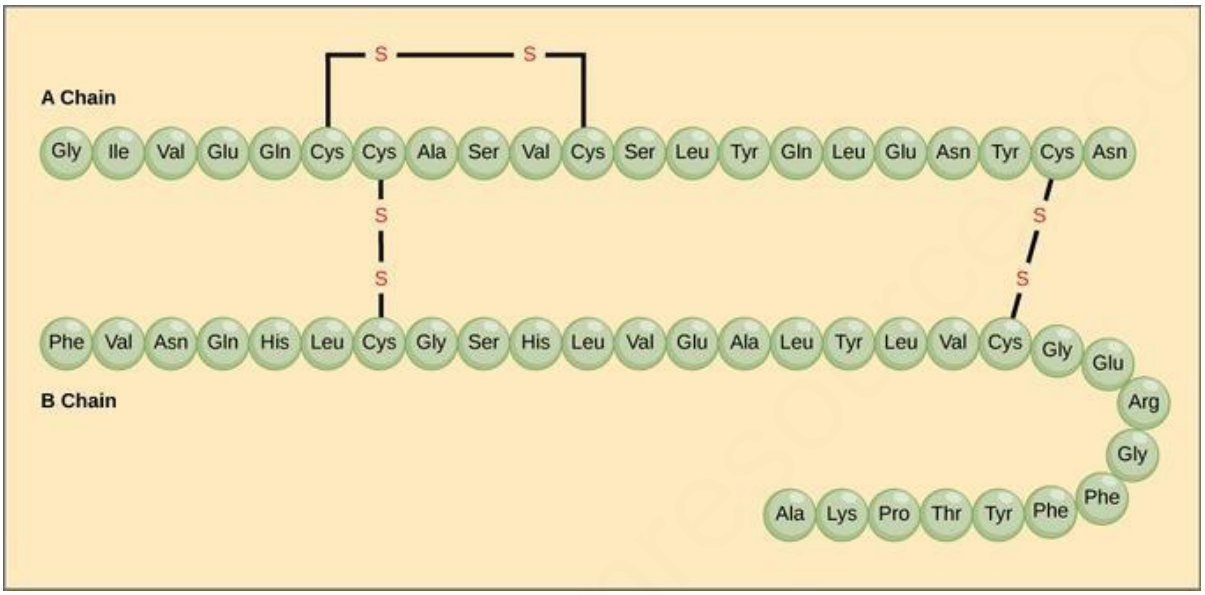
Different sequence of amino acids give different shape to protein molecules. The shape and structure of the protein molecules are related to their function:

The sequence of amino acids in the chain determines how the chain will fold up to make the protein, so different proteins have different three-dimensional shapes. The three-dimensional shape of a protein determines its function.

Levels of classification of proteins:

