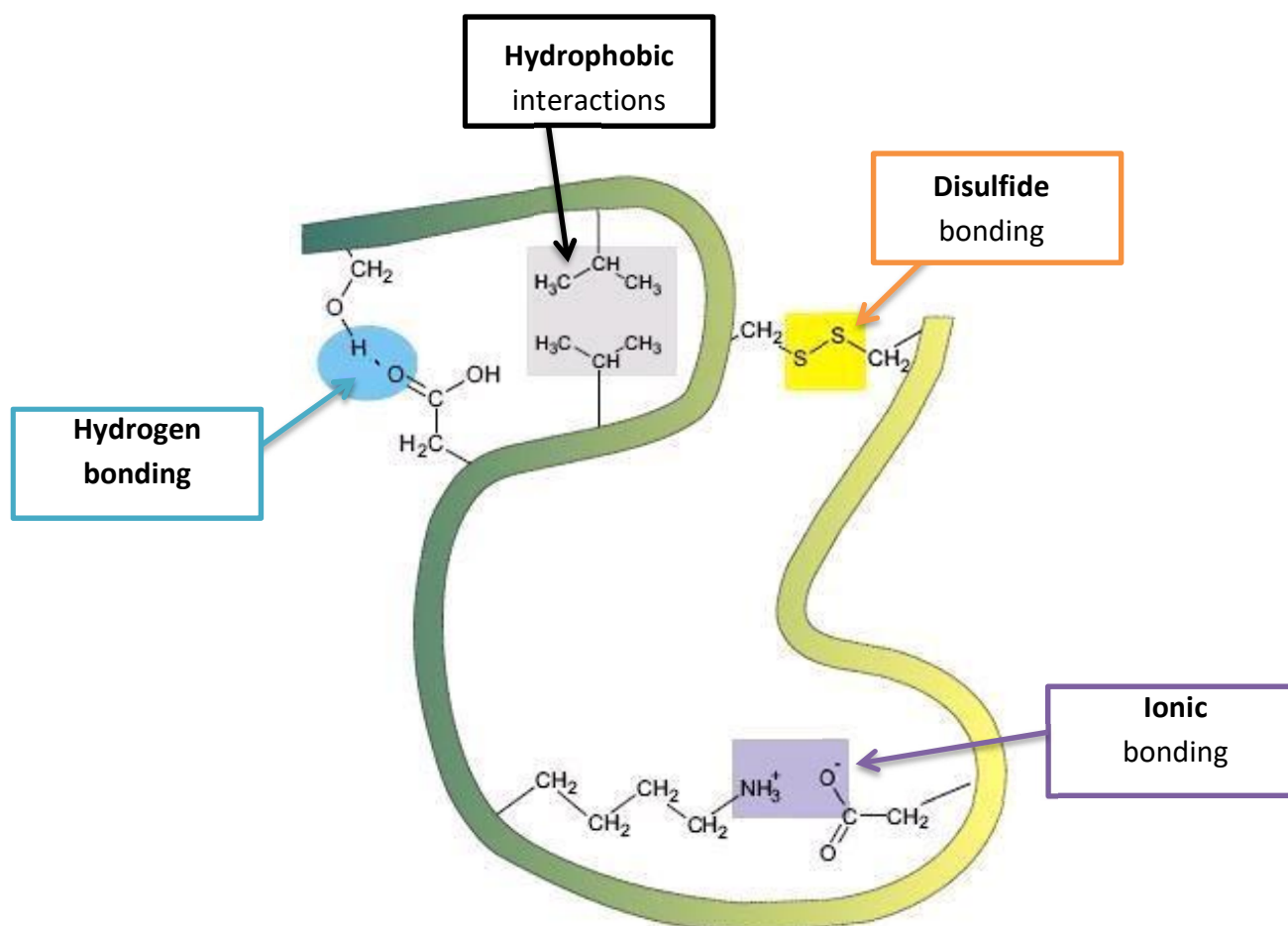


Name:
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QA2 – Amino Acid Interactions

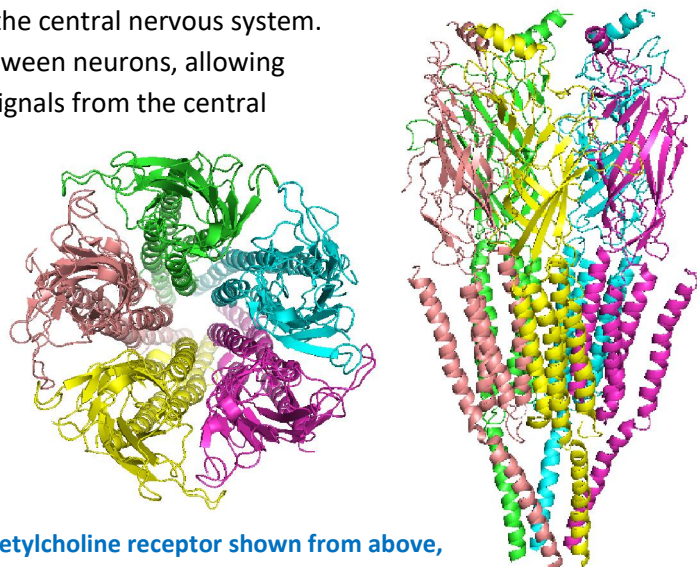
1. The diagram below shows a small section of a protein, with different amino acid residues extending out from the polypeptide backbone. Label the different types of interaction which are holding the tertiary structure in place.



2. Using your answers to Q1., explain why the diversity of amino acid side chains is so important to the overall shape and structure of a protein.

Having a diverse range of amino acids allows a **diverse range of interactions** to occur between the residues of the polypeptide chain. This allows the amino acid sequence to be 'designed' so that it can **fold in a specific way**, to give a **very specific overall shape** – its tertiary structure. **For example**, the ionic bond between the bottom two residues uses a relatively long lysine side chain, which forces the curve at the bottom to be relatively large. Whereas the disulfide bonding occurs between two relatively small residues, and this pulls the two ends of the chain closer together.

Acetylcholine (ACh) is a **neurotransmitter** that acts on the central nervous system. Neurotransmitters send signals across the synapses between neurons, allowing neurons to communicate with each other. This allows signals from the central nervous system to be relayed to muscles and glands in the body. Acetylcholine receptors are proteins which act as **ion channels**. This means that in their normal resting state, the channel is closed, and no ions can pass through. But when two ACh molecules bind to an acetylcholine receptor, the protein changes shape, and the ion channel opens. This allows ions to flow, which can then interact with muscles, telling them to contract.



An acetylcholine receptor shown from above, and the side. PDB entry 2bg9.

3. The diagram below shows how ACh specifically binds to the active site of a receptor. Label the interactions occurring between the amino acid residues and the ACh molecule (centred).

