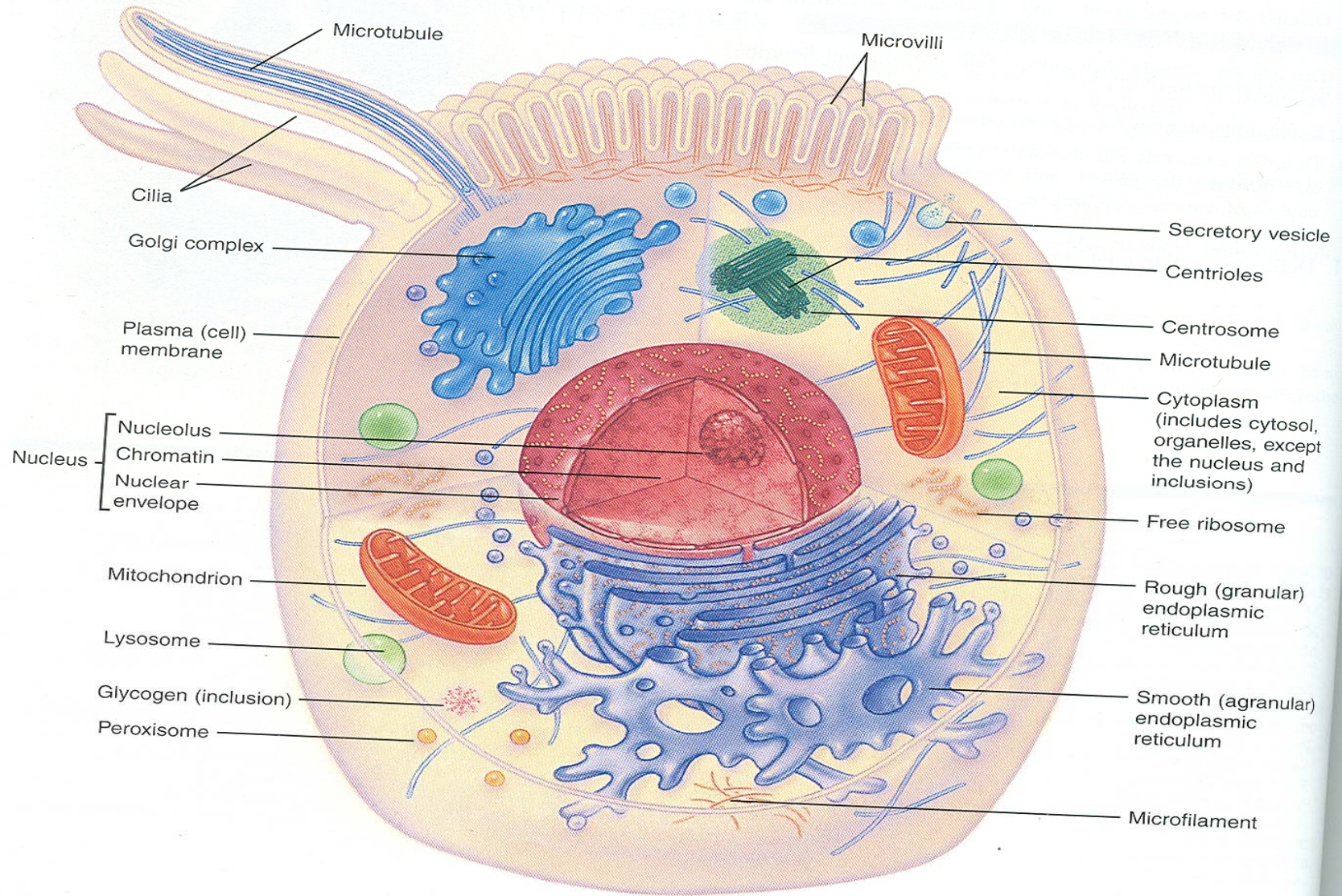




The cell is the basic, living, structural and functional unit of the body.

...from microscopic studies.



