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|-------------|---------------|------------------|
| Surname     | Centre Number | Candidate Number |
| Other Names |               | 0                |



**GCSE**

0239/02

**ADDITIONAL SCIENCE  
HIGHER TIER  
BIOLOGY 2**

A.M. MONDAY, 28 January 2013

45 minutes

| For Examiner's use only |              |              |
|-------------------------|--------------|--------------|
| Question                | Maximum Mark | Mark Awarded |
| 1                       | 8            |              |
| 2                       | 7            |              |
| 3                       | 4            |              |
| 4                       | 7            |              |
| 5                       | 9            |              |
| 6                       | 7            |              |
| 7                       | 8            |              |
| <b>Total</b>            | <b>50</b>    |              |

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**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator and a ruler.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

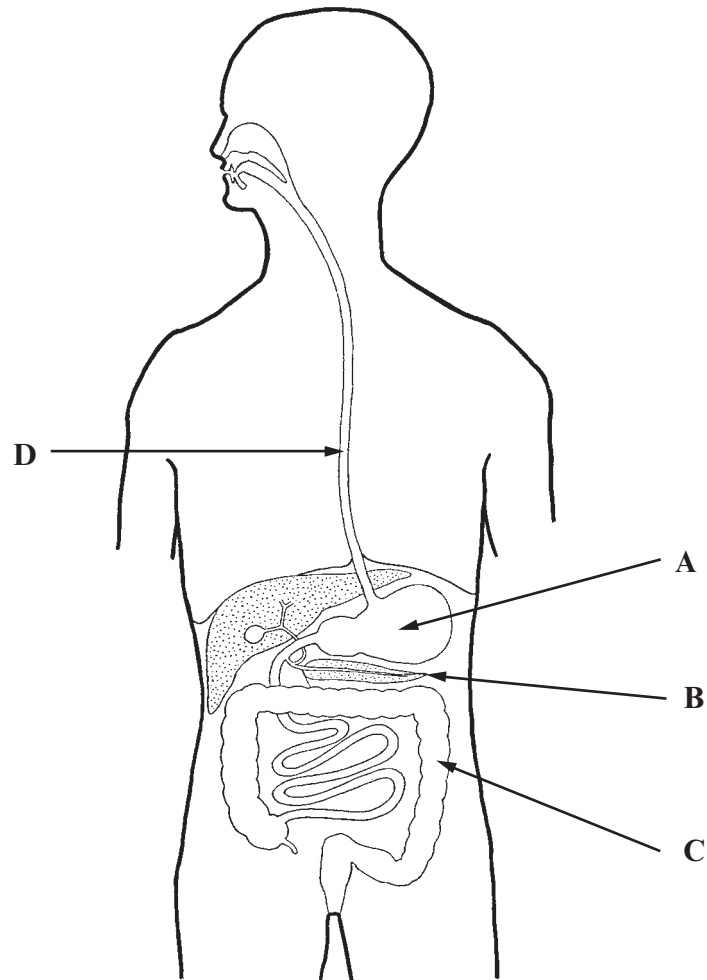
**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Answer **all** questions.

