

# Conjugation in Paramecium

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## Conjugation of paramecium :-

Defination:- conjugation is defined as the temporary union of two individuals which mutually exchange micronuclear material. ordinarily paramecium reproduce by binary fission for long periods of time, but at certain intervals they performs the sexual reproduction by means of conjugation. Before conjugation two paramecia of different mating types come closed together.

### ■ process of conjugation :-

During conjugation two conjugants come closed together and paired by the ventral surface. The interlocking between in made stronger by gullets which degenerate to form a protoplasmic bridge between them.

### ■ Nuclear changes during conjugation :-

- i) Macro nucleus undergoes gradual ~~dis~~ disintegration and ultimately disappears.
- ii) Micro nucleus undergoes two successive mitotic divisions forming four nuclei in each conjugant.

iii) Three of these micro nuclei in each conjugant degenerate and the remaining one micro nucleus undergoes an unequal division forming two gamete nuclei. one of the gamete nuclei is large called sationary nucleous while the small one is called Migratory nucleous.

iv) The migratory nucleous of one conjugant goes to the sationary nucleous of the other and vice versa.

v) The migratory nucleous of one conjugant unites with the sationary nucleous of the other and forms the zygote nucleous.

vi) The conjugants with zygote nucleous is called Ex-conjugants.

vii) In each ex-conjugant, the zygote nucleus undergoes three successive mitotic divisions forming 8 nuclei. In which four becomes micro and other four becomes macro nuclei.

viii) Among the four micro nuclei, 3 micro nuclei degenerate <sup>leaving</sup> behind one active micro nucleus. The micro nucleus divides and cytoplasmic division follows, resulting into two paramecia from in each ex-conjugant. Each of the two paramecia contains two macro nuclei and one micro nucleus.

- ix) The micro nucleus again divides followed by cytoplasmic division by forming four paramecia each with one micro and one macro nucleus.
- x) So from each ex-conjugant four paramecia are formed.

■ Factors inducing conjugation :-

- i) conjugation occurs usually under unfavourable living condition — starvation or shortage of food.
- ii) conjugation <sup>occurs</sup> after about three hundreds of asexual generation of binary fission (sonneborn, 1947)
- iii) conjugation occurs when there is a change in the physiological condition of paramecia when smaller in size (210  $\mu$ m long).
- iv) Sudden darkness in light condition and low temperature are said to induce the process of conjugation in some species. | iv  
| c
- v) conjugation does not takes place during night or darkness — it starts in early morning and continues till afternoon. | v  
| c  
| c



■ Significance:-

i) Rejuvenation and re-organisation:-

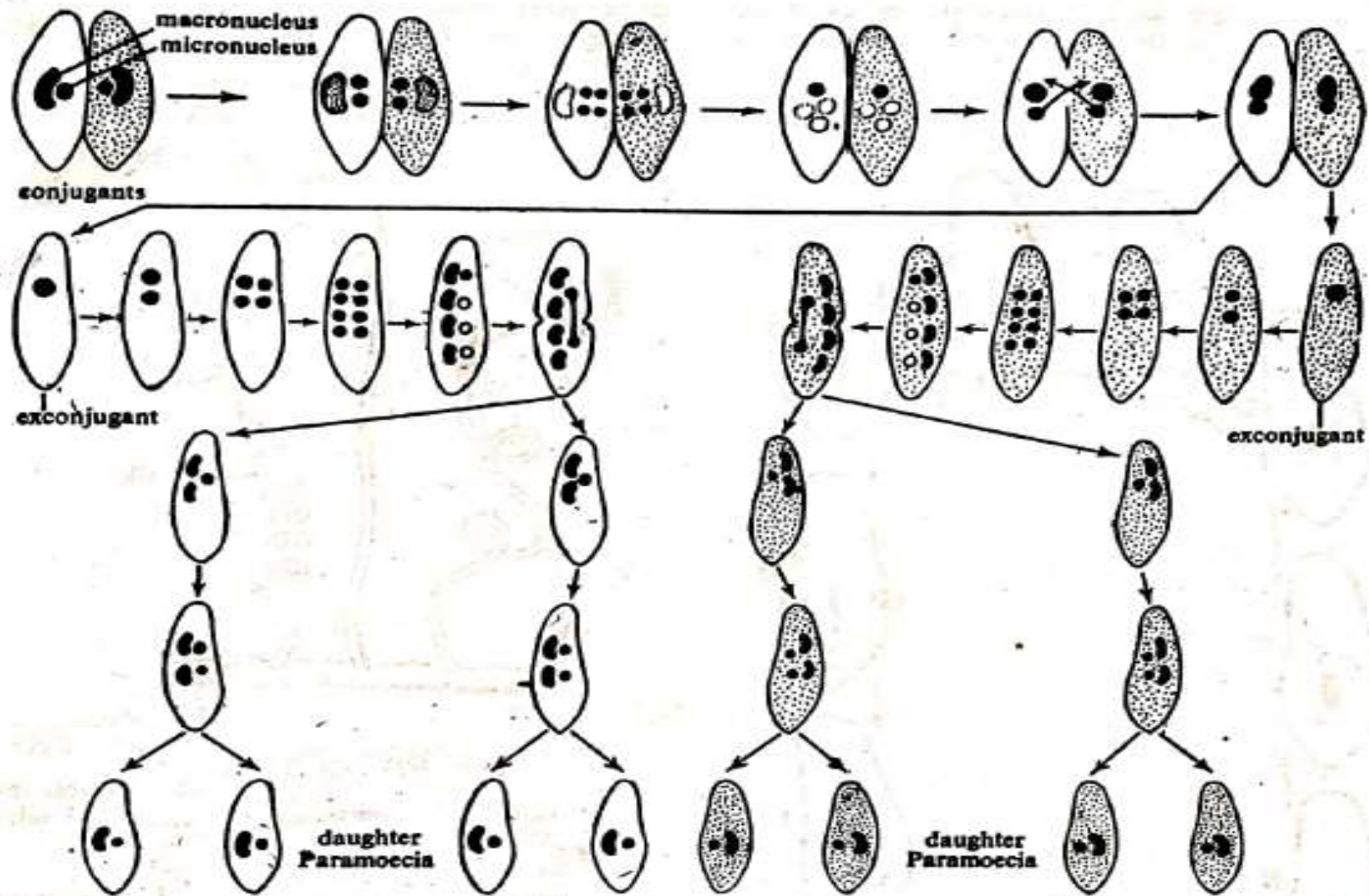
conjugation serves as a process of re-juvenation and re-organisation by which the vitality of the race is restored. If conjugation does not occur for long periods, the paramecia weaken and die (Woodruff).

ii) Hereditary variation and evolution:-

conjugation brings about the recombination and variation — as the migratory nucleus of one conjugant unites with the stationary nucleus of other conjugant.

iii) **Nuclear reorganization** : It brings about the formation of correct number of chromosome in nucleus.

III) There is no distinction of sex in conjugants through only paramecia of two different mating type of the same variety will conjugate.



**Fig:** Stages of conjugation in *Paramecium caudatum* (diagrammatic). Note that two individuals come together, exchange their nuclear material and then separate. Each individual ultimately produces four daughter paramoecia.