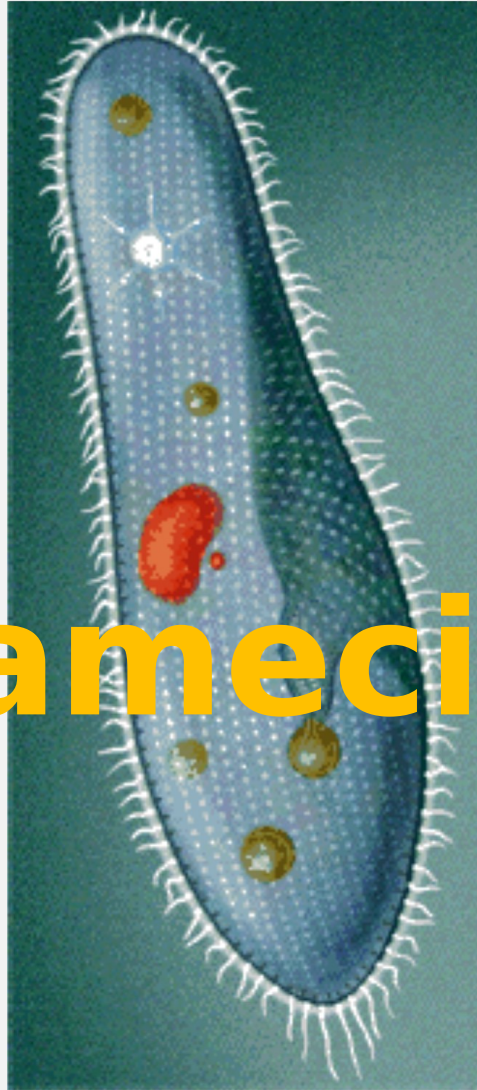


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# Paramecium



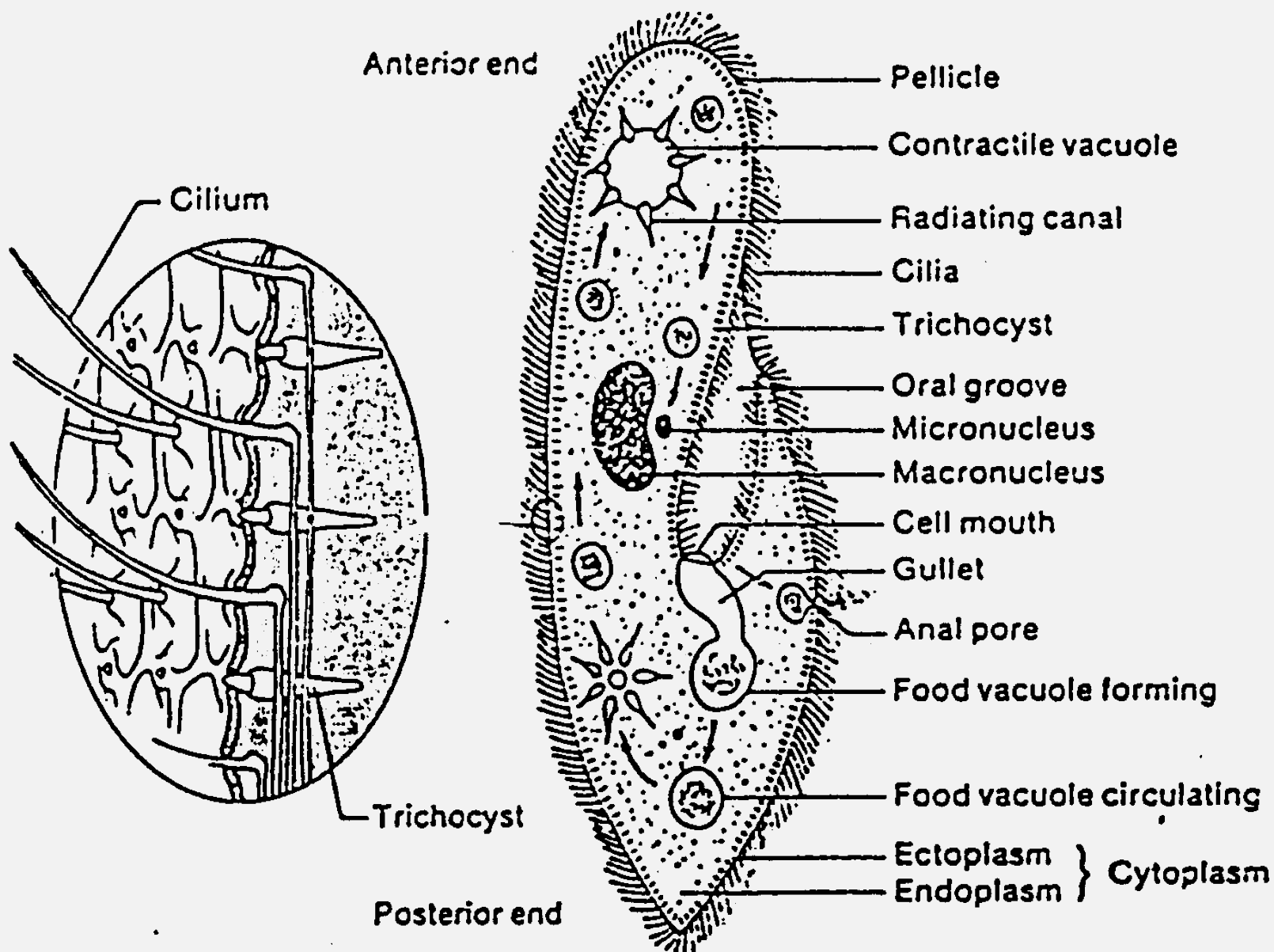
Dr. Laxmikant  
Shinde JES College,  
Jalna