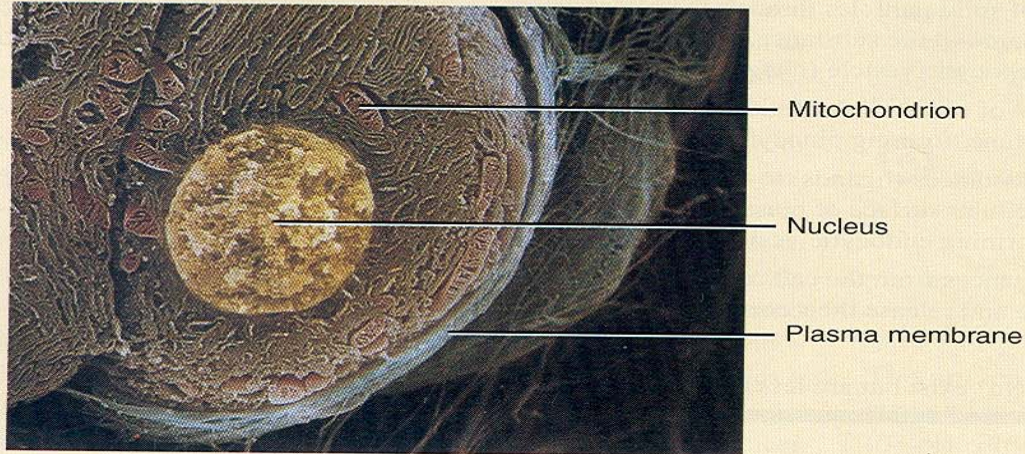
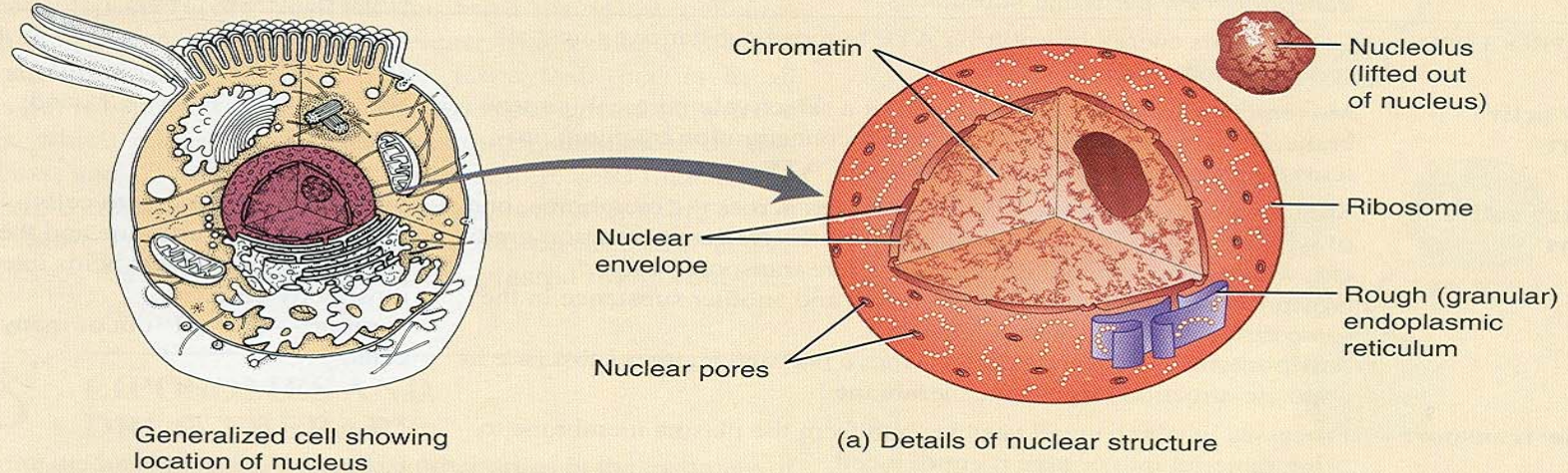
Sectional view




List the four principal parts of a cell.

Figure 3.14 Nucleus.

