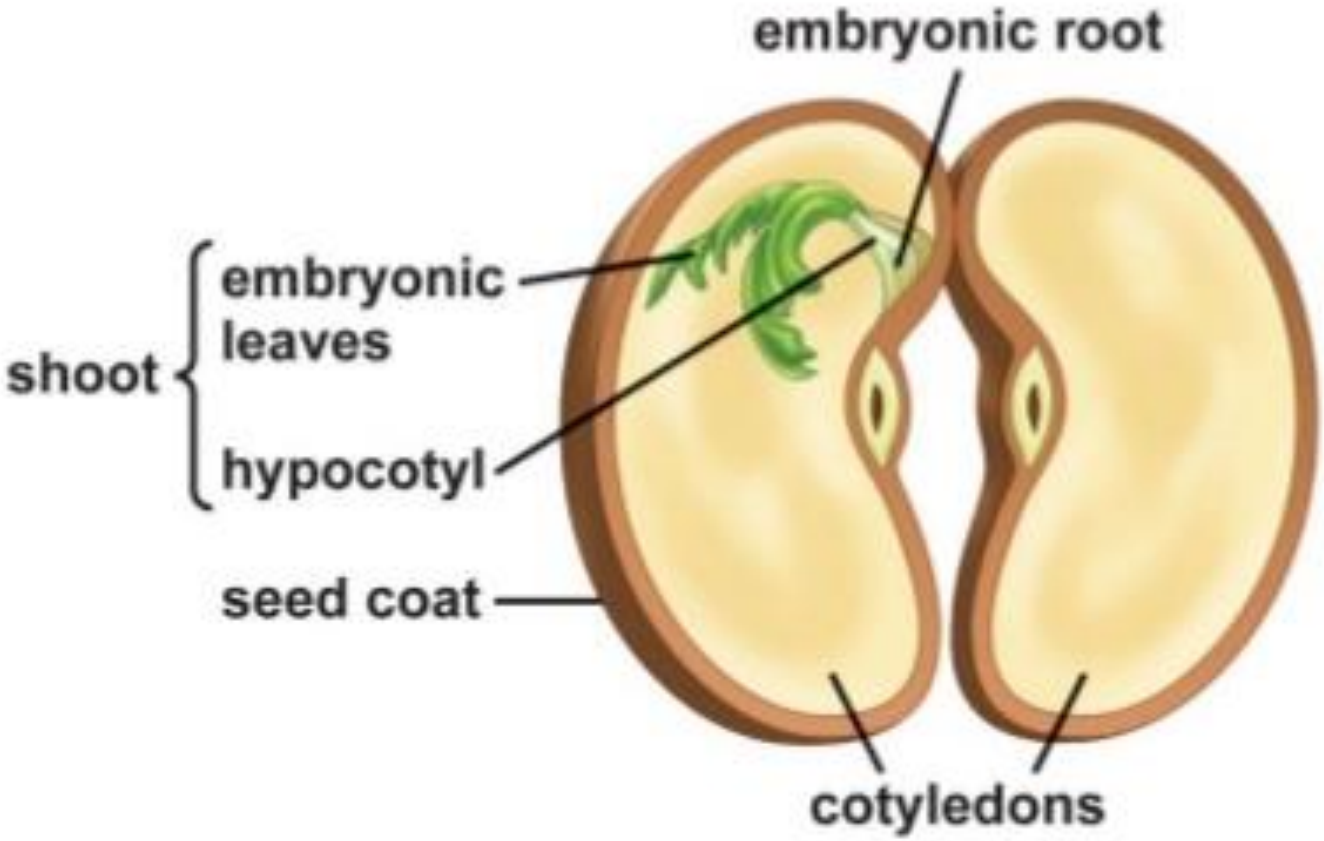
1. Seed coat
2. Endosperm
3. Embryo
   a. Cotyledon
   b. Epicotyl
   c. Hypocotyl
   d. Radicle



Seed germination



Anatomy of a Seed



(c) Bean seed (dicot)

Figure 6.33 Mitosis and cell division are the basis of embryonic development.