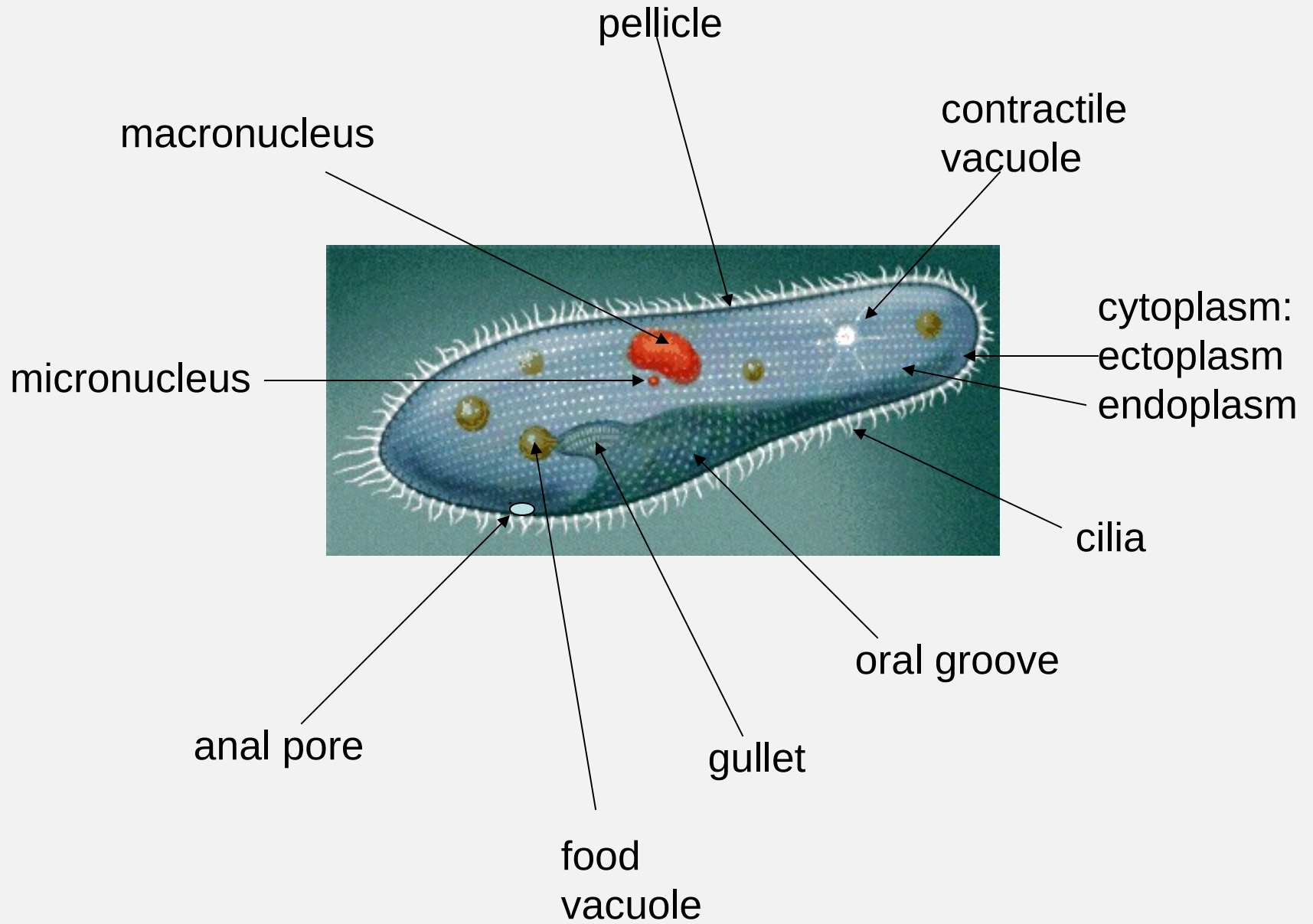
# PARAMECIUM



| SYSTEMATIC POSITION |                   |
|---------------------|-------------------|
| Phylum              | Protozoa          |
| Subphylum           | Ciliophora        |
| Class               | Ciliata           |
| Subclass            | Holotricha        |
| Order               | Hymenostomatida   |
| Suborder            | Peniculina        |
| Genus               | <i>Paramecium</i> |
| Species             | <i>caudatum</i>   |

- *Paramecium* is a small unicellular organism.
- It is plentiful in freshwater ponds.





## EXTERNAL MORPHOLOGY

Measures 170-290 microns and is slipper-shaped. The cell is elongated, rounded at the anterior end and somewhat pointed at the posterior end. Ventral surface of body bears a prominent, oblique depression called oral groove, which leads into a deeper conical *vestibule* which in turn communicates with a *buccal cavity*.

External envelope of body is a cuticular membrane, the pellicle, which is made of a pattern of polygonal depressions and raised lines with series of cavities called *alveoli*. A single cilium emerges out from the middle of each polygon. Entire body surface is covered by cilia, which measure 10-12 microns in length and 0.27 microns in diameter.

## INTERNAL ANATOMY

The cytoplasm is clearly differentiated into clear ectoplasm, which includes the basal bodies of cilia, kinetodesmata and trichocysts. Endoplasm is granular and dense semi-fluid zone that fills the entire cell body. Each trichocyst consists of an elongated shaft and a terminal pointed tip called the spike or *barb* covered by a *cap*. They are probably used as defense organelles.

