Methods of Reproduction

Sexual and Asexual Reproduction

Asexual Reproduction:

requires only 1 parent and the offspring are an <u>exact copy</u> of the parent---a clone

Asexual Reproduction:

- Organisms that reproduce asexually cannot develop much variety, because they are "copying" the original organism exactly.
- This does not allow for evolution of the species. Each organism is the exact same as its parent.
- This process take a relatively short period of time. And can produce 1-100s of offspring.

Methods of asexual reproduction:

Binary fission

Budding

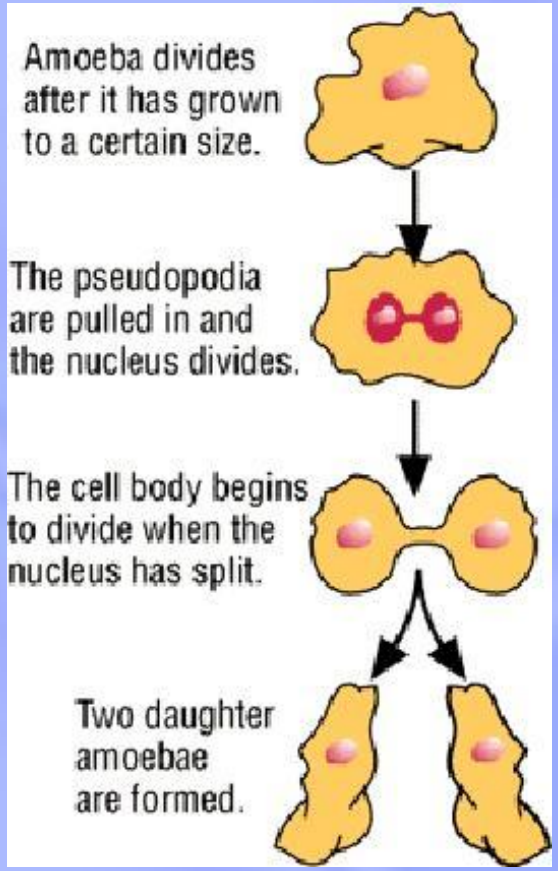
Fragmentation

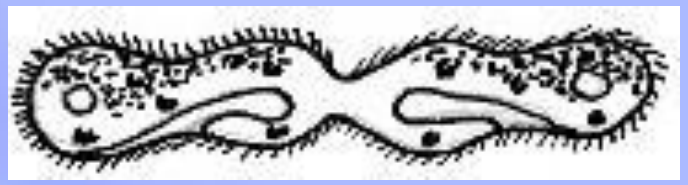
Parthenogenesis

Binary fission

Single-celled organisms (*Amoeba, paramecium, euglena*) which use asexual reproduction can do so simply by dividing into two equal halves.

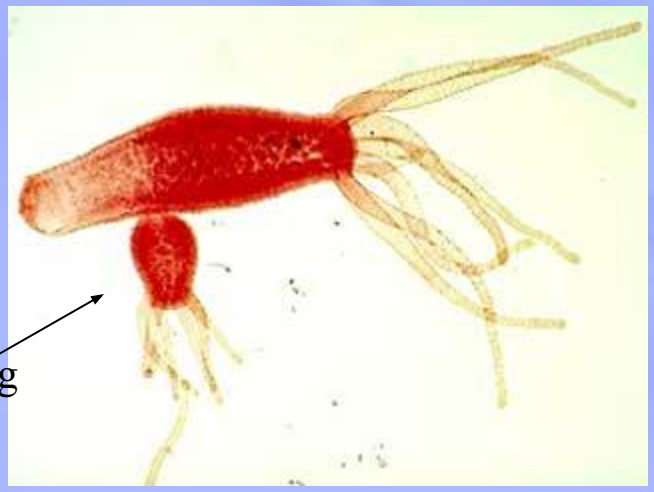
This is called binary fission.





- **When conditions are good, such as plenty of water, food, right temperatures, etc., binary fission is a very effective way of producing many, many offspring.**
- **For example, the cell of a Paramecium can divide, grow, and divide again in the space of 8 hours.**

Budding- an offspring grows out of the body of the parent.



