Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Level

BIOLOGY **9700/05**

Paper 5 Practical Test A2

May/June 2005

1 hour 30 minutes

Candidates answer on the Question Paper.
Additional Materials: As listed in Instructions to Supervisors

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work that you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **both** questions.
The number of marks is given in brackets [ ] at the end of each question or part question.
You are advised to spend 45 minutes on question 1.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
1	
2	
Total	

This document consists of **7** printed pages and **1** blank page.

SP (MML 8289 4/04) S81909/2

1 You are required to investigate the light-dependent stage in photosynthesis in a leaf extract, using the dye DCPIP. When DCPIP is **reduced**, it changes from a **blue** colour, to **colourless**.

You are required to produce a leaf extract from material provided.

Procedure to make a leaf extract

- Place the piece of fresh leaf, **C1**, on a white tile.
- With a scalpel, carefully remove any large veins and discard them.
- Chop the rest of the leaf into small pieces.
- Place the chopped leaf into a plastic specimen tube.
- Using a syringe or pipette, add 2 cm^3 of cold buffer solution, labelled **C2**, to the specimen tube.
- Add a spatula full of sand, labelled **C3**. Carefully grind the chopped leaf in the specimen tube, using a glass rod for about one minute to obtain a green leaf extract.
- Clean the surface of the white tile with a paper towel.
- Place a Petri dish on the edge of the tile as shown in Fig. 1.1, so that the dish is tilted.
- Pour the leaf extract from the specimen tube into the Petri dish and allow it to drain to the edge of the dish as shown in Fig. 1.1.

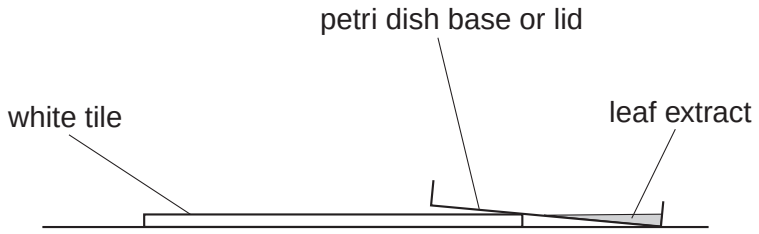

Fig. 1.1

- Completely cover the Petri dish with aluminium foil to shield the contents from light. The foil should be made easy to remove.

  Leave the foil in position except when removing samples.

- Take a capillary tube and stand one end of the tube in the leaf extract. Some of the extract will immediately rise a short distance up the tube. Remove the tube and lay it on the tile as a colour standard. **Label this Tube 1**.
- You are provided with a 1% solution of DCPIP, labelled **C4**. Using a teat pipette, add five drops of **C4** solution to the leaf extract. Tilt the dish to mix the two liquids (or mix with the teat pipette).

  Ensure that the foil cover is replaced.

- Take a second capillary tube and collect some leaf extract / C4 mixture. Immediately replace the foil cover and wrap the tube quickly in aluminium foil to prevent any exposure to light. Lay the tube on the tile.

  Label this Tube 2.

- Take a third capillary tube and collect some leaf extract / C4 mixture. Place the tube near a bench lamp.

  Label this Tube 3.

- Carefully check the colour of the liquid in all of the tubes, every minute, ensuring that the foil on Tube 2, is replaced each time.
- Note the time taken for the dye in Tubes 2 and 3 to be reduced.
- If there is no change in colour after 10 minutes, stop the investigation.

(a) Draw a table to show your results.

[4]

(b) Explain your results in relation to the light-dependent stage of photosynthesis.

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..... [3]

(c) Suggest why **C2** and **C4** were kept in a beaker of ice so that the solutions were cold when they were being used.

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..... [3]

(d) Explain the purpose of using the buffer solution, **C2**.

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..... [1]

(e) The buffer solution also contained some sucrose. Suggest why sucrose was added to the buffer solution.

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..... [1]

(f) Suggest how the investigation could be improved to make the results more reliable.

