Class-F.Y.B.Sc (Credit Pattern) Savitribai Phule Pune University,Pune

Sem-I 2021

Paper –ZO 113

ONLINE PRACTICAL -5

Chapter-I: Animal Diversity-I and Ecology

Todays Topic- Paramecium –External Morphology and culture

DEPARTEMENT OF ZOOLOGY

Practical no.5

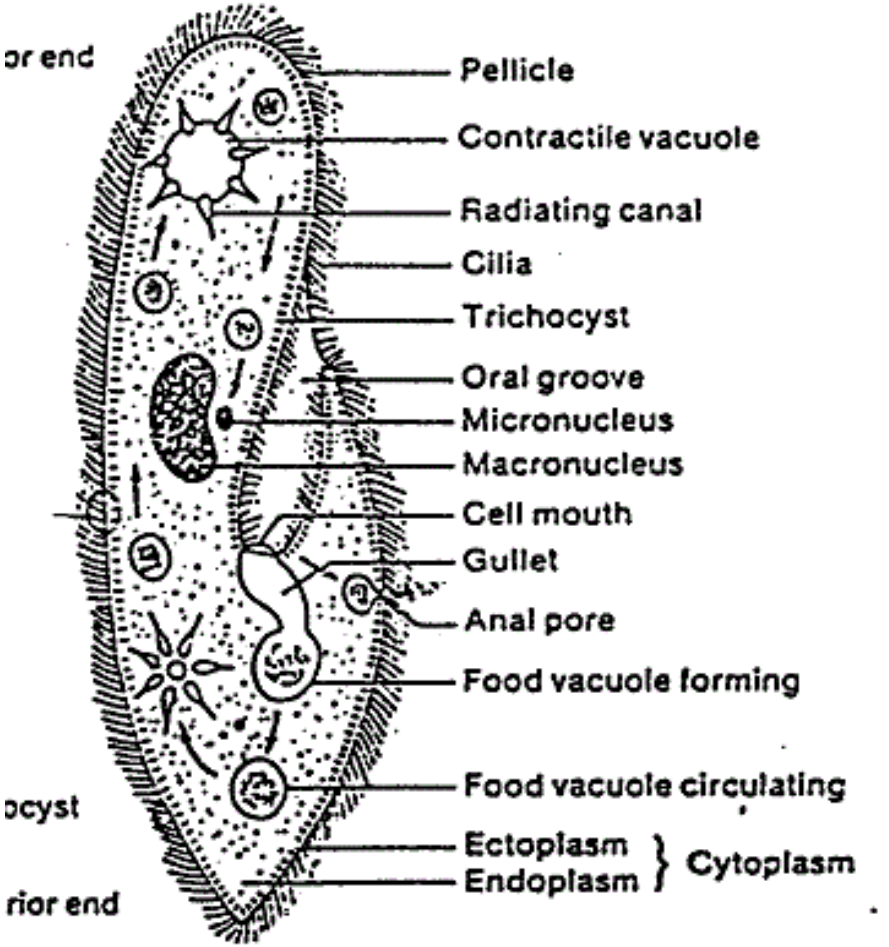
External Morphology of Paramoecium

Systematic position:

Phylum Protozoa **-Microscopic,unicelluar**
Sub-Phylum Ciliophora -Locomotary organs cilia
Class Ciliata - Cilia persists throughout life
Order Hymenostomatida -cilia distributed uniformally
Genus ***Paramecium***
Species ***caudatum***

Morphology:

1. Shape: *Paramecium* resembles like the sole of slipper or shoe. Hence commonly called slippper animalcule
2. Size: Varies in size from 0.15-0.3 mm in length and 0.045-0.07 mm in width.
3. Pellicle: It is the thin, tough, elastic covering of paramecium.
4. Cilia: Entire bodymis covered by hair like cilia. *Paramecium* contains 10000-14000 cilia.
5. Paramoecium single celled animal showing mega and micro nucleus,ecto and endoplasm,two contractile vacuoles,many food vacuoles



Culture of Paramoecium –Experiment

Paramecium culture procedure:

Aim- culture of live paramecium in the laboratory

Materials needed: 2L flask, 2.5g wheat 3/4 g of sodium phosphate powder or hay

Procedure:

1.Fill flask with 1L of distilled water

2. Add it wheat grains &sodium phosphate and add to water Bring mixture to a boil

3.Allow mixture to cool to room temperature

4.Filter cooled mixture through cotton or nitex to filter out wheat particles Autoclave cooled and filtered mixture

5.Inoculate mixture with klebsiella medium ie agar

6.Incubate inoculated mixture overnight (8-12 hours) @ 37 degrees. The high temperature is necessary for proper bacterial bloom

7.Pour mix into the large jar and add paramecium culture; or add mix directly to existing paramecium culture for continued rapid growth

8.Keep flask containing culture for 1-3 days for growth and multiplication of paramecium

Observations:

Ripe culture should have a paramecium population visible as a "cloud" in the flask. Sufficient population size can be confirmed with a dissection microscope.Take 2 to 3 drops of culture on slide cover it with coverslip and observe under microscope

PARAMOECIUM CULTURE

Paramoecium culture.

