Pakistan School
Kingdom of Bahrain

PAKISTAN SCHOOL, KINGDOM OF BAHRAIN.

Welcome to

Grade 11

Rules of the class

1) Be on time for all your classes.
2) Respect all the participants of the class.
3) Do not create any disturbance.
4) Pay attention to your teacher.
5) Raise hand if you have a question.
6) Enter into the class with your actual name and CPR number.

Chapter 2

Biological molecules

OBJECTIVES:

At the end of this lesson students will be able to:

- Classify polysaccharides
- Recognize the role of various polysaccharides
- Describe the basic conformation of proteins

POLYSACCHARIDES

- Yield more than 10 monosaccharides
- Homo polysaccharides : Condensation of only one kind of monosaccharides

  E.g. = Starch , glycogen , cellulose , chitin
- Hetero polysaccharides : Condensation of different kind of monosaccharides

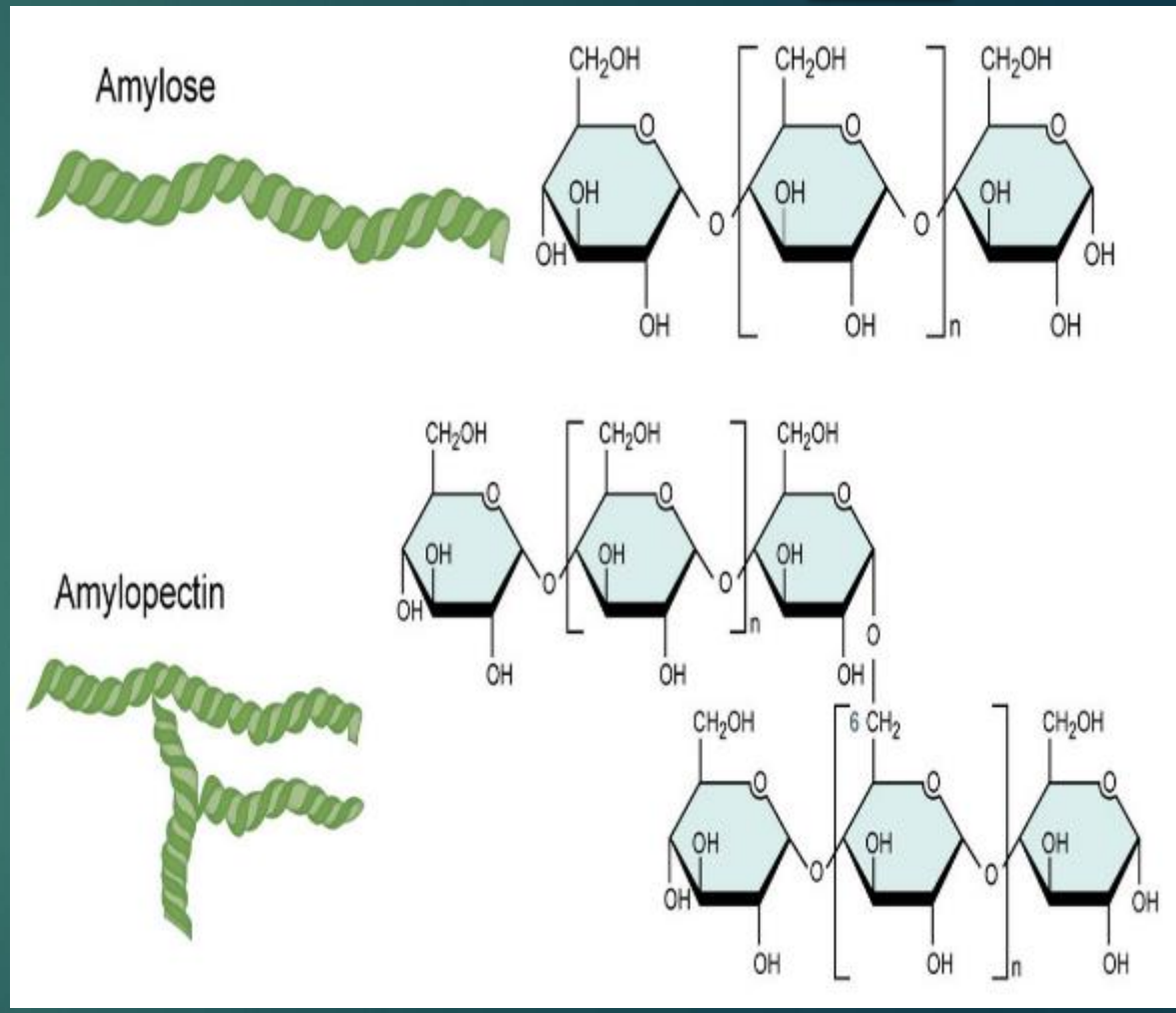
  E.g. = agar , pectin , peptidoglycan
- Functions : 1) Food & energy stores → Starch, glycogen