1. The diagram shows the human digestive system.

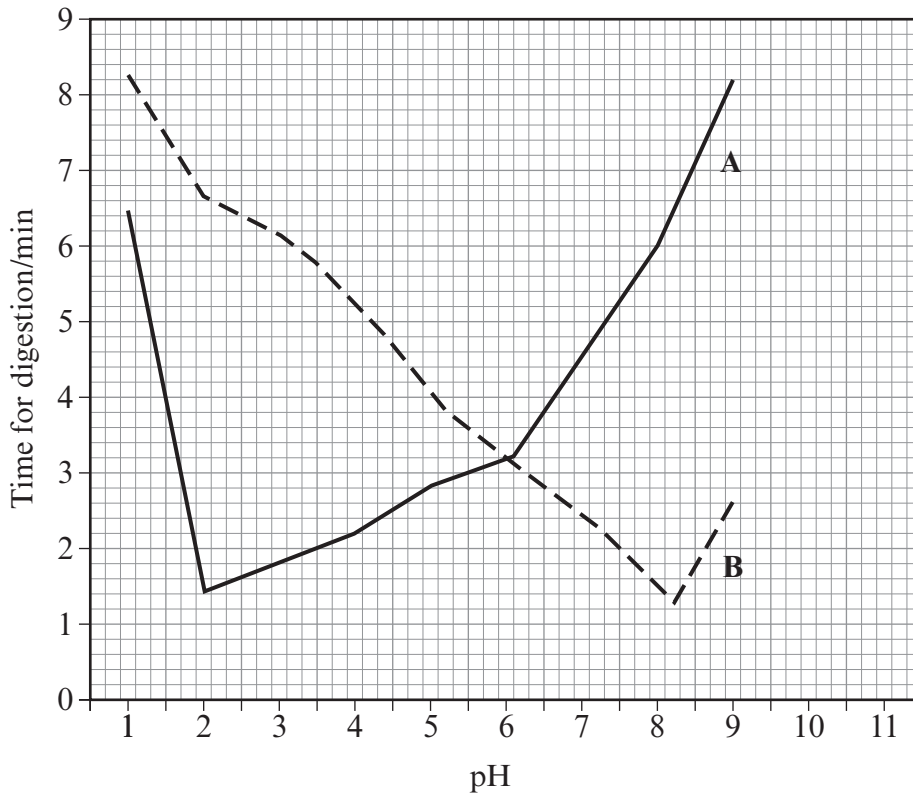


- (a) Name the structures labelled **A** to **D**.

[4]

- A** .....
- B** .....
- C** .....
- D** .....

(b) The graph below shows the result of an investigation into the effect of pH on the action of two digestive enzymes labelled **A** and **B**.



(i) From the graph, state the time taken for the enzyme **B** to complete its digestion at pH 4.5. [1]

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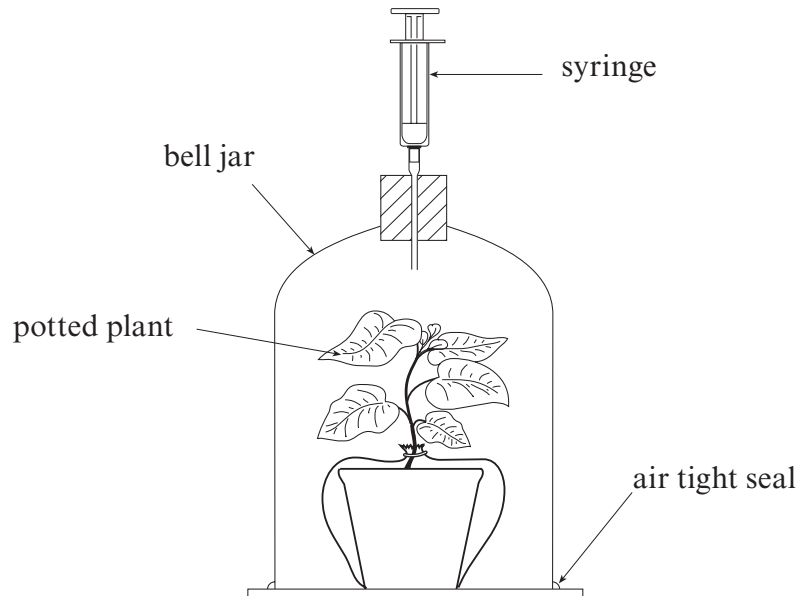
(ii) At what pH is the rate of reaction the same for both enzymes [1]

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(iii) From the graph, describe the effect of pH on the action of enzyme **A**. [2]

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2. The apparatus below was set up as shown and exposed to bright sunlight for 6 hours.



Before and after the exposure to light, samples of air in the bell jar were collected using the syringe.

The samples of air were analysed for carbon dioxide and oxygen content.

- (a) Complete the table below to show whether the percentage of gas in the sample had changed using the words **increased** or **decreased**. [2]

| Gas            | % of gas before exposure to light | After 6 hours of exposure to bright sunlight |
|----------------|-----------------------------------|--|
| Carbon dioxide | 0.03                              |  |
| Oxygen         | 21                                |  |

- (b) Explain your answer to (a). [4]

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- (c) Suggest what could be done to the apparatus to reverse the exchange of gases. [1]

