Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A level

1072/02

HUMAN BIOLOGY – HB2

P.M. MONDAY, 2 June 2014

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**9**	
3.	**6**	
4.	**12**	
5.	**12**	
6.	**9**	
7.	**8**	
8.	**10**	
Total	**70**	

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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.
The quality of written communication will affect the awarding of marks.

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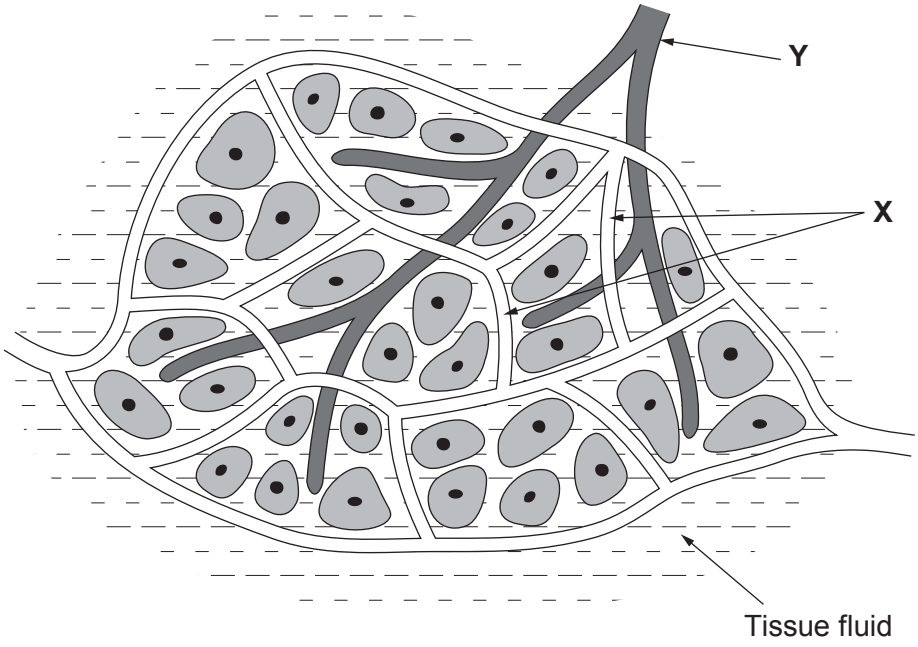
Answer **all** *questions.*

1. The diagram shows two different types of vessel found in the tissues of the human body.



(a) Name the type of blood vessel labelled **X** in the diagram. [1]

.....

(b) Name the fluid found in vessel **Y**. [1]

.....

(c) The movement of water out of the blood vessels into the tissue fluid is caused by high hydrostatic pressure at the arterial end. The reabsorption of most of the water back into the blood at the venous end is due to osmotic pressure.

(i) Name a substance found in the plasma that helps to maintain this osmotic pressure. [1]

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(ii) What name is given to the medical condition caused by a low level of this substance in the blood? [1]

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2. *Ascaris* and *Schistosoma* are endoparasitic worms that cause diseases in humans.

(a) Explain what is meant by the term *endoparasitic*. [1]

.....

.....

(b) Complete the table below to show **two** ways in which Ascariasis is different from Schistosomiasis. [4]

	Ascariasis	Schistosomiasis
Where in the body the parasite is usually found		
Method of entry of the parasite into the human body		

(c) Heavy infections with both *Ascaris* and *Schistosoma* can lead to the infected person developing anaemia but for different reasons.

Suggest how these parasites can cause anaemia in infected people.

Ascaris ..... [2]

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.....

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Schistosoma ..... [2]

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Turn over.

