

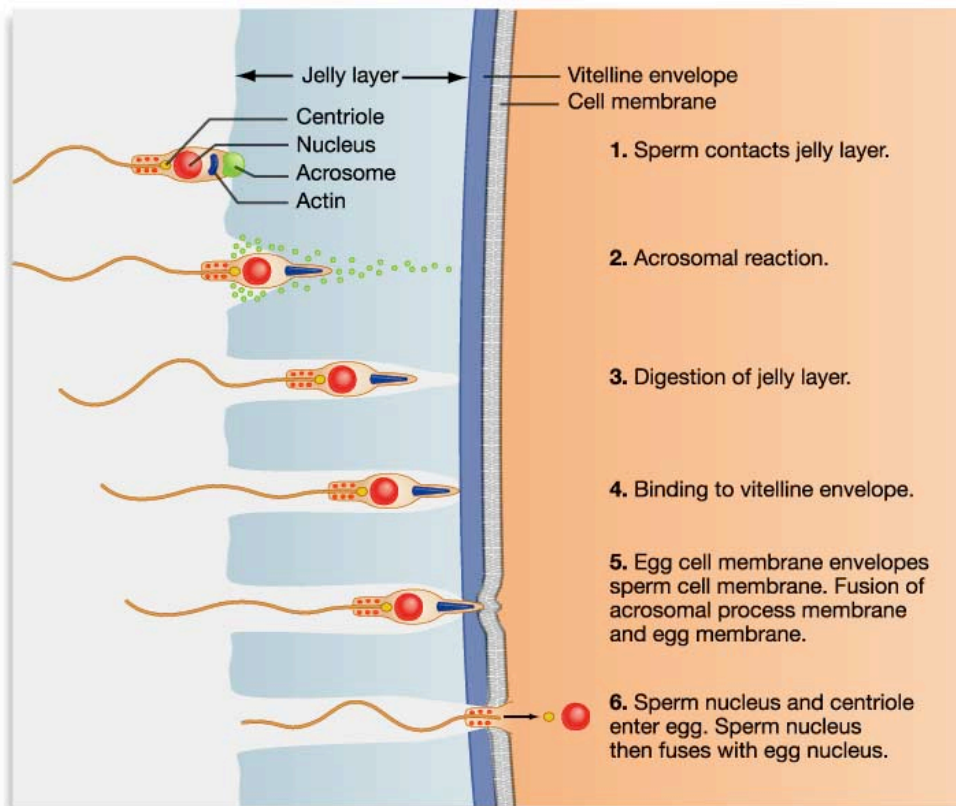


Internal vs External Fertilization & Development

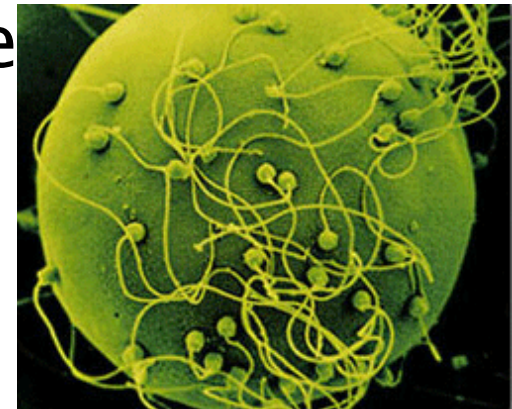


Fertilization

- Fertilization is the union of egg and sperm

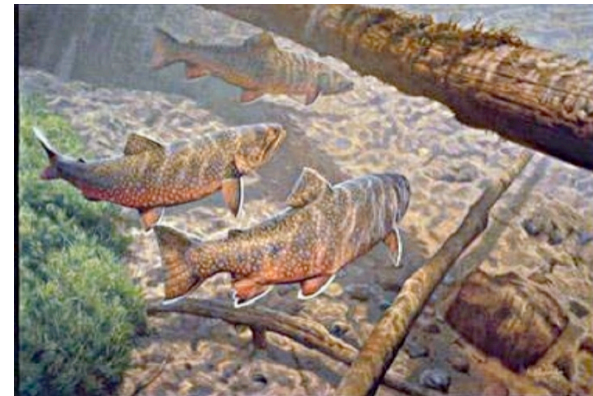


zygote



External Fertilization

- External fertilization occurs outside of female parent
 - Fish
 - Amphibians
 - Aquatic vertebrates



