



GCE Biology

S21-A400U10-1

Assessment Resource 3

Energy for Life Resource C

1. Many diseases are caused by deviations of blood glucose from normal levels. The concentration of blood glucose is actively regulated to remain very nearly constant.

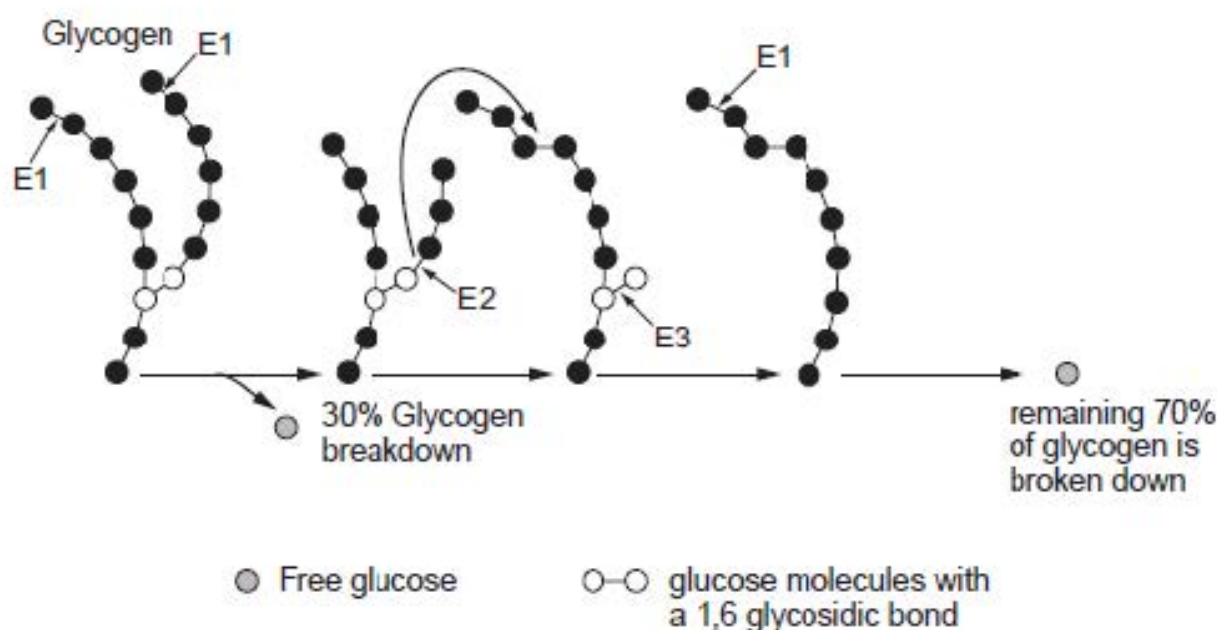
(a) What general name is given to this type of negative feedback mechanism? [1]

Glycogen is a molecule the body uses to store glucose, a source of energy. Glycogen storage disease (Cori's disease) is an inherited disorder caused by the build up of glycogen in the body's cells. The accumulated glycogen is structurally abnormal being a short branched polysaccharide.

The disorder is caused by a deficiency of a debranching enzyme.

From infancy, individuals with Cori's disease have low blood glucose levels.

The diagram below shows normal glycogen breakdown with all enzymes functioning.



Enzyme E1 sequentially hydrolyses 1-4 glycosidic bonds in glycogen from the end of the molecule

Enzyme E2 transfers short chains of glucose from one chain to another

Enzyme E3 is the debranching enzyme

- (b) Symptoms of Cori's disease are often more obvious between meals.

