

**Past HKCEE Questions**

**Evolution**

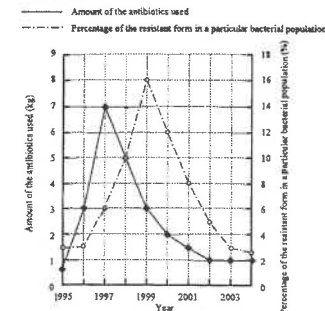
**Paper I**

1. Peter moved to a small island ten years ago. He found that there were a lot of mosquitoes, so he sprayed the area around his house with a certain kind of insecticides. The mosquito population dropped rapidly, but rose again after several months. He then sprayed the same insecticide to kill the mosquitoes and this was repeated whenever there was a rise in the mosquito population. However, Peter has found that the insecticide has become less and less effective in recent years.

- Explain why the mosquito population rose again after a large number of them were killed by the insecticide. (2 marks)
- In the same population, the mosquitoes may show different degrees of resistance to the insecticide. Explain *two* genetic causes that may lead to this variation among the mosquitoes. (4 marks)
- Using the theory of natural selection, explain why the insecticide has become less and less effective in killing the mosquitoes. (4 marks)

(HKCEE 2005)

2. Antibiotic is a drug commonly used to treat bacterial infections. In recent years, there have been more reported cases of resistant forms of bacteria strains found in hospitals. The graph below shows the percentage of the resistant form in a particular bacterial population and the amount of antibiotics used in one particular hospital each year from 1995 to 2004:



- Explain why the increased amount of antibiotics used will lead to the rise in the percentage of the resistant form in the bacterial population. (4 marks)
- Some patients in hospitals will have a higher death rate if infected with resistant forms of

bacteria. Suggest one group of these patients and give an explanation. (2 marks)

- If you were a doctor, suggest two practices that you could adopt to slow down the rise of the resistant forms of bacteria. (2 marks)

(HKCEE 2007)

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**Paper II**

05-52

Fossil records are valuable in the study of evolution because they provide information about

- A. the population size of different species.
- B. the cause of mutation in organisms.
- C. the time of existence of organisms.
- D. the life span of different species.

06-55

The misuse of antibiotics will lead to the development of bacteria with greater resistance to antibiotics. This means that

- A. most bacteria are killed and only the more resistant bacteria survive.
- B. bacteria will become stronger after applying the antibiotics.
- C. bacteria mutate in order to resist the antibiotics.
- D. bacteria get used to the antibiotics applied.

06-56

In the nineteenth century, most of the peppered moths in England were white. About 100 years later, 98% of the moths recorded in industrial areas were black while most in rural areas were still white. This is an example of

- A. competition.
- B. evolution.
- C. natural selection.
- D. variation.

06-58

If a mutation leads to the development of a character which is dominant, which of the following can be deduced from this?

- A. There will be more individuals in the population carrying this allele than if the mutation leads to a recessive character.
- B. There will be more individuals possessing this character in the population.
- C. All individuals in the population carrying this allele will possess this character.
- D. It will cause the death of the individuals carrying this allele.

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**Suggested Answers**

**Paper I**

1. (i) • Some mosquitoes survived after the spraying of the insecticide 1,1
- They would reproduce to give many offspring and thus the population would rise again
- Or
- Many eggs were laid before the death of the mosquitoes
- The eggs hatched and thus the population would rise again
- (ii) • Mutation 1,1
- It results in the change of the gene(s) controlling sensitivity / resistance to the insecticide
- or
- Independent assortment of homologous chromosomes occurs during meiosis
- leading to the formation of gametes with different alleles for insecticide-resistance
- or
- Fertilization
- It results in a random combination of alleles for insecticide-resistance in the zygote
- (iii) There are genetic variations among the mosquitoes in their resistance against insecticide 1
- Those that are resistant have a higher chance of survival in the presence of the insecticide 1
- They have a greater chance of reproduction / producing more offspring 1
- Thus the proportion of the insecticide-resistant mosquitoes increases in the subsequent generations 1
- Hence, the insecticide becomes less effective in killing the mosquitoes 1
- Effective communication
2. (i) Genetic variations exist among the bacteria in their resistance against the antibiotic 1
- The increase in the amount of antibiotics kills non-resistant form while the resistant form survive 1
- The resistant form continue to reproduce / produce more of its own kind 1
- The number of resistant form of

- bacteria increases faster 1
- (ii) Any group with weak immune system plus correct example, e.g. children, elderly, AIDS patients, cancer patient after treatment, patients taking immunosuppressor drugs 2
- (iii) Any 2 1+1
- Prescribe antibiotics only when necessary
  - Instruct the patient to finish the whole course of prescription
  - Use narrow spectrum antibiotics

**Paper II**

05-52	C
06-55	A
06-56	C
06-58	C