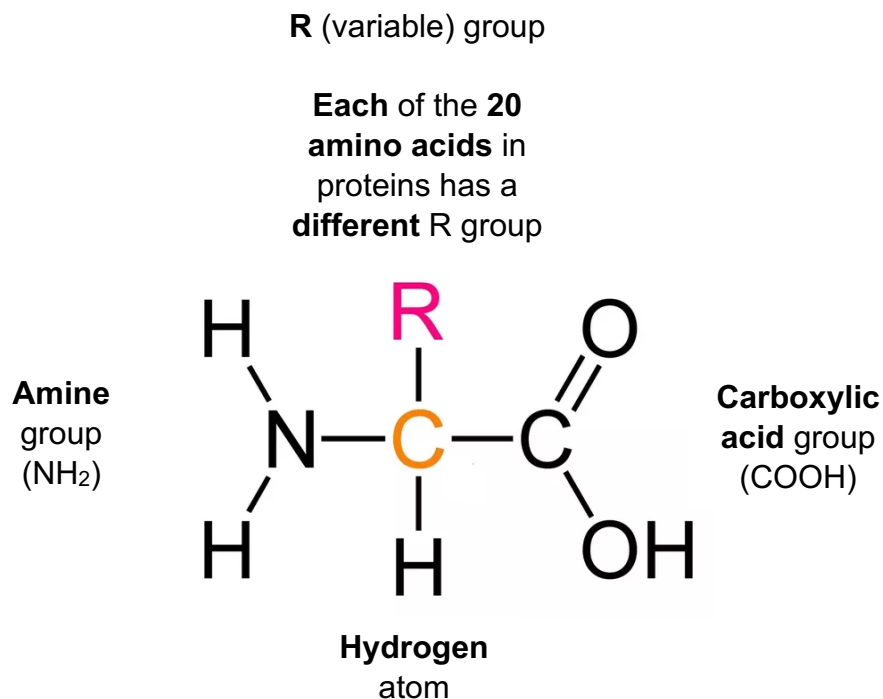


## A. AMINO ACIDS

- **Amino acids** are **joined** together by **condensation** reactions to form a **protein** (**polypeptide**)

### Structure of an amino acid



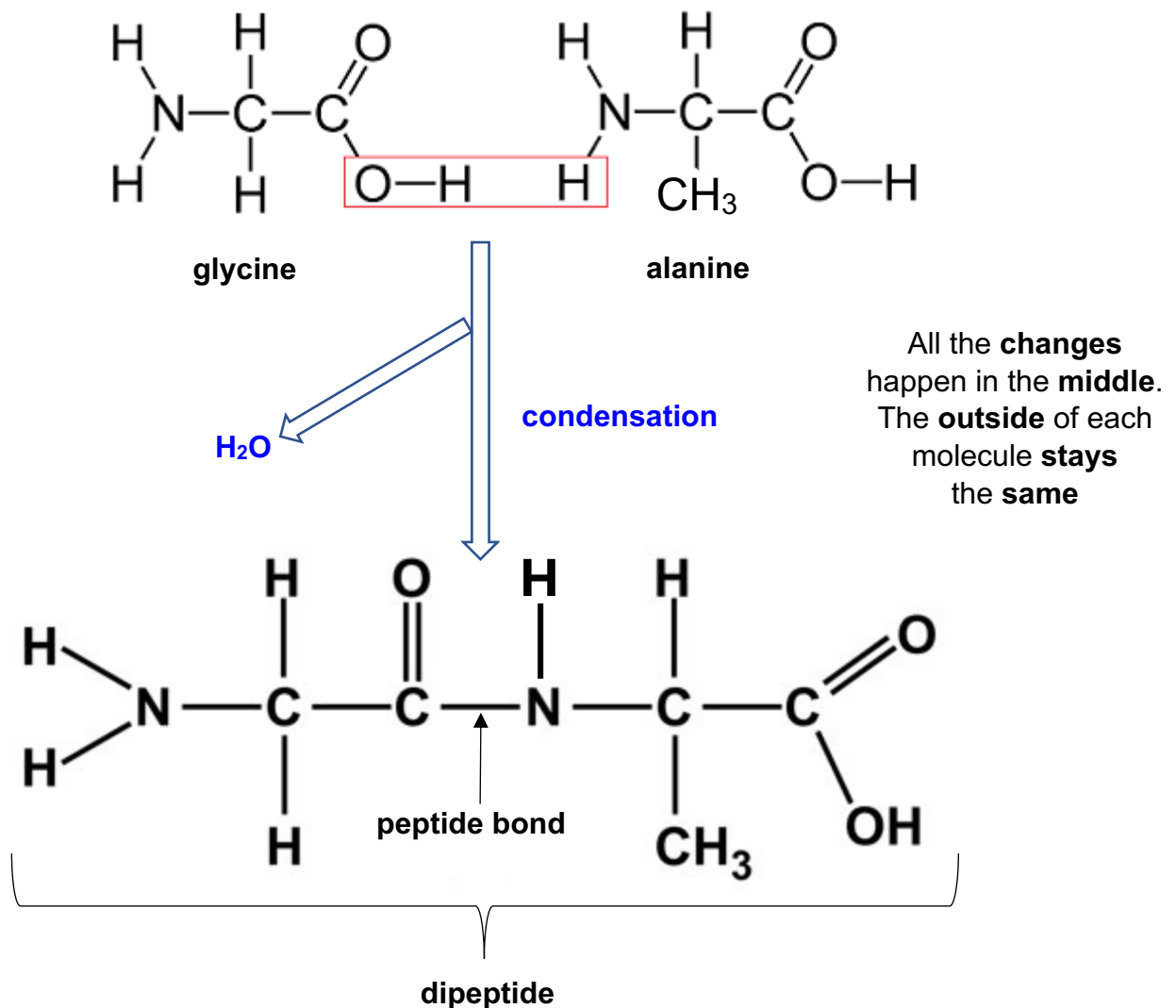
- **Proteins**, or **polypeptides**, are made by **joining amino acids** together
- There are **20** different amino acids, each with a **different R group**