  2) Structural material → cellulose
- Storage function due to insolubility in water so no osmotic or chemical influence in cell ; compact folding

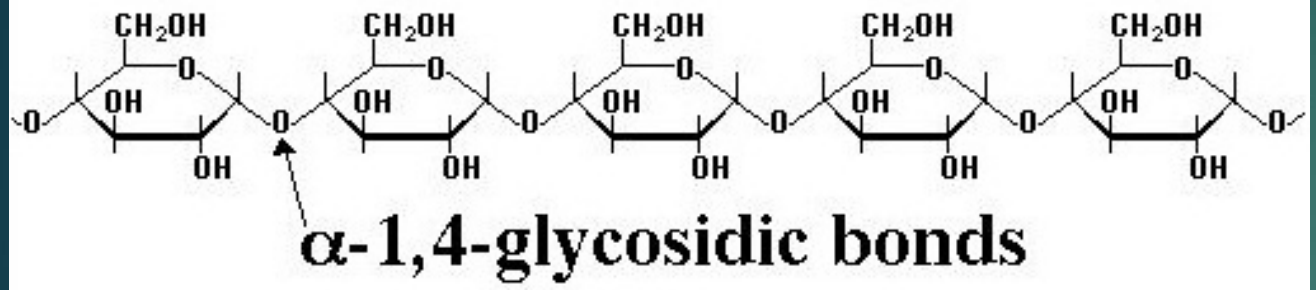
STARCH

- Homo polysaccharide - (Monosaccharide units = α – glucoses)
- Stored in root, stem , leaves (Potato tubers)
- Digested by = Amylase
- Hydrolysis gives maltose → glucoses (due to maltases)
- Presence test = Iodine test (blue)
- 2 types : a) Amylose = Linear chain , unit – glucoses , α –1,4 - glycosidic linkages , soluble in hot water

