1. Nov/2022/Paper_41/No.1

The wild Bactrian camel, *Camelus ferus*, lives only in the desert regions of Mongolia and northern China.

Fig. 1.1 shows a wild Bactrian camel.

Fig. 1.1

(a) The wild Bactrian camel is at risk of extinction in the wild and is categorised as critically endangered by the International Union for Conservation of Nature (IUCN). There are only 950 wild Bactrian camels left in their natural habitat.

Suggest reasons why the wild Bactrian camel has become critically endangered.

Loss of habitat caused by human activities.
Competition with invasive species
Hunting and poaching by humans
Diseases

[2]

(b) Outline the role of the IUCN.

- It influences governments' polices in favour of the conservation of threatened species.
- It gives advice on biodiversity and conservation of species.
- They update a Red list of endangered species.
- It educates the public on the benefits of the conservation of threatened species.

[3]

(c) Some zoos use assisted reproduction techniques, such as embryo transfer, in their captive breeding programmes for endangered species. Embryo transfer has resulted in domesticated dromedary camels giving birth to wild Bactrian camel calves.

Describe the procedure of embryo transfer in a mammal such as a camel.

The female camel is made to super-ovulate and then given sperm cells by artificial insemination. After fertilisation an embryo is removed from the female camel and stored. Then the best embryos are selected and implanted into the uterus of the female surrogate. The surrogate will carry the embryo to full term. Progesterone hormone is given to the surrogate to ensure strong uterine wall after implantation. Many embryos can be used in different surrogates to increase chances of forming new offspring. [4]

[Total: 9]

2. June/2022/Paper_41/No.1(a)

(a) The golden mantella, *Mantella aurantiaca*, is a small terrestrial frog found in Madagascar.

Fig. 1.1 shows a golden mantella.

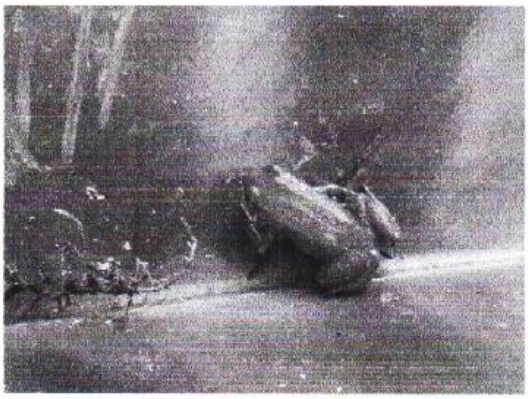

Fig. 1.1

(i) Name the domain and kingdom to which the golden mantella belongs.

domain ..... Eukarya .....

kingdom ..... Animalia .....

[2]

(ii) The skin of the golden mantella is brightly coloured and contains a toxin.

Suggest a benefit to the frog of being brightly coloured.

..... The colour is warning to predators .....

.....

..... [1]

3. June/2022/Paper_41/No.8

(a) Over the past 200 years, many species of animals and plants have become extinct.

Fig. 8.1 shows the changes between the years 1800 and 2000 in:

- the number of species becoming extinct
- the size of the world human population.