(i) What would be the main symptom of low blood glucose? [1]

(ii) Using the diagram opposite explain how the lack of the debranching enzyme causes low blood glucose. [4]

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(c) Explain what has happened to produce a non-functional glycogen debranching enzyme. [3]

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(d) Both parents are usually unaffected and it affects both males and females equally. How is this gene most likely to be inherited? [1]

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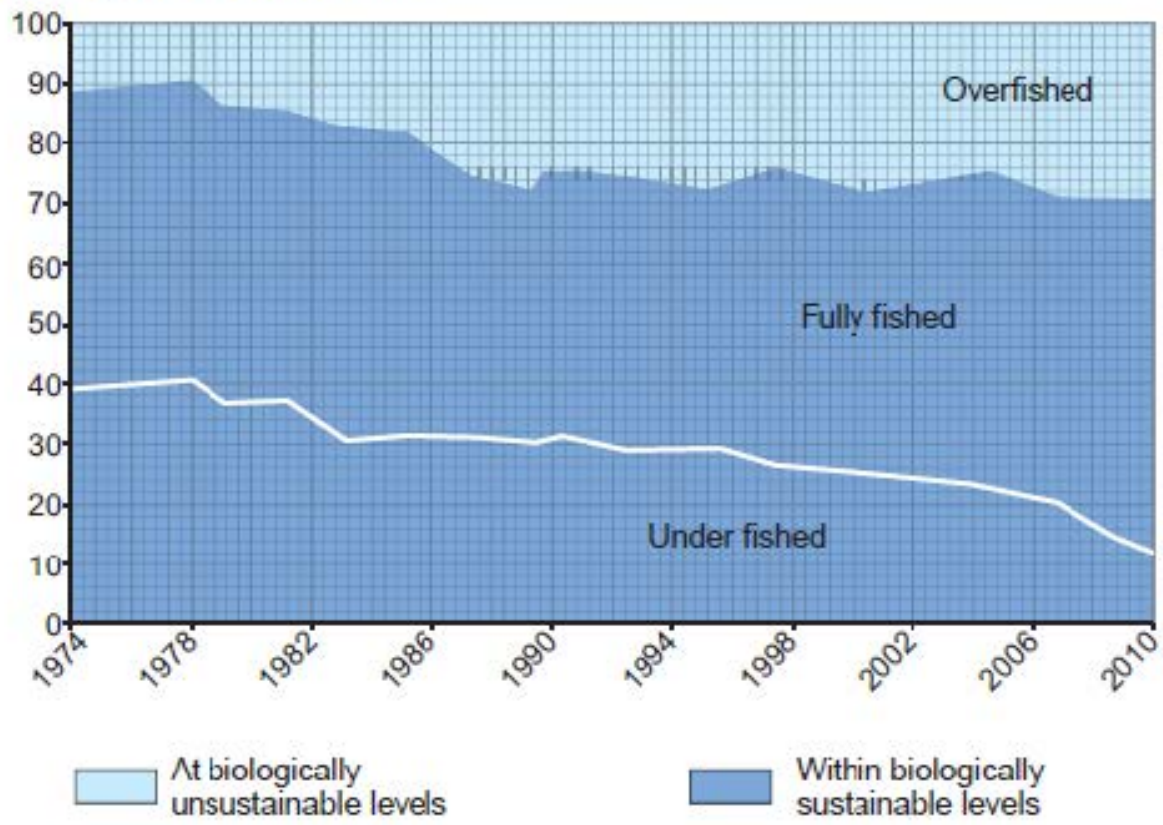
(e) How does glycogen differ structurally from the storage polysaccharide starch? [1]

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2. The graph below shows the trends in the state of world stocks of marine fish from 1974 to 2010.

Percentage of stocks assessed



Fully fished = fished at maximum sustainable yield

Underfished = currently believed to be fished at below maximum sustainable yield

(a) Using the data, what conclusions can be drawn about the world fishing stocks since 1974. [4]

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- (b) Describe **three** strategies, apart from aquaculture, which can be used to prevent overfishing and explain how each would help to conserve stocks. [3]

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- (c) One method of decreasing demands on wild fish stocks is the use of aquaculture. The Scottish salmon industry is one such example. One problem with raising salmon this way is the high build up of parasites, such as lice, which feed on the blood and tissue of salmon.

- (i) Why are the farmed fish more susceptible to infection by lice than wild fish and why is eliminating the lice a problem for fish farms? [2]

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- (ii) There are important environmental concerns that farmed fish can escape from their pens. Explain **three** reasons why it is important to the environment that the escape of farmed fish is prevented. [3]

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