CHAPTER 4: CHEMICAL COMPOSITION OF THE CELL

Essential and Non-essential Amino Acids

1. Amino acids are not stored in the human body and a constant dietary supply is necessary to prevent malnutrition.
2. Meat and foods that contain all the essential amino acids (first class proteins) must be eaten daily.
3. This is how the human body deals with amino acids:
   (a) First, amino acids are taken up by the cells.
   (b) Then protein synthesis takes place.
   (c) If any **non-essential** amino acid is missing, the body will make it.
   (d) If any **essential** amino acid is missing, the protein synthesis stops and all of the amino acids in place (*see Figure 4.16, page 89, Nexus SPM Biology*) are dismantled and the protein is not made.
4. The lack of essential amino acids:
   (a) In the long term, inadequate protein in the diet leads to **kwashiorkor** (*see Table 6.14, page 158, Nexus SPM Biology*).
   (b) Kwashiorkor is most often seen in post-weaning infants (the baby stops taking its mother's milk and starts to eat solid food) when they go on a diet rich in plant poteins that lack a specific essential amino acid, e.g. corn, which lacks lysine; and bean, which lacks methionine (see table on the next page).
   (c) The good news is that meat contains all of the essential amino acids in sufficient quantity for human needs.
5. How other organisms deal with amino acids:
   (a) Most bacteria and plants (not mammals) are able to synthesise all the 20 common amino acids.
   (b) Ruminant animals (*see Figure 6.27, page 167, Nexus SPM Biology*) generally synthesize the essential amino acids in the rumen to meet their needs.
6. The following table shows 9 essential amino acids and 11 non-essential amino acids; note that some amino acids are considered essential at different stages of life (e.g.*essential in children, but not in adults) or during certain illnesses.

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The basic set of 20 amino acids

Essential amino acids	Non-essential amino acids
Histidine* Isoleucine Leucine Lysine Methionine Phenylalanine Threonine Tryptophan Valine	Alanine Arginine* Asparagine Aspartate Cysteine Glutamate Glutamine Glycine Proline Serine Tyrosine

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