

Biodiversity

Question Paper 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Biodiversity, classification and conservation
Sub Topic	Biodiversity
Booklet	Theory
Paper Type	Question Paper 2

Time Allowed : 70 minutes

Score : / 58

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

- 1 Sarawak is an area of south-east Asia that is largely covered by tropical rainforest. Logging has been allowed in large parts of the forest. A study was carried out to estimate the population size of different species of mammals living in the rainforest:
- before logging
 - immediately after logging
 - two years after logging
 - four years after logging.

Table 8.1 shows the results of the study for six species of mammal. Where numbers were too small to measure the population density, the species were recorded as “present”.

Table 8.1

mammal	mean number of animals km ⁻²			
	before logging	immediately after logging	two years after logging	four years after logging
marbled cat	present	0	0	0
small-clawed otter	present	0	0	0
giant squirrel	5		4	1
treeshrew	10	5	10	38
small squirrel	16	24	104	19
barking deer	3	1	10	present

- (a) Calculate the percentage rise in the small squirrel population from before logging to two years after logging.

Show your working.

answer % [2]

- (b)** Suggest why populations, such as that of the small squirrel, do not increase in size indefinitely.

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..... [4]

- (c)** Suggest why marbled cats and small-clawed otters became extinct in this area but the other mammals did not.

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..... [2]

[Total: 8]

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A series of horizontal dotted lines for writing, spanning the width of the page.

- 3 The slime mould, *Dictyostelium discoideum*, is a eukaryote and a decomposer of protein-rich material.

Fig. 5.1 shows the life cycle of *D. discoideum*.

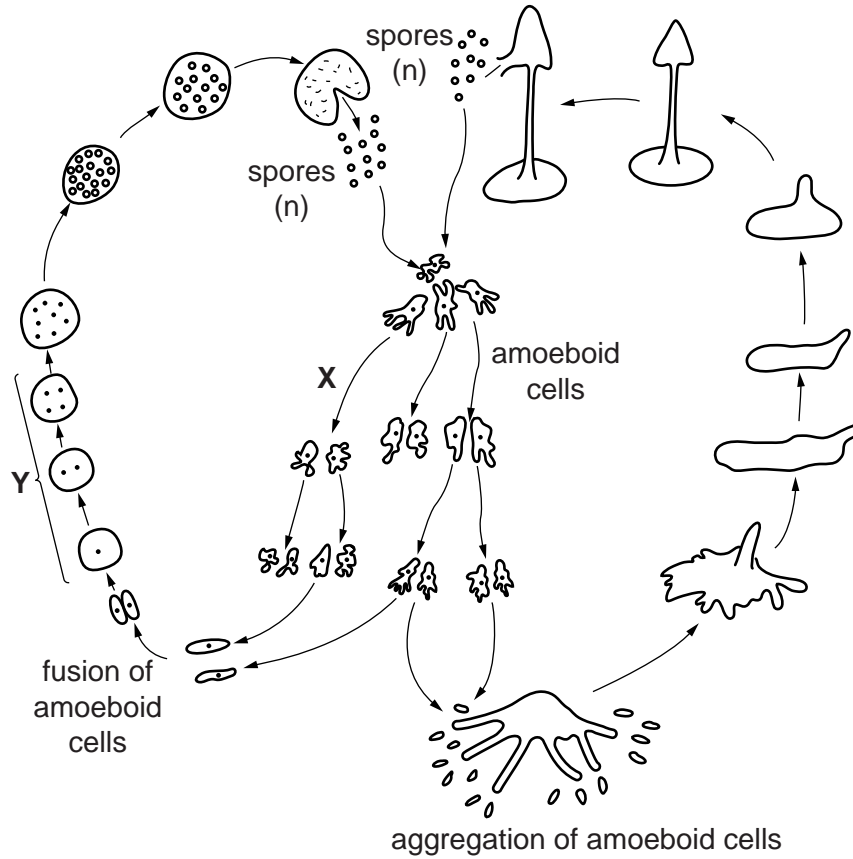


Fig. 5.1

- (a) State the type of nuclear division that occurs at X and at Y.

X

Y [1]

- (b) State what is meant by the term *reduction division* and explain why this division is necessary in a life cycle, such as that shown in Fig. 5.1.