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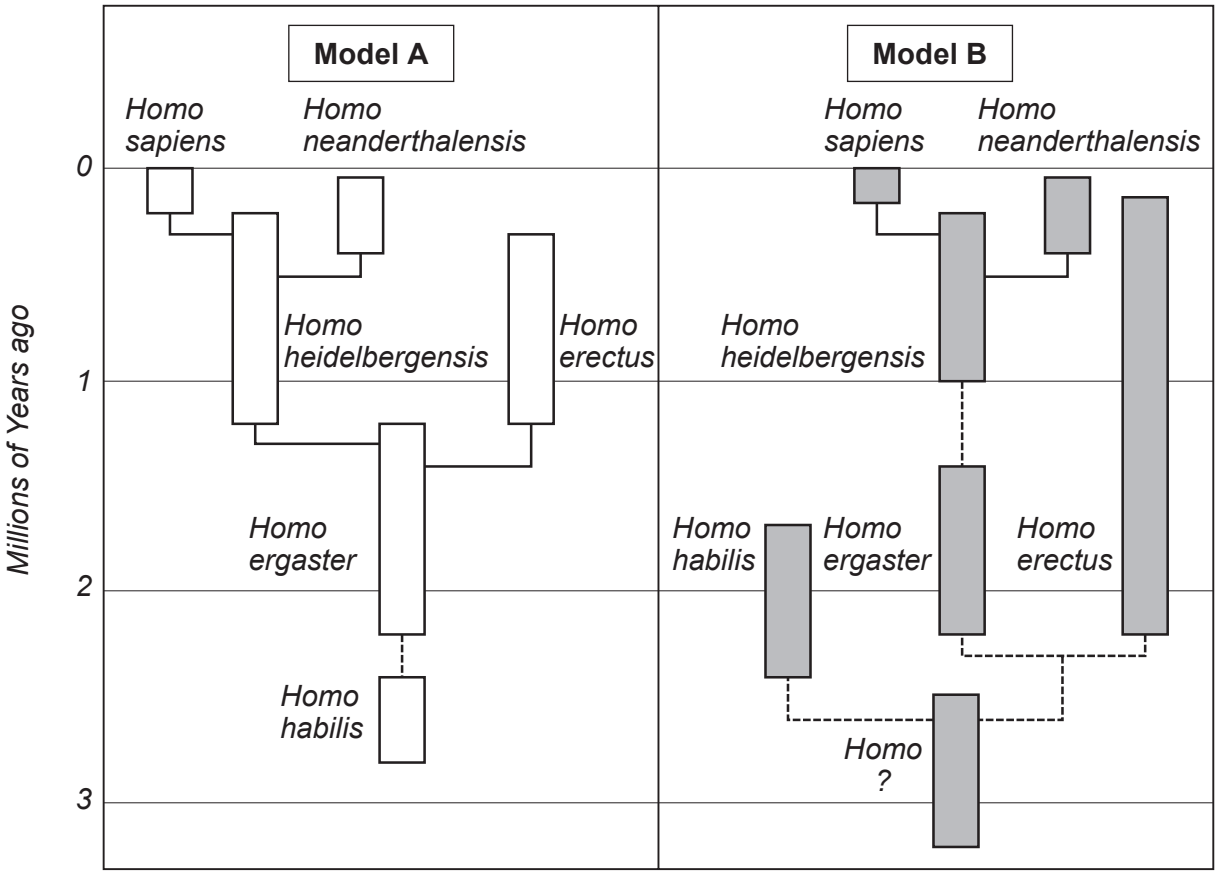
3. *(a)* The diagrams below show two different models of human evolutionary relationships based on different interpretations of the same fossil evidence.



(i) Name the type of diagram used to represent these **evolutionary relationships**. [1]

.....

(ii) Describe **one** similarity and **one** difference in the evolutionary relationships suggested by Model **A** and Model **B**. [2]

Similarity .....

.....

.....

Difference .....

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(iii) Suggest why dotted lines have been used in parts of the diagrams. [1]

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(b) Evidence shows that *Homo sapiens*, *Homo neanderthalensis* and *Homo heidelbergensis* co-existed in Europe for several thousand years and may have interbred.

Suggest how DNA analysis is helping scientists to develop a better understanding of human evolution. [2]

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4. Digestion involves the breaking down of food by a combination of mechanical and chemical processes.

(a) Describe **two** ways in which food is broken down **mechanically** in the human alimentary canal. [2]

