

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Advanced GCE**

**BIOLOGY**

**2805/05**

**Mammalian Physiology and Behaviour**

Thursday

**20 JUNE 2002**

Afternoon

1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate Name

Centre Number

Candidate  
Number

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**TIME** 1 hour 30 minutes

**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 stages in any calculations.

<b>FOR EXAMINER'S USE</b>		
<b>Qu.</b>	<b>Max.</b>	<b>Mark</b>
<b>1</b>	<b>13</b>	
<b>2</b>	<b>16</b>	
<b>3</b>	<b>17</b>	
<b>4</b>	<b>17</b>	
<b>5</b>	<b>15</b>	
<b>6</b>	<b>12</b>	
<b>TOTAL</b>	<b>90</b>	

Answer **all** questions.

1 (a) Name the structure in the mammalian eye that is referred to in each of the following statements:

(i) This layer contains much dark pigment to minimise light scattering within the eye and is rich in blood vessels.

.....[1]

(ii) When this part of the eye contracts, the lens becomes more spherical.

.....[1]

(iii) Nerve fibres of retinal neurones converge here to form the optic nerve.

.....[1]

(iv) Its circular and radial fibres control the amount of light that reaches the retina.

.....[1]

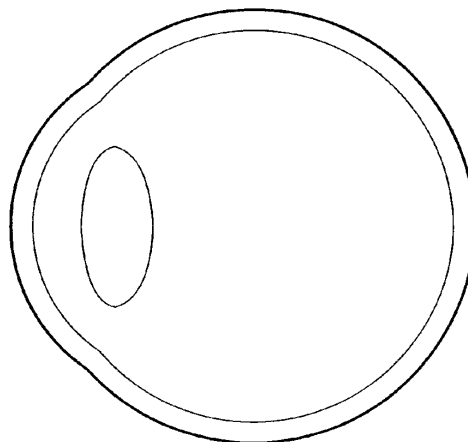
(v) This part of the eye has a high concentration of tough, collagen fibres and helps maintain the shape of the eyeball.

.....[1]

(vi) This region is often described as 'the area of most acute vision' as it is sensitive to detail.

.....[1]

Fig 1.1 shows a simplified section through the eyeball.



**Fig. 1.1**

(b) Draw light ray diagrams on Fig. 1.1 and annotate the figure to show what is meant by *inversion of the image*. [3]

Photoreceptor cells in the retina are known as rods and cones.

(c) State **four** ways, **other than shape**, in which **rod** cells differ from cone cells.

- 1. ....  
.....
  - 2. ....  
.....
  - 3. ....  
.....
  - 4. ....  
.....
- .....[4]

[Total : 13]

- 2 (a) (i) State **two** ions that are essential for the formation of inorganic bone tissue.  
 ..... [1]
- (ii) Name the material that comprises most of the organic matrix of bone.  
 ..... [1]

Fig. 2.1 shows a section of compact bone as seen using a light microscope.

