

# Movement of cell ciliary movement

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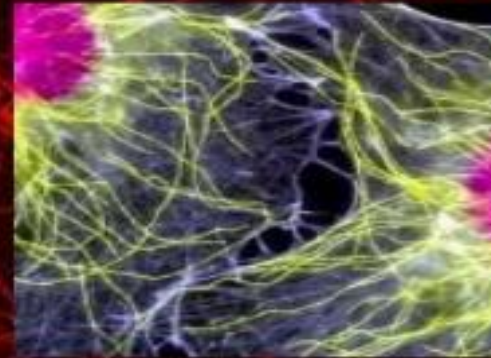
# objectives

- Cytoskeleton
- Microfilaments
- Microtubules
- Intermediate filaments

# Cytoskeleton: The skeleton and muscle of a cell



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Cells need (cyto) skeleton to:

- \* create shape
- \* change shape
- \* allow movement

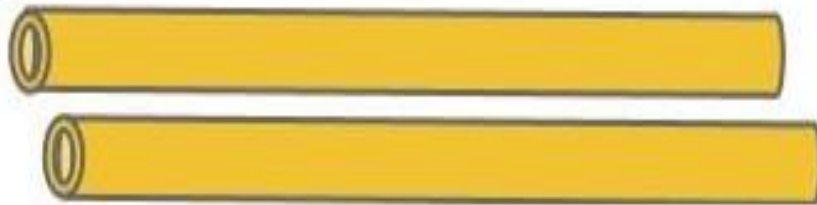
Dynamic!

# What is cytoskeleton

- Is a microscopic network of protein filaments and tubules in the cytoplasm of many living cells, giving shape and organize the cell parts.
- In addition they provide a basis for movement and cell division.
- It is dynamic three dimensional structure that fills the cytoplasm

- The long fibers of the cytoskeleton are polymers of subunits.
- By definition free ribosomes is ribosome attached to cytoskeleton.
- Polysome refers to two or more ribosomes.

- The primary types of fibers are microfilaments, microtubules and intermediate filaments.



**Microtubules**  
20-25 nm diameter



**Intermediate filaments**  
10nm diameter



**Actin filaments**  
3-6nm diameter

## Cytoskeleton Components

# microfilaments

- Fine thread like protein fibers.
- 3-6 nm in diameter.
- Composed of contractile protein Actin.
- When associated with protein Myosin responsible for muscle contraction.
- Also carry out, cellular movements including gliding contraction and cytokinesis.



