

Unit 2 questions: The variety of living organisms

1 Natural woodlands, which once covered 80% of Britain, are stable ecosystems with high levels of diversity. These natural woodlands were dominated by a range of species, such as oak and ash, which lose their leaves in winter. Much of today's woodland consists of evergreen conifer plantations. Conifers are grown for timber. They are planted close together in straight lines. The trees are usually of the same age and the same species.

(a) Explain why the diversity of animals is higher in natural woodland than in conifer plantations. (4 marks)

(b) The conifers used in plantations are the result of a long period of selection for desirable characteristics. Explain how a programme of selection might affect the variety of alleles in a population. (4 marks)

AQA, 2006

2 (a) Yarrow is a herbaceous plant which grows in California at altitudes from 1500 m to 3000 m. The mean height of the stems of plants growing at 3000 m is smaller than that of plants growing at 1500 m. The higher the altitude, the lower the mean temperature. Explain how the lower temperature at high altitude reduces the growth of plants. (4 marks)

(b) The relative contribution of environmental and genetic factors on the growth of the plants was investigated. Samples of young plants were taken and grown outdoors in prepared plots at altitudes of 1500 m and 3000 m.

Altitude at which young plants were collected / m	Mean maximum height of stems of plants / cm	
	Grown at 1500 m	Grown at 3000 m
1500	80.4	35.3
3000	31.5	24.7

Describe the evidence from the table that the variation in height is:

- (i) partly genetically determined;
- (ii) partly environmentally determined.

(2 marks)

AQA, 2006

3 **Figure 1** shows part of a DNA molecule in the process of replication.

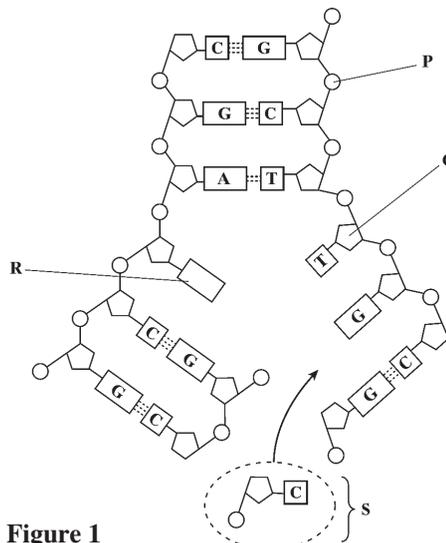


Figure 1

- (a) Name parts P, Q,R and S. (4 marks)
- (b) Which enzyme joins part S to the new DNA strand? (1 mark)
- (c) During which stage of the cell cycle does DNA replication occur? (1 mark)

AQA, 2003

- 4 **Figure 2** shows the life cycle of a fungus. In favourable environmental conditions the fungus reproduces asexually but, when conditions worsen, sexual reproduction occurs. The advantage of sexual reproduction is that it introduces variation.

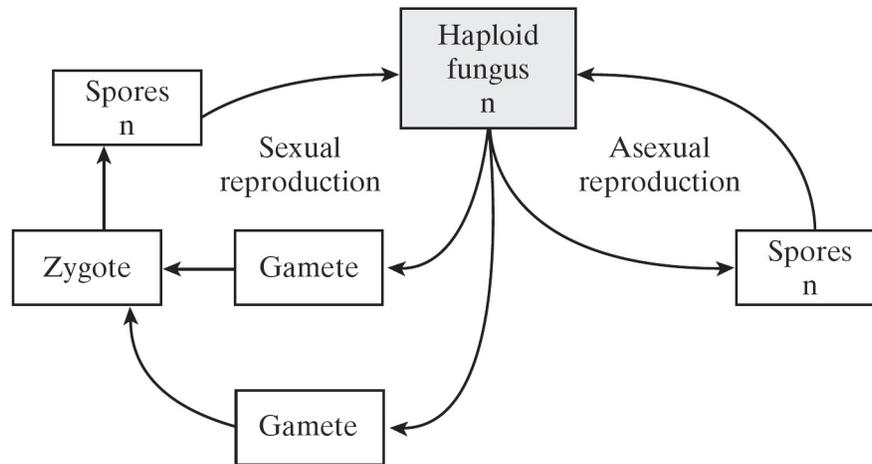


Figure 2

- (a) On a copy of the diagram, mark with an X where meiosis occurs. (1 mark)
- (b) Give **two** ways in which meiosis produces variation. (2 marks)
- (c) Suggest **one** advantage of sexual reproduction being stimulated by worsening environmental conditions (1 mark)