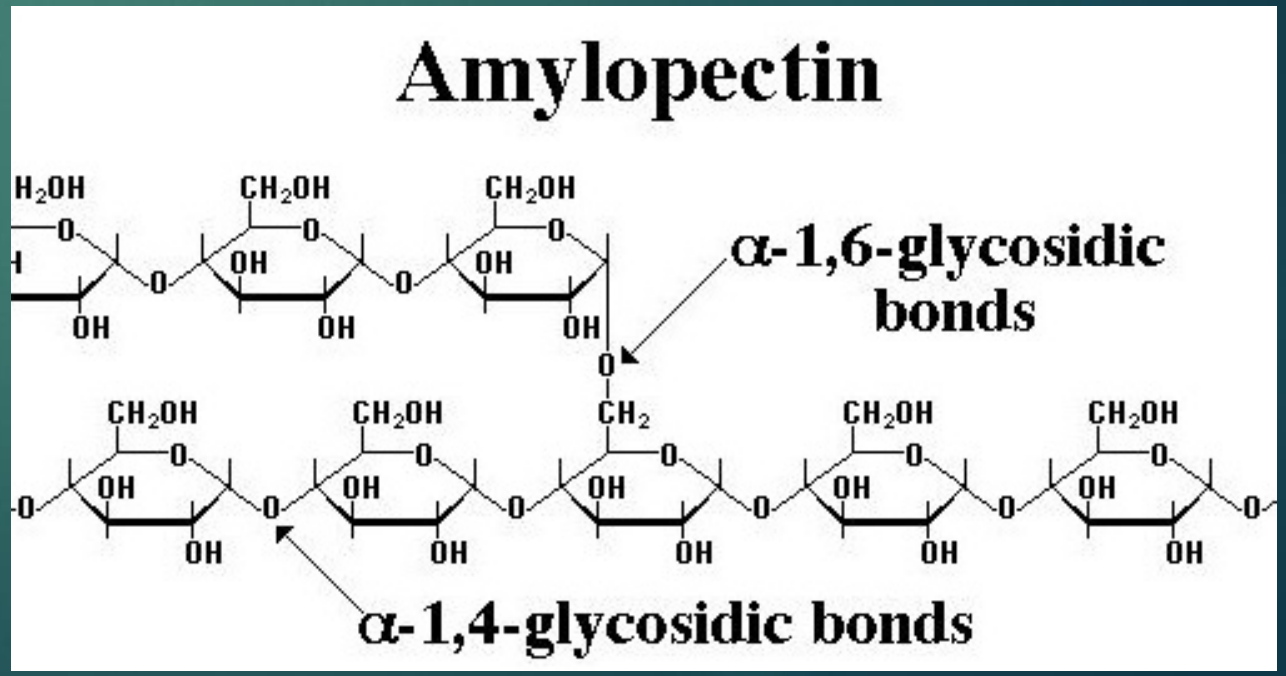
b) amylopectin = Branched chain , unit – glucoses , α –1,6 - glycosidic linkages , insoluble in water