Clean slides.

Dilute sugar, salt solution, dilute vinegar.

Droppers

sugar solution

salt solution

dilute vinegar

Paramoecium culture

Paramecia under dissecting microscope

Conjugation and Binary fission in Paramoecium-Identify and comment

A.Binary Fission

1.This is the commonest type of Asexual reproduction in *Paramecium*.

2.It occurs during the favorable condition when food is available in large quantities and the temperature is favorable.

3.It is asexual reproduction fully grown specimen divides into 2 daughter individuals

4.The division is at the right angle to the longitudinal axis of the body.

5.The division of the whole-cell preceded by the division of nuclei

6.In this process, the **micronucleus** starts dividing by process of **mitosis** into 2 daughter micronuclei which move in opposite ends of the cell.Simultaneously, the **macronucleus** divides transversely **amitotically** by simply becoming elongated and constricted in the middle.

7. 2 oral grooves now begin to form, one in the anterior half and the other in the posterior half.

8.2 original contractile vacuoles remain one in each half of dividing parental individuals.

9. 2 new contractile vacuoles are later formed and also 2 new buccal structures appear.

10. In meantime, constriction furrows appear near the middle of the body.

11. Constriction furrows deepen and ultimately the cytoplasm is completely divided, resulting in two **daughter** *Paramecia*

12.The process of binary fission requires 2 hours to complete.