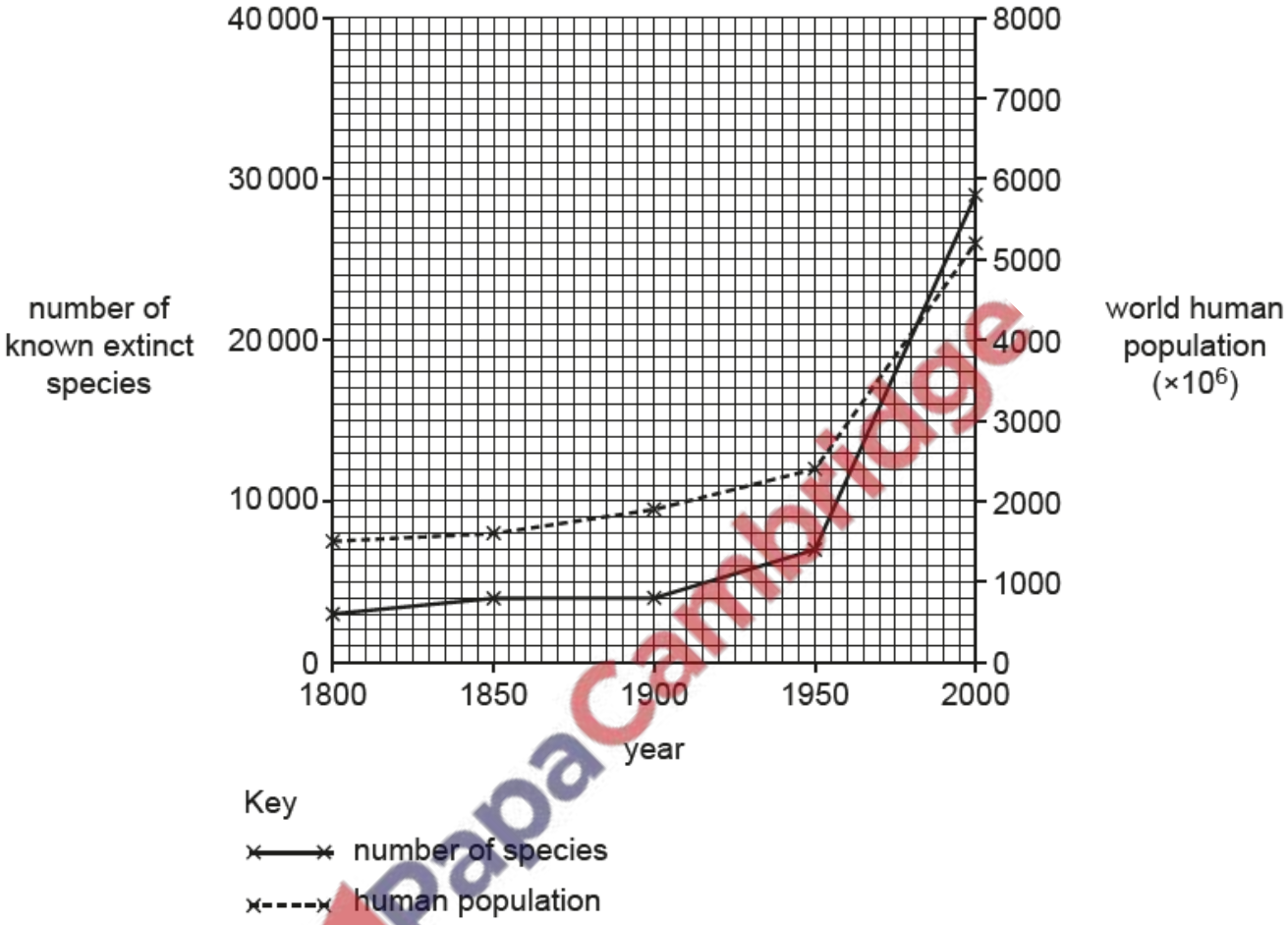

Fig. 8.1

(i) It has been suggested that there is a correlation between the number of species becoming extinct and the size of the world human population.

Suggest reasons for this possible correlation.

Loss of habitats for agriculture, roads and clevelopement of roads.
Hunting and fishing
Spread of animal or plant disease by humans

[3]

(ii) Calculate the rate of species extinction per year between 1950 and 2000.

Show your working.

$$\frac{29000-7000}{2000-1950} = \frac{440}{}$$

440

answer = ... [2]

(b) Extinction of animal and plant species reduces biodiversity.

Explain why it is important to maintain biodiversity.