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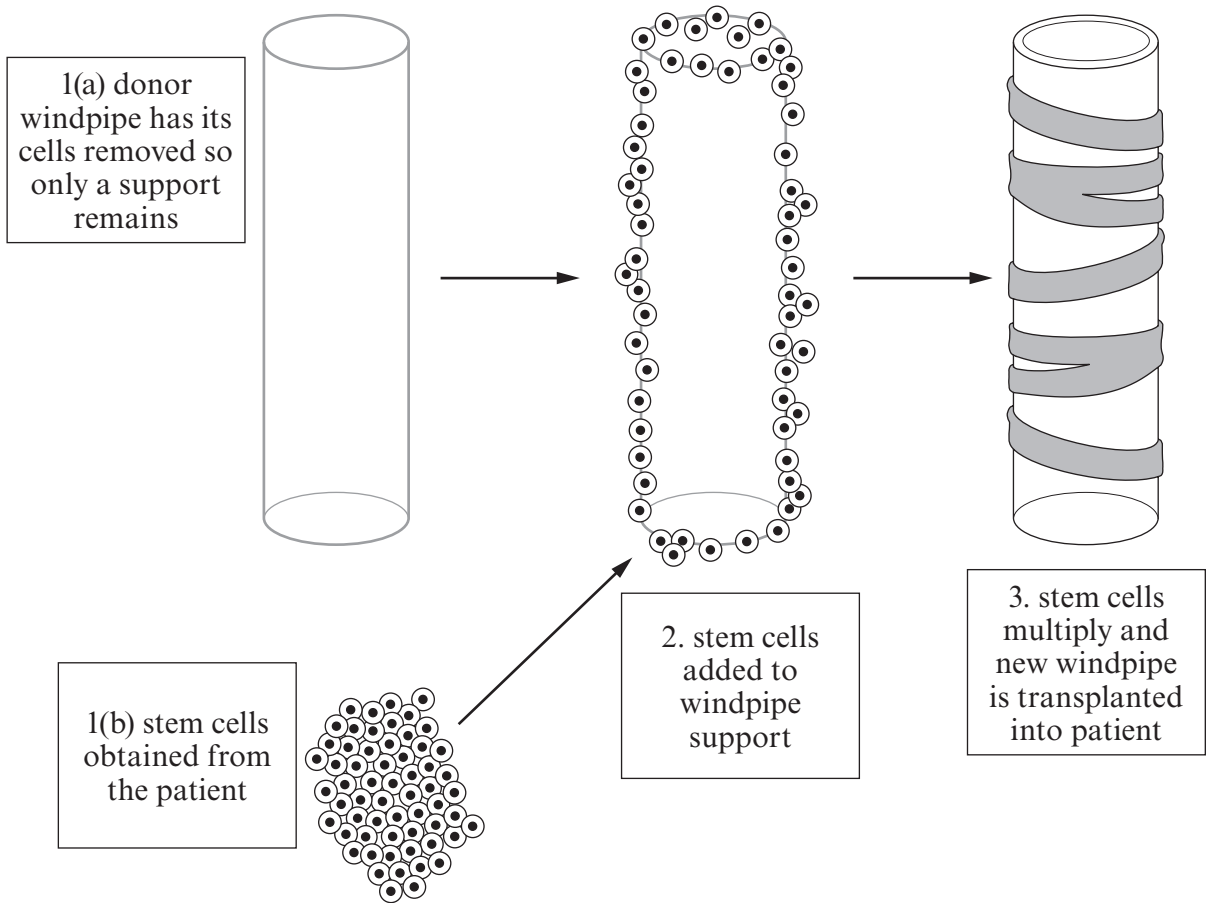
3. (a) What are stem cells?

[2]

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(b) In 2008 scientists carried out the first successful windpipe transplant in humans using the patient's own stem cells.

The process involved the following stages:



State **two** advantages to the patient of using their own stem cells rather than using embryonic stem cells. [2]