Primary Structure

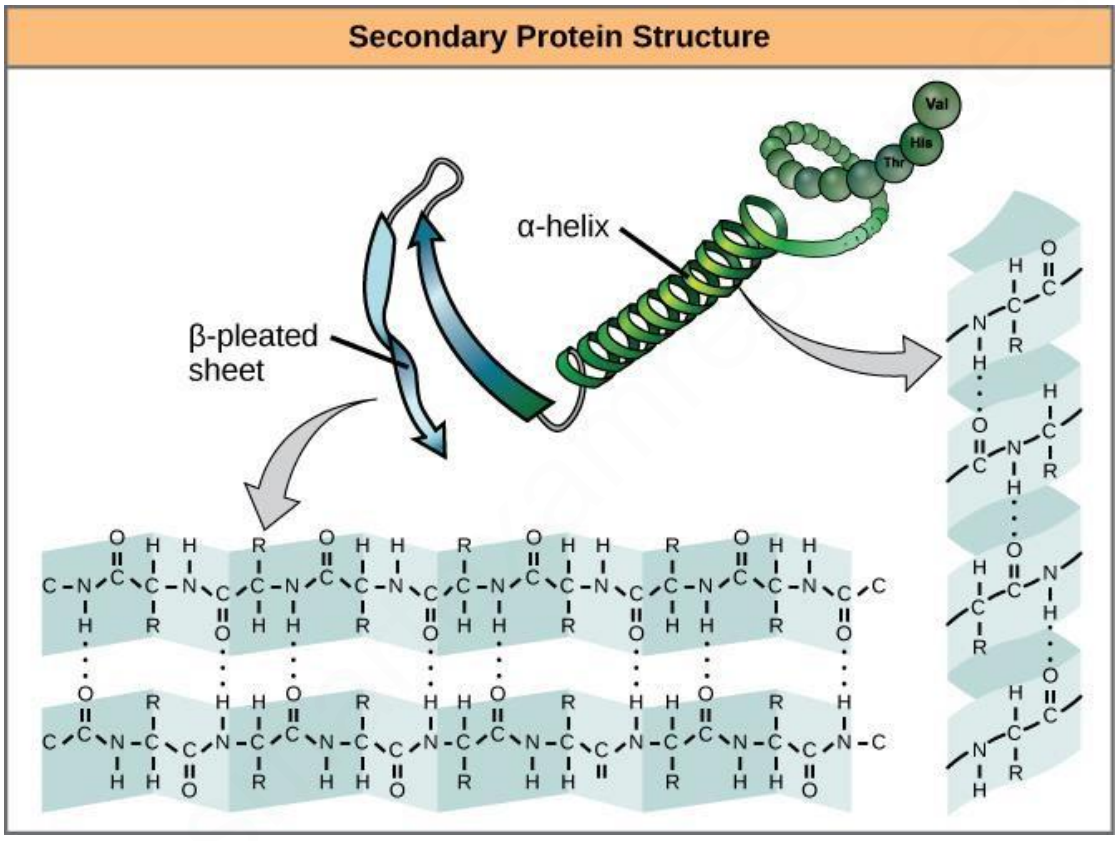
A protein's primary structure is the unique sequence of amino acids in each polypeptide chain that makes up the protein..



The gene, or sequence of DNA, ultimately determines the unique sequence of amino

Secondary Structure

A protein's secondary structure is whatever regular structures arise from interactions between neighbouring or near-by amino acids as the polypeptide starts to fold into its functional three-dimensional form. Secondary structures arise as H bonds form between local groups of amino acids in a region of the polypeptide chain. Rarely does a single secondary structure extend throughout the polypeptide chain. It is usually just in a section of the chain. The most common forms of secondary structure are the α-helix and β-pleated sheet structures and they play an important structural role in most globular and fibrous proteins.



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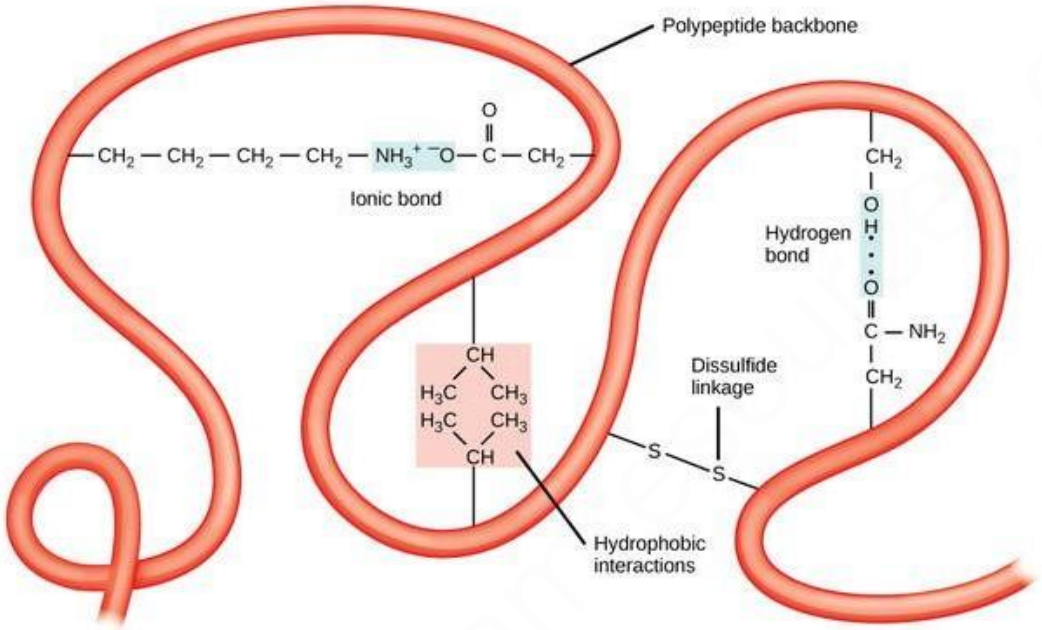
Tertiary Structure

The tertiary structure of a polypeptide chain is its overall three-dimensional shape, once all the secondary structure elements have folded together among each other. When a protein loses its three-dimensional shape, it will no longer be functional.