- Biodiversity is the sum total of various organisms in the habitat. Green vegetation are producers of food for organisms in a food chain. Some trees such as Artemesia produce medicine for malaria.
- Trees provide aesthetic beauty for an area.
- Many trees have a cultural significance to a specific community and so they need to be conserved.
- Trees hold onto soil particles by their roots. This reduces soil erosion.
- The various organisms in an area attract tourists. Tourists pay to see the organisms. This a boost for ecotourism.
- Some trees are used in scientific research and education. Trees provide rubber, paper and wood for human uses. [7]

[Total:12]

4. June/2022/Paper_42/No.7

The bacterium, *Escherichia coli*, can use glucose or disaccharides, such as lactose, in its metabolism. Lactose needs to be hydrolysed by the enzyme β-galactosidase to form glucose and galactose, which can then be used by *E. coli*.

The production of β-galactosidase is controlled by a length of DNA called the *lac* operon.

(a) Fig. 7.1 shows the *lac* operon when lactose is **absent**.

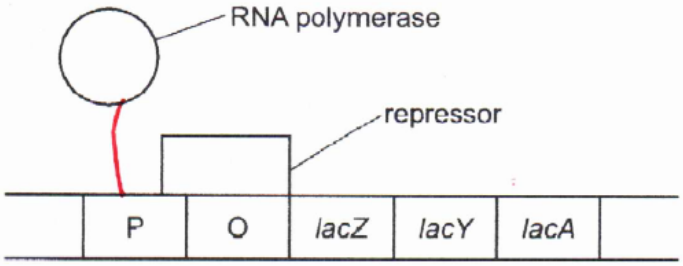

Fig. 7.1

On Fig. 7.2, draw the positions of RNA polymerase and the repressor molecule when lactose is **present**.

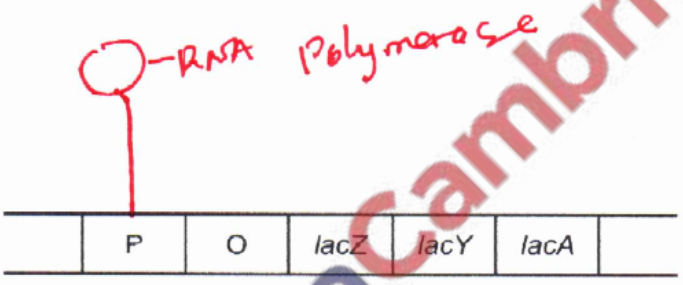

Fig. 7.2 [2]

(b) The protein coded for by *lacY* is not involved in the control of gene expression.

(i) Name the type of gene represented by *lacY*.

Structural gene [1]

(ii) Name the protein product coded for by *lacY* **and** state the precise role of this protein.

Lactose permease - it transports lactose into a cell. It makes the cell more permeable to lactose.

[2]

(c) In an investigation into the growth of *E. coli*, a sample of the bacterium was grown in a medium that contained limited concentrations of glucose and lactose. The population size of *E. coli* was measured at regular intervals.

Fig. 7.3 shows the population growth curve obtained for this investigation.

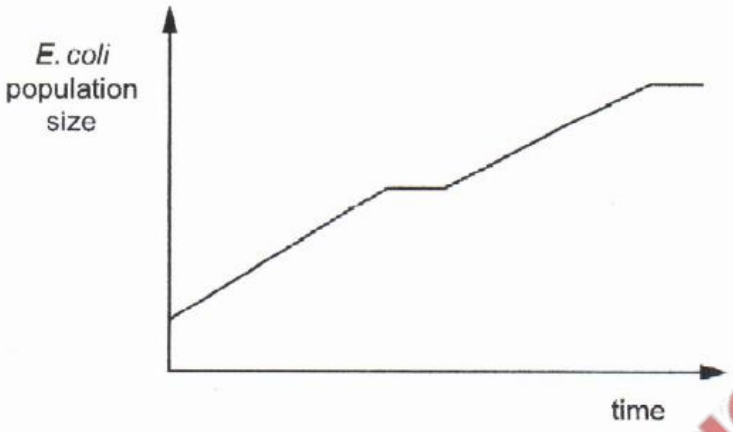

Fig. 7.3

Describe **and** suggest explanations for the population growth curve shown in Fig. 7.3.