 **The nucleus contains most of the genes, which are located on chromosomes.**

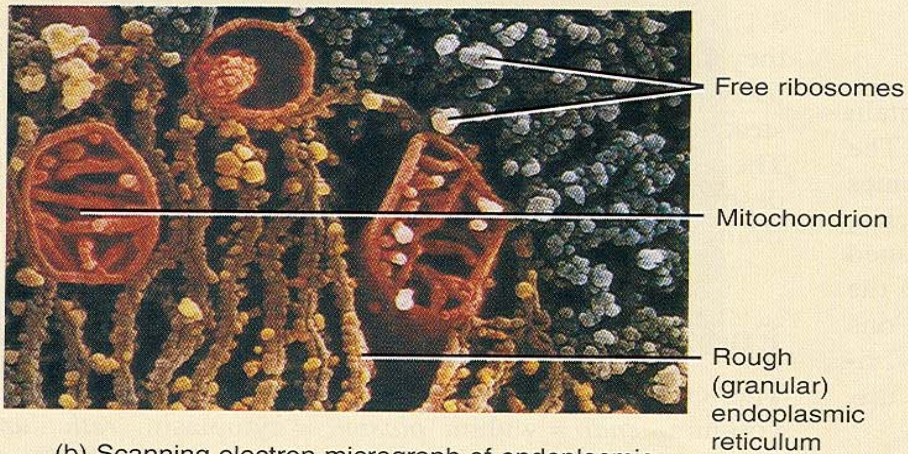
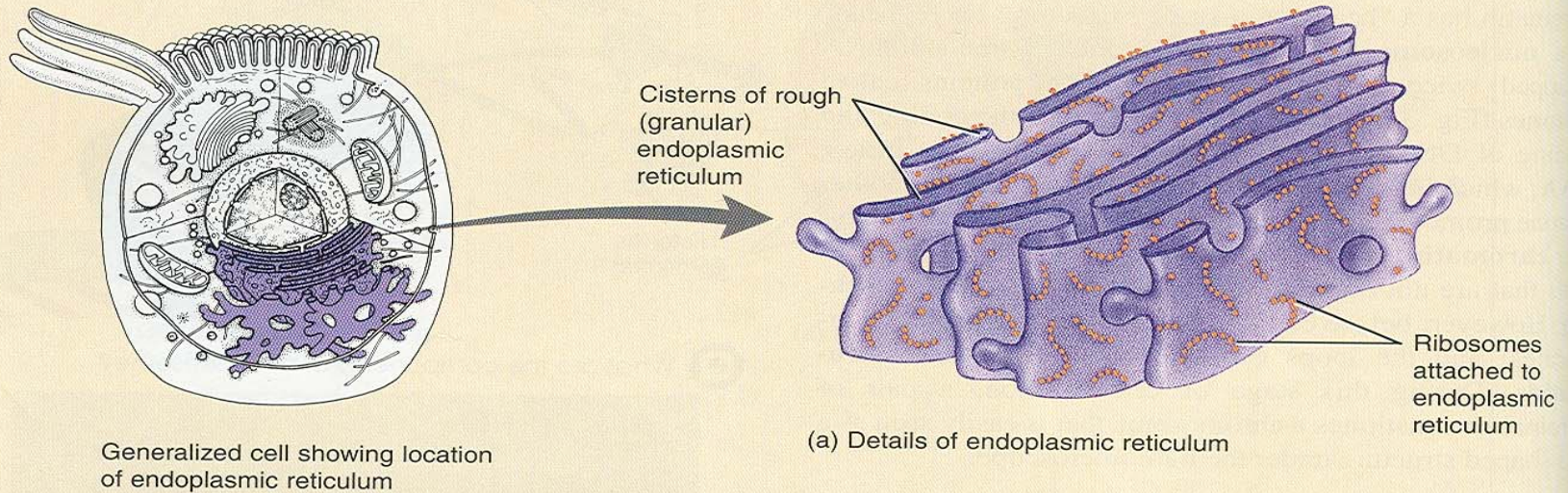


(b) Scanning electron micrograph of a nucleus (7800x)

 Why is the nucleus called the control center of the cell?

FUNCTIONS OF THE NUCLEUS
1. Controls cellular structure.
2. Directs cellular activities.

Figure 3.17 Endoplasmic reticulum.



(b) Scanning electron micrograph of endoplasmic reticulum and ribosomes (60,000x)