(i) .....  
.....  
(ii) .....  
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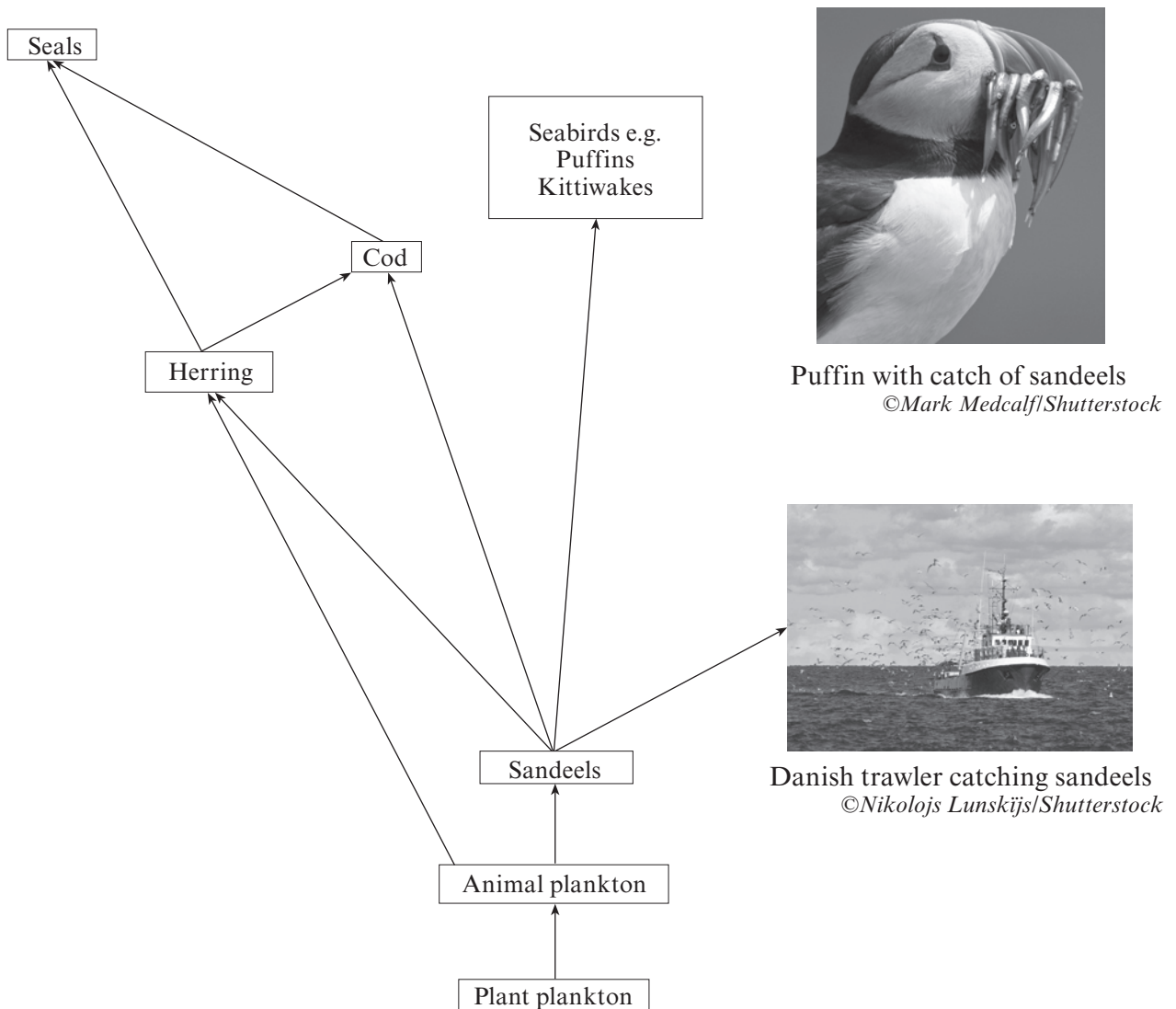
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4. Many of the UK's 4 million seabirds of the North Sea are at risk because there are not enough sandeels for them to feed on.

Here are some key facts about the North Sea;

- herring stocks are increasing after years of decline.
- many of the puffins and kittiwakes are feeding their young on thin, starving sandeels.
- in 2004, only 1 in 5 pairs of kittiwakes reared young successfully.
- there are many trawlers in the North Sea fishing for sandeels. Sandeels are turned into fishmeal which is used to feed livestock and farmed salmon.
- sea surface temperatures have risen by 2°C in the last 25 years. This is causing a decrease in the quantity of plant plankton available.

The diagram below shows a small part of the North Sea food web.



(a) Explain how the increase in the numbers of herring in the North Sea could affect the sandeel population. [3]

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(b) (i) Using the information in the food web and key facts suggest why the North Sea puffin and kittiwake populations are falling dramatically. [3]

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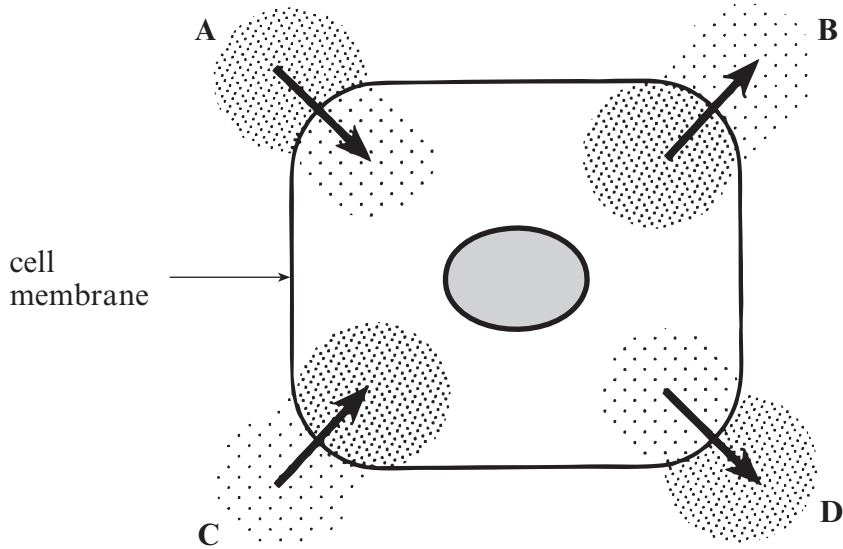
(ii) The UK Government uses the kittiwake as an indicator of the state of the sea. Suggest **one** way the Government could reverse the decline in seabirds. [1]