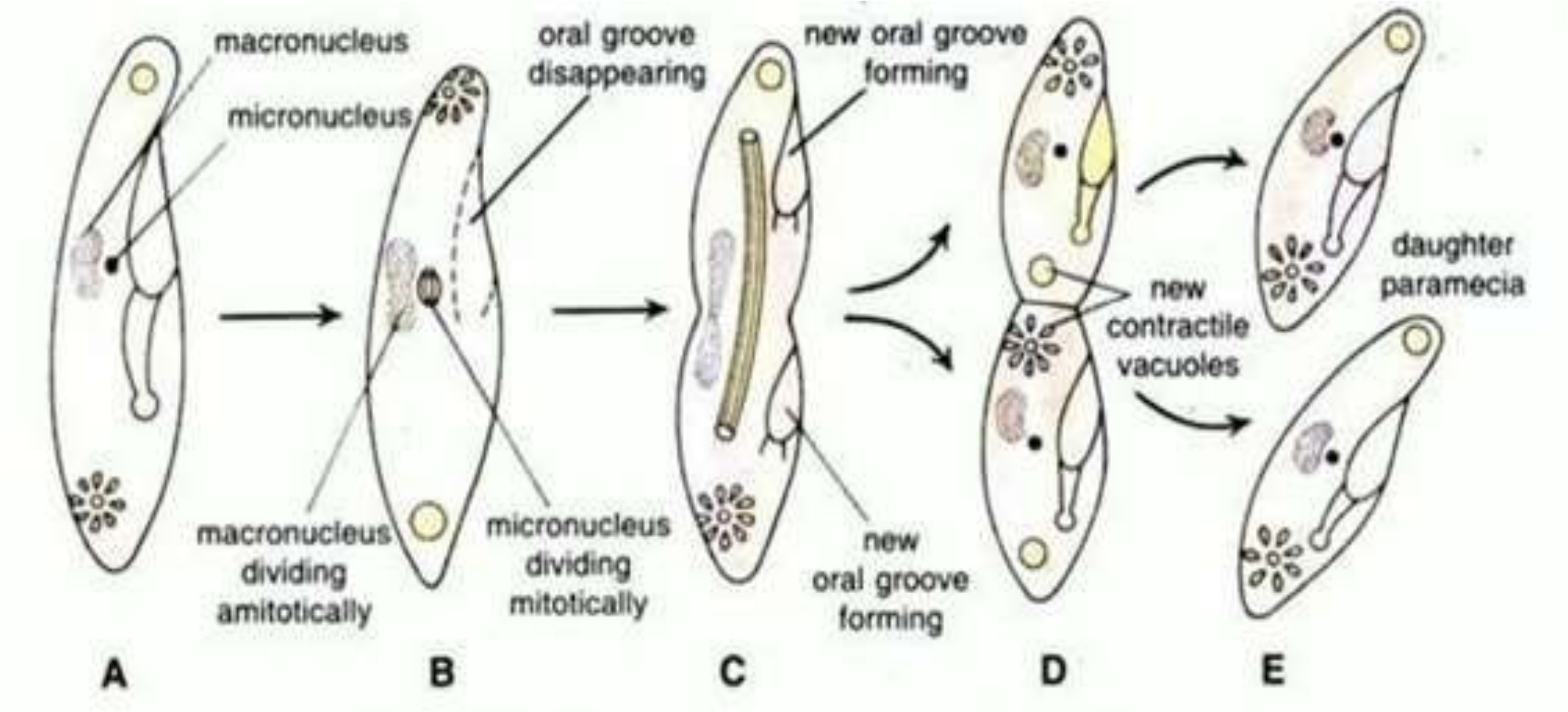


Fig Binnary fission in paramecium

B.Conjugation in Paramecium-Sexual reproduction

1.In conjugation (sexual reproduction) the two paramaecia conjugents from 2 different mating types of the same variety come in contact ventrally and unite through the edges of their oral groove.

2. Their cilia produce a substance on the surface of the body which causes the adhesion of 2 conjugating paramecia.

3. They then stop feeding and their buccal structure disappears.

4. The pellicle and ectoplasm, all along with the union of two forms, are disintegrated and a **protoplasmic bridge** is formed between 2 individuals.

5. Now, at this stage, they are called gametocytes or conjugant.

6.The macronucleus simply breaks up into fragments, which are later absorbed by the cytoplasm.

7. Diploid micronucleus of each conjugant first grows in size and divides by meiosis and forms 4 haploid daughter micronuclei.

8. Out of these four micronuclei, three daughter micronuclei disintegrate and disappear in each conjugant, while the remaining one divides into two unequal daughter **pronuclei**

9.Of these, the smaller one is the active **male migratory pro-nucleus**, whereas the larger one is the **stationary female pro-nucleus.**

10. The migratory male pro-nucleus of each conjugant moves through the protoplasmic bridge into the other conjugant and ultimately fuses with stationary female pro-nucleus forming a **zygote nucleus** or **synkaryon** in which the diploid number of chromosomes is restored and there has been exchanged of hereditary material.

11.The 2pairing paramecia, after a union of 12 to 48 hrs. separate and now called **exconjugants**.
In each exconjugants, the zygote nucleus divides by mitosis 3 times in rapid succession producing 8 micronuclei, of which 4 enlarge to become **macronuclei** and 4 to become
12.3 micronuclei disintegrate and disappear.
13. while remaining micronucleus divides with binary fission of exconjugants.
14. Now, from each conjugant 2 daughters, paramecia are obtained, each containing 2 macronuclei and 1 micronucleus.
15. The micronucleus again divides with the division of each daughter paramecium, forming 2 individuals each containing one macronucleus and one micronucleus.
16. At the end conjugation, 4 daughter individuals are produced from each conjugant.

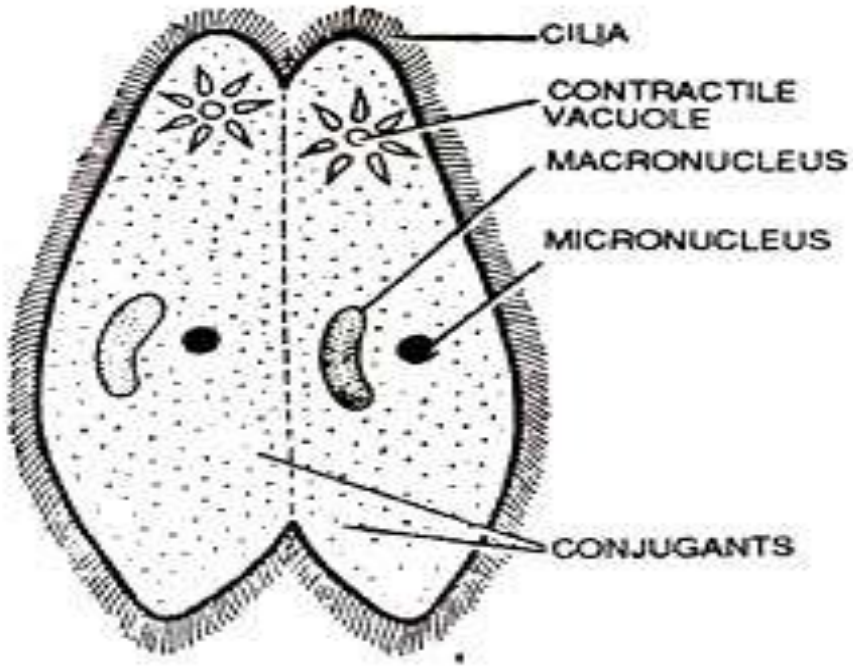


Fig. 82 PARAMAECIUM IN CONJUGATION