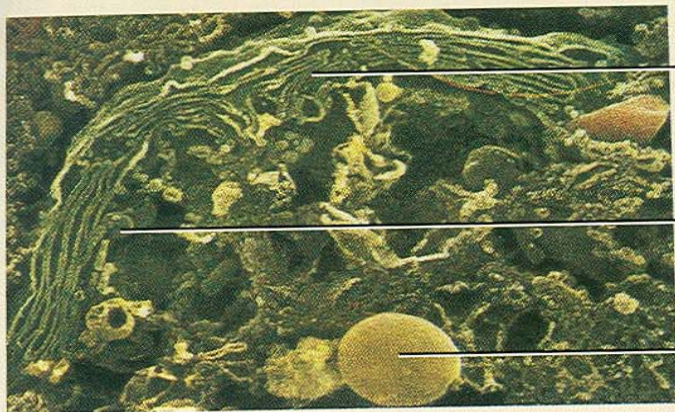
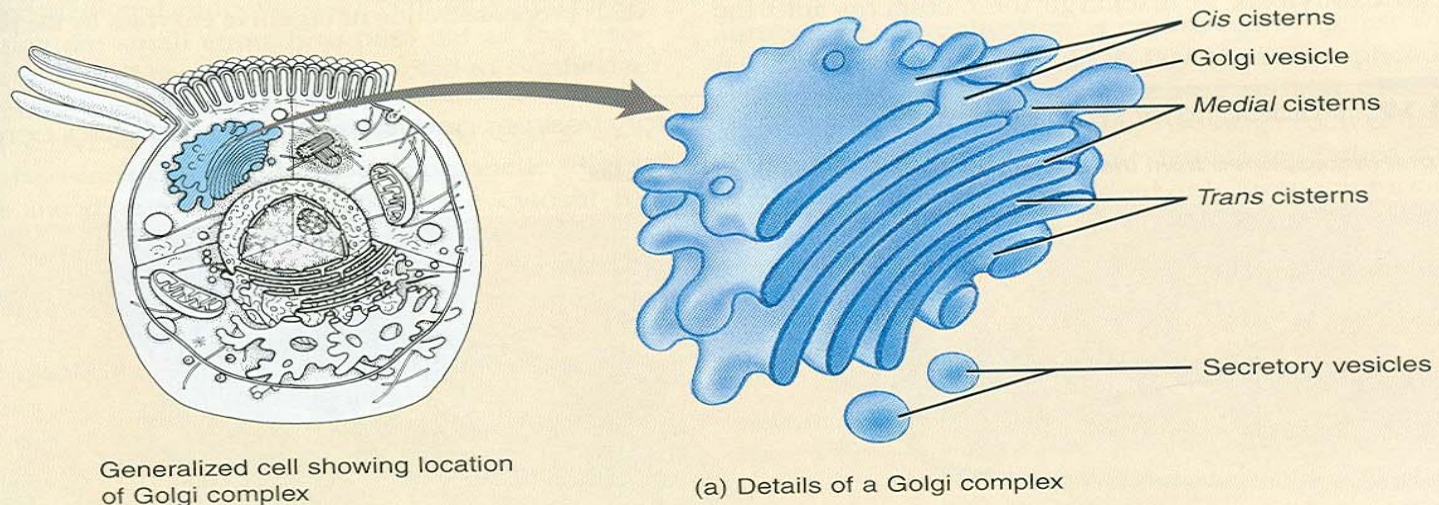
FUNCTIONS OF ENDOPLASMIC RETICULUM (ER)

1. Provides a surface area for chemical reactions
2. Transports various molecules from one part of the cell to another.
3. Rough ER stores newly synthesized molecules and forms glycoproteins.
4. Rough ER and Golgi complex synthesize and package materials to be secreted by the cell.
5. Smooth ER is the site of synthesis of fatty acids, phospholipids, and steroids and of detoxification of various chemicals.
6. In muscle cells, sarcoplasmic reticulum (derived from ER) releases calcium ions, which initiates muscle contraction.



What are the structural and functional differences between smooth and rough ER?

Figure 3.18 Golgi complex.



(b) Scanning electron micrograph of Golgi complex (20,000x)

