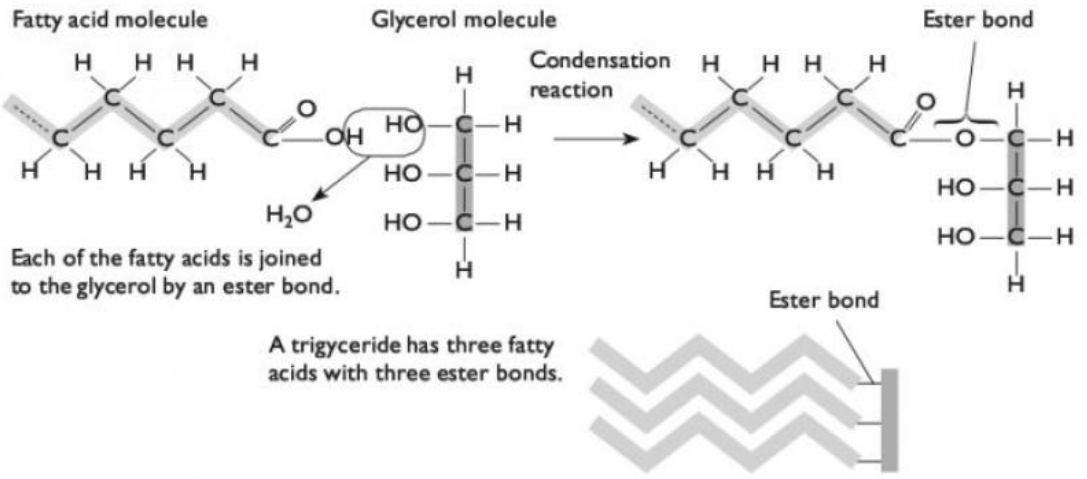
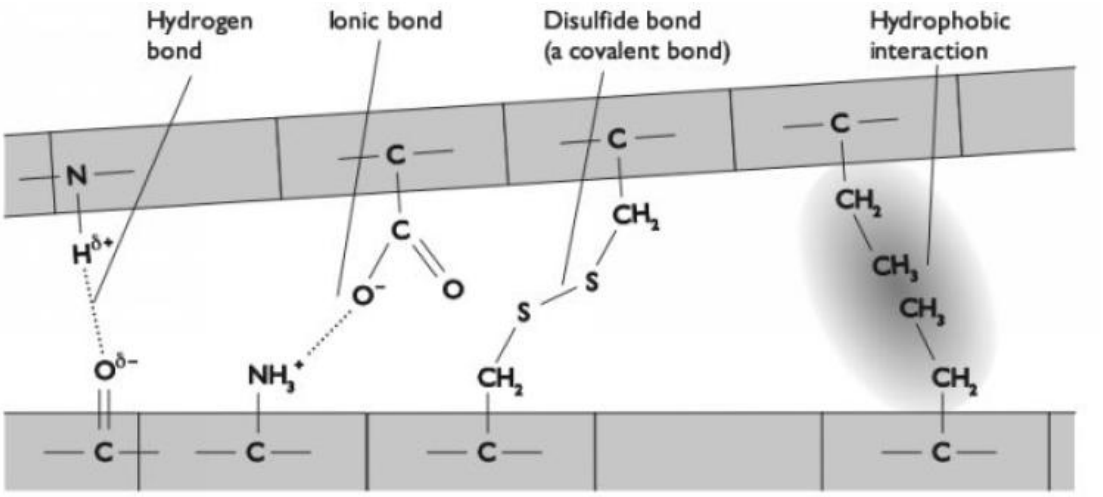
Comparison of prokaryotic, animal and plant cells

