

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Advanced Subsidiary GCE**

**BIOLOGY**

**2802**

Human Health and Disease

Wednesday

**15 JANUARY 2003**

Afternoon

1 hour

Candidates answer on the question paper.

Additional materials:

Electronic calculator

|                |   |                  |  |  |  |  |  |   |  |  |  |  |  |
|----------------|---|------------------|--|--|--|--|--|---|--|--|--|--|--|
| Candidate Name | Centre Number   | Candidate Number |  |  |  |  |  |   |  |  |  |  |  |
|                | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table> |                  |  |  |  |  |  | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table> |  |  |  |  |  |
|                |   |                  |  |  |  |  |  |   |  |  |  |  |  |
|                |   |                  |  |  |  |  |  |   |  |  |  |  |  |

**TIME** 1 hour

**INSTRUCTIONS TO CANDIDATES**

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces on the question paper.
- Read each question carefully before starting your answer.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

| <b>FOR EXAMINER'S USE</b> |             |             |
|---------------------------|-------------|-------------|
| <b>Qu.</b>                | <b>Max.</b> | <b>Mark</b> |
| <b>1</b>                  | <b>4</b>    |             |
| <b>2</b>                  | <b>9</b>    |             |
| <b>3</b>                  | <b>9</b>    |             |
| <b>4</b>                  | <b>13</b>   |             |
| <b>5</b>                  | <b>13</b>   |             |
| <b>6</b>                  | <b>12</b>   |             |
| <b>TOTAL</b>              | <b>60</b>   |             |

**This question paper consists of 12 printed pages.**

Answer **all** the questions.

1 (a) (i) State the term given to any form of exercise that makes use of the gas exchange system and the cardiovascular system to supply oxygen to the muscles.

..... [1]

(ii) Name the end product of anaerobic respiration in muscle tissue.

..... [1]

(b) (i) Name the organ where T lymphocytes mature.

..... [1]

(ii) State the term given to any otherwise harmless substance or material, such as pollen, that stimulates an unnecessary immune response, for example hay fever.

..... [1]

[Total: 4]