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..... [3]

[Total : 15]

2 Fig. 2.1 is a photomicrograph of human blood.

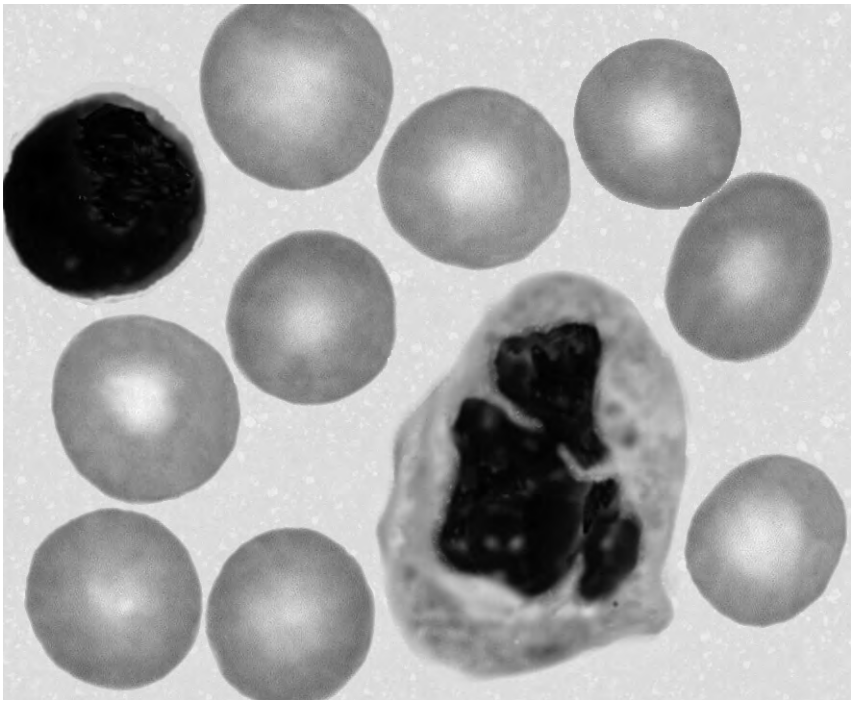

Fig. 2.1

(a) Determine the ratio of red blood cells to white blood cells.

ratio ..... [2]

(b) You are provided with a slide of human blood, labelled **K1**. Choose an appropriate magnification so that you can clearly see both red and white blood cells in your field of view. The white blood cells have been stained blue for easy identification.

(i) Explain why it would be difficult to determine the exact ratio of red blood cells to white cells in slide **K1**.

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..... [2]

(ii) Comment on the ratio of red blood cells to white blood cells when compared with the ratio you determined in **(a)**.

..... [1]

[Turn over

(c) Fig. 2.2 is the same photomicrograph of blood, as is shown in Fig. 2.1.

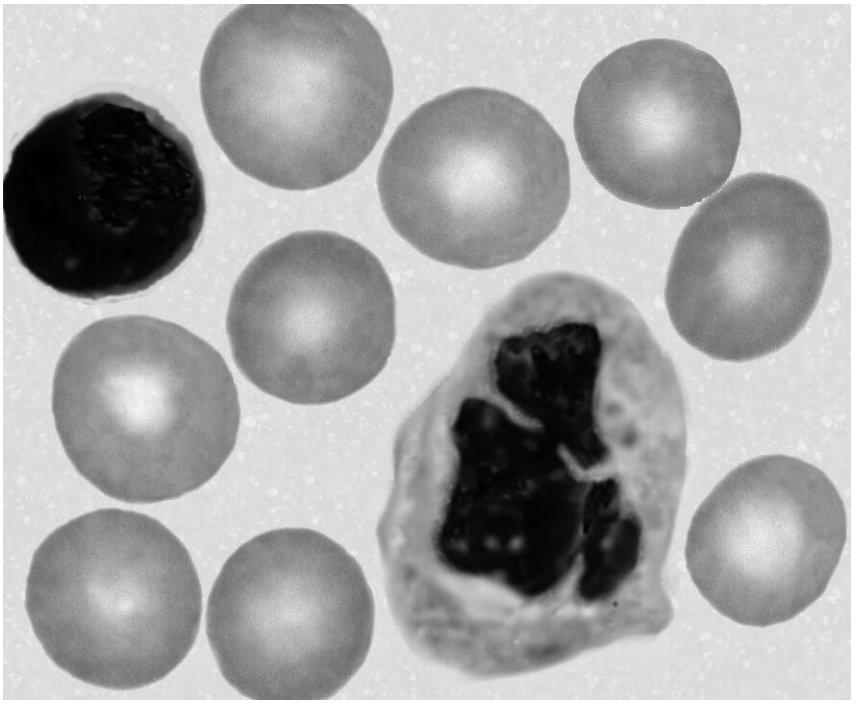

Fig. 2.2

In the spaces below, draw to the same scale, labelled diagrams of:

(i) a red blood cell.

(ii) a phagocyte.

(iii) a lymphocyte.

[8]

(iv) Draw a line, **on Fig. 2.2**, across the lymphocyte.

The actual diameter of a red blood cell is 8 μm.

Use this information to calculate the width of the lymphocyte along the line drawn.

width of lymphocyte ..... [2]

[Total : 15]

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