Hydra Budding

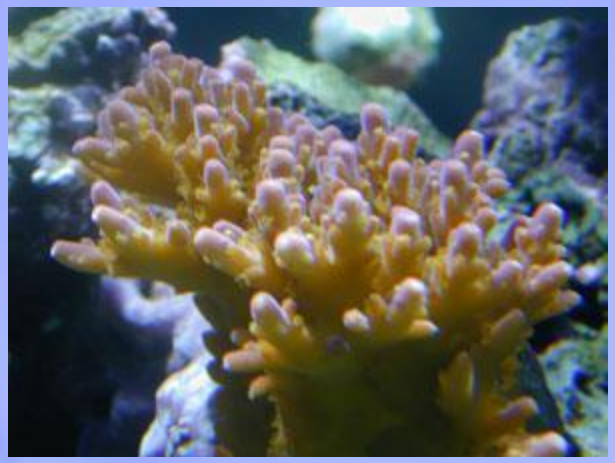
Cactus Budding

Budding cont.

Green plants are quite sophisticated in their methods of asexual reproduction. Offspring may be produced by runners, bulbs, rhizomes or tubers.

Regeneration

In this form, the body of the parent breaks into distinct pieces, each of which can produce an offspring.

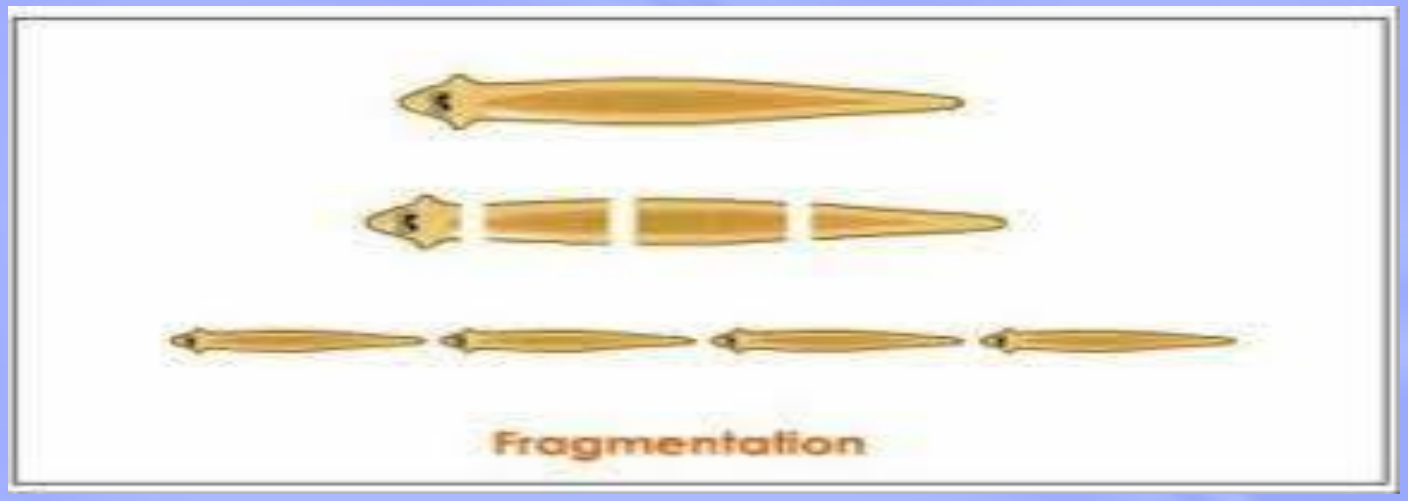


Pieces of coral broken off in storms can grow into new colonies.

A new starfish can grow from one detached arm.

Fragmentation

In this form, the organism fragments into smaller pieces and each piece forms a new organism identical to its parent.



A flat worm will break into distinct pieces and each will regrow another smaller organism.