Amylose

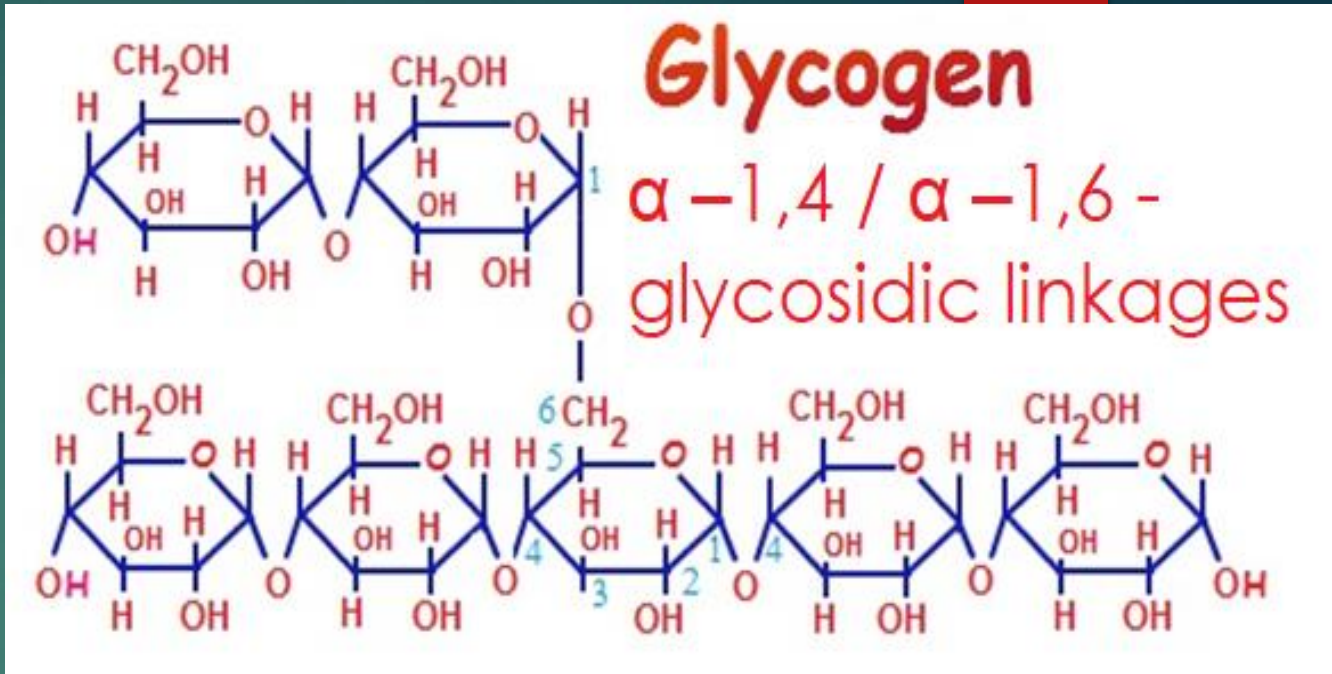


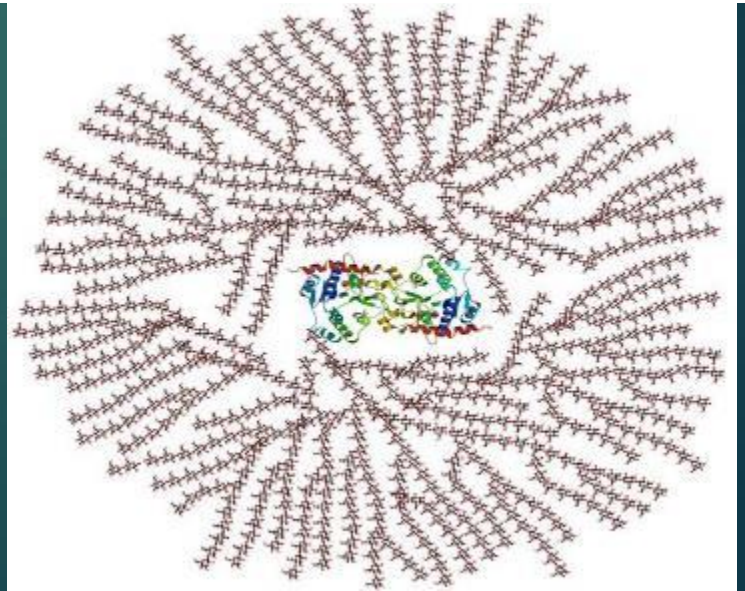
Amylopectin



GLYCOGEN

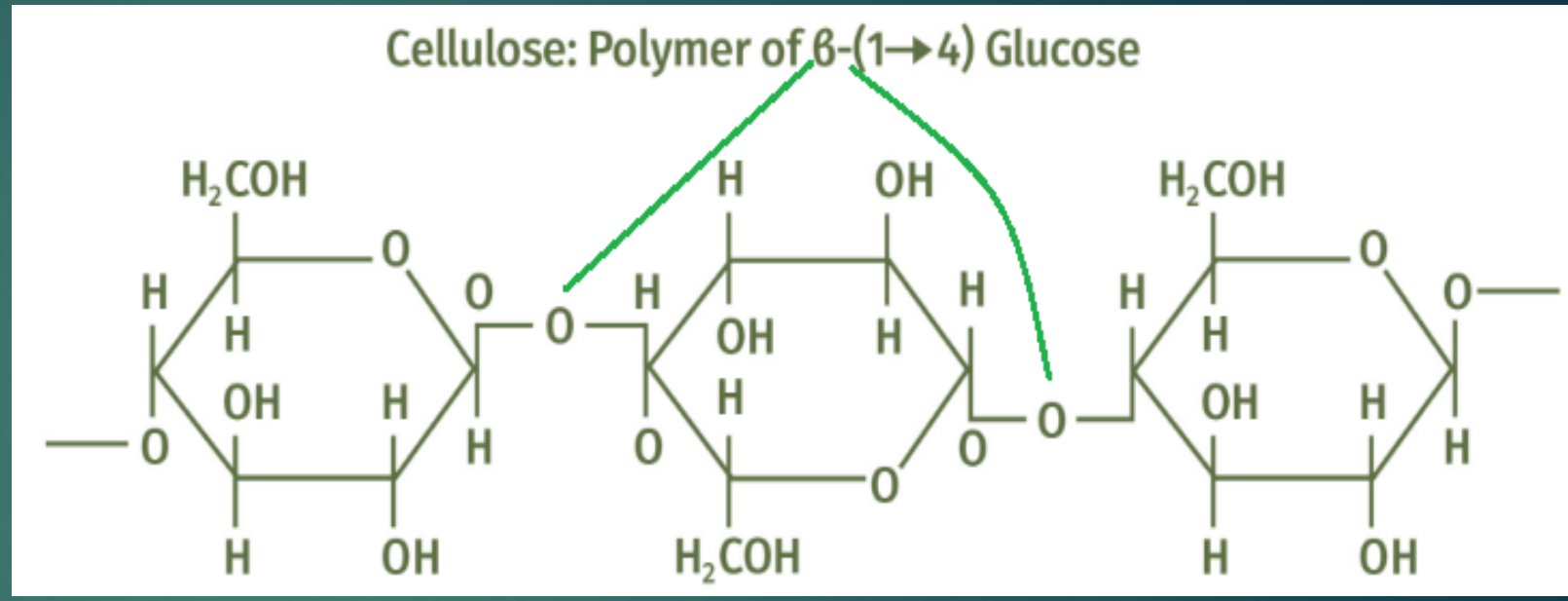
- Homo polysaccharide - (Monosaccharide units = α – glucoses)
- Storage carbohydrate for animals
- Stored in liver & muscles (animal's starch)
- Presence test = Iodine test (red)
- Similar to amylopectin but more branched
- Digestion pattern similar to starch





