

AS Level Biology A
H020/01 Breadth in Biology

Question Set 6

1. Many multicellular organisms need to be able to convert monosaccharides into polysaccharides and back again.

Mammals convert the monosaccharide glucose into a highly branched polysaccharide called glycogen, which gets stored in liver cells.

- (a) Explain why mammals store glycogen instead of glucose.

[3]

Glycogen is insoluble so does not alter the osmotic pressure of cells. Moreover, it is compact, reducing the space required for its storage. It is also highly branched, with many terminal end points due to α -1,6-glycosidic bonding. This means a large number of glucose molecules can be rapidly hydrolysed at once when required.

- (b) Humans use the enzyme α -amylase to break down polysaccharides in food for absorption into the blood.

The gene for human α -amylase is found on chromosome 1.

The gene is transcribed in the nucleus and translation occurs on the rough endoplasmic reticulum in cells of the salivary gland.

Describe how the molecule is prepared and secreted by cells of the salivary gland after translation has taken place.

[3]

The assembled protein in the rough endoplasmic reticulum is pinched off in a vesicle and transported to the Golgi apparatus where it is modified, processed and labelled. The protein is packaged into a secretory vesicle and transported to the cell surface membrane with the aid of the cytoskeleton. The vesicle fuses with the plasma membrane and its contents are released outside of the cell in a process known as exocytosis.

Total Marks for Question Set 6: 6

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