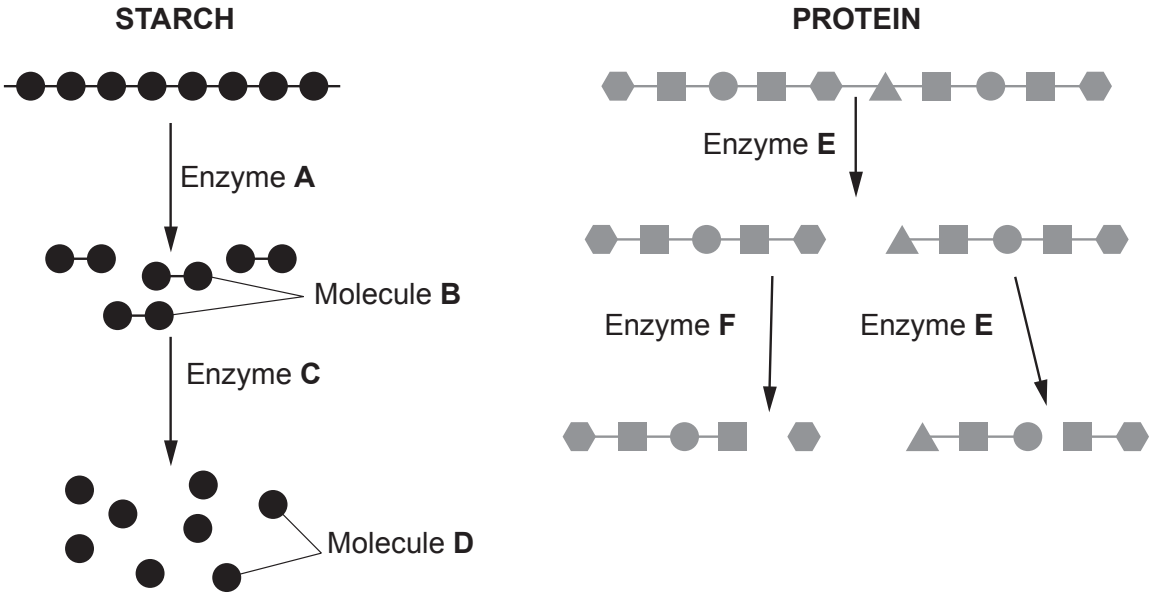
I. .....

.....

II. .....

.....

(b) The diagrams show the digestion of a molecule of starch and a molecule of protein.



(i) In the digestion of starch name:

Enzymes **A** and **C**: [1]

A ..... **C** .....

Molecules **B** and **D**: [1]

B ..... **D** .....

(ii) Name **two** places in the alimentary canal where digestion caused by enzyme **A** takes place. [1]

....

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(c) (i) In the digestion of protein name the **types** of enzyme shown at **E** and **F**. [2]

E .....

F .....

(ii) Pepsin and trypsin are enzymes involved in the digestion of proteins. Both are secreted as inactive precursors. Complete the table to give the names of the substances responsible for their activation. [2]

Enzyme	Name of precursor	Activated by
pepsin	pepsinogen	
trypsin	trypsinogen	

(iii) *Helicobacter pylori* is a species of bacterium that lives in the stomach and digests urea into alkaline ammonia. Ammonia is toxic to epithelial cells lining the gastric pits (glands).

Suggest how infection with *H.pylori* can lead to the development of a peptic ulcer. [3]

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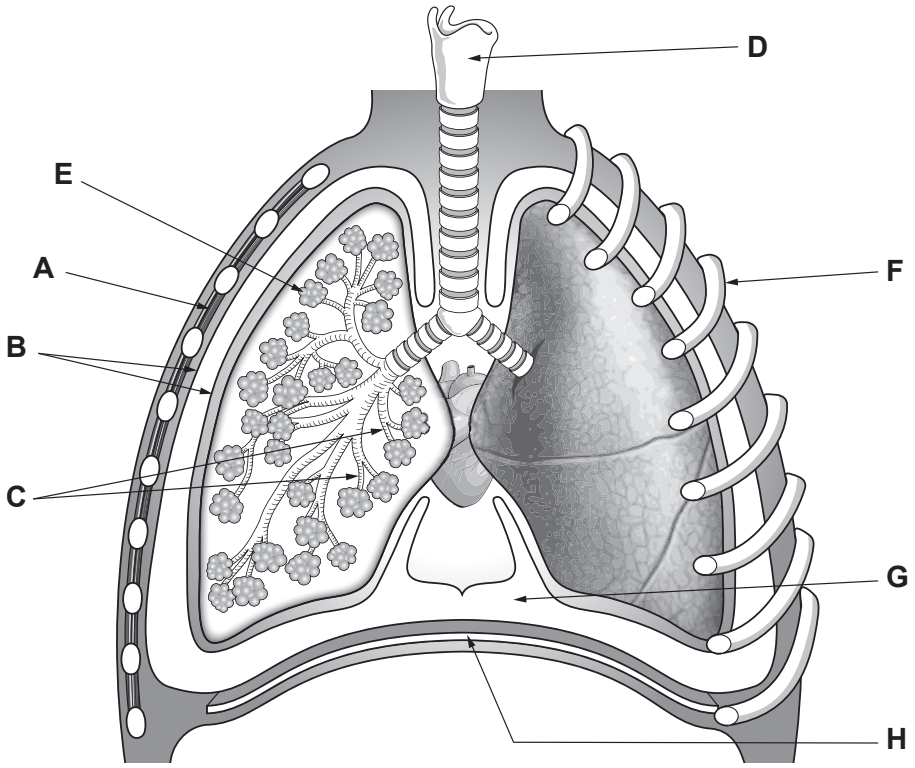
5. The diagram represents the human respiratory system.