CELLULOSE (most abundant)

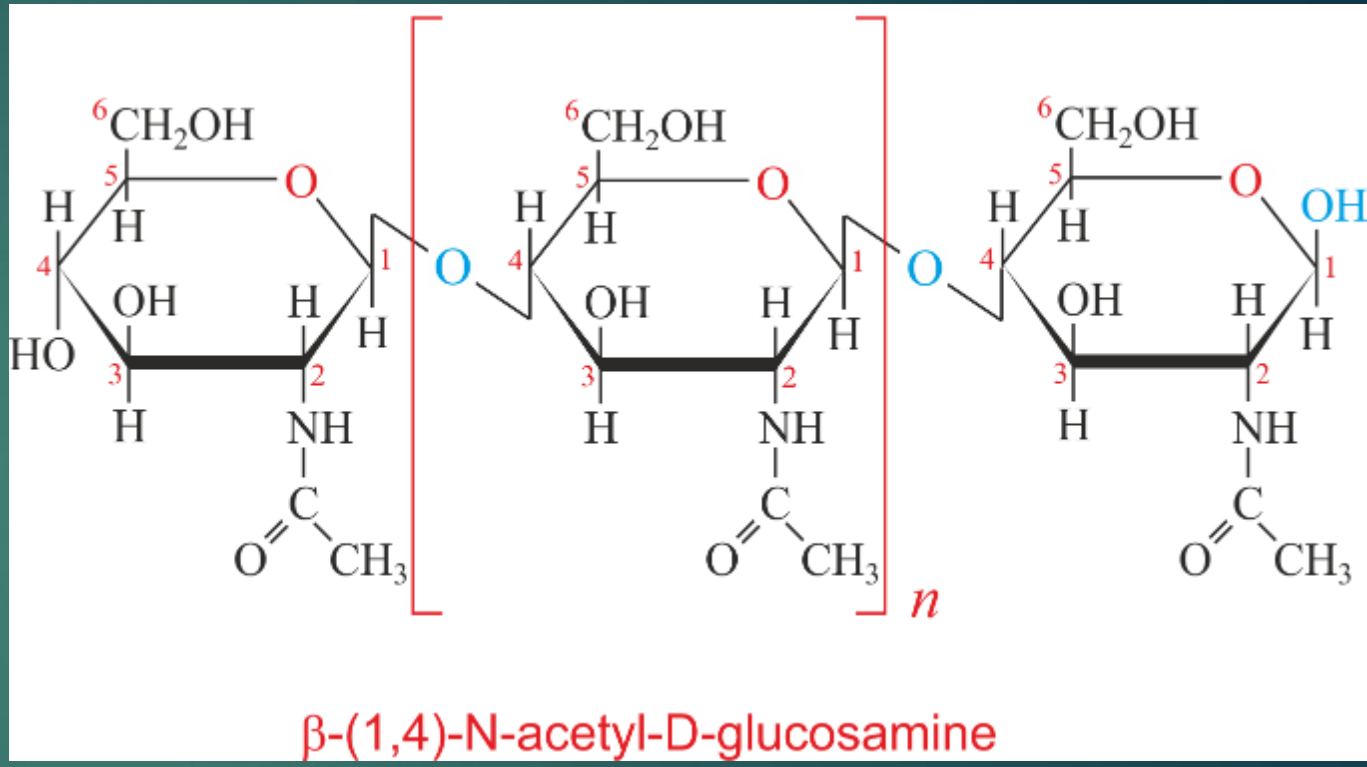
- Homo polysaccharide - (Monosaccharide units = β – glucoses)
- Plant structural carbohydrate (e.g. cell wall)
- Cotton & paper = pure forms