The population increases, then levels off, increases, then levels off. The first increase is happens when glucose is respired to provide energy for growth. When glucose runs out the first time, population size levels off. The second decrease occurs when lactose has run out. There is a time delay for lactose permease to works

..... [4]

[Total: 9]

5. June/2022/Paper_43/No.8

(a) The Malayan tapir, *Tapirus indicus*, lives in the rainforest of South East Asia.

Fig. 8.1 shows a Malayan tapir and her calf.

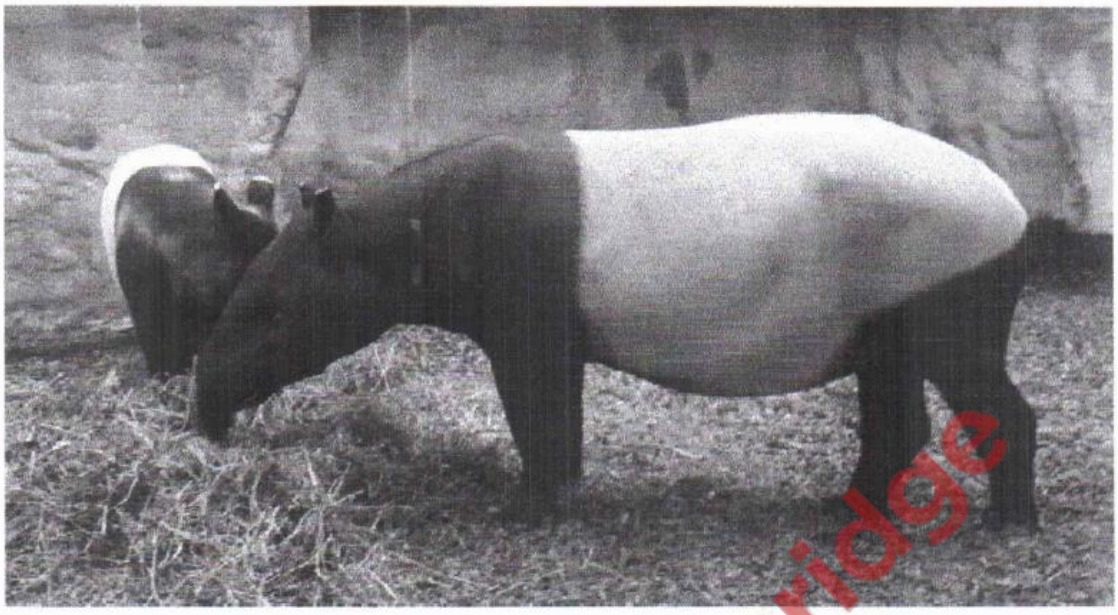

Fig. 8.1

On the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species, the Malayan tapir is categorised as endangered and could become extinct. One problem is the illegal trade in the Malayan tapir.

Apart from illegal trading, suggest and explain reasons why the Malayan tapir has become endangered and could become extinct.

Loss of habitat due to commercial farming affects breeding of the Tapir. Climate changes associated with floods are a threat to the calves of Tapir. Many die during floods. Hunting of Tapir by humans reduce their population. Extreme hunting is a threat to their existence. [2]

(b) The trade in Malayan tapirs is regulated by the Convention on International Trade in Endangered Species (CITES).

Suggest ways by which CITES attempts to regulate the trade in wild fauna and flora.

Ban trade on endangered species. If a species is not endangered, a permit must be issued for humans to use them. They should introduce penalties for people trading on endangered species. They must encourage countries to join CITES. They encourage border controls to monitor trade on endangered species.

[3]

(c) Many endangered species, such as the Malayan tapir, are protected in zoos.

Outline the role of zoos in the conservation of endangered species.

- Zoos keep animals in safe conditions so they can be used to teach the public on their importance. This encourage the public to protect the endangered species.
- Zoos provide grounds for captive breeding so that population of endangered organisms may increase. The sick animals also get treated at the zoos and then released back to the wild.

[4]

[Total: 9]