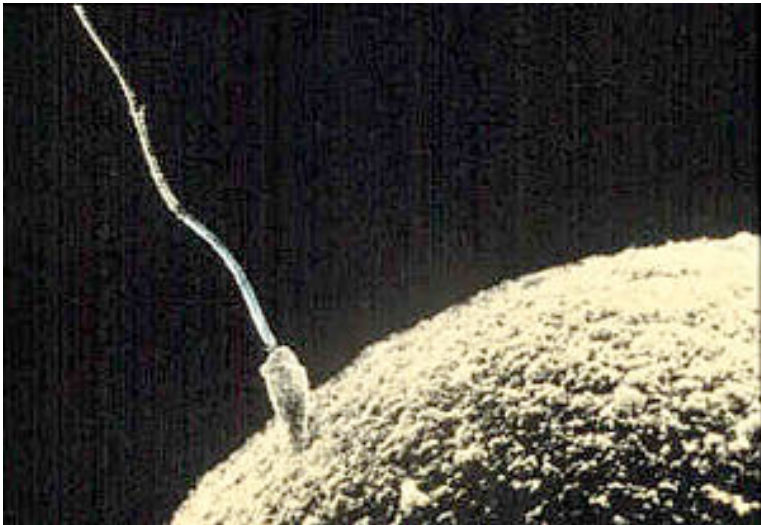
External Fertilization

- Produce many eggs in water because:
 - Eggs are laid in the water
 - There is no parental care
 - Fertilization & development occur outside the female body



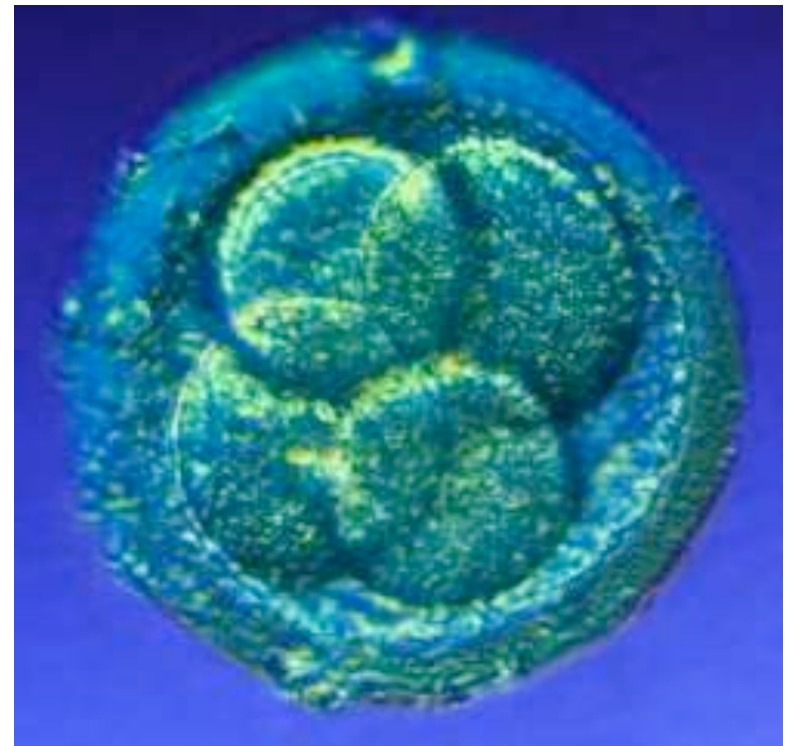
Internal Fertilization

- Internal fertilization occurs inside the female parent
 - Reptiles (lay many eggs)
 - Birds (lay only a few eggs)
 - Mammals
 - development takes place



Internal Fertilization

- Chance of survival is high
- Zygote forms inside the female body.



Parthenogenesis



- Eggs develop without fertilization
 - Bees
 - There are three main categories for honey bees.
 - The queen is the center of the hive because she is responsible for laying eggs. She mates once and retains the sperm for the rest of her reproductive life. When the queen lays her eggs, she deposits them in different sized receptacle.
 - The smaller cells, about 5mm in diameter, contain fertilized eggs destined to become sterile female workers.
 - The larger cells, about 7mm in diameter, contain future

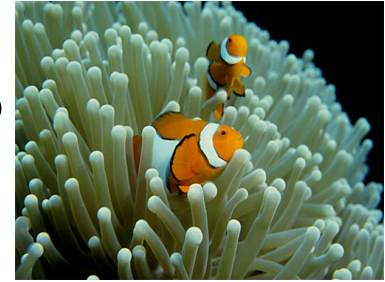
Hermaphrodites



- Hermaphrodites have both male and female reproductive organs
 - Hydra, snail,
 - [Earthworms](#) are example of hermaphrodite. Although they possess ovaries and testes, they have a protective mechanism against self fertilization and can only function as a single sex at one time.
 - Sexual reproduction occurs when two worms meet and exchange [gametes](#), copulating on damp nights during warm seasons. Fertilized eggs are protected



Hermaphrodites



- **Protandry:** When the organism starts as a male, and changes gender to a female later in life.
 - The [Clownfish](#)
 - Generally one anemone contains a 'harem', consisting of a large female, a smaller reproductive male, and even smaller non-reproductive males.
 - If the female is removed, the reproductive male will change sex and the largest of the non-reproductive males will mature and become reproductive. It has been shown that fishing pressure can change when the switch from male to female occurs, since fishermen naturally prefer to catch the larger fish.