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5. The diagram shows four ways in which substances may enter and leave a cell in the small intestine. The dots show the concentration of different substances.



Complete the following table to show which arrow represents the movement of oxygen, carbon dioxide and glucose. Name the process involved in the movement of each substance and give the reason for your answer. [9]

| Substance      | Letter | Process | Reason |
|----------------|--------|---------|--------|
| carbon dioxide |        |         |        |
| glucose        |        |         |        |
| oxygen         |        |         |        |

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6. During long-distance running or cycling, chemical changes take place in our bodies. Water is lost and is often replaced by drinking sports drinks.

(a) Sports drinks contain water and about 6% glucose which acts as a fuel for the body.

(i) Name the process which uses oxygen to help release energy from this fuel. [1]

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(ii) Name a chemical produced in this process. [1]

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(b) Long-distance runners may include “carbo-loading” in their training where they eat large amounts of starch-rich food.

Sprinters often eat glucose-rich sweets and drinks just before a race.

Explain why

(i) “carbo-loading” is useful to long distance runners. [1]

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(ii) glucose-rich sweets and drinks are useful to sprinters. [1]

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(c) During exercise a chemical can build up in the muscles causing pain.

(i) State the name of this chemical. [1]

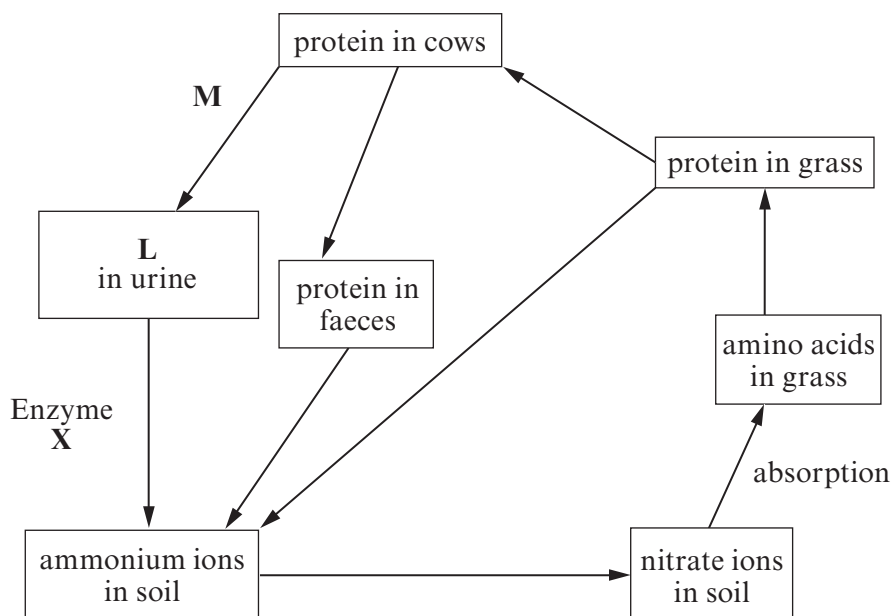
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(ii) Explain why it is formed. [2]

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7. The flow diagram shows part of the nitrogen cycle in a field grazed by cows.



- (a) Name the process **M**.

[1]

**M** .....

- (b) Name the chemical **L** and the enzyme **X**.

[2]

**L** .....

**X** .....

(c) There are internationally recognised areas where the use of chemical fertiliser is restricted. In 2009, the Welsh Assembly Government designated such an area around a lake, Llyn Caron, in Anglesey. This was because the lake had an algal bloom (overgrowth of water plants).

(i) Name a **non-chemical** factor which affects the rate of growth of the algal bloom. [1]

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(ii) Describe and explain the possible effect on the fish in Llyn Caron if the algal bloom was allowed to increase. [4]

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| 8 |

**END OF PAPER**