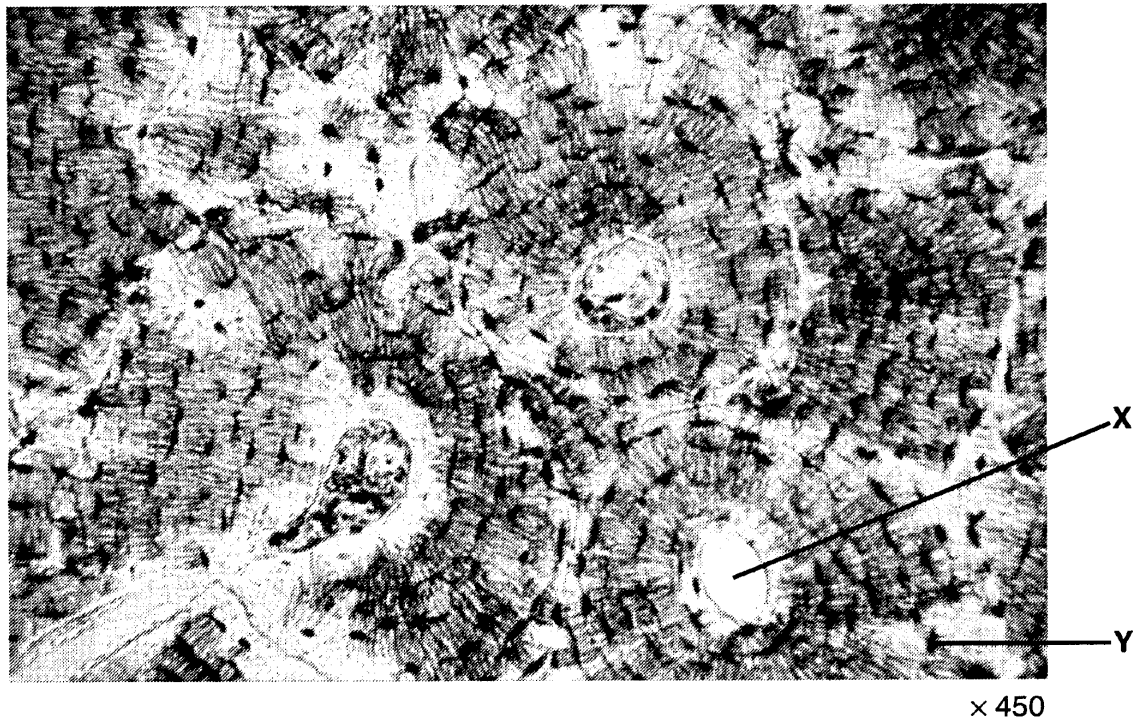


Fig. 2.1

- (b) Name X and Y.  
 X .....  
 Y ..... [2]

Compact bone is a living tissue.

- (c) Suggest the role of X in compact bone.  
 .....  
 .....  
 .....  
 ..... [3]

(d) State **two** ways in which hyaline cartilage differs from bone.

- 1. ....  
.....
- 2. ....  
.....[2]

As a person ages, *osteoporosis* may occur in the bones. 'Senescent osteoporosis' may result in hip fractures. This occurs more commonly in women than in men.

(e) Describe what takes place in the limb when osteoporosis occurs and explain its possible causes.

- .....
- .....
- .....
- .....
- .....
- .....
- .....
- .....
- .....
- .....
- .....
- .....[5]

(f) Suggest why women are more likely than men to suffer bone fractures in old age.

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

[Total : 16]

