

Binary Fission and Mitosis

Most prokaryotes reproduce through binary fission. Binary fission is when one single-celled organism divides into two parts.

Binary fission is very similar to mitosis because both processes form two daughter cells that are identical to the parent cell. However, the actual processes are different in several ways because of the differences between prokaryotic and eukaryotic cell structures. Mainly due to the lack of a nucleus and centrioles/spindle fibers in prokaryotic cells.

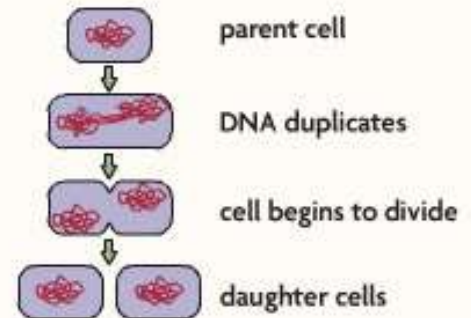
Most bacteria species reproduce through binary fission and have a single, circular chromosome. The bacterial chromosome is replicated, then the chromosomes attached to the cell membrane at different ends of the cell, insuring that when the cell splits each new bacteria will have the correct DNA. The chromosomes must attach to the cell membrane because bacterial cells do not have centrioles to form spindles to pull the chromosomes apart, like animal cells have during mitosis.

Process

1. The single chromosome doubles
2. The duplicated chromosomes attach to the cell membrane
3. The cells grow longer and the chromosomes move away from each other.
4. The membrane pinches in half during cytokinesis, creating two identical daughter cells.

VISUAL VOCAB

Binary fission is the asexual reproduction of a single-celled organism by division into two roughly equal parts.



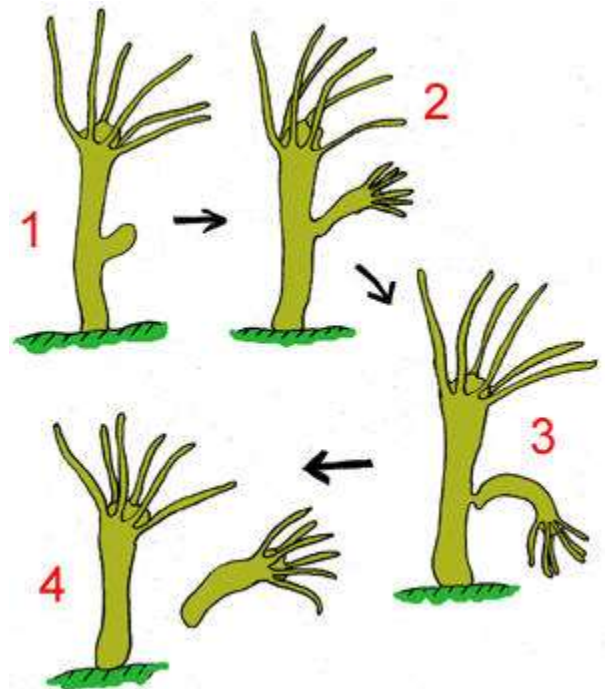
Budding

Budding occurs when a small outgrowth on the surface of a parent organism forms a new separate individual. The new organism may live independently or attached as part of a colony. Many organisms reproduce by budding, for example; hydras and other cnidarians (small, freshwater animals), corals, flatworms, plants, and some types of yeast. In some species buds may be produced from almost any point of the body, but in many cases budding is restricted to specialized areas.

Hydra are multicellular animals that live in freshwater habitats. They are particularly interesting because they seem to not age, or die of old age. When food is plentiful hydra will form a bud, or sometimes multiple buds that will eventually form new individuals through the process pictured to the right. New buds can be formed as fast as every two days. When environmental conditions are more harsh hydra form ovaries or testicles and reproduce sexually.

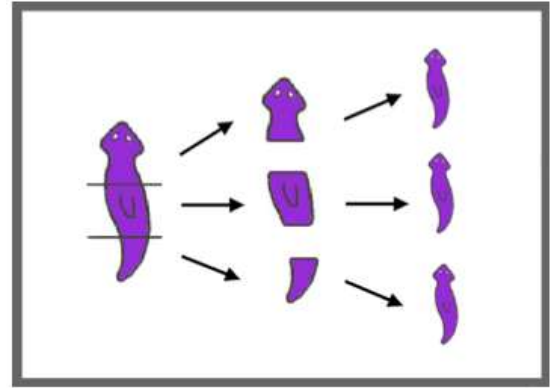
Process

1. A bud develops due to repeated cell division at one specific site
2. These buds develop into tiny individuals using mitosis
3. When fully mature they detach from the parent body as new, independent clones of the parent



Fragmentation

Fragmentation is the breaking of the parent body into two or more parts that regenerate into separate individuals. If the organism is capable of fragmentation, and the separated part is big enough, a separate identical individual will regrow. Note that in fragmentation, there is generally a noticeable difference in the size of the new individuals.



Sea stars can reproduce asexually by fragmentation. If the arm of an individual sea star is broken off it will regenerate a new sea star.

Fishery workers have been known to try to kill the sea stars that eat their clam or oyster beds by cutting them in half and throwing them back into the ocean. Unfortunately for the workers, the two parts can each regenerate a new half, resulting in twice as many sea stars to prey upon the oysters and clams.

Many species of annelids (worms) can also reproduce through fragmentation. For example, California blackworms, or mudworms, are hermaphroditic -- they have both male and female reproductive parts -- and can reproduce sexually. However, blackworms can also perform fragmentation to reproduce without a partner.

Process

1. A parent organism is fragmented
2. If each piece is large enough it will grow into a new, identical individual through mitosis

Parthenogenesis

Parthenogenesis -- literally "virgin birth" -- is a type of asexual reproduction in which offspring develop from unfertilized eggs. This means that females are capable of reproducing without contribution from a male. It can be observed in some species of flatworms, scorpions, aphids, bees, fish, amphibians, reptiles, and in rare cases birds, but not in mammals. The resulting offspring are essentially clones of the parent.

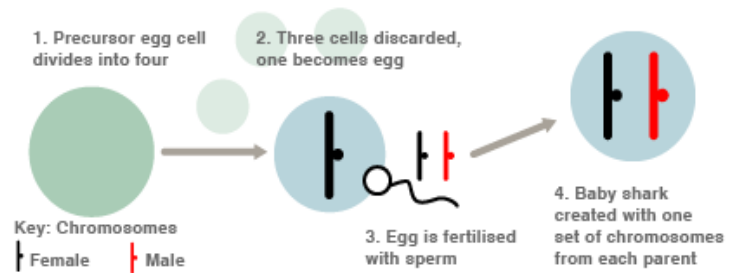
Some species, like copperhead snakes, can reproduce asexually as an alternative to their typical sexual reproduction. Female copperhead snakes can give birth to live young without having been inseminated by a male, even when males are available, according to National Geographic. In this form of parthenogenesis, the polar body, or a cell produced alongside the female's egg, acts as a sperm cell and essentially "fertilizes" the egg. Meaning that the female produces an offspring using only her genetic material.

Process

1. An egg cell in a female is either fertilized by a polar body cell, or spontaneously undergoes mitosis to double the DNA
2. An embryo develops as it normally would, maturing into a new, identical individual

HOW NORMAL FERTILISATION AND PARTHENOGENESIS DIFFER

Normal Fertilisation



'Virgin birth' - Parthenogenesis

