

Reproduction in *Paramecium*. Part-1

In *Paramecium*, reproduction happens by asexual methods and nuclear reorganizations. These are discussed below-

Asexual reproduction: It takes place by transverse binary fission in which division takes place at right angle to the longitudinal axis of body. It is the method of reproduction during favourable conditions & the daughter progeny are genetically identical division to the parent and are called clones.

The steps in division are:

1. *Paramecium* stops feeding, its oral groove & buccal epithelium begin to disappear.
2. Micronucleus undergoes endomitosis i.e. mitosis with nuclear membrane intact, into two daughter micronuclei.
3. Macronucleus undergoes amitotic division by elongation & constriction.
4. Two anal grooves begin to form, one in anterior & posterior each. Two new buccal structures also appear.
5. One contractile vacuole remains in each half, other is formed after division.
6. A constriction furrow starts in the middle of the body & two daughters are pinched off. the anterior one is called proter & posterior one opisthe.

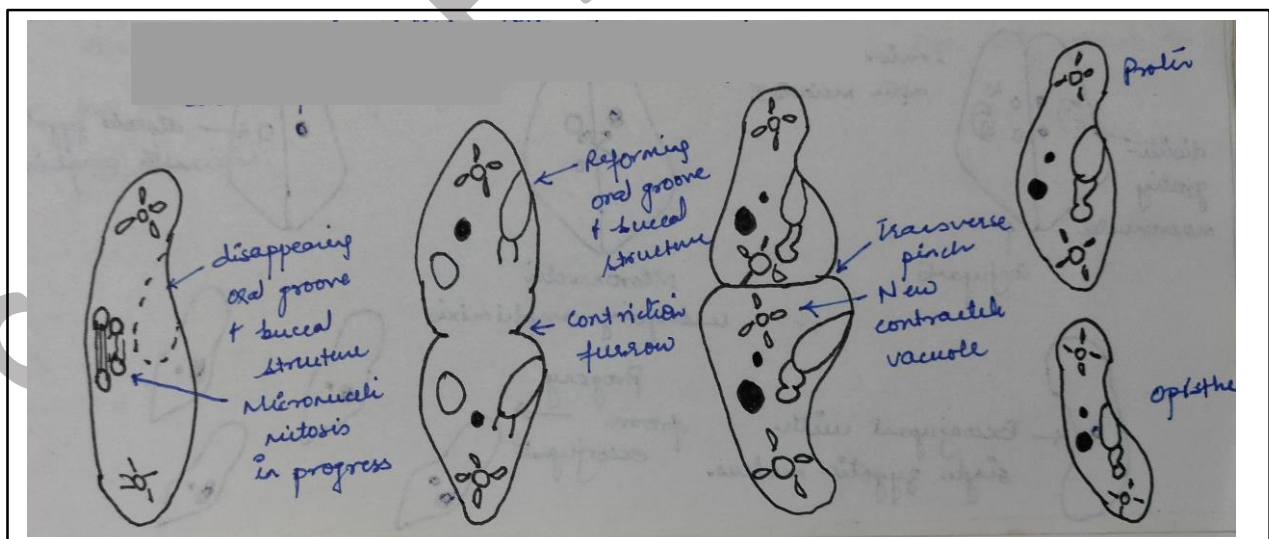


Figure: Asexual reproduction by binary fission in *Paramecium*.

Nuclear organization: This involves processes of conjugation, autogamy & endomixis. These are discussed below.

1. Conjugation: It is a nuclear exchange process found to occur between *Paramecia* of different mating types. It occurs after many generations of binary fission with the purpose to restore the vitality of mating types & introduce genetic variations. It is also found to occur during unfavourable conditions.

In this, pre-conjugates belonging to different mating types unite at their ends and grooves & are called as conjugates now. The pellicle at contact point dissolves to form a protoplasmic bridge between conjugants & macronucleus degenerates. Micronucleus undergoes meiosis then degeneration of all daughter nuclei but one and then mitosis in the remaining daughter to form anisogametes. The microgametes from conjugants cross into each other via protoplasmic bridge & fuse with larger stationary gamete. This fusion is called as amphimixis & diploid zygotic nucleus is called as zygote. Now, conjugants separate and are called as exconjugants.