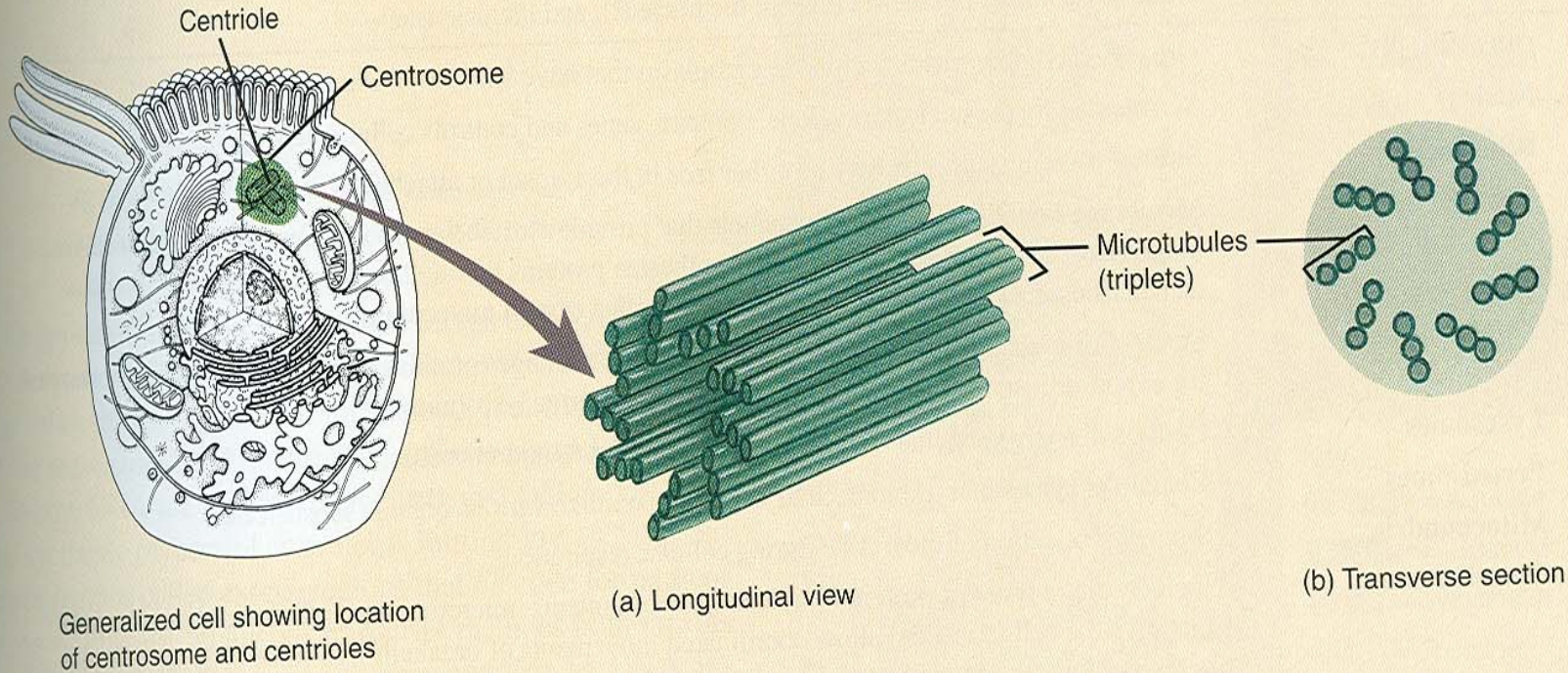
FUNCTIONS OF THE GOLGI COMPLEX

1. Processes, sorts, and packages proteins and lipids for delivery to the plasma membrane.
2. Forms lysosomes and secretory vesicles.



What are the origin and destination of proteins that are processed by the Golgi complex?

Figure 3.21 Centrosome and centrioles.



Generalized cell showing location of centrosome and centrioles

(a) Longitudinal view

(b) Transverse section

Q If you observed that a cell did not have a centrosome, what could you predict about its capacity for cell division?

