

## Replication of protein molecules via the formation of double helix structure 二重ラセン構造の形成によるタンパク質の分子の複製

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Primitive proteins are formed from amino acids directly. The amino acid has chirality of left-hand type (L) or right-hand type (D). Wallach's rule states that racemic crystals (DL crystals) are usually denser than the crystals of the individual enantiomers (L or D). On the other hand, amino acid molecules with the same chirality make peptide bond (homochiral peptides) due to stereospecific property of the molecule. Assuming Wallach's rule, vertical homochiral peptides of horizontal heterochiral pairs will form a double helix structure as shown in Fig 1. The racemic effect can elongate the double helix by using an attached amino acid as a template. Since control must be one way, the molecule to control must be different from the molecule to be controlled. The sequence of amino acids can be represented by the same double helical structure of nucleic acids. If pair of three-letter code of nucleotides (codon and anticodon) is incorporated between the L-type and D-type amino acids, molecular structure of the amino acid and that of the nucleotide modify each other. The mutual modifications of the same double helix links amino acid molecules and corresponding nucleic acids. So, the arrangement of amino acid is represented by the arrangement of nucleotides. The amino acid sequence can be memorized by using three-letter nucleotide codes of DNA which has a leading strand and a lagging strand. When DNA helicase breaks the hydrogen bonds between complementary DNA bases, separated RNAs make mRNA and tRNA. That is, mRNA contains L-type amino acids and L-type nucleotides, while tRNA has D-type nucleotides and D-type amino acids. As a result, mRNA assembles the sequence of amino acids, while the atomic arrangement in amino acid of D-type tRNA is opposite chirality of L-type mRNA.

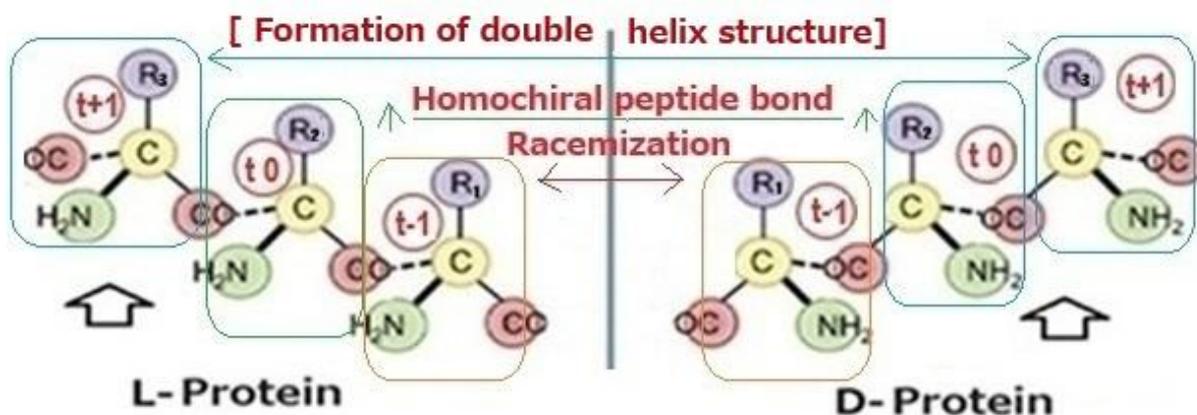


Fig 1. Formation on a step of double helix by amino acid molecules.

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