*Macronucleus* is large, kidney-shaped, polyploid, with inconspicuous nuclear membrane. It is vegetative in function and controls the day to day metabolic activities. *Micronucleus* is spherical with a nuclear membrane and diploid number of chromosomes. It is lodged in a depression near the surface of macronucleus and controls the reproductive activities of the animal.

There are two contractile vacuoles.

Each vacuole is surrounded by 6-10 long and narrow *radial canals* that extend far into cytoplasm and eventually connect to the endoplasmic reticulum.

The contractile vacuoles form an excretory system of the cell body.

Food vacuoles, called *gastrioles* can be seen moving within the endoplasm.

The digestive system includes *oral groove* that leads ventrally into *vestibule*, which leads directly into a wide tubular passage, the *buccalcavity*.

Buccal cavity opens into a narrow gullet or *cytopharynx* through a narrow aperture, the *cytostome*.

The cytopharynx at its proximal end forms the *food vacuole*.

Near the posterior end of body, a minute aperture called *cytopore* or *cytoproct* is formed for excretion

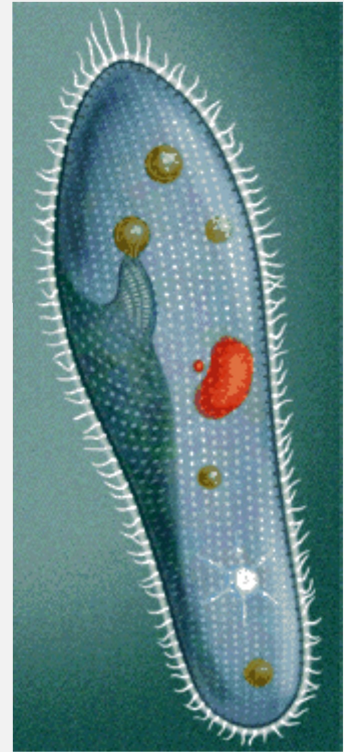
- *Contractile vacuoles* are organs of osmoregulation.
- They contract and expand at regular intervals to get rid of excess water from cytoplasm.
- Water from cytoplasm is discharged into *endoplasmic reticulum*, from where it flows into the *nephridial tubules* and *feeder canals* and is stored in ampullae, which then discharge it into contractile vacuole.
- Once the vacuole has grown to its maximum size, it discharges excess water to the exterior through a pore in pellicle.