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..... [2]

- (c) The amoeboid cells of *D. discoideum* feed on protein-rich material and break it down to form ammonium ions (NH_4^+). The cell membranes of *D. discoideum* have transporter proteins that are responsible for the excretion of ammonium ions.

Describe what happens to the ammonium ions excreted by *D. discoideum* into the soil.

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- (d) Suggest why a transporter protein is required for the removal of ammonium ions from *D. discoideum*.

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[Total: 8]

4 Microorganisms play an important role in the cycling of nitrogen in ecosystems.

Fig. 6.1 is a diagram of a nitrogen cycle.

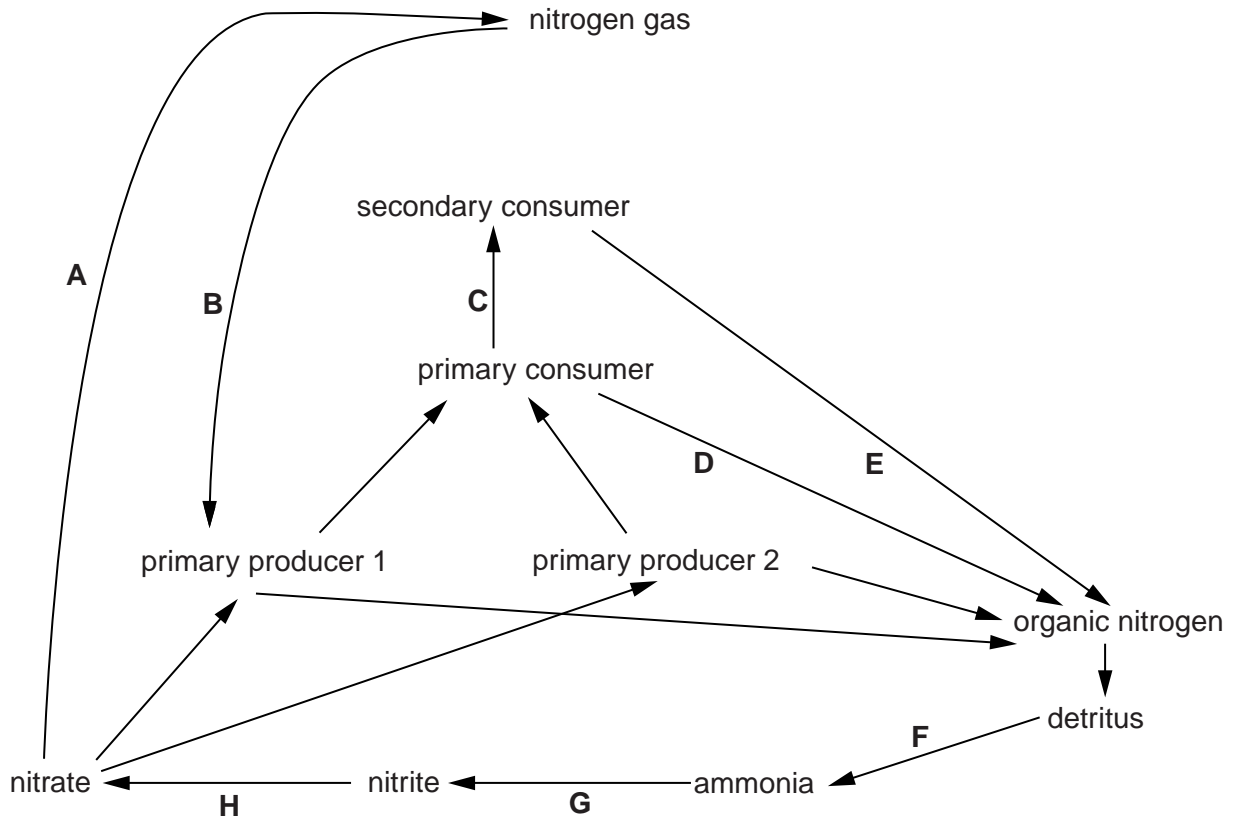


Fig. 6.1

(a) Read the information below about four different species of soil bacteria. In the box provided, write the appropriate letter that matches each microorganism to its corresponding stage in the nitrogen cycle in Fig. 6.1.