A **PROTEOME** is **all the proteins** that can be **produced** by a cell, tissue or organism

Every **individual** has a **unique PROTEOME**

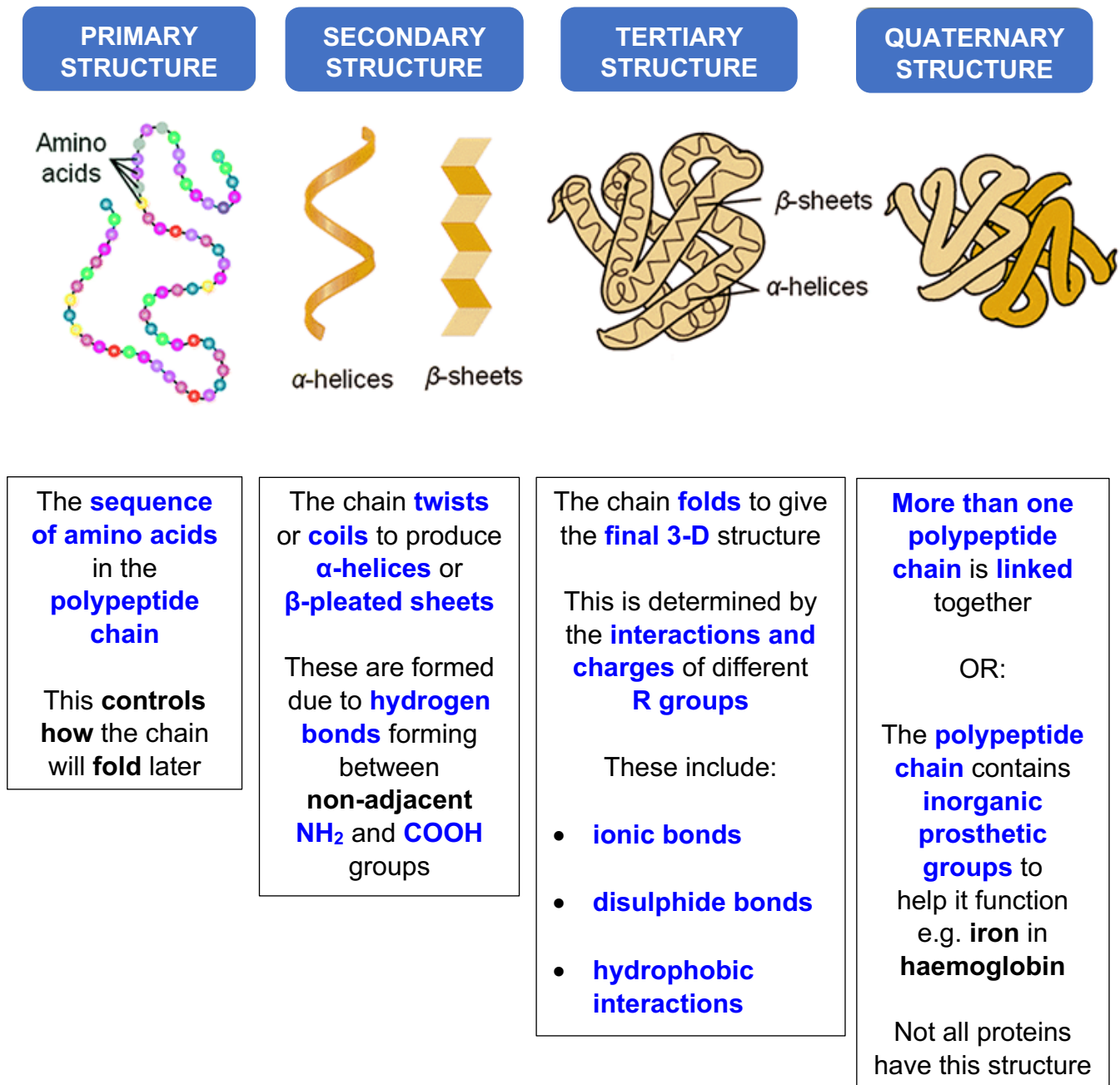
## B. MAKING A DIPEPTIDE

- A **dipeptide** is made up of **two amino acids**, **joined** by a **condensation reaction**.
- The amino acid **glycine** has the R group '**H**'. The amino acid **alanine** has the R group '**CH<sub>3</sub>**'.