2 Fig. 2.1 shows a section of lung tissue.

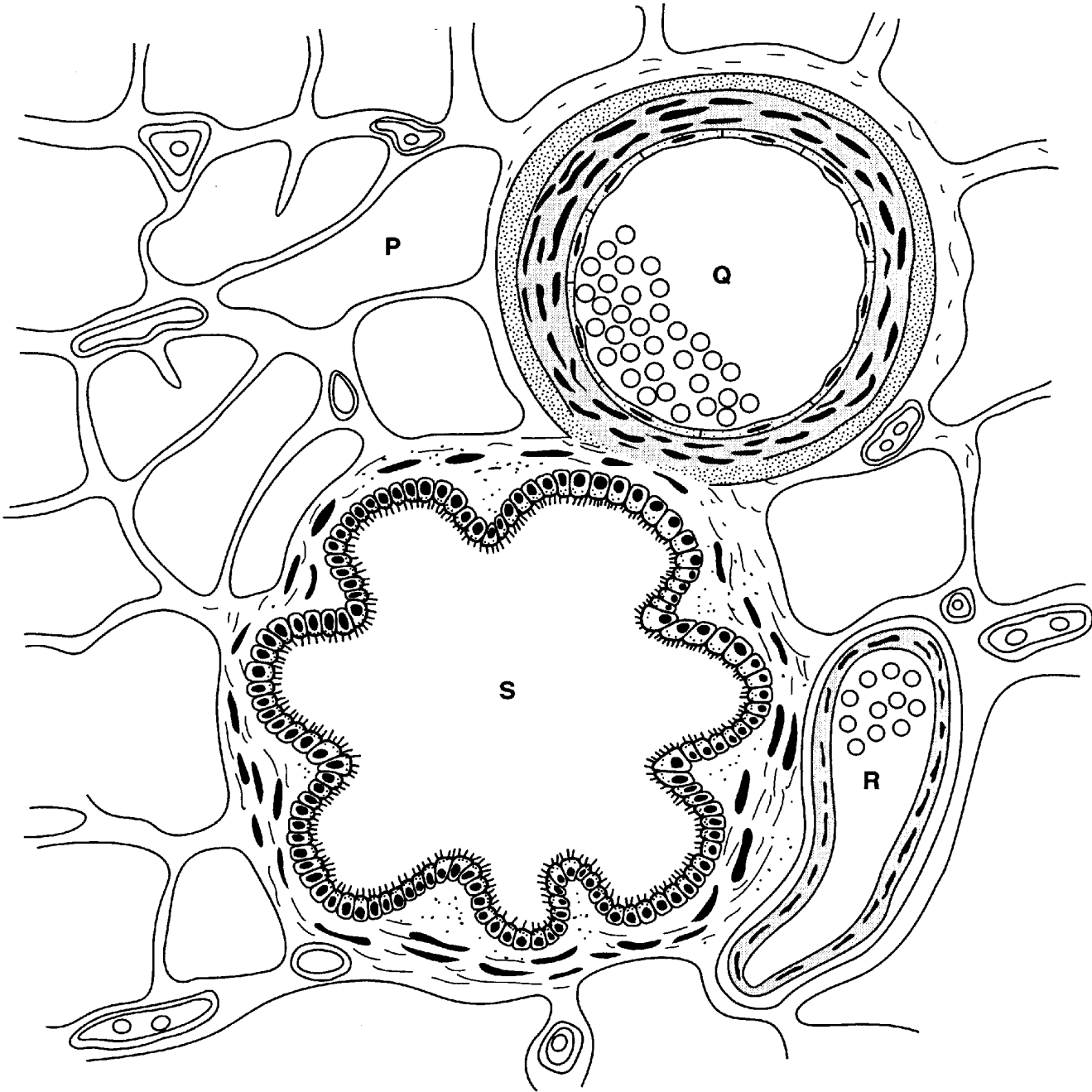


Fig. 2.1

(a) The letters P to S in Fig. 2.1 are in the centres of four different structures. Name these structures.

P .....

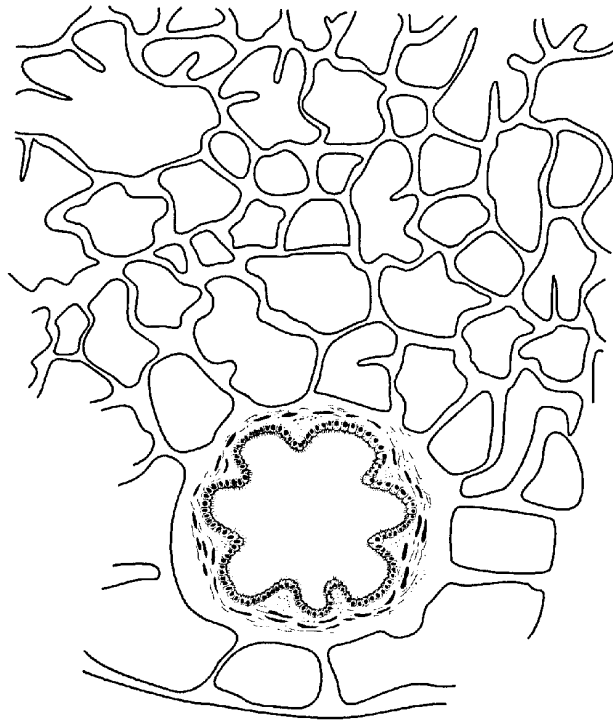
Q .....

R .....

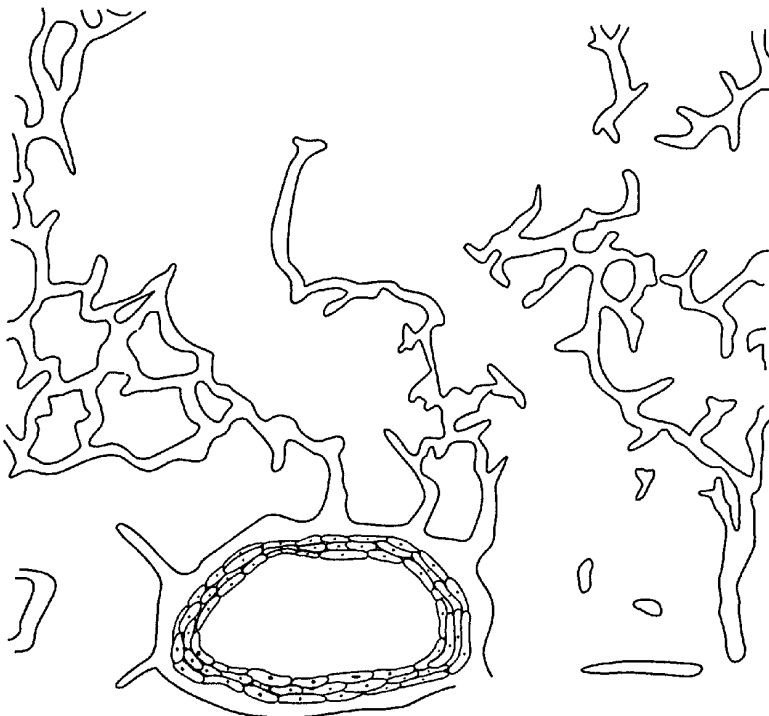
S .....[4]

Fig. 2.2 shows sections of lung tissue at lower magnification than in Fig. 2.1.