Each conjugant undergoes a set of mitotic nuclear divisions, nuclear degeneration and transverse binary fission. Thus, finally giving rise to 4 progeny *Paramecium*.

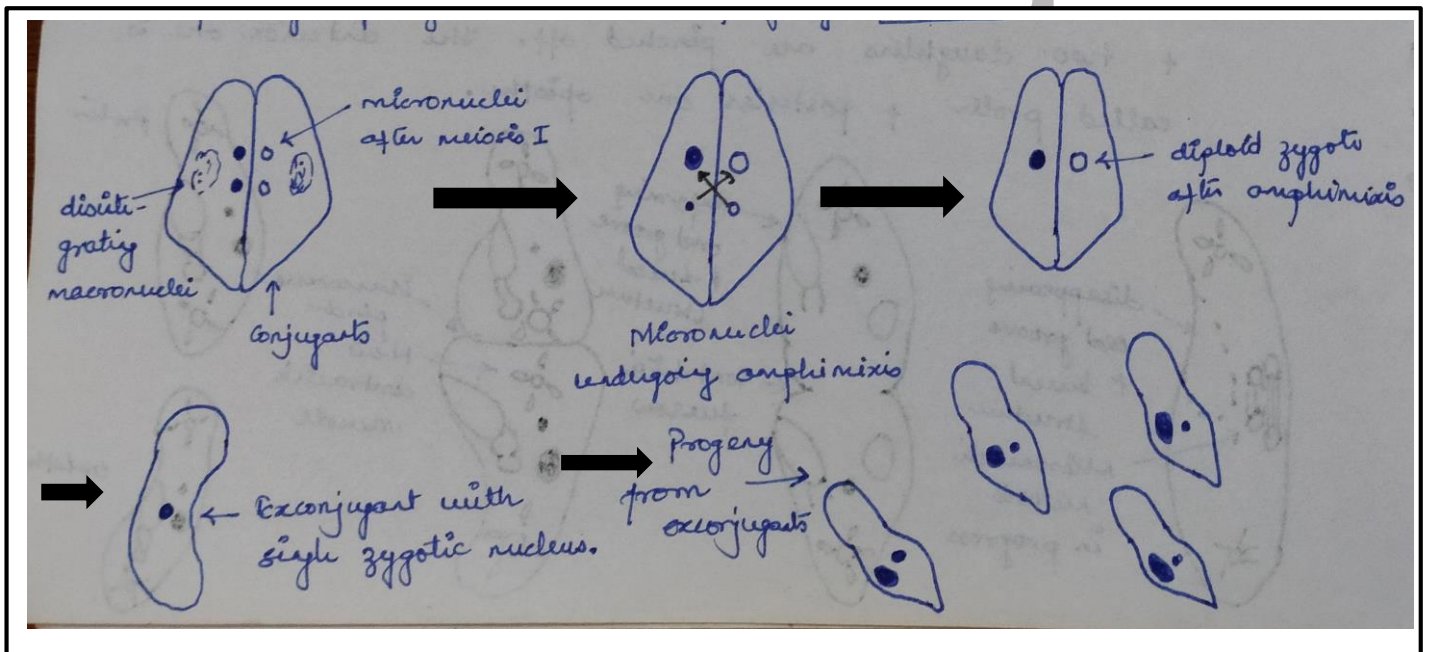


Figure: Conjugation in *Paramecium*

2. Autogamy: It is a process of nuclear reorganization found in *P. aurelia*, the species with two micronuclei. Autogamy resembles conjugation with difference being that it occurs within a single individual. It results in the formation of two progeny cells at its completion, rejuvenation of species and genetic reorganization.

3. Endomixis: It is a process of nuclear reorganization found in *P. aurelia*. It is found in pedigreed culture of *P. Aurelia*. It takes place in the absence of meiosis.

Steps involved are:

1. Vegetative macronucleus degenerates while micronuclei undergoes mitosis twice.
2. 8 daughter nuclei are formed, 6 degenerate.
3. *Paramecium* divides with one micronuclei in each daughter.
4. The micronuclei undergo set of mitosis & daughters divide by binary fission.

Thus, a single individual gives rise to 4 daughters.

This process leads to reorganization of nuclear material.

Note: An important difference between endomixis & other methods for nuclear reorganization is that meiosis does not occur in endomixis.

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