AQA, 2003

- 5 (a) Describe how water is moved through a plant according to the cohesion–tension hypothesis. (4 marks)
- (b) The mass of water lost from a plant was investigated. The same plant was used in every treatment and the plant was subjected to identical environmental conditions. In some treatments, the leaves were coated with a type of grease. This grease provides a waterproof barrier. The results of the investigation are given in the table.

Treatment	Mass lost in 5 days / g
No grease applied	10.0
Grease applied only to the upper surface of every leaf	8.7
Grease applied to both surfaces of every leaf	0.1

- (i) What is the advantage of using the same plant in every treatment?
 - (ii) Why was it important to keep the environmental conditions constant?
 - (iii) What is the evidence that the grease provides a waterproof barrier? (3 marks)
- (c) (i) Calculate the mass of water lost in 5 days through the upper surface of the leaves. (3 marks)
- (ii) Use your knowledge of leaf structure to explain why less water is lost through the upper surface of leaves than is lost through the lower surface.

AQA, 2005

6 **Figure 3** shows some cells from the tissues in a root.

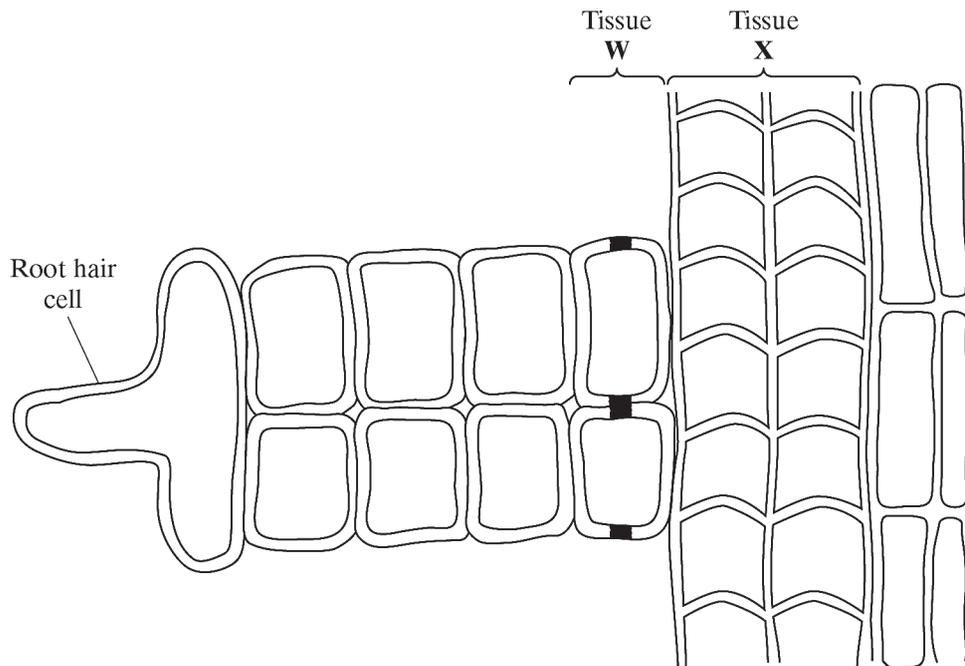


Figure 3

- (a) Name the tissues labelled W and X. (2 marks)
- (b) Explain why water moves from the apoplast pathway to the symplast pathway when it reaches the tissue labelled W. (2 marks)

AQA, 2005

- 7 (a) Explain how blood capillaries are adapted for their function of gas exchange. (4 marks)
- (b) Describe how haemoglobin is involved in absorbing oxygen in the lungs and transporting it to respiring tissues. (6 marks)

AQA, 2003

- 8 (a) Describe **three** features of all members of the animal kingdom which are absent from all members of the plant kingdom. (3 marks)
- (b) *Ensatina eschscholtzi* is a species of salamander, a type of amphibian. Copy and complete the table to show the classification of this salamander.