3 Fig. 3.1 shows the teeth and lower jaws of two mammals, a carnivore and a ruminant.

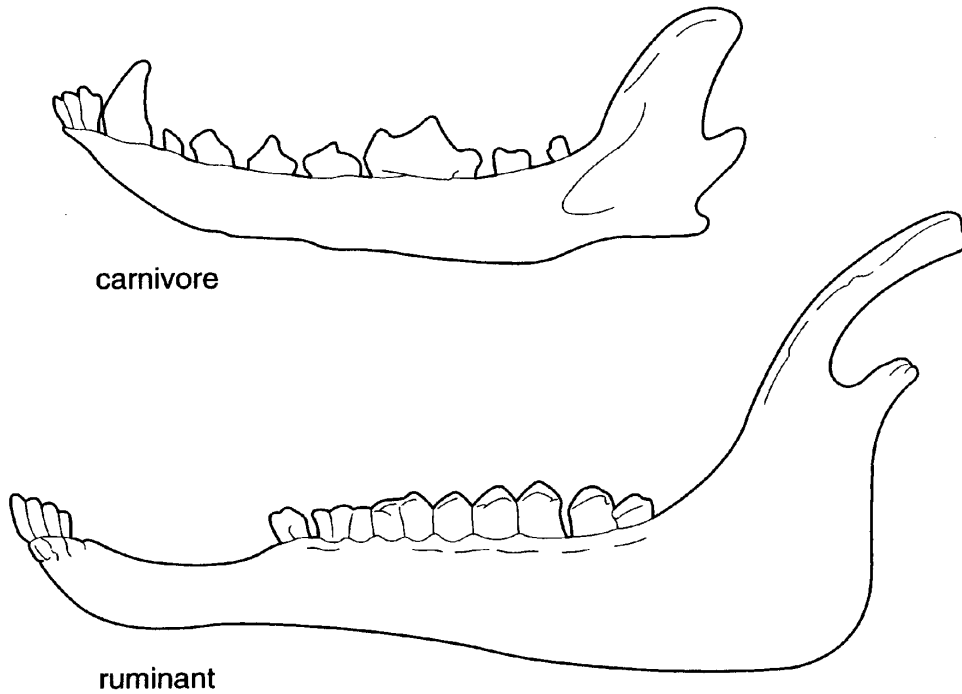


Fig. 3.1

(a) With reference to Fig. 3.1,

(i) state **three** visible features that are characteristic of carnivores;

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

(ii) describe how the teeth and jaw of a ruminant are specialised for its diet.

.....

.....

.....

.....

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.....







4 (a) Explain clearly, giving **one** example of each, what is meant by the following terms:

(i) *reflex action*

example .....

explanation .....

.....

.....

.....

.....

[3]

(ii) *conditioned reflex*

example .....

explanation .....

.....

.....

.....

.....

[3]

To enable the human heart to respond appropriately to changing demands, its action is regulated by antagonistic nerve pathways.

Fig. 4.1 illustrates a mechanism for the control of heart rate by the autonomic nervous system.

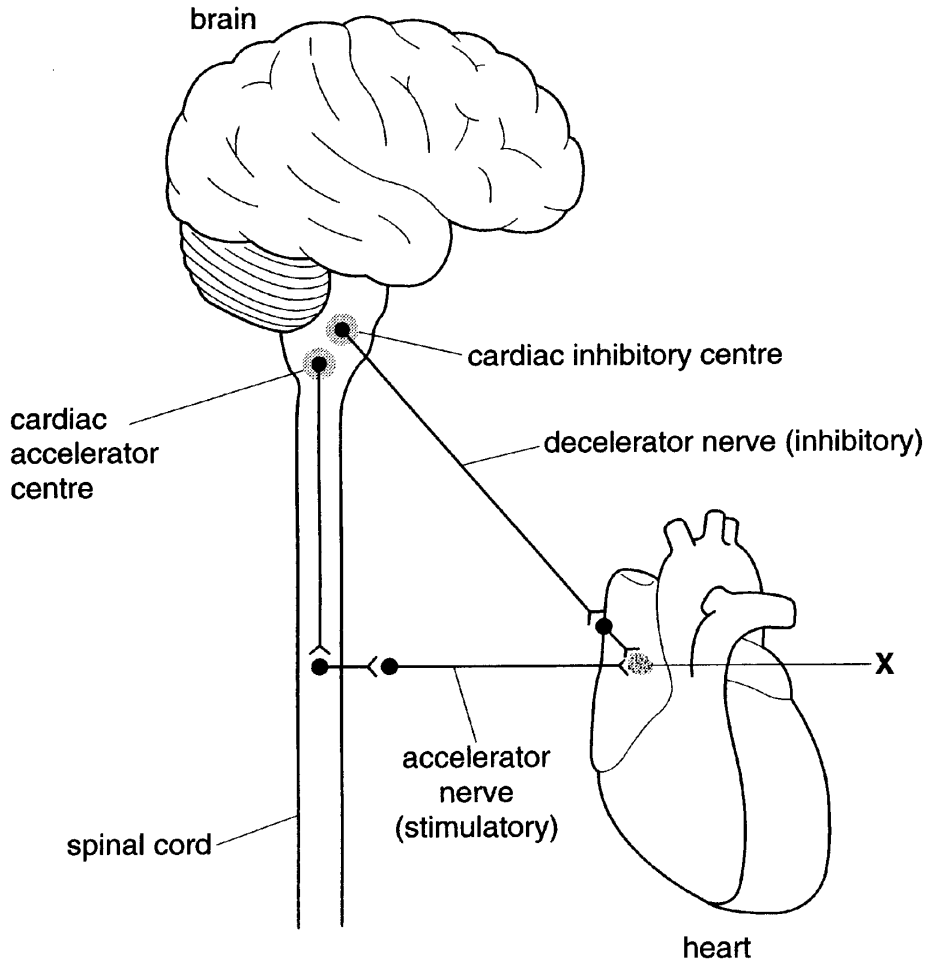


Fig. 4.1

(b) With reference to Fig. 4.1,

(i) State the part of the brain in which the cardiac inhibitory centre is found;

