Pedro de Carvalho
A2 Biology Coursework

Analysis of the amino acids in protein by paper chromatography

Introduction

Amino acids are a group of over a hundred chemicals of which around twenty commonly occur in protein. They always contain a basic group, the amino group (-NH) and an acid group, the carboxyl group (-COOOH) as shown in fig. I1

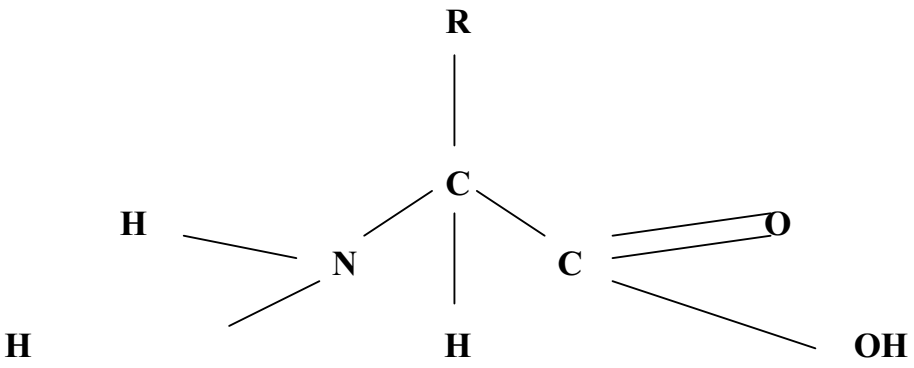

Fig.I1

All the amino acids have the same basic chemical structure. It is only the R-group that differs. In the amino acid glycine, for example, it is H while in alamine it is CH.
A condensation reaction occurs between the amino group of amino acid and the carboxyl of another to form a dipeptide. Further combinations of this type extend the length of the chain to form a polypeptide (protein). A polyptide usually contains many hundreds of amino acids.

Proteins are required for making enzymes, many structural components and cell secretions. They are made from 20 different amino acids. The body can make some of these itself but in humans there are 8 that cannot be synthesized at all and these are essential for the diet. The amount of each of the 8 essential amino acids varies in different proteins foods. Some foods have greater value than others.

Plants are able to make amino acids by combining some of the molecules produced by photosynthesis with nitrogen obtained from nitrates taken up

from the soil. Animals are unable to do this and need to obtain many of the amino acids they require from their diet. From these, they can produce others by the process of transamination. Animals cannot store excess amino acids in their bodies until they are required.

The purpose of this experiment is to identify which amino acids are present in the protein present in the egg white. The protein is first hydrolysed by treating with the digestive enzyme trypsin. The amino acids are then separated and identified by paper chromatography.

The principle behind paper chromatography that is performed in this experiment is as follows. A small amount of solvent is put at the bottom of a jar. A strip of absorptive paper, with a concentrated spot of the mixed amino acids towards the bottom, is suspended in the jar so that its end dips into the solvent. The latter moves slowly up the strip of paper, carrying the amino acids with it. As the amino acids travels at different speeds, they separate from one another. The paper is then treated with a reagent, which stains the amino acids so they can be detected with a reagent, which stains the amino acids so that they can be detected and identified.

The advent of chromatography for the separation of amino acids has led to the development of the fully automated amino acid analyser which rapidly produces a qualitative and quantitative print out for any protein material under test. This allows critical assessment of the value of food for human nutrition.