- Presence test = Iodine test (no color)
- Structure = Linear unbranched chain , unit – glucoses , β –1,4 - glycosidic linkages
- Glucose units – upright and inverted arrangement

CHITIN (2ND most abundant)

- Homo polysaccharide - (Monosaccharide units =N-acetyl glucosamine)
- Structural carbohydrate (e.g. fungi cell wall , arthropods exoskeleton)
- Unbranched
- Units – alternative upright and inverted arrangement
- β –1,4 - glycosidic linkages

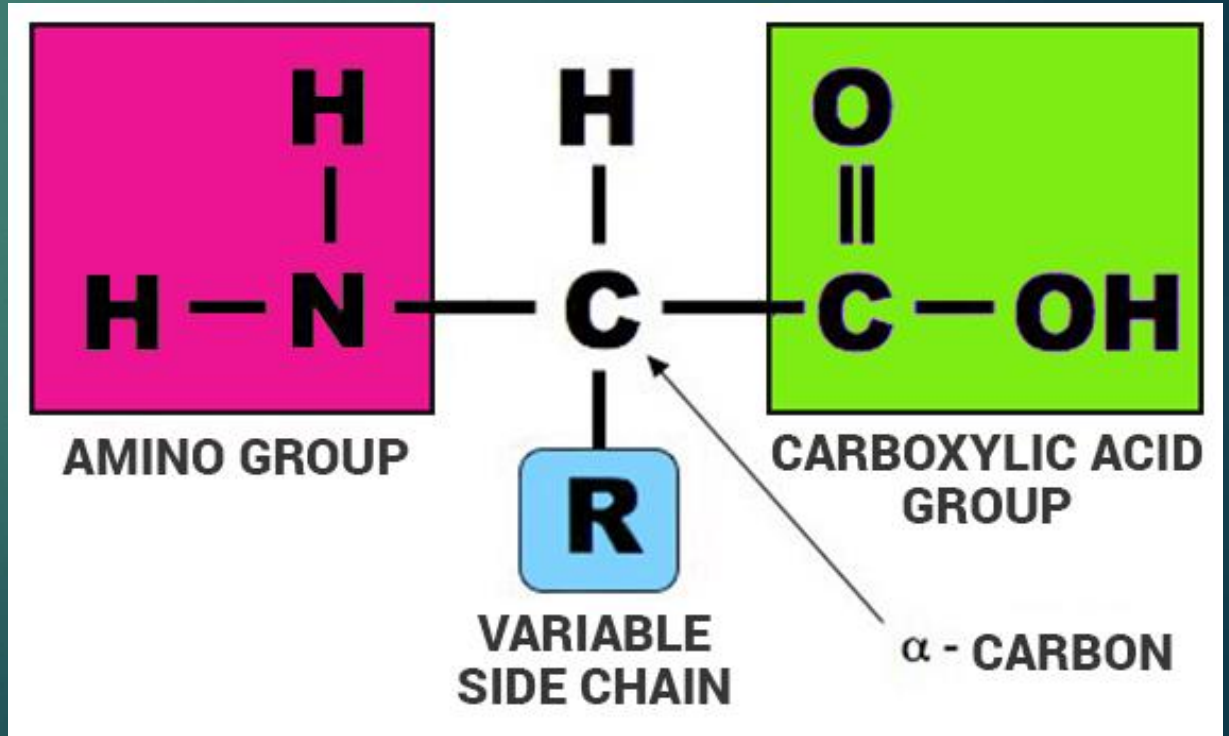


PROTEINS

- Main structural components of cell
- Contain (C H O N – all , P S – some , Fe I Mg – few)
- Polymers of amino acids or polypeptide chains
- Single or multiple polypeptide