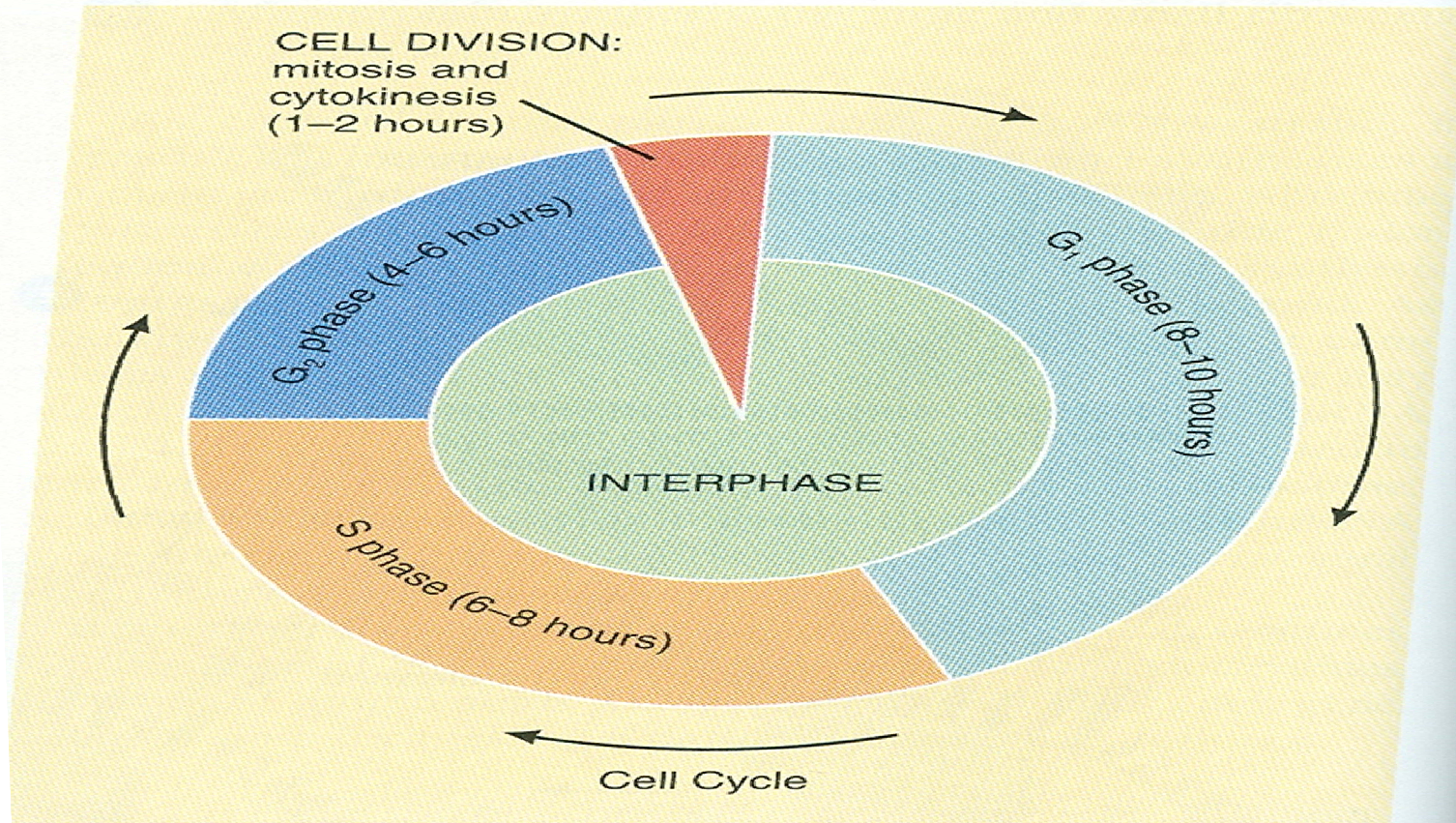
FUNCTIONS OF CENTROSOME AND CENTRIOLES

1. Serve as centers for organizing microtubules in nondividing cells and for forming the mitotic spindle during cell division.
2. Play a role in formation and regeneration of flagella and cilia.

Figure 3.24 The cell cycle.



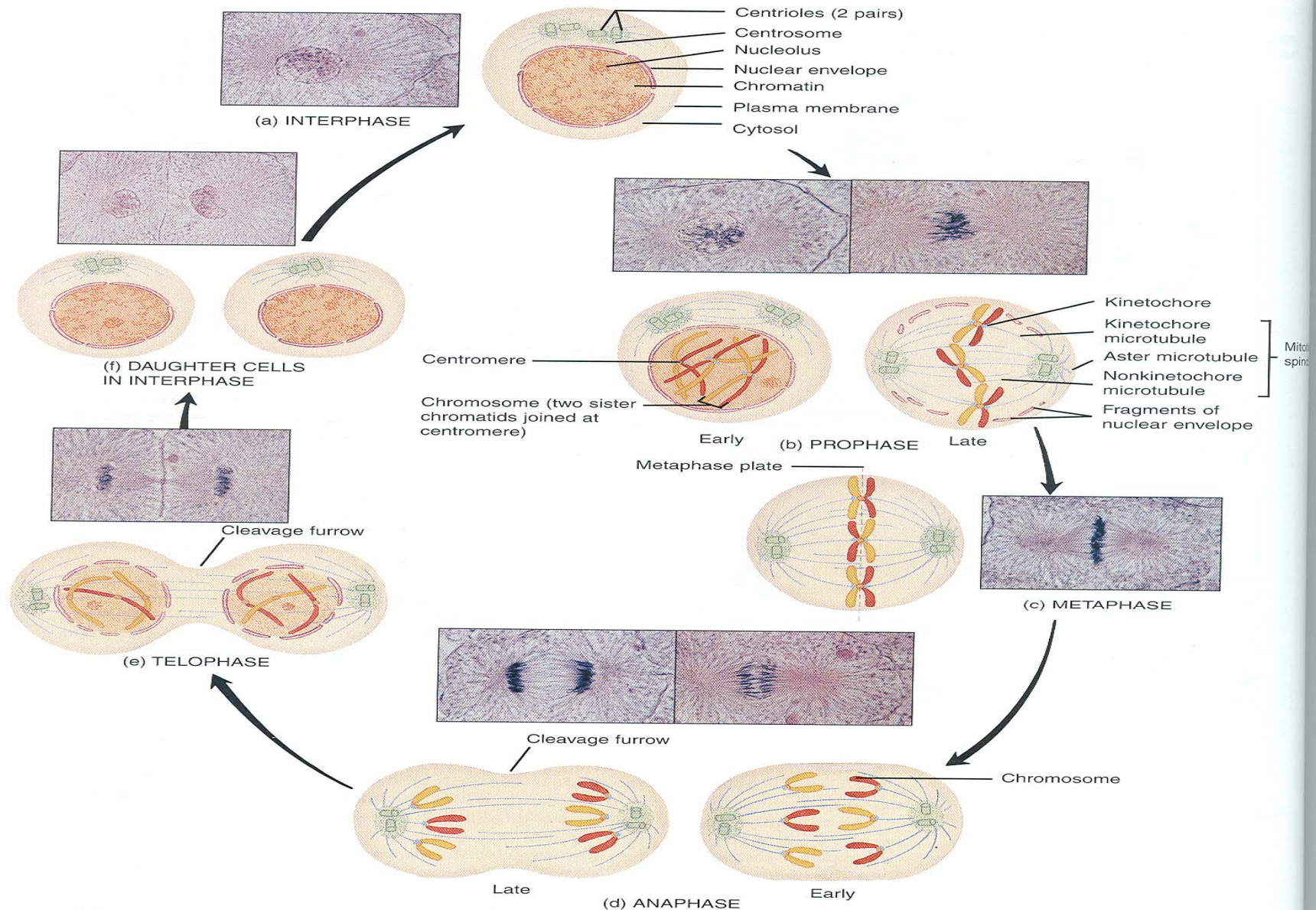
In a complete cell cycle, one parent cell divides into two daughter cells.