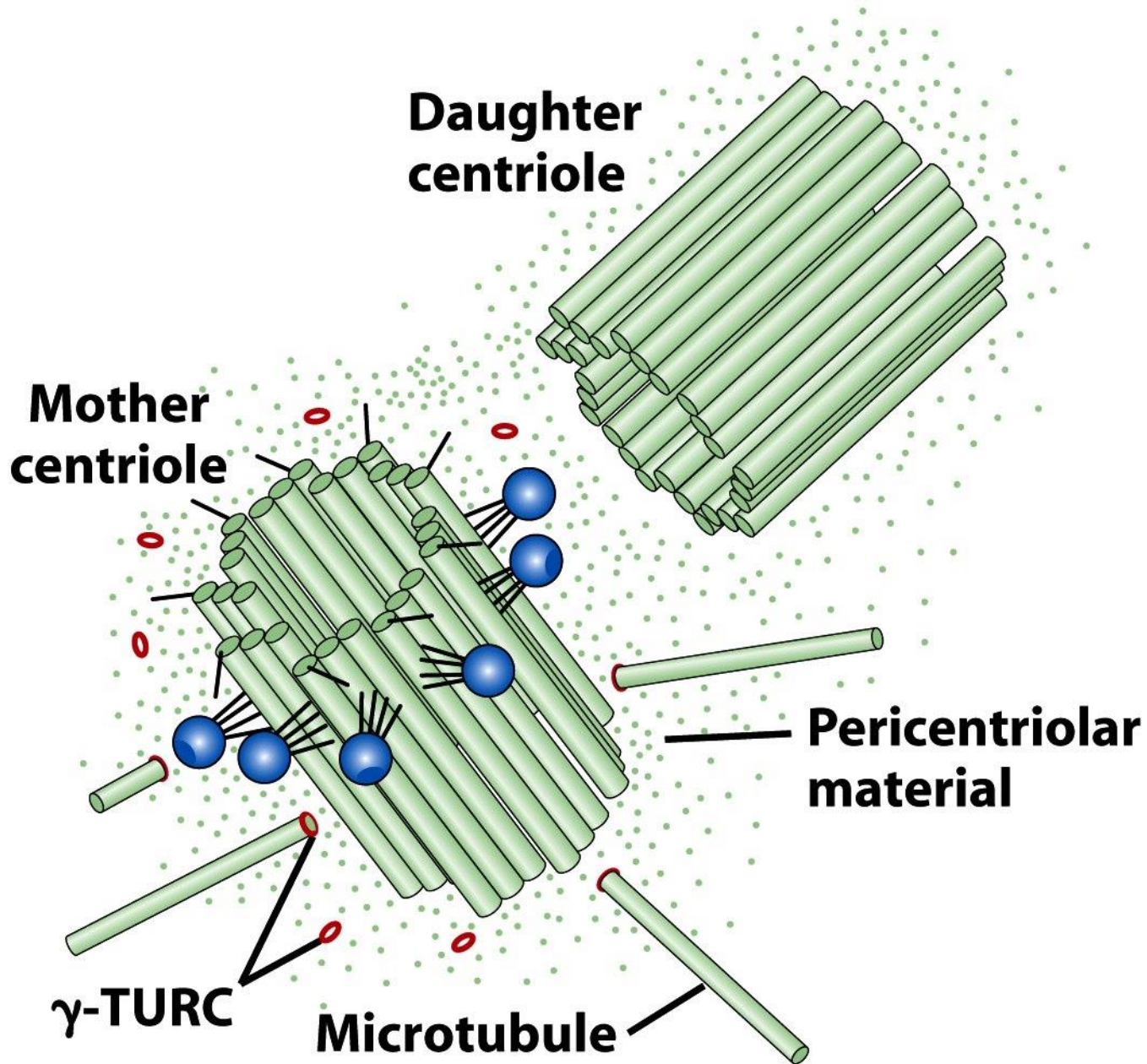


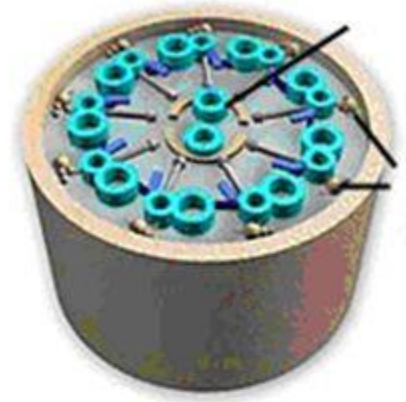
Figure 18-6b  
*Molecular Cell Biology, Sixth Edition*  
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# Microtubules

- Cylindrical tubules
- 20-25nm in diameter.
- Composed of subunits of protein tubulin these subunits are termed alpha and beta.
- Act as a scaffold to determine cell shape, and provide a set of tracks for cell organelles and vesicles to move out.
- Also form spindle fibers for separating chromosomes during mitosis.
- When arranged in geometric pattern inside flagella and cilia, they are used for locomotion

# Cilia and Flagella

- Are locomotor appendages
- Extensions of cytoskeleton



## Examples:

Many unicellular protists move with flagella

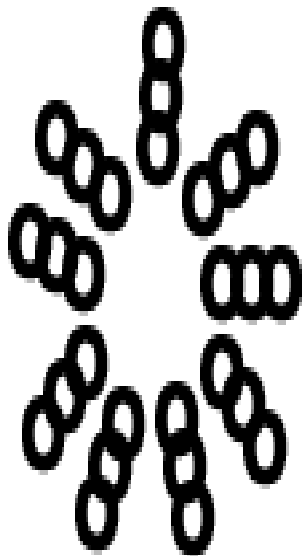
Some plant reproductive cells have flagella

Cilia in oviducts move egg toward uterus

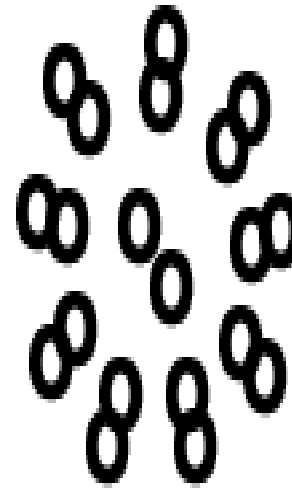
Cilia lining windpipe sweep mucous out of lungs

Flagellum in sperm cells

(Prokaryotic flagella don't have microtubules)



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**Centriole & Basal Body (9 + 0 pattern)**  
A ring of 9 microtubule triplets with  
no microtubules in the center.

**Flagellum & Cilium (9 + 2 pattern)**  
A ring of 9 microtubule doublets  
with 2 microtubules in the center.

**Cross section of centriole and flagellum showing  
the distinctive arrangement of the microtubules.**

# Intermediate filaments.

- It is about 10nm diameter.
- Provide tensile strength for the cell.
- Example of the cytoskeleton in epithelium skin cell of intestine, all the types of the fibers are present.
- Microfilaments project into the villi giving shape to the cell surface.
- Microtubules grow out of the centrosome to the cell periphery.
- It connect adjacent cells through desmosomes.

# reference

- Guyton and Hall text book of Physiology.