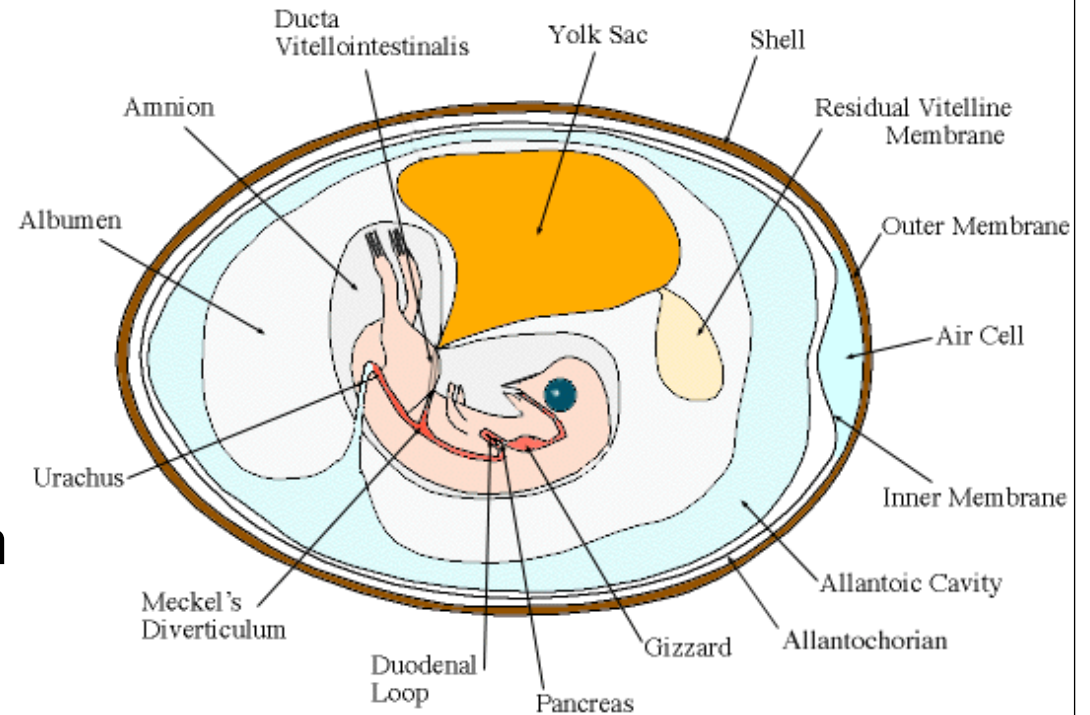
Development of the fertilized egg

- External Development
 - Develops outside the parent
 - Aquatic development: develops in water. Egg get nutrition from yolk sac.
 - Terrestrial Development: land development



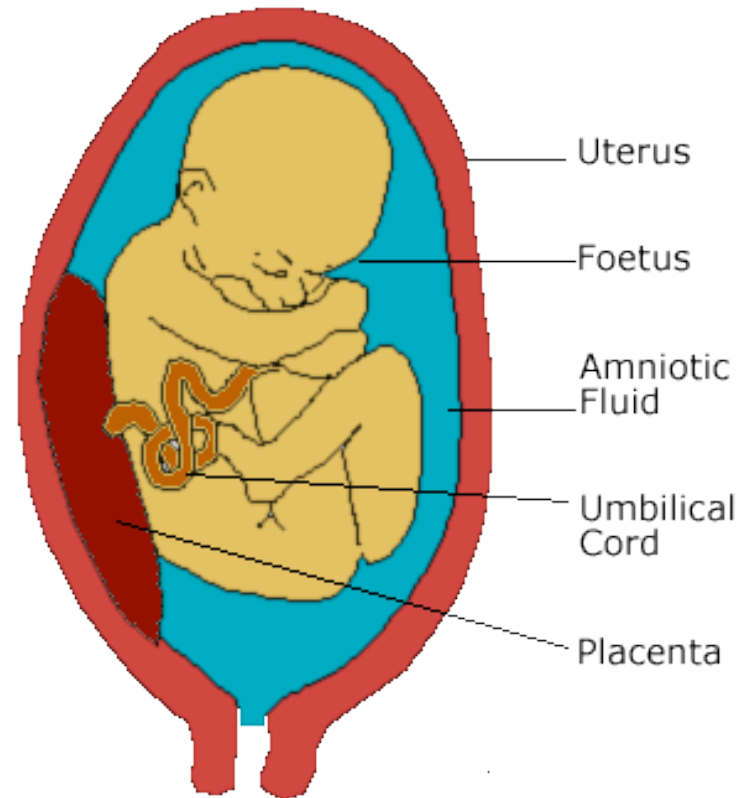
The Egg

- Eggs have
 - **Amnion** – fluid filled sac (moist, cushion)
 - **Yolk sac** – nutrition
 - **Allantois** – derived from gut lining. Filled with blood vessels (gas & nutrient exchange **similar to placenta in mammals**)
 - **Chorion** – membrane surround embryo yolk sac



Internal Development

- Internal Development occurs in mammal inside female
 1. Placental – mammals that possess an internal structure that forms joining of embryo and mother (mice, cats dogs, whale, human)
 - Allows for longer internal development
 - Exchange of O₂, CO₂ & nutrients between mother and embryo



Non-placental Mammals

1. Non-placental – have external development
 - Marsupials & monotremes → egg laying mammals