.....[1]

(ii) State the name and function of the tissue labelled X.

name .....

function .....

.....[2]

(c) The heart rate increases during exercise and gradually returns to the resting rate after exercise has stopped.

Describe how the autonomic nervous system controls the heart rate during and after exercise.

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[7]

(d) State what would happen to the heart if the autonomic nerve supply was cut.

.....  
.....

[1]

[Total : 17]

5 Fig. 5.1 is an outline of an important biochemical process performed by the mammalian liver.

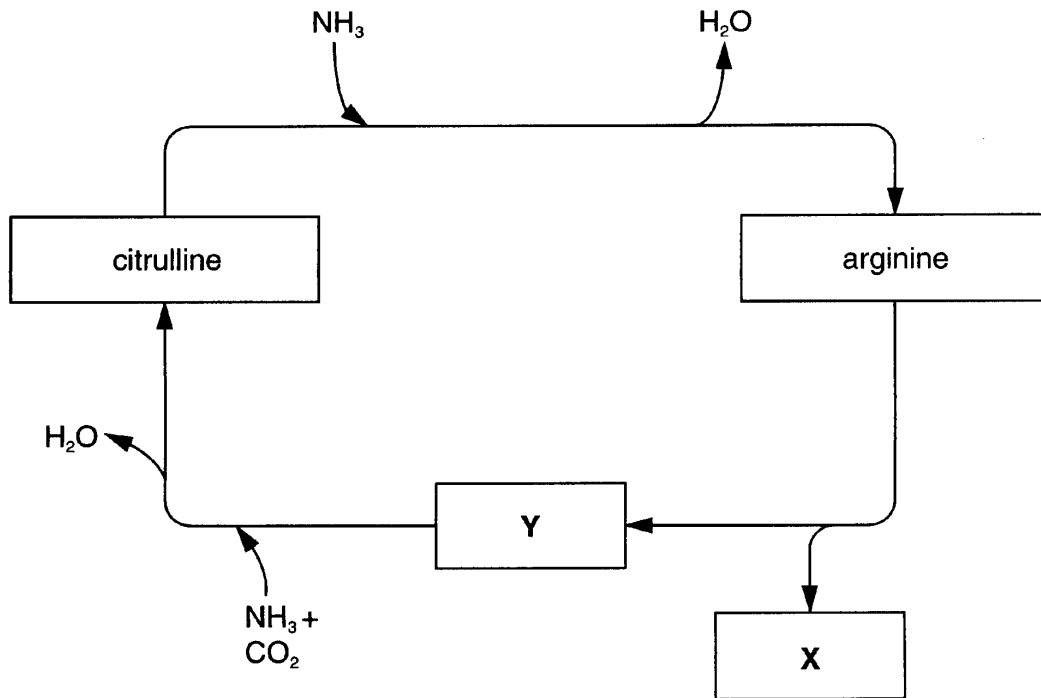


Fig. 5.1

(a) With reference to Fig. 5.1,

(i) name X and Y;

X .....

Y .....

[2]

(ii) outline the role of this process in the mammal;

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

(iii) state the name given to this process.