Taxonomic group	Name
Kingdom	Animalia
	Chordata
	Amphibia
	Urodela
	Plethodontidae
Genus	
Species	

(2 marks)

- (c) In California there are different types of *Ensatina eschscholtzi*, each with a characteristic appearance and found in its own area. They are sufficiently different from each other to be classified as subspecies. These may become new species with time.

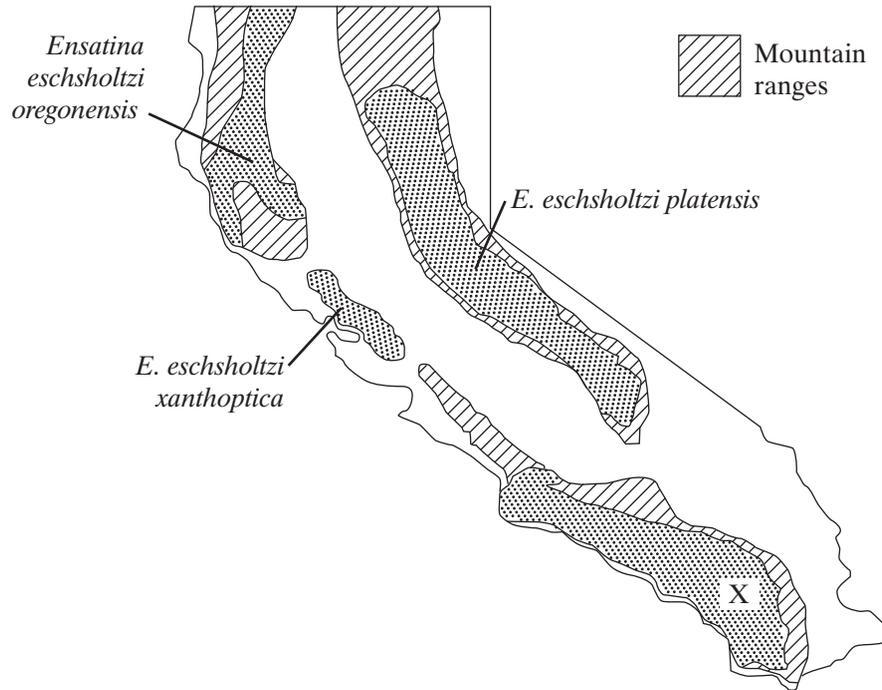


Figure 4

- (i) Suggest **one** way in which scientists could find out whether the salamanders from the area marked X were a different species from those found in other areas.
- (ii) Within each subspecies there is a range of types. Explain the factors that give rise to this variation.

(6 marks)

AQA, 2003

- 9 (a) In a hospital laboratory, a sterile Petri dish of nutrient agar was inoculated with bacteria from a patient with a throat infection. Three discs, each of which had been soaked in a different antibiotic, were placed on top of the bacteria. The dish was incubated at 37°C. **Figure 5** shows the appearance of the dish after incubation.

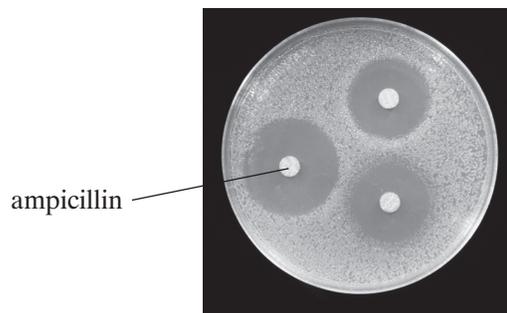


Figure 5

Explain why there are clear zones around some of the discs containing antibiotic. (2 marks)

- (b) It was suggested that ampicillin might be the best antibiotic to treat the patient's throat infection. Give the evidence from the laboratory test to support this suggestion.

(1 mark)

AQA, 2005

- 10 Some antibiotics bind with specific receptors in the cell-surface membranes of bacteria. The structure of these receptors is determined genetically. Bacteria can become resistant to an antibiotic because a gene mutation results in an altered receptor. Explain how resistance to an antibiotic could become widespread in a bacterial population following a gene mutation conferring resistance in just one bacterium.

(5 marks)

AQA, 2005