

# PARTHENOGENESIS

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Asexual Reproduction

# History of Parthenogenesis

- 1800's First discovered in domestic chickens
- 1900's Domestic pigeons
- 1936 Gregory Pincus used artificial parthenogenesis on rabbit eggs
- 1940 Domestic turkeys
- 1950 Jacques Loeb used artificial parthenogenesis on frog eggs
- 2007 Dr. Damion Chapman discovered parthenogenesis in dwarf hammerhead sharks in an aquarium (also has been found in two other shark species)

# PARTHENOGENESIS

- Biological reproduction that involves development of a female (rarely male) gamete (sex cell) without fertilization.
- Different from hermaphroditic species which have both male and female gametes.

Facultative

Cyclic/Heterogony

Artificial

Shark

Water Flea

Chemicals and  
Temperature

# Facultative

- Facultative Species

- Has the ability to reproduce sexually through fertilization or asexually through parthenogenesis
- Switch is sometimes based on organism's environment
- Create eggs capable of either fertilization or parthenogenic activation



# Facultative:

Several species of insects:

- Ants and honey bees

Komodo Dragon (based on availability of mate)

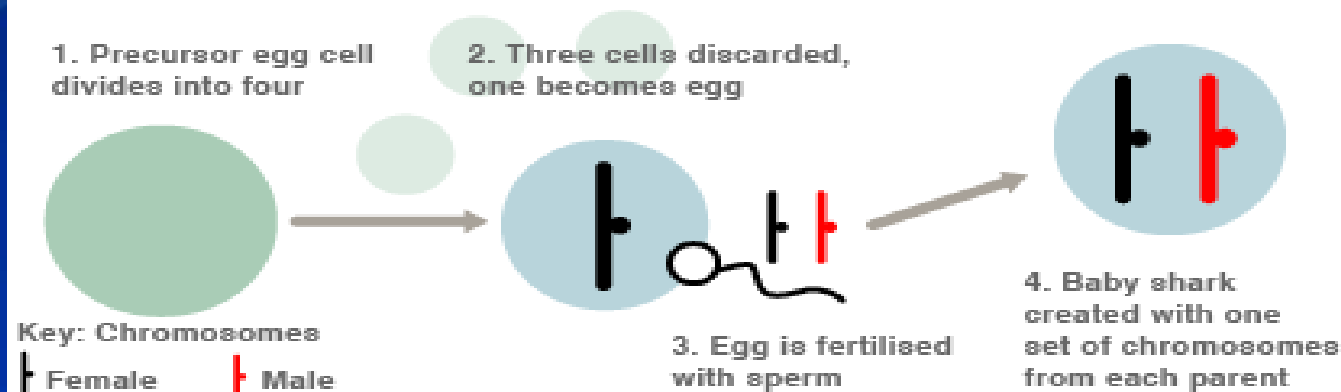
Hammerhead Sharks (Deuterostome)



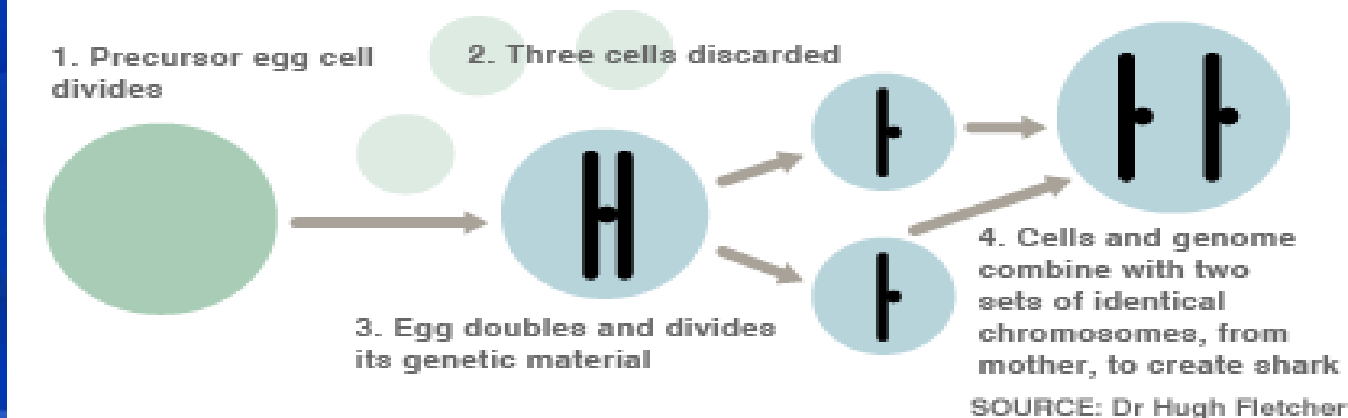
# Facultative Parthenogenesis: Shark Egg:

