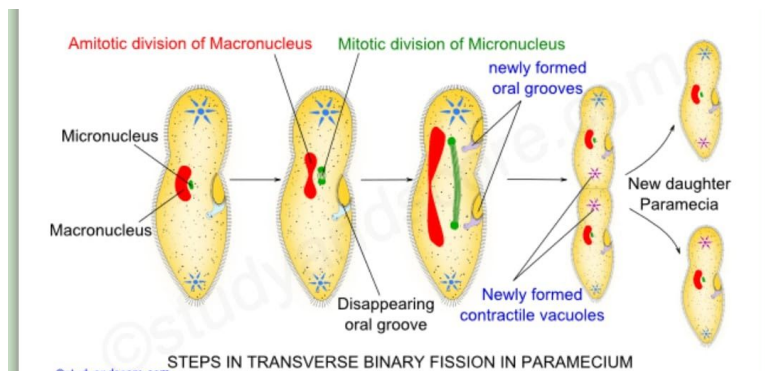


~~asexual reproduction in paramecium, endomixis, autogamy, binary fission, cyogamy, conjugation~~

~~Paramecium stops feeding before initiating binary fission and then its oral groove disappears. Macronucleus divides by amitosis and micronucleus divides by mitosis. After division, they move towards the opposite end. At the same time, the constriction develops at the middle part of the body which divides cytoplasm into two equal parts. In this way, two daughter-Paramecia are produced.~~

~~Daughter from anterior end is called protot and another daughter from posterior end is called opisthe. They are of equal size and contain a complete set of cell organelles as in parents. Oral groove and cytopharynx are newly formed in both the daughters. One contractile vacuole goes to protot and another to opisthe. Other two are newly formed. The whole process is completed within 2 hours and may occur one to four times a day.~~



SEXUAL REPRODUCTION: CONJUGATION

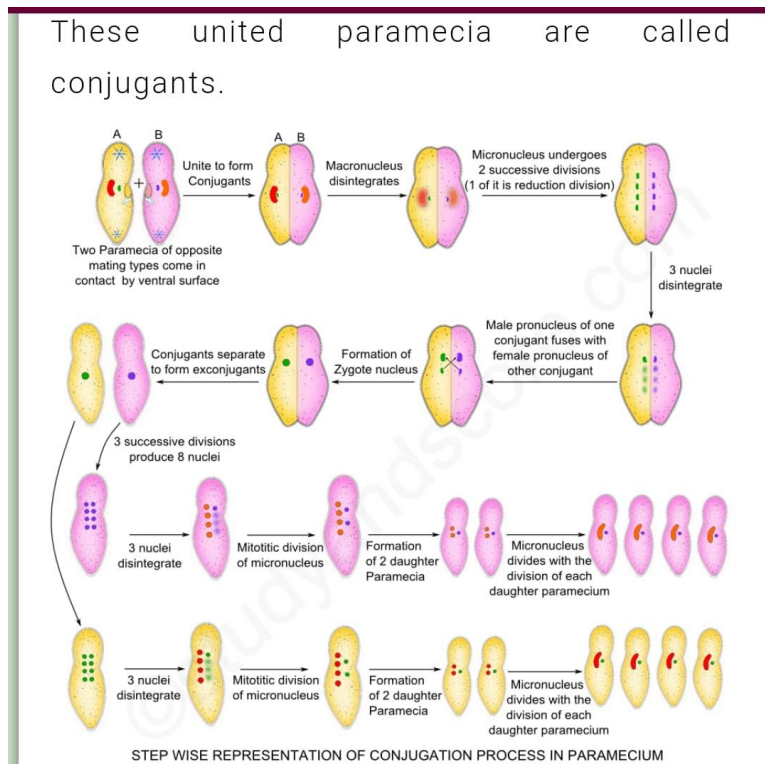
In Paramecium, Conjugation is a form of sexual reproduction. It is a temporary union of two individuals of same species for mutual exchange of genetic materials. Continuous multiplication by binary fission is interrupted by conjugation as it is necessary for the survival and rejuvenation of the race.

Conjugation inducing factors: The following are the factors which induce conjugation, Unfavorable conditions like some degree of starvation, shortage of food, a particular bacterial food, a certain range of light and temperature and certain chemicals induce conjugation. Also conjugation is induced after certain number of asexual binary fissions to rejuvenate the paramecium.

Types of mating systems in paramecium: Each variety of the species of paramecium has two mating types which differ in chemical characteristics of their surface membranes. Conjugation can occur only between different mating types of the same variety or syngen.

Conjugation process: The two Paramecium of opposite mating types come in contact by their ventral surface during swimming. They stick together through their oral groove region. Following this attachment their cilia, Trichocysts, feeding apparatus degenerate. Pellicle and ectoplasm degenerate at the point of contact and a cytoplasmic bridge. This cytoplasmic bridge is also

known as protoplasmic bridge or Conjugation Bridge. These united paramecia are called conjugants.



The conjugants attach with each other for several hours during which complicated reorganization and exchange of nuclear material occurs as described below,

Changes in macronucleus: The macronucleus breaks up into fragments and these fragments are later absorbed into the cytoplasm.

Changes in micronucleus: Lot of complicated changes and divisions take place in the micronucleus.

The diploid micronucleus in each conjugant grows in size and then divides by meiosis (in meiotic division a single cell gives four haploid daughter cells)

As a result of meiotic division four haploid daughter micronuclei are produced. Out of these four micronuclei, three degenerate and disappear.

The remaining one micronucleus divides by mitosis to form two unequal pronuclei or gamete nuclei. The smaller gamete nuclei is active in migratory in nature and is called migratory gamete nucleus. The larger gamete is passive and stationary in nature and is called stationary gamete nucleus.

The migratory gamete nucleus of one conjugant passes through the protoplasmic bridge into other conjugant and fuses with its stationary gamete nucleus. This fusion results in the formation of a single diploid zygote nucleus. This zygote nucleus is also known as synkaryon.

And this process of complete fusion of two nuclei from two different individuals to form a zygote nucleus is called as amphimixis.

After the formation of zygote nucleus, the attached conjugants separate and now they are called ex-conjugants.

The zygote nucleus in each exconjugants divides thrice by mitosis finally forming eight nuclei. Four of these eight nuclei grow in size to become macronuclei. The remaining four small nuclei are called micronuclei.

Out of the four micronuclei, three degenerate and disappear. And the remaining one micronucleus divides mitotically into two. Simultaneously the exconjugants also divide into two daughter paramecia.

Each daughter paramecia thus obtained from exconjugants has 2 macronuclei and 1 micronucleus.

A micronucleus of daughter individuals again divides mitotically with the division of cytoplasm to produce four daughter individuals each with one macronucleus and one micronucleus.

In this way, 8 paramecia are produced as a result of conjugation four from each

Significance of conjugation

Nuclear Reorganization: In conjugation new and metabolically active macronucleus is produced by reorganization of micro nuclear materials.

Rejuvenation: In conjugation old, weak and defective macronucleus is replaced by new one which can control metabolism growth and the environment. Because of this paramecium is rejuvenated i.e. it gains the previous vigor.

Genetic variation: In conjugation, genetic materials are exchanged between Paramecium of opposite mating types. It brings variation in daughter individuals due to genetic recombination.