Feature	Prokaryotic cells	Eukaryotic cells	
		Animal cells	Plant cells
Plasma/cell surface membrane	Always present	Always present	Always present
Cell wall	Always present; made up of peptidoglycans	Never present	Always present; made up of cellulose
Nucleus and nuclear envelope	Never present	Always present	Always present
Chromosomes	Contain so-called 'bacterial chromosomes' — a circular molecule of DNA not associated with histones; bacteria may also contain smaller circles of DNA called plasmids	Contain several chromosomes, each made up of a linear DNA molecule associated with histones	Contain several chromosomes, each made up of a linear DNA molecule associated with histones
Mitochondria	Never present	Usually present	Usually present
Chloroplasts	Never present, though some do contain chlorophyll or other photosynthetic pigments	Never present	Sometimes present
Rough and smooth endoplasmic reticulum and Golgi apparatus	Never present	Usually present	Usually present
Ribosomes	Present, about 18 nm diameter	Present, about 25 nm diamet er	Present, about 25nm diameter
Centrioles	Never present	Usually present	Never present



The formation of a triglyceride molecule



Bonds Involved ln malntalnlng the tertiary and quaternary structure of protelns

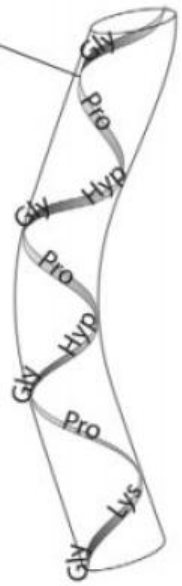
Collagen — a fibrous protein

Polypeptide chain

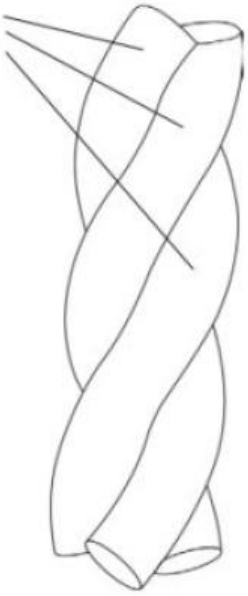
Every third amino acid is glycine

Key

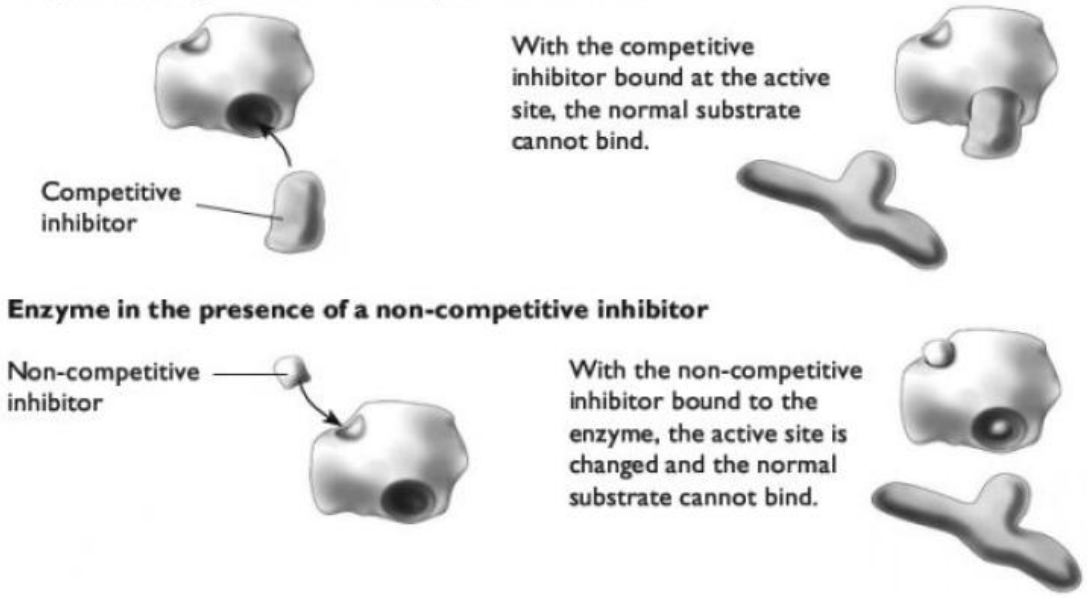
Gly	glycine
Pro	proline
Hyp	hydroxyproline
Lys	lysine