## HOW NORMAL FERTILISATION AND PARTHENOGENESIS DIFFER

### Normal Fertilisation



### 'Virgin birth' - Parthenogenesis

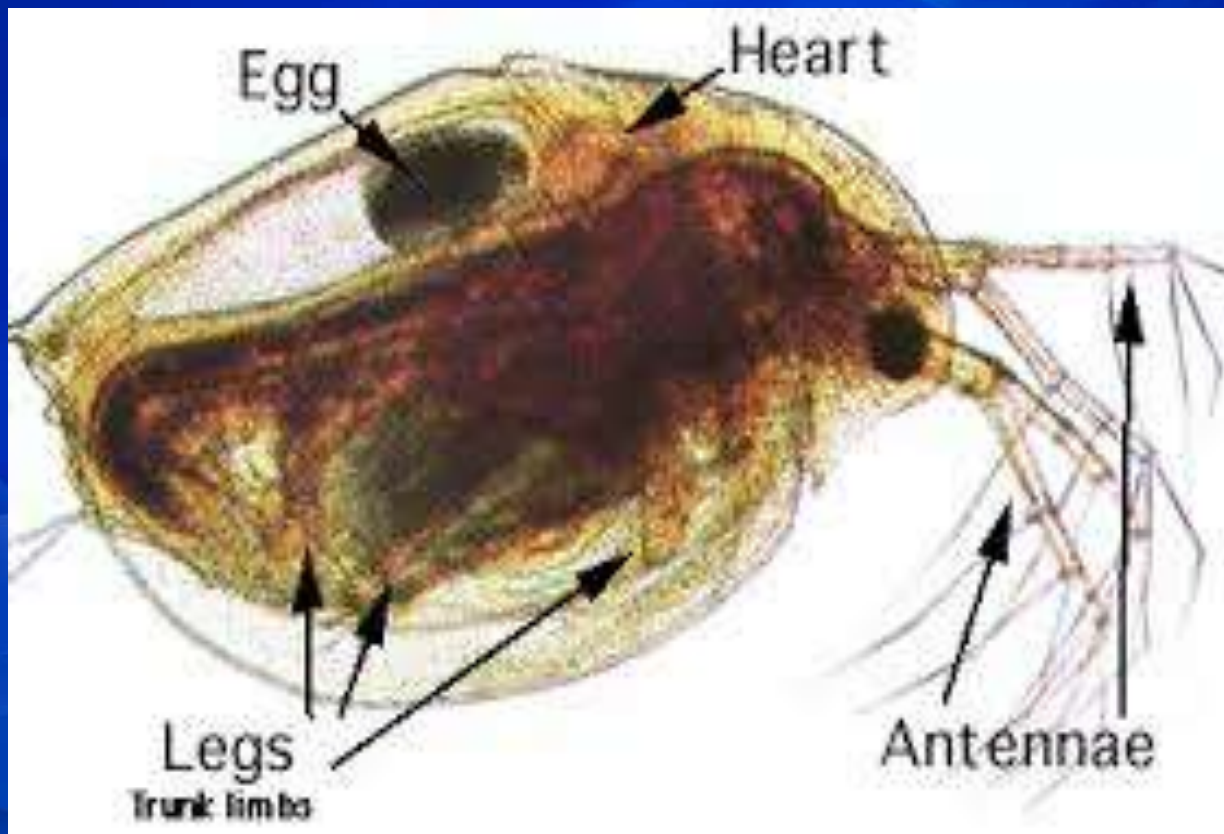


# Cyclic/Heterogony

- Some species alternate between parthenogenesis and fertilization generations.
- In these species certain eggs are capable of fertilization and some are not and undergo parthenogenesis.
- Each organism has its own process that determines how and when each type of egg is laid and what sex will develop.

# Cyclic/Heterogony:

## Water Flea (Protostome)





# Water Flea

## Fertilized Egg

- Larger
- Slow developing
- Yolk-rich
- Lie dormant through the winter
- After fertilized by the male produces females

## Unfertilized Egg

- Smaller
- Fast developing
- Laid in summer
- Produces some males and females

# Artificial Parthenogenesis

- Performed by chemical and temperature changes.
- 1900 Jacques Loeb used artificial parthenogenesis by pricking unfertilized frog eggs with a needle; some had normal development.
- No successful human parthenogenesis have been reported.

# Another Example Of Facultative Parthenogenesis

- Burmese Python



# Facultative Parthenogenesis: Snake Egg

- Mechanism for the sexual-asexual switch is unknown, but at some point in time the organism becomes asexual by the mode of terminal fusion.
- The egg fuses with a second polar body and believes that fertilization has occurred.
- Goes through duplication and development.
- Produces homozygous offspring.
- Mother: ZW
- Offspring: ZZ male or WW female



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