# Paramecium Movement

- The outer surface of the cell is covered with many hundreds of tiny hair-like structures called **cilia**.
- These act like microscopic oars to push through the water, enabling the organism to swim.
- If *Paramecium* comes across an obstacle, it stops, reverses the beating of the cilia, swims backwards, turns through an angle and moves forward again on a slightly different course.
- It moves so quickly that we have to add a thickening agent or **quieting solution** to the slide to slow it down to study it.
- As it moves through the water particles of debris and food are collected and swept into the gullet.

# Paramecium Feeding

- *Paramecium* has a permanent feeding mechanism, consisting of an **oral groove** and a funnel-shaped **gullet** into which food is drawn by the combined action of cilia which cover the body and other cilia lining the oral groove and the gullet.
- As it moves through the water it **rotates on its axis** and small particles of debris and food are collected and swept into the gullet.
- They feed on small organisms such as **bacteria, yeasts, algae** and even other **smaller protozoa**.



# Reproduction

- **A. Division.** In favorable conditions the cell divides in two by a process called binary fission. This whole process make take place two or **three times a day** if conditions were right!
- **B. Conjugation.** This is a more complicated method. It involves two cells coming together to exchange DNA. The two cells then separate and continue to reproduce by simple division.

# Paramecium Reproduction

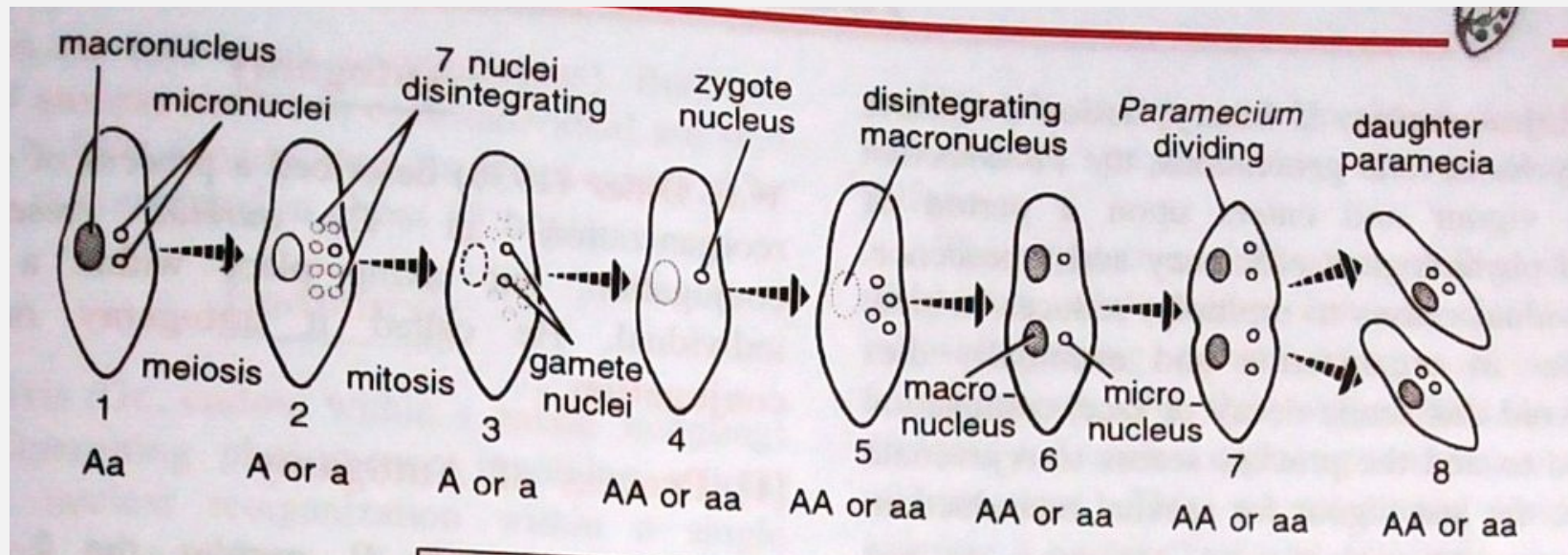
- In favourable conditions the cell divides in two by a process called **binary fission** (asexual reproduction).
- This forms two new cells, each of which rapidly grows any new structures required and increases in size.
- This whole process may take place two or three times a day if conditions were right.