(a) Use some of the letters from the diagram to match the structures to the following functions. [3]

Function	Structure
Flattens during inhalation to increase the volume of the thorax	
Become constricted and inflamed during an asthma attack	
Contain a surfactant to reduce surface tension	

(b) The structures labelled **E** have thin walls and are surrounded by an extensive capillary network.

Explain how these adaptations increase the efficiency of gas exchange. [3]

Thin walls .....

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.....

Extensive capillary network .....

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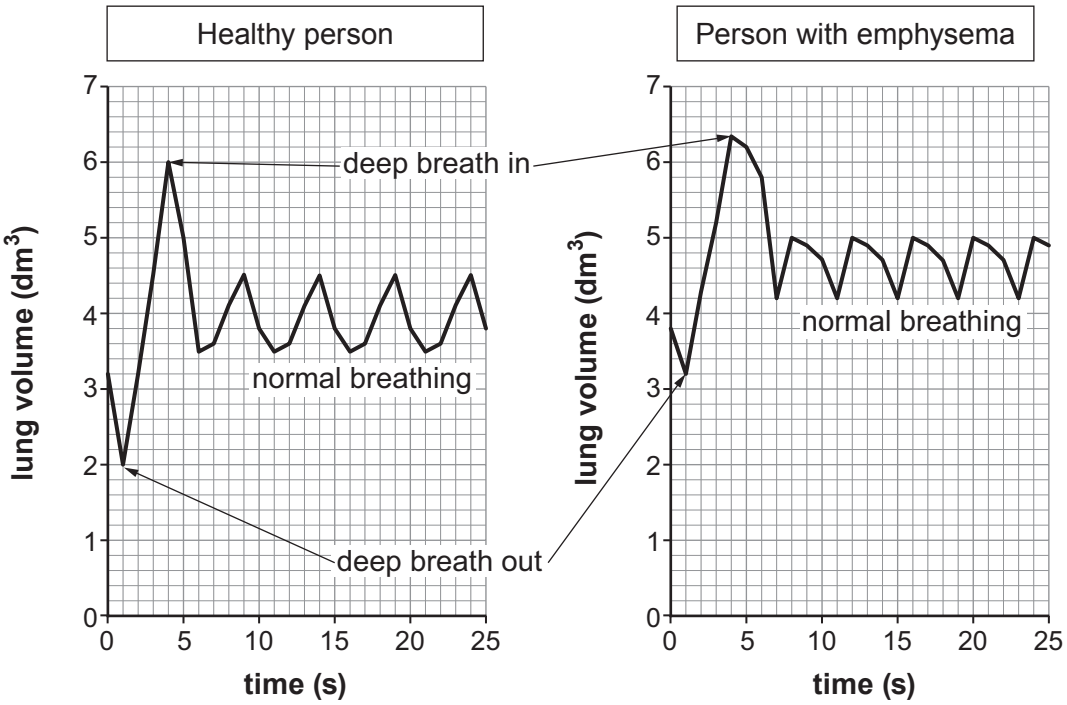
(c) The graphs below show spirometer traces for a healthy person and a person with emphysema over the same time period.



(i) Using data from the graphs, describe how the breathing pattern of a person with emphysema differs from that of a healthy person. [3]

Deep breath out .....

.....

.....

.....

Deep breath in .....

.....

.....

.....

Normal breathing .....

.....

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(ii) Suggest how damage to the lungs caused by emphysema leads to **one** of the differences shown in the graph. [3]

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Turn over.

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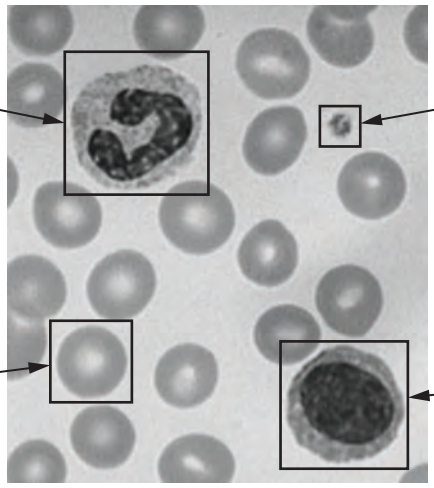
6. The image shows a smear of human blood.



(a) Label the components of blood identified on the image above. [2]

(b) (i) State the main function of the cell labelled **C** in the image. [1]

.....

(ii) Describe and explain **one** adaptation shown by cell **C** that enables it to carry out this function. [2]

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.....