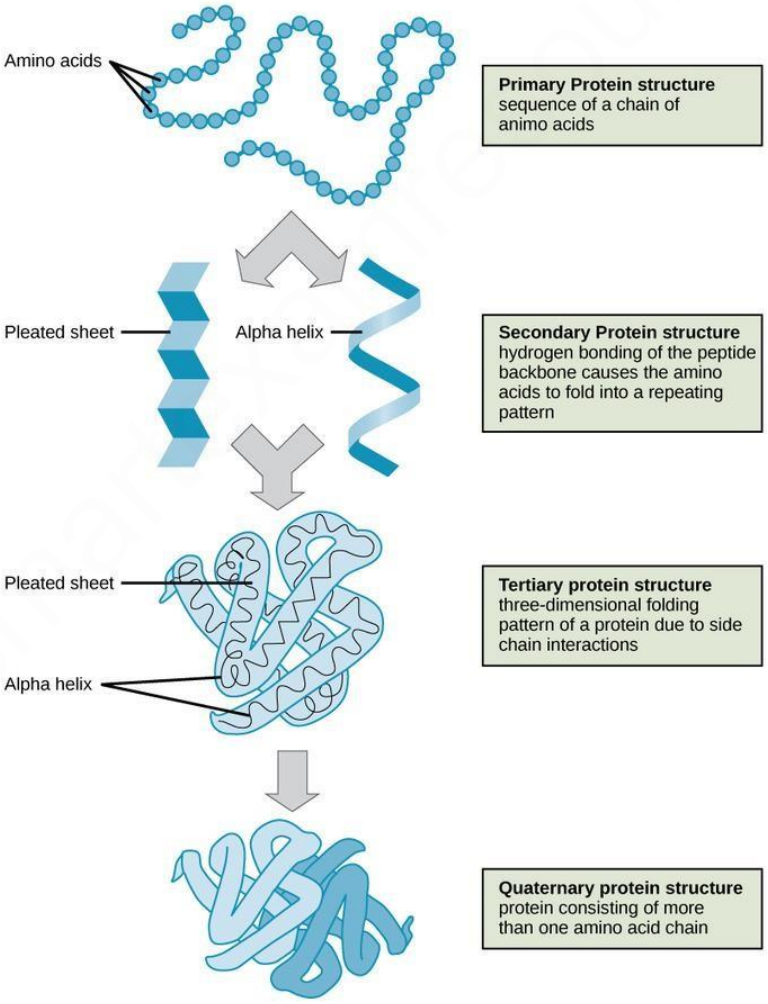


Quaternary Structure

The quaternary structure of a protein is how its subunits are oriented and arranged with respect to one another. As a result, quaternary structure only applies to multi- subunit proteins; that is, proteins made from more than one polypeptide chain.
Proteins made from a single polypeptide will not have a quaternary structure.

In proteins with more than one subunit, weak interactions between the subunits help to stabilize the overall structure. Enzymes often play key roles in bonding subunits to form the final, functioning protein.

For example, insulin is a ball-shaped, globular protein that contains both hydrogen bonds and disulfide bonds that hold its two polypeptide chains together. Silk is a fibrous protein that results from hydrogen bonding between different β-pleated chains.



Proteins can be classified as globular or fibrous based on their structure:

Properties	Fibrous proteins	Globular proteins
Shape	long and narrow	rounded/spherical
Role	structural (strength and support)	functional (catalysts and transport)
Solubility in water	mostly insoluble	mostly soluble
Sequence of amino acids	repetitive amino acid sequence	irregular amino acid sequence
Stability	less sensitive to changes in heat and pH	more sensitive to changes in heat and pH
Examples	collagen, keratin	hemoglobin, insulin, catalase