Fragmentation- plant cuttings

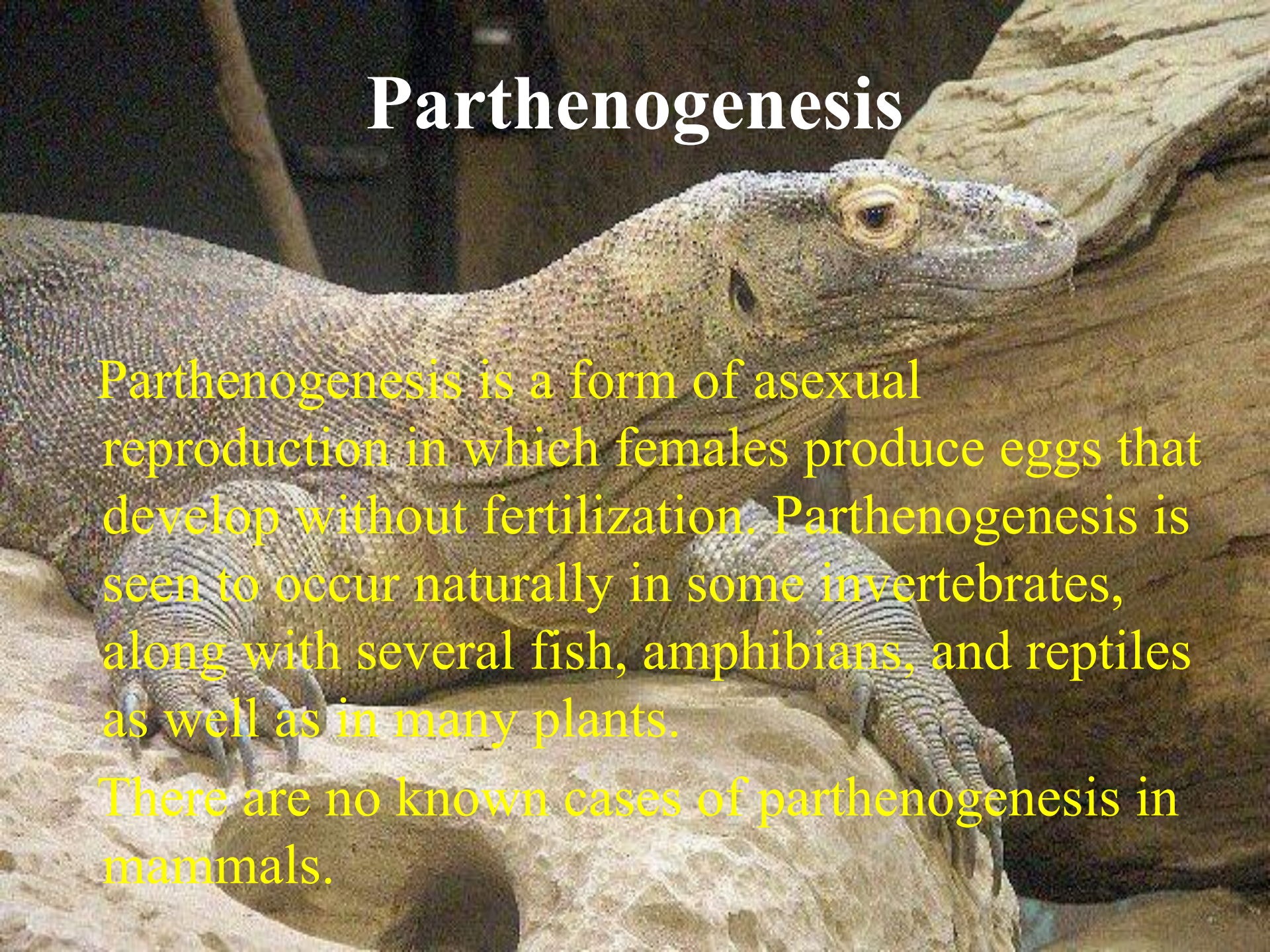
Some plants can grow from cutting them up and replanting them.

Sporulation

In this form, the parent organism produces tiny spores that it releases. They will then create an exact copy of the original organism without fertilization.

The mushroom is releasing unfertilized spores

Parthenogenesis



Parthenogenesis is a form of asexual reproduction in which females produce eggs that develop without fertilization. Parthenogenesis is seen to occur naturally in some invertebrates, along with several fish, amphibians, and reptiles as well as in many plants.

There are no known cases of parthenogenesis in mammals.

Asexual Reproduction:

Advantages of Asexual Reproduction

- uses less energy (it is not necessary to find a partner)
- offspring is usually well adapted to its environment because of the success of its parent

Asexual Reproduction:

Disadvantages of Asexual Reproduction

- the species does not adapt at all or adapts very slowly when circumstances change
- an asexual species runs the risk of suddenly disappearing because of a catastrophe that affects all organisms

What is sexual reproduction?