..... [1]



6 Fig. 6.1 shows a neuromuscular junction.

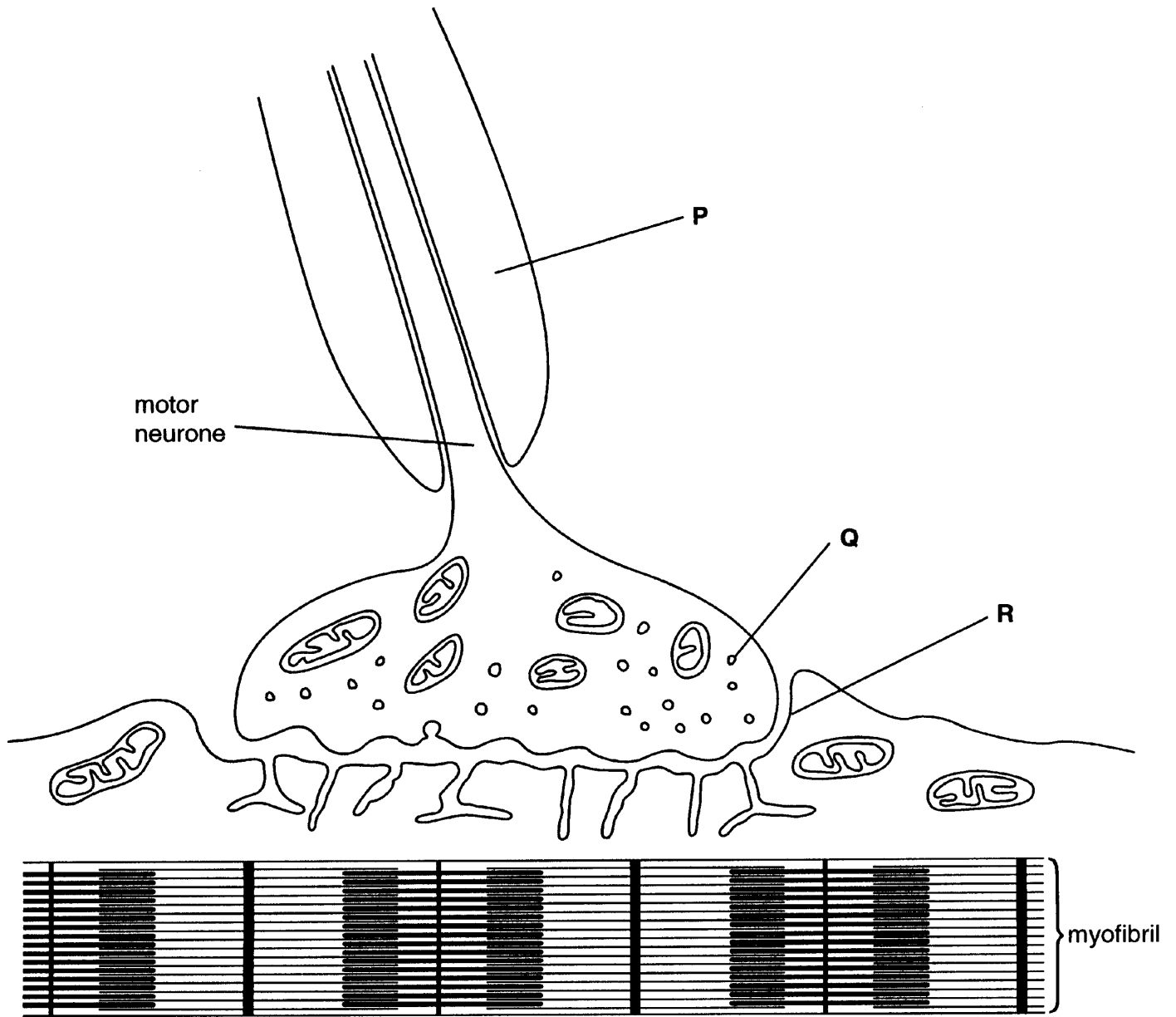


Fig. 6.1

(a) Name structures P to R.

P .....

Q .....

R .....[3]



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*Copyright Acknowledgement:*

Fig. 2.1 Photograph of compact bone kindly supplied by Philip Harris Education, Leics.

Fig. 4.1 Diagram from 'Physiology and Anatomy' by Clancy and McVicar, p. 213, published by Edward Arnold (ISBN 0340-6319-2).

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