.....

(c) Identification of the antigens present on the cell membranes of these cells is used to place people into different blood groups.

(i) What is meant by the term *antigen*? [2]

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(ii) Explain why it is important to identify a person's blood group correctly before giving that person a blood transfusion. [2]

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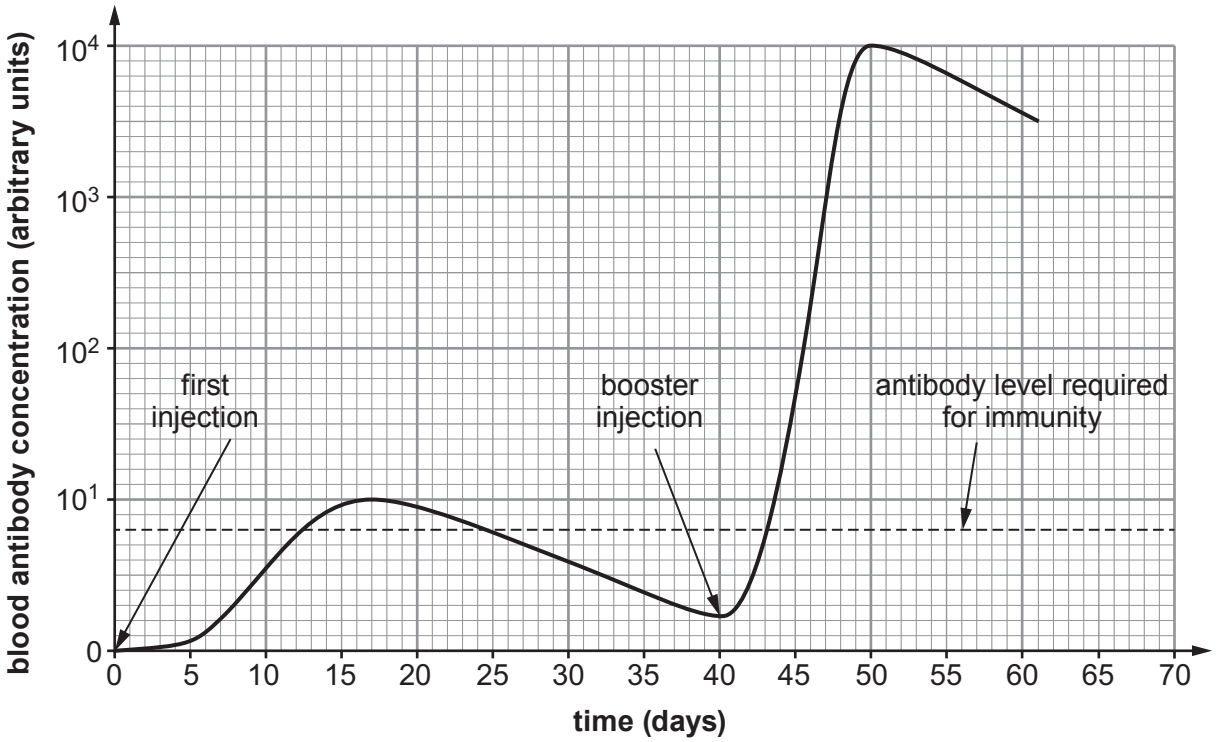
7. The graph shows how blood antibody concentration against *Rubella* changed in a 12 month old child following an injection with *Rubella* antigen at day 0 followed by a booster injection at day 40.



(a) (i) State the time taken to produce the antibody level required for immunity following the first injection with *Rubella* antigen. [1]

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(ii) Explain why the time taken to produce the antibody level required for immunity was much shorter following the booster injection. [2]

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Examiner only

(b) The child, who had not been exposed to measles previously, was given a separate immunisation against the measles virus at Day 40 – the same day that she received the booster injection against *Rubella*.

(i) On the graph opposite, draw a line to show how the blood antibody concentration against **measles** changes from the immunisation at **day 40** to **day 60**. [3]

(ii) Explain why the blood antibody concentration against measles would change in this way. [2]

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8. Answer **one** of the following questions.
Any diagrams included in your answer must be fully annotated.

Either, *(a)* (i) Describe how a single cardiac cycle is controlled in the human heart. [6]

(ii) Explain how an electrocardiogram can be used to diagnose problems in the control of the heartbeat. [4]

Or. *(b)* (i) Describe the different ways in which antibiotics control the growth of bacteria. [6]

(ii) Explain how and why penicillin is more effective against Gram positive bacteria than Gram negative bacteria. [4]

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END OF PAPER

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