During which phase of interphase do the chromosomes replicate?

Figure 3.26 Cell division: mitosis and cytokinesis. Start looking at the sequence at (a) and read clockwise until you complete the process.

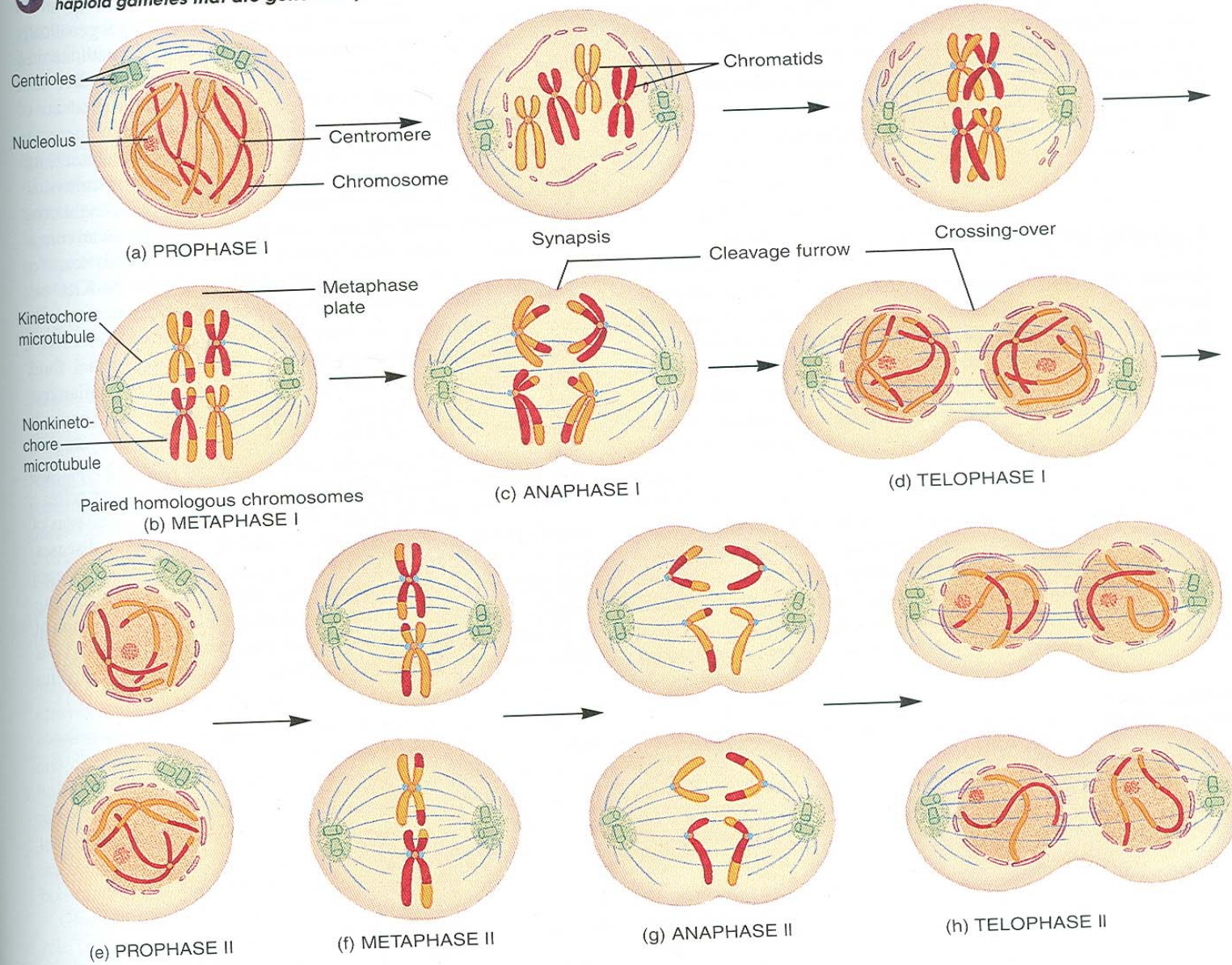
 **In somatic cell division, a single diploid parent cell divides to produce two identical diploid daughter cells.**



 When does cytokinesis begin?