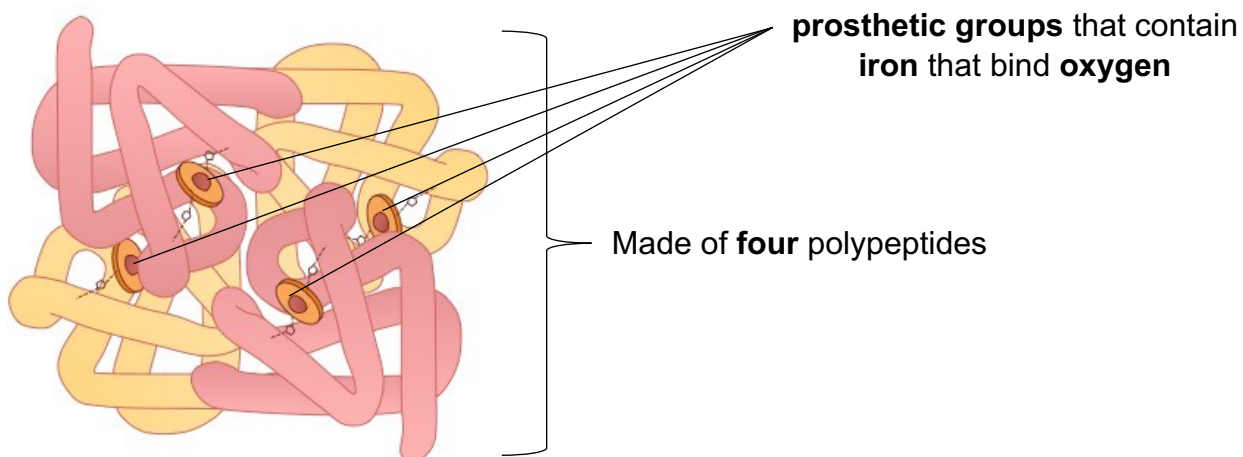


- Proteins (polypeptides)** are made by doing this **several** times to produce a **long chain** of **amino acids** by **condensation** reactions
- Amino acids** can be **joined** together in **any sequence** giving a **huge range** of possible **polypeptides**
- Each **protein** is **unique** as it has a **specific sequence** of **amino acids**
- Each **gene** codes for **production** of a **specific sequence** of **amino acids**  
= a **protein** / **polypeptide**

## C. PROTEIN STRUCTURE



### Example of a quaternary structure - haemoglobin



## D. EXAMPLES OF PROTEINS

- A popular **multiple-choice** question.

NAME	TYPE	DESCRIPTION
COLLAGEN	Structural	<ul style="list-style-type: none"><li>• It has <b>three polypeptides wound together</b>.</li><li>• This forms a <b>rope-like shape</b>, which gives <b>strength</b>.</li><li>• Prevents the <b>skin from tearing</b></li><li>• Prevents <b>bones from fracturing</b> and gives <b>ligaments tensile strength</b>.</li></ul>
SPIDER SILK	Structural (Linear)	<ul style="list-style-type: none"><li>• It is used to make <b>webs</b> for catching prey and 'walking' on.</li><li>• It has a very <b>high tensile strength</b> and <b>becomes even stronger when stretched</b> = less chance of breaking.</li></ul>
INSULIN	Hormone	<ul style="list-style-type: none"><li>• Involved in <b>lowering blood glucose concentration</b>.</li><li>• It binds to <b>receptors</b> on <b>liver</b> cells and causes <b>glucose to be converted to glycogen</b> and <b>stored</b>.</li></ul>
IMMUNOGLOBULIN	Antibody	<ul style="list-style-type: none"><li>• They bind to <b>antigens</b> on pathogens.</li><li>• Each antibody has a <b>different tertiary structure</b>, specific to <b>one antigen</b>.</li></ul>
RUBISCO	Enzyme (Globular)	<ul style="list-style-type: none"><li>• Involved in <b>photosynthesis</b>.</li><li>• It <b>fixes CO<sub>2</sub></b> to <b>make sugars</b> and other compounds.</li></ul>
RHODOPSIN	Pigment	<ul style="list-style-type: none"><li>• It makes the <b>rod cells</b> in the <b>retina light-sensitive</b>.</li><li>• It has a <b>non-amino</b> part called <b>retinal</b> that <b>absorbs light</b> and <b>sends electrical impulses</b> to the <b>brain</b>.</li><li>• Used for <b>night</b> vision.</li></ul>