Collagen is formed from three polypeptide chains held together by hydrogen bonds



The structure of collagen

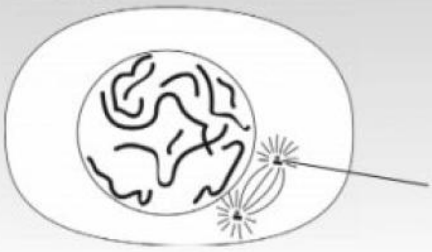


Competitive and non-competitive enzyme inhibitors

The roles of the components of cell membranes

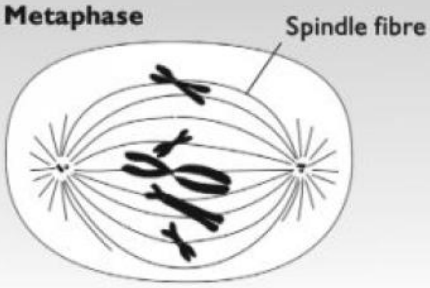
Component	Roles
Phospholipids	Form the fluid bilayer that is the fundamental structure of the membrane. Prevent hydrophilic substances — such as ions and some molecules — from passing through.
Cholesterol	Helps to regulate the fluidity of thhe cell membrane.
Proteins and glycoproteins	Provide channels that allow hydrophilic substances to pass through the membrane; these channels can be opened or closed to control the substances' movement. Actively transport substances through the membrane against their concentration gradient, using energy derived from ATP. Act as receptor molecules for substances such as hormones, which bind with them; this can then affect the activity of the cell. Cell recognition — cells from a particular individual or a particular tissue have their own set of proteins and glycoproteins on their outer surfaces.
Glycolipids	Cell recognition and adhesion to neighbouring cells to form tissues.

Prophase



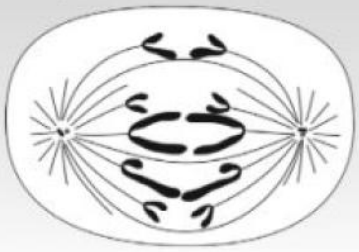
- The chromosomes condense
- The centrioles duplicate
- The centriole pairs move towards each pole
- The spindle begins to form

Metaphase



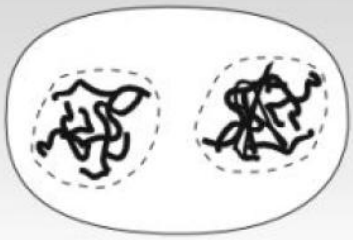
- The nuclear envelope disappears
- The centriole pairs are at the poles
- The spindle is completely formed
- The chromosomes continue to condense
- The spindle fibres attach to the centromeres of the chromosomes
- The spindle fibres pull on the centromeres, arranging them on the equator

Anaphase



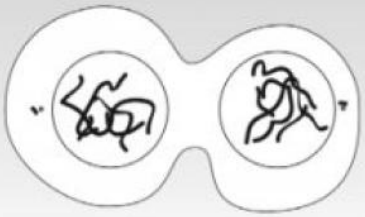
- The links between sister chromatids break
- The centromeres of sister chromatids move apart, pulled by the spindle fibres

Telophase



- Sister chromatids (now effectively separate chromosomes) reach opposite poles
- The chromosomes decondense
- Nuclear envelopes begin to form around the chromosomes at each pole
- The spindle disappears

Cytokinesis



- The cell divides into two cells, either by infolding of the plasma membrane in animal cells, or by the formation of a new cell wall and plasma membrane in plants

Mitosis and cytokinesis in an animal cell

Transcription:

The hydrogen bonds between bases are broken by RNA polymerase, exposing the bases.

Free RNA nucleotides in the nucleus form new hydrogen bonds with the exposed bases on the template strand according to complementary base pairing.

The RNA nucleotides are linked together to form an mRNA molecule by RNA polymerase.

Translation:

mRNA molecule arrives at a ribosome, it enters a groove between the two subunits of the ribosome. The tRNA with the anticodon complementary to the first codon on the mRNA enters the ribosome and attaches to the codon by hydrogen bonding. Two tRNA molecules can fit into the ribosome at any one time, so the second tRNA enters the ribosome.

The amino acids carried by the two tRNAs are now side by side and a peptide bond is formed between them.

The first tRNA now leaves, the ribosome move forward one codon and the third tRNA enters, carrying the next amino acid. This process is repeated until a stop codon is reached.