- **A** is from a non-smoker
- **B** is from a smoker who suffers from emphysema



**Fig. 2.2 A**



**Fig. 2.2 B**

(b) Describe how the lung tissue in Fig. 2.2 B differs from the lung tissue in Fig. 2.2 A.

Your answer should refer only to features visible in these drawings.

.....  
.....  
.....  
.....[2]

(c) Explain why people with emphysema have difficulty in forcing air out of their lungs when they breathe out.

.....  
.....  
.....  
.....[2]

(d) Describe **one** piece of epidemiological evidence that would suggest a link between emphysema and the smoking of cigarettes.

.....  
.....[1]

[Total: 9]

3 (a) Complete the following passage about aspects of nutrition.

Certain specific nutrients are required in the human diet. This is because they cannot be manufactured from other compounds by human cells. There are twenty different amino acids needed to synthesise ..... . Eight or nine amino acids must be present in the diet and these are called ..... amino acids.

Vitamins are also required in the diet. Rod cells in the eye use vitamin ..... to make the pigment, rhodopsin. A deficiency of this vitamin can lead to several different conditions.

One example is called ..... [4]

(b) Suggest why people who have *anorexia nervosa* are at risk of developing fragile bones.

.....  
.....  
.....[2]

(c) Explain how a woman's diet should change when she is breast-feeding her child.

.....  
.....  
.....  
.....  
.....  
.....[3]

[Total: 9]

4 Cholera is spread mainly by contaminated water and food. In areas where it is endemic it is mainly a disease of young children, although infants who are breast-fed are rarely affected.

In 1970, cholera spread to West Africa, which had not experienced the disease for more than 100 years. The disease spread quickly and eventually became endemic in most of Africa.

(a) (i) Name the organism that causes cholera.

.....[1]

(ii) Explain how cholera is transmitted from one person to another through the water supply.

.....  
.....  
.....  
.....[3]

(iii) Define the term *endemic*.

.....  
.....[1]

(iv) Suggest why infants who are breast-fed are rarely affected by cholera.

.....  
.....  
.....[2]

(b) Describe **three** public health measures that can be taken to control the spread of cholera.

1 .....  
.....  
2 .....  
.....  
3 .....  
..... [3]

(c) Explain why malaria does not show the same worldwide distribution as cholera.

.....

.....

.....

.....[3]

[Total: 13]



- 5 Table 5.1 shows deaths from lung cancer, coronary heart disease (CHD) and stroke in the UK in 1997.

**Table 5.1**

| disease     | deaths of men |          |                                     | deaths of women |          |                                     |
|-------------|---------------|----------|-------------------------------------|-----------------|----------|-------------------------------------|
|             | all ages      | under 75 | deaths under 75<br>as % of all ages | all ages        | under 75 | deaths under 75<br>as % of all ages |
| lung cancer | 22 021        | 12 822   | .....                               | 13 234          | 7 387    | 56                                  |
| CHD         | 76 490        | 38 105   | 50                                  | 64 069          | 16 090   | 25                                  |
| stroke      | 24 898        | 8 415    | 34                                  | 41 502          | 7 249    | 17                                  |

- (a) (i) Complete Table 5.1 by calculating the percentage of deaths from lung cancer that occur among men under the age of 75.

**Express your answer to the nearest whole number.** [1]

- (ii) State **one** other piece of information that is required to assess how important these diseases are as causes of death in the UK.

.....  
.....[1]

- (iii) 'Cardiovascular diseases, such as CHD and stroke, shorten the lives of men more than they do the lives of women.'

Explain whether the data in Table 5.1 support this statement.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

(b) In this question, one mark is available for the quality of written communication.

Smoking is a significant contributory factor to the development of cardiovascular diseases.

Explain how the constituents of cigarette smoke cause cardiovascular diseases, such as coronary heart disease (CHD) and stroke.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

Quality of Written Communication [1]

[Total: 13]

- 6 Diphtheria is an acute infectious disease that affects the trachea and bronchi and sometimes the skin. The bacterium that causes diphtheria releases a toxin that affects nervous tissues and the heart. The disease is spread by droplet infection.

The World Health Organisation (WHO) collects statistics on infectious diseases, such as diphtheria. Fig. 6.1 shows the number of reported cases of diphtheria worldwide between 1980 and 2000.