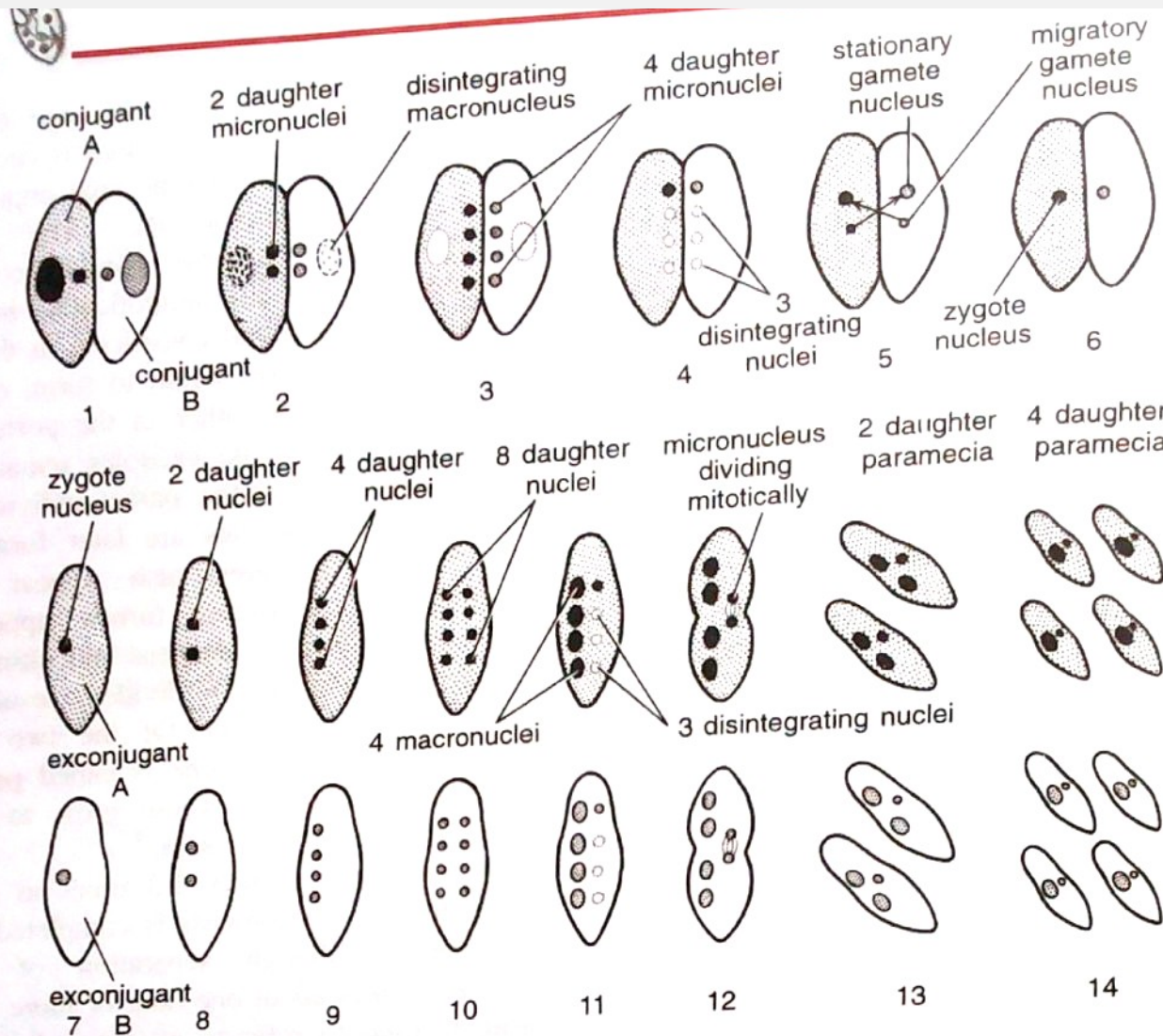
- This is a more complicated method called **conjugation** (sexual reproduction).
- It involves two cells coming together to exchange nuclear material.
- The two cells then separate and continue to reproduce by simple division.
- It is similar in some ways to sexual reproduction in more complex animals.



# A. Binary fission



# B. Conjugation



# Paramecium reproduction by binary fission.

(1) The ciliate stops moving

(2) both mega- and micronucleus divide and move to opposite ends of the organism.

(3) The cytoplasm then divides at right angles to the long axis.

(4) The daughter paramecia separate.

(5) Binary fission may take place 2 or 3 times each day.



Thank You...!!