AMINO ACIDS

- Biologically, 20 types of Amino acids in proteins
- R – group determines the chemical properties



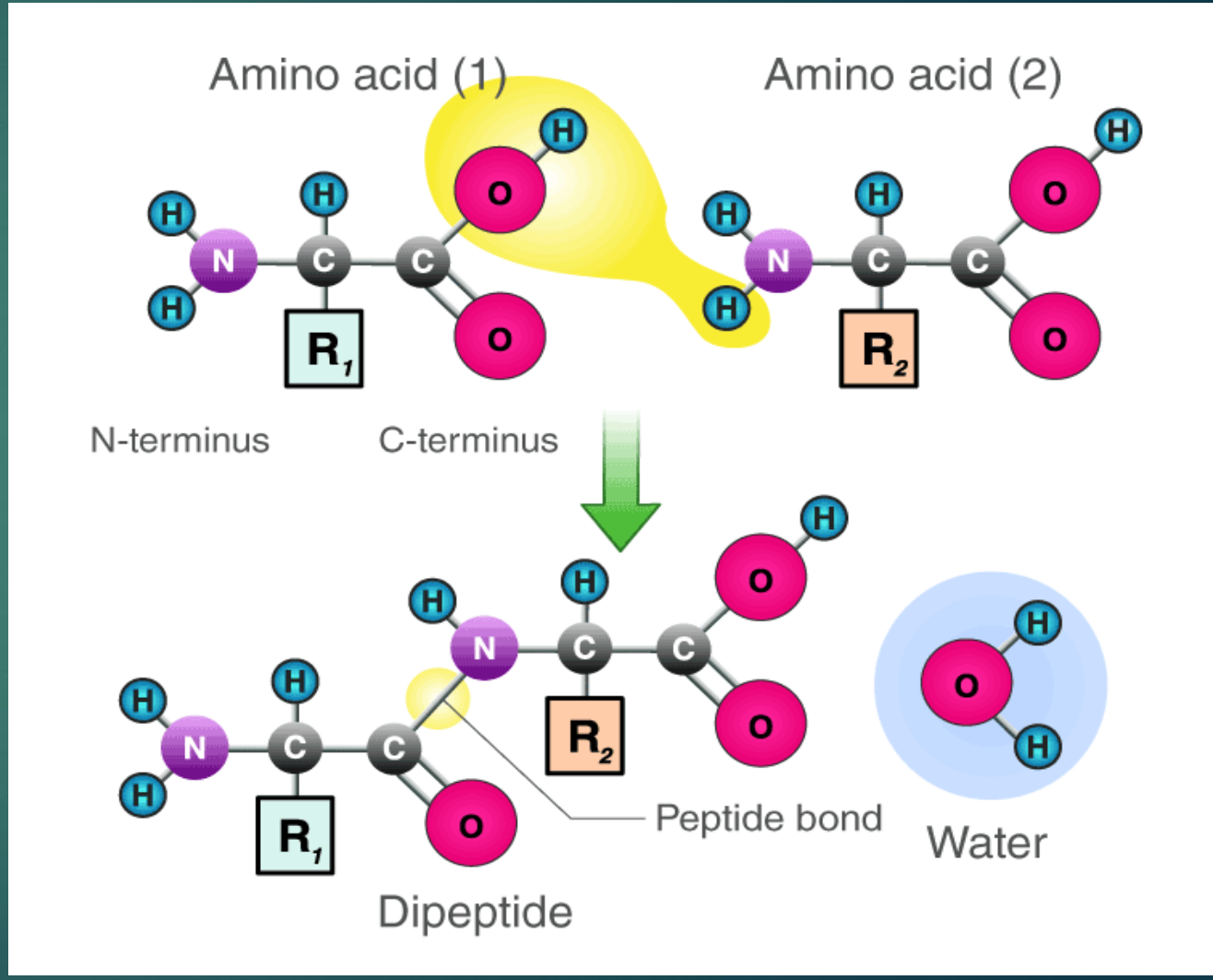
DIPEPTIDES & POLYPEPTIDES

- Formed by condensation of A.A. on ribosome under instructions of mRNA which takes these instructions from DNA = Translation
- Bond between C of carboxylic acid of one A.A. and N of amino group of another A.A. = Peptide bond

Condensation of 2 A.A. → dipeptide

Condensation of 3 A.A. → tripeptide

Condensation of many A.A. → polypeptide

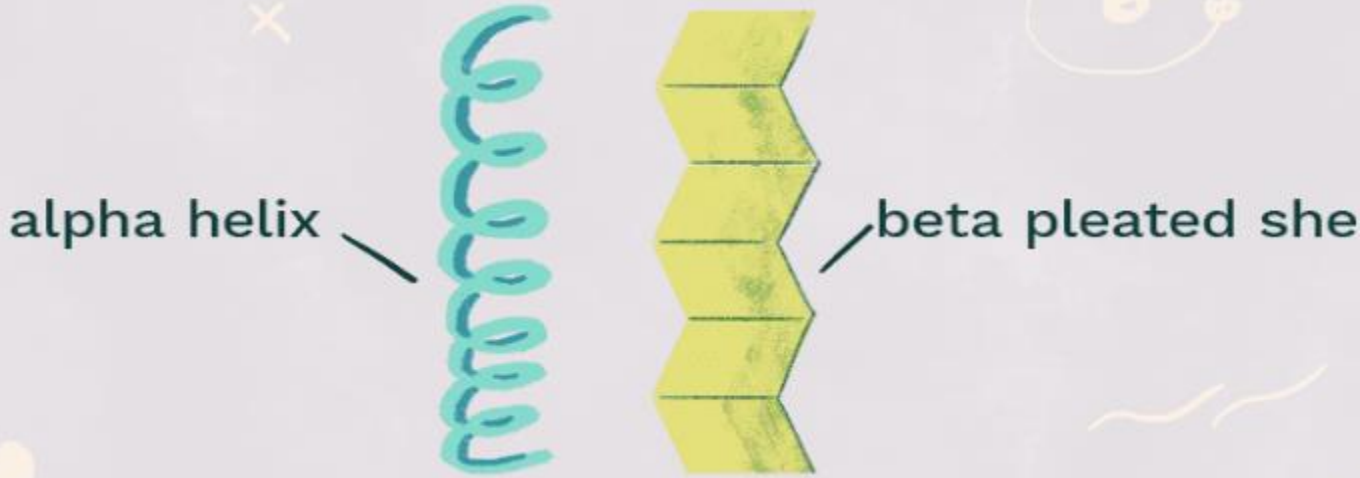


STRUCTURAL CONFORMATIONS IN PROTEINS

- **Primary structure :** Linear polypeptide with specific sequence & number of A.A. formed on ribosomal surface
- **Secondary structure :** α - helix (helical), β - pleated sheet (flattened sheets formed by H-bonding of opposite charge bearing groups of different A.A).
- **Tertiary structure :** Globular shaped proteins formed by multiple folding of α - helix by ionic bonds and disulfide bridges
- **Quaternary structure :** Complex structure in which more than 1 globule attached together by hydrophobic interaction

Types of Protein Structures

Primary Structure



Secondary Structure

Tertiary Structure

Quaternary Structure

PLENARY:

1. Define polysaccharides and give examples.
2. What is the difference between starch and glycogen ?
3. What is the product of hydrolysis of polysaccharides ?
4. What is the general structure of an amino acid ?
5. How many levels are there in protein formation ?


STAY
HOME
STAY SAFE

Allah Hafiz