- **Requiring 2 parents**
  - **male and female (egg & sperm)**
- The egg and sperm join (zygote) to form an entirely new organism
- Offspring are different from the parent organism.
- This process creates a variety of genetic make-up which is the driving force behind evolution.

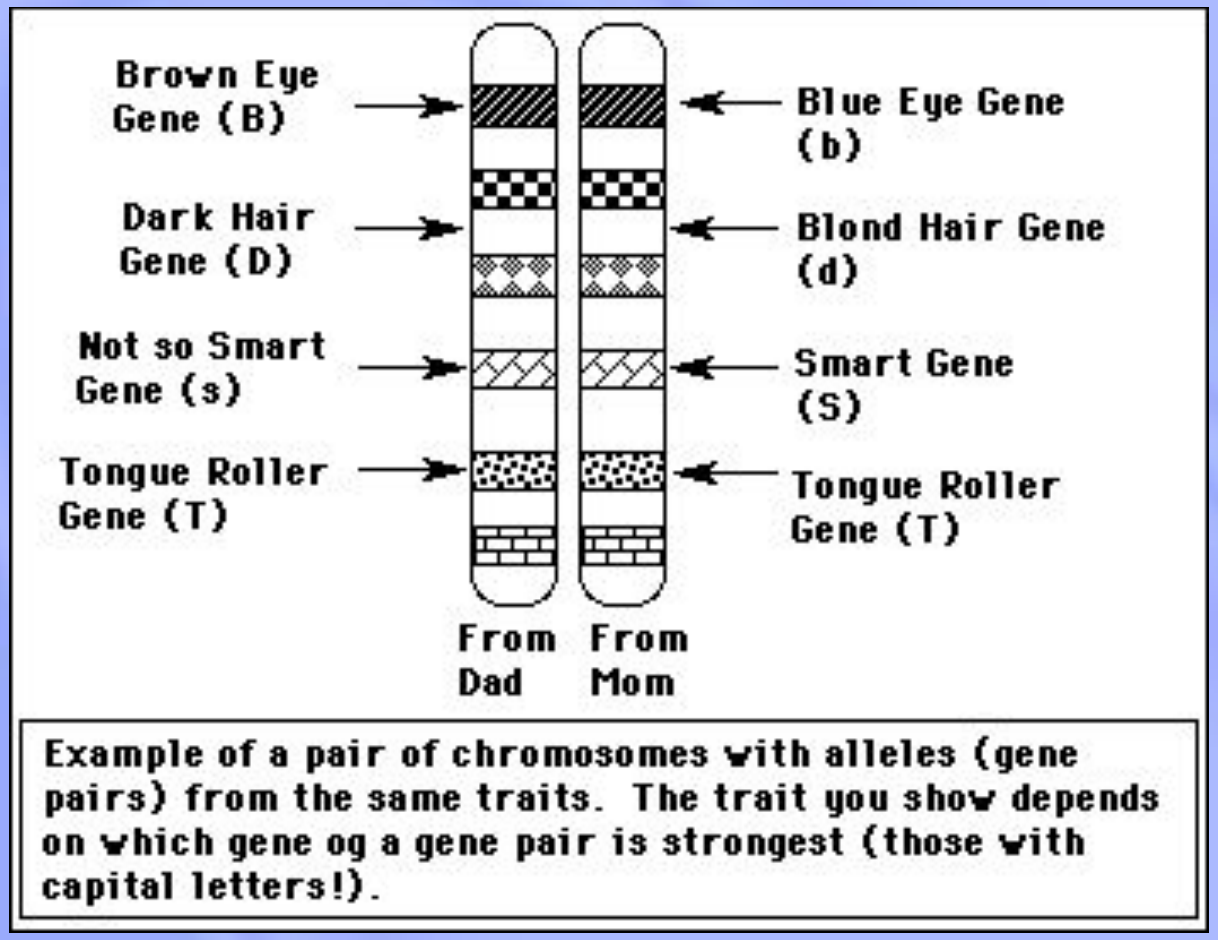
Sexual Reproduction

- Sexual reproduction produces a greater chance of variation within a species than asexual reproduction would.
- This variation improves the chances that a species will adapt to his environment and survive.

