The α helix is also described in the handout figure.

Note that for L-a.a. the normally allowed structure is right-handed as indicated in the Ramachandran plot.

In this structure, $\Phi = -57°$ and $\Psi = -47°$, as earlier indicated, and n = 3.6.

In the α helix, the carbonyl O of the 1st a.a. is H-bonded to the N-H group of the 5th a.a. along the chain which results in a 13-membered ring.

Note that the H-bonds are parallel to the axis of the helix.

Note that in the α helix the H-bond is more linear and as a result should be stronger than the H-bond in the 3_{10} helix as indicated below

Also note that in the α and 3_{10} helices, the R groups of the a.a. extend out from the helix.

The α helix is the most common secondary structure found in proteins.

The α helix is the predominant structural unit in the keratins that are fibrous proteins found in skin, hair, horns, nails and feathers.

Handout figures 7-25, 7-26 and 7-27 describe the organization of keratin molecules in hair.

α keratins contain a central ~310 residue segment of a polypeptide chain which has a 7-residue pseudorepeat, *a-b-c-d-e-f-g*, with hydrophobic residues at *a* and *d*.

The central segments of two polypeptide chains form α helices that coil around each other to form a dimer as shown in Figs 7-26 and 7-27.

The strands interact with each other between the nonpolar residues at *a* and *d* as shown in Fig 7-27.

The dimers are arranged in two staggered rows with the non-helical ends of the chains arranged in a head to tail manner to form a protofilament.

Eight such filaments make up a microfibril that is used to make construct a macrofibril.

The hair cells are in turn largely composed of packed macrofibrils.

Some of the properties of hair and wool fibers have been related to their protein structure.

Wool for example is very extensible; it can be stretched to almost twice its length because it is composed of α helical proteins that are not fully extended.

The resistance to stretching is in part due to the intrapeptide H-bonds in the α helices.

The resistance to stretching is also due to disulfide cross-links between polypeptide chains within and between protofilaments.

The permanent wave process for hair first involves reducing disulfide bonds to the mercapto form, and then forming different disulfide bonds after the hair has been shaped.

The disulfide cross links are about every 3 to 4 turns based on the cys content of wool fiber shown in the handout table.

Harder keratins such as those found in horns and nails have a greater cys content.

Genetic skin diseases characterized by skin blistering are due to sequence differences that affect filament formation.