- *Nitrosomonas europaea* is an ammonia-oxidising bacterium.
- *Bacillus cereus* is a denitrifying bacterium.
- *Azospirillum lipoferum* lives in the roots of some cereals and grasses and supplies fixed nitrogen to plants.
- *Streptomyces coelicolor* is a bacterium that secretes powerful hydrolases to break down compounds such as proteins and cellulose.

[4]

- (b) Some fungi form beneficial associations with plant roots. They enable the plant to increase the uptake of nutrients, such as phosphates, which are not readily available to the plants from the soil.

Suggest how increasing phosphate ion uptake will lead to increased plant growth.

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[Total: 7]

5 Read the following passage.

Catfish are a commercially important species of freshwater fish used as a human food source. In the wild, catfish are found in all types of large freshwater habitats, such as rivers, lakes and reservoirs. In North America, they are often maintained in catfish ponds, which are artificially constructed habitats. Each pond functions as a self-sustaining ecosystem with its own community of organisms. Catfish feed on living and dead fish, amphibians, insects and even dead mammals found on the bottom of the pond. Different species of phytoplankton are always present in these ponds. They are small organisms found suspended in the water and they are essential for the growth of all the other pond organisms.

(a) With reference to the passage:

(i) state the meaning of the terms *habitat* and *community*

habitat

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community

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..... [4]

(ii) name the producer in the pond ecosystem

..... [1]

(iii) describe the features of producers.

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(b) Studies on the energy efficiency of raising catfish in ponds have shown that only 15–20% of the energy taken in by the catfish population in their food is used to increase their total biomass.

(i) Explain why only some of the energy taken in by the catfish is used to increase biomass.

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(ii) In the wild, only about 10% of the energy taken in by the catfish in their food is used to increase biomass.

Suggest why this percentage is lower in the wild than in the pond.

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..... [1]

[Total: 12]

- 6 The greenish warbler, *Phylloscopus trochiloides*, is a species of small bird that originated in northern India, on the southern edge of the Himalayan mountain range.

Fig. 1.1 shows a greenish warbler.



Fig. 1.1

Thousands of years ago, populations of the greenish warbler spread around the western and eastern edges of the Himalayan mountain range to establish themselves in north-eastern Europe and Siberia.

- A gradual change in characteristics occurred in these populations, leading to different forms of the greenish warbler.
- One example of gradual change is in the song of the male warbler, which is very distinctive and is used in mating behaviour.
- When greenish warblers from north-eastern Europe meet those from Siberia no mating takes place.
- The greenish warblers from north-eastern Europe and Siberia are now considered to be two separate species.

Fig. 1.2 shows the spread of the greenish warbler.

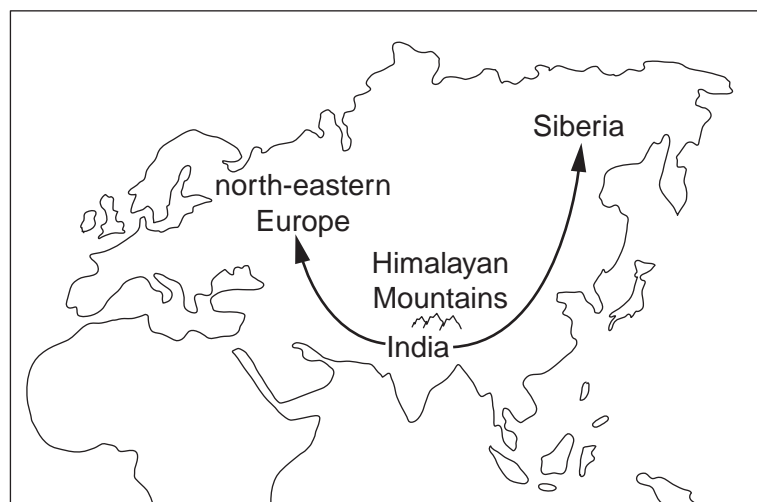


Fig. 1.2

(a) Explain what is meant by the term *species*.

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..... [2]

(b) State the likely isolating mechanism taking place in populations of the greenish warbler.

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(c) Explain how the process of speciation occurred in the greenish warbler populations.

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[Total: 8]