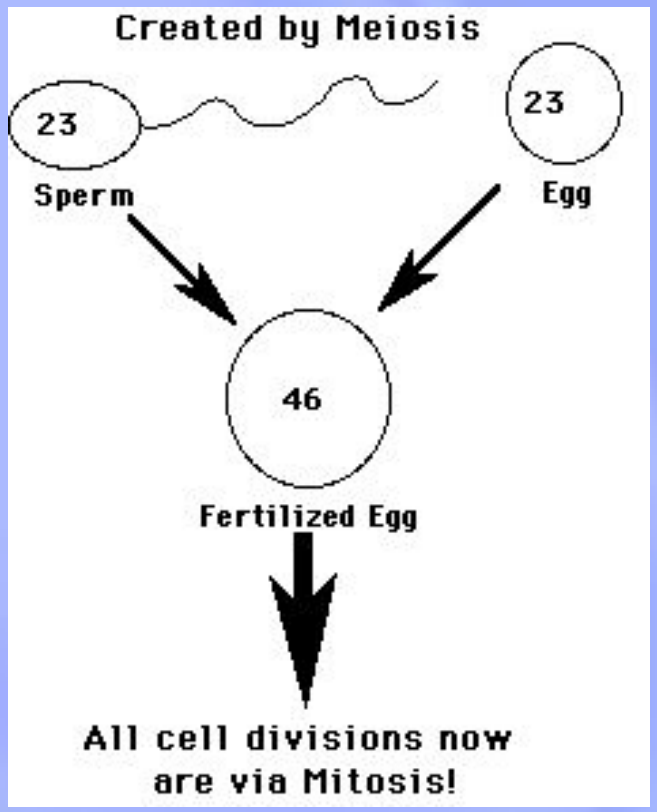
Sexual Reproduction:

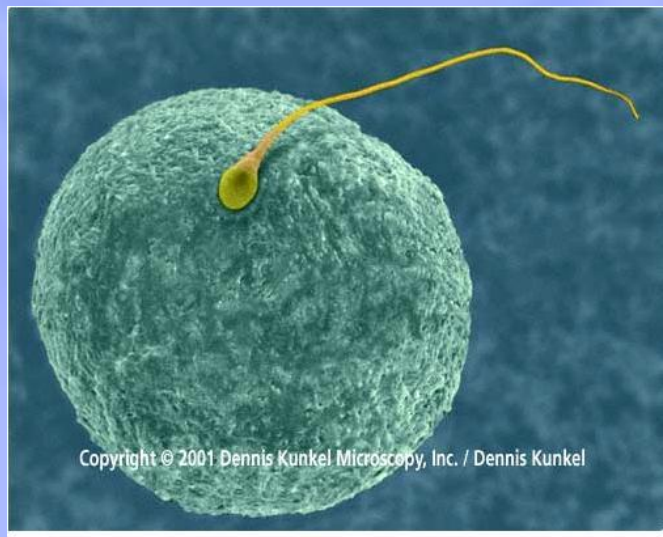
Requiring 2 parents (egg & sperm)

Combining different genetic material



Example of a pair of chromosomes with alleles (gene pairs) from the same traits. The trait you show depends on which gene og a gene pair is strongest (those with capital letters!).