Figure 3.27 Meiosis. See text for details.

In reproductive cell division, a single diploid parent cell undergoes reduction division and equatorial division to produce four haploid gametes that are genetically different from the parent cell.

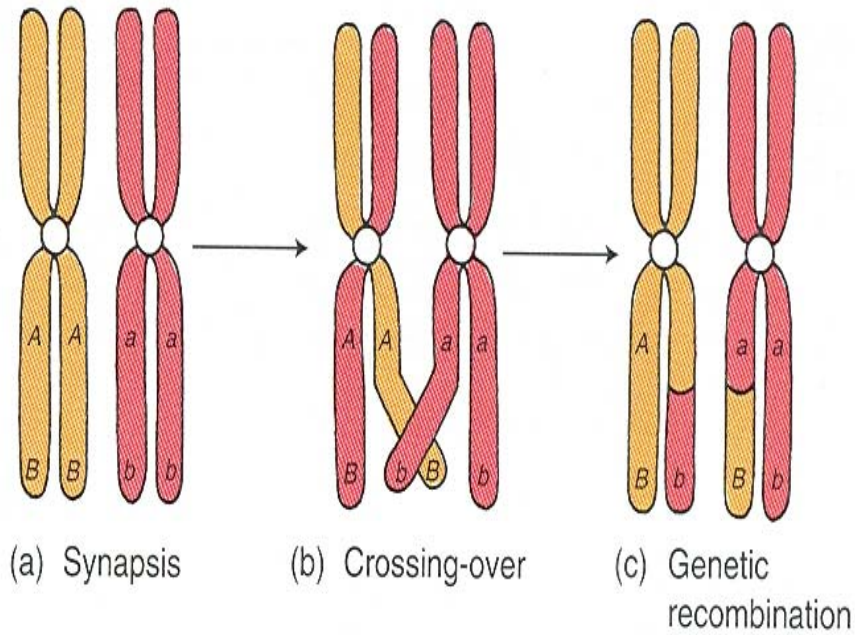


Q When does chromosomal replication occur in meiosis?

Figure 3.28 Crossing-over within a tetrad.

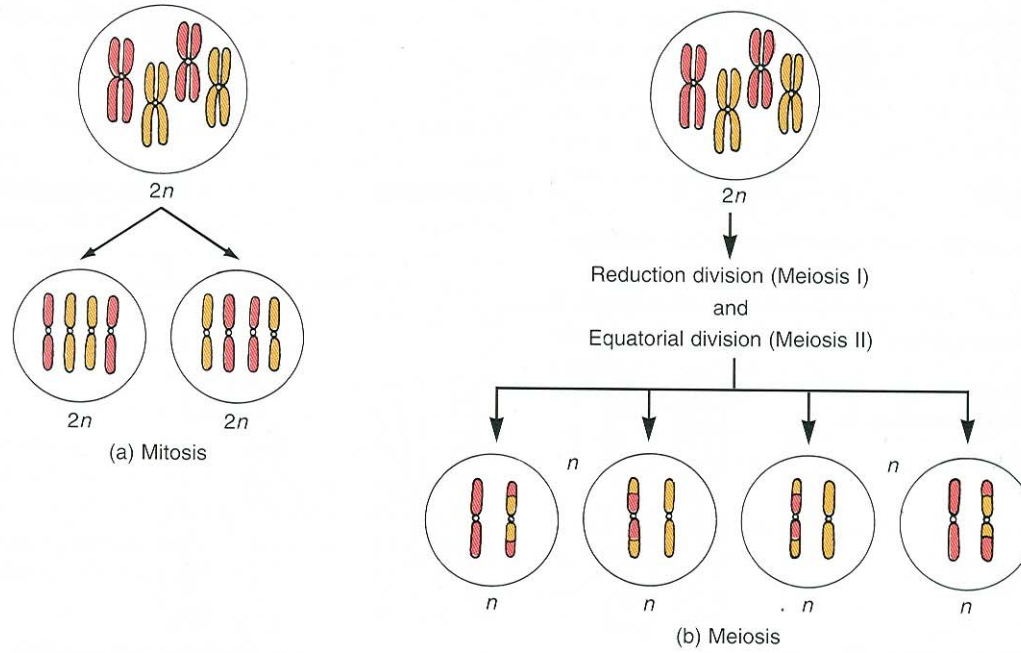


Crossing-over permits an exchange of genes between homologous chromosomes.



How does crossing-over affect the genetic content of daughter cells?

Figure 3.29 Comparison between (a) mitosis and (b) meiosis.



 Where in the body does meiosis occur?