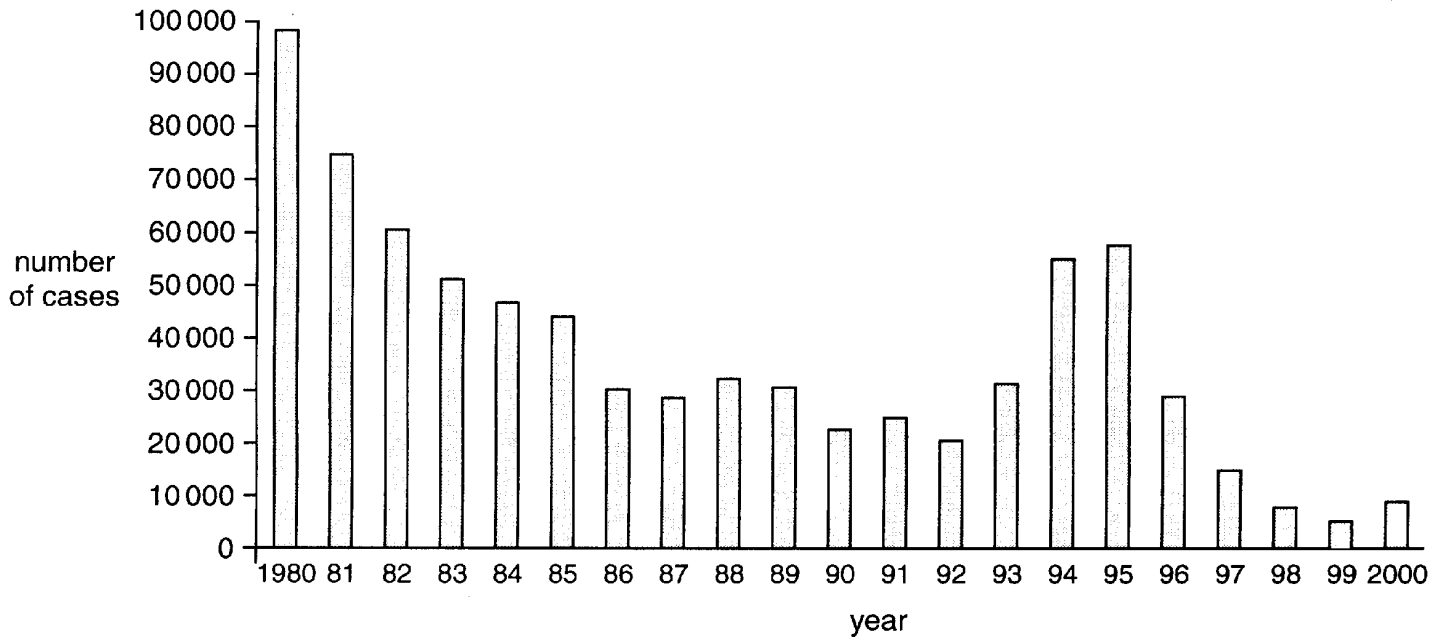


Fig. 6.1

- (a) Describe the trends in the number of reported cases of diphtheria between 1980 and 2000.

Credit will be given if you use figures to illustrate your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....[3]

(b) Explain why the WHO collects statistics for major infectious diseases, such as diphtheria.

.....  
.....  
.....  
.....  
.....[3]

(c) In 1940, the number of reported cases of diphtheria in England and Wales was 42 281, with 2 480 deaths. A vaccine was introduced to give protection against diphtheria in that year. The number of reported cases in England and Wales is now very small indeed.

Explain how vaccination has reduced the number of cases of infectious diseases, such as diphtheria.

.....  
.....  
.....  
.....  
.....  
.....[3]

(d) Antibiotics, such as penicillin, are chemical substances used in the treatment of infectious diseases.

Explain why the widespread use of antibiotics may be considered to be undesirable.

.....  
.....  
.....  
.....  
.....[3]

[Total: 12]

Copyright Acknowledgements:

- Question 5 Table 5.1 from 'Coronary Heart Disease Statistics', p. 14, table 1.2, published by the British Heart Foundation, September 1999 (ISBN 1-899088-35-0).
- Question 6 Graph from World Health Organisation web site: [www.who.int/vaccines-surveillance/graphics/htmls/IncDiph.htm](http://www.who.int/vaccines-surveillance/graphics/htmls/IncDiph.htm)

OCR has made every effort to trace the copyright holders of items used in this Question paper, but if we have inadvertently overlooked any, we apologise.