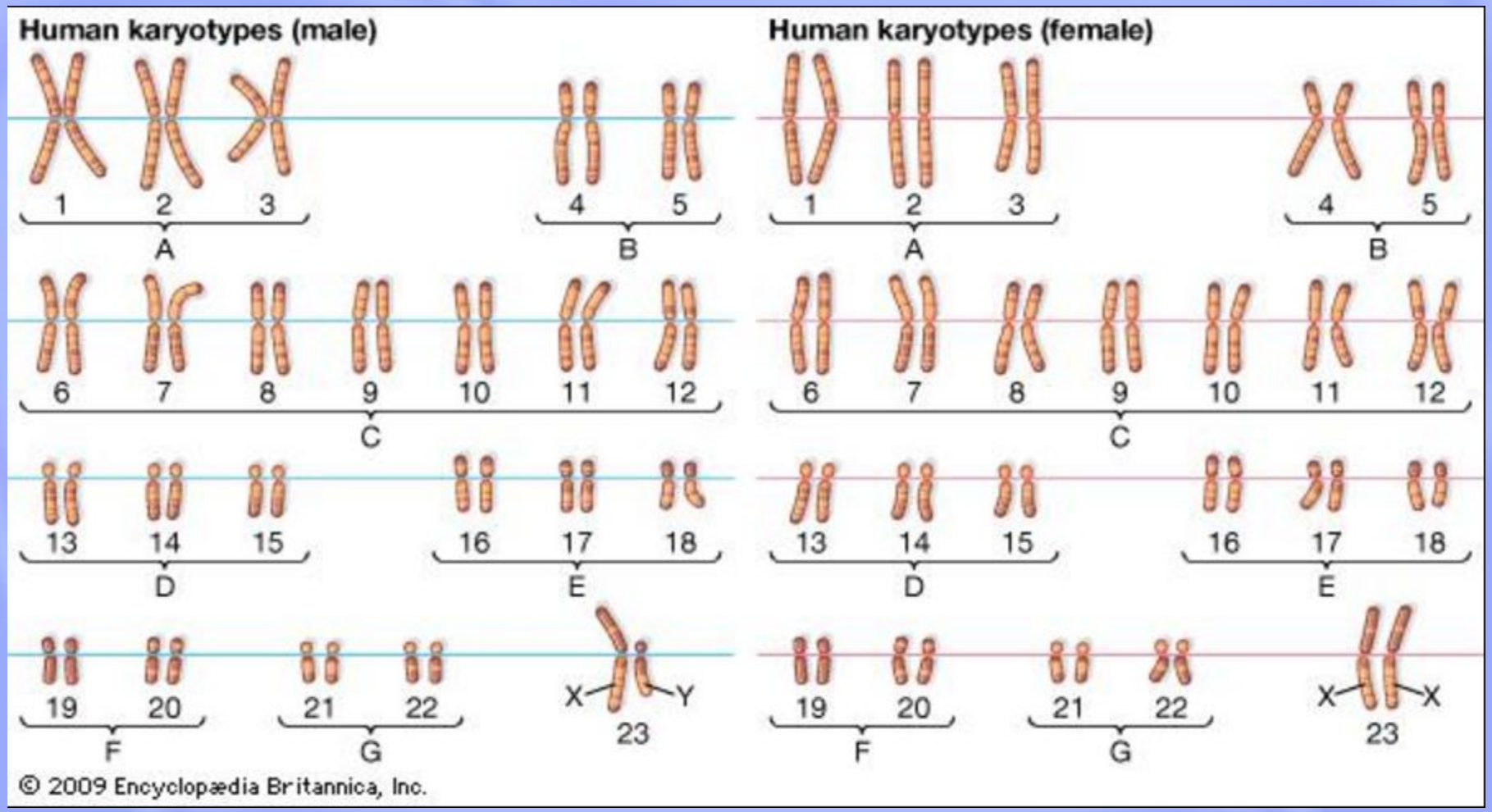




Sexual Reproduction:

Requiring 2 parents (egg & sperm)

Combining different genetic material



Sexual Reproduction Adv.

- increases the genetic variability in organisms of the same species and even within the offspring of one couple
- in the long run, allows the best adaptations to be widespread within a species, especially in changing circumstances

Sexual Reproduction Adv.

- the variability of organisms within a species guarantees that a higher proportion will survive in perilous circumstances

Sexual Reproduction Dis.

- finding a reproductive partner and producing gametes demands the output of a lot of energy
- not only do you need two gametes for fertilization, one has to be male, the other Female
- genetic “errors” happen more frequently because meiosis is more complex than mitosis and diploid organisms have more chromosomes to double

Methods of sexual reproduction:

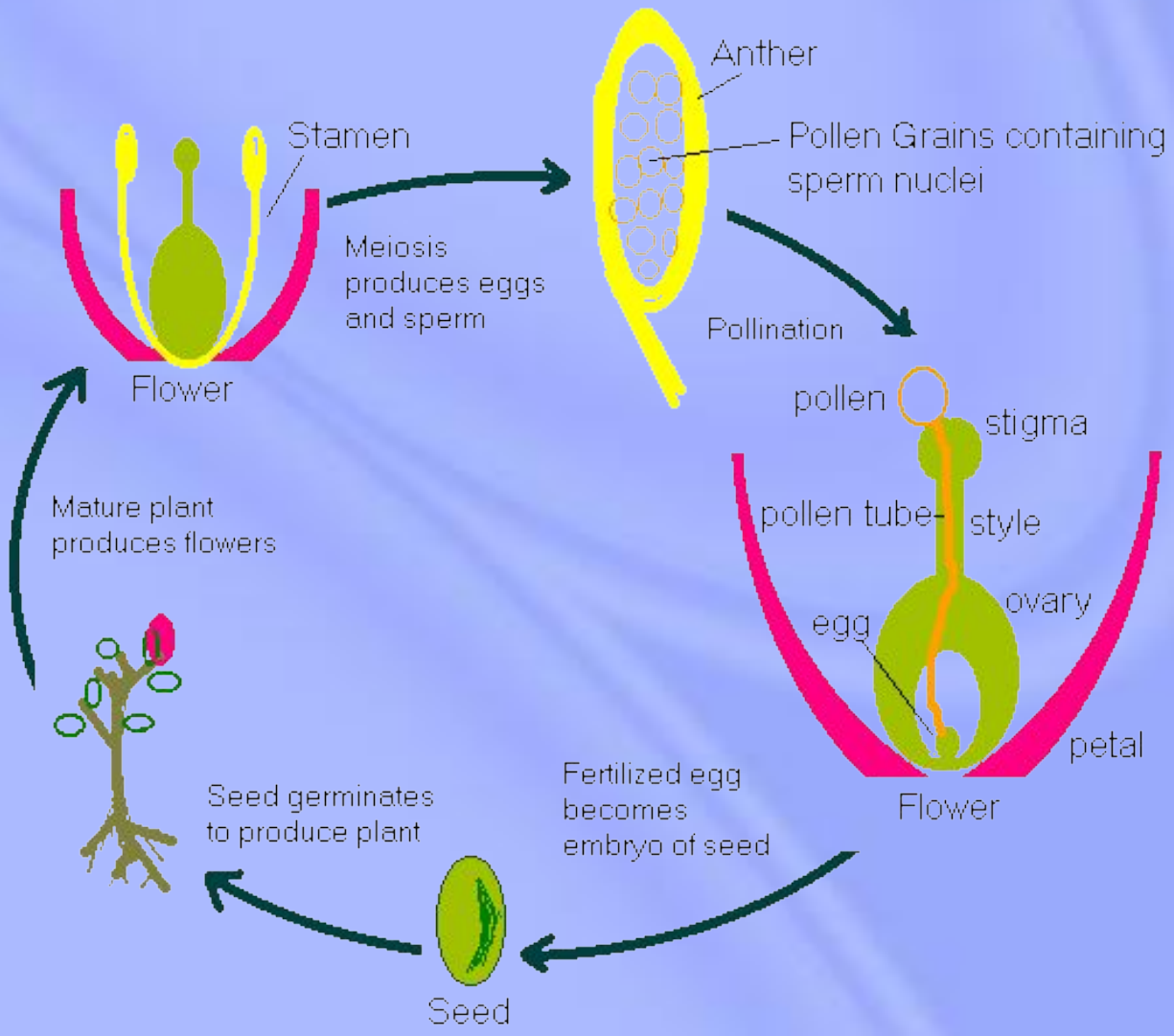
Pollination

External Fertilization

Internal Fertilization

Sexual Reproduction in Flowering Plants

Pollen is produced in the male organs of the flowers - ***anthers***. ***Pollination*** occurs when pollen is transferred from the anthers to the female organs by wind or by animals. If the female ***stigma*** is receptive to a pollen grain, the pollen produces a ***pollen tube***, which grows through the female tissue to the ***egg***, where ***fertilization*** takes place by the sperm nucleus.



External Fertilization

- External fertilization usually requires a medium such as water, which the sperms can use to swim towards the egg cell. External fertilization usually occur in fish and amphibians.
- The females lay the eggs in the water and the male squirts the sperm in the same area.

Internal Fertilization

- Fertilization occurs within the female.
- Internal fertilization occurs in mammals, insects, birds, reptiles.
  - Mammals (gorillas, lions, elephants, rats, zebras, and dolphins have live births)
  - Insects, birds, reptiles lay eggs

Sexual vs. Asexual Reproduction

- **Asexual** reproduction results in offspring that are genetically identical to the parent organism.
- **Sexual** reproduction results in offspring that are genetically different from the parent organisms.