INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Thursday 5 May 1994 (morning)

Paper 3 — 1 hour 30 minutes

This examination paper consists of two sections.

Section A (Core) consists of four questions.
Section B (Options) consists of eight questions.

The maximum mark for each question is 20.

This examination paper consists of six pages.

INSTRUCTIONS TO CANDIDATES

DO NOT open this examination paper until instructed to do so.

Answer ONE question from Section A.

Answer ONE question from Section B.

EXAMINATION MATERIALS

Required/Essential:

None

Allowed/Optional:

A simple translating dictionary for candidates not working in their own language

SECTION A (*CORE*)

1. Ecological relationships in a given ecosystem can be described in different ways. Explain the construction and discuss the problems arising from the use of:

(a) pyramids of numbers; *[8 marks]*

(b) pyramids of biomass; *[6 marks]*

(c) pyramids of energy. *[6 marks]*

2. Describe the changes in the blood as it passes through

(a) the lungs; *[6 marks]*

(b) the liver; *[9 marks]*

(c) the kidneys. *[5 marks]*

3. (a) Describe the process of RNA synthesis in the nucleus of a cell. *[7 marks]*

(b) Identify the three major kinds of RNA and describe their roles in protein synthesis. *[6 marks]*

(c) Describe the process of RNA translation. Give diagrams to help explain the process. *[7 marks]*

4. (a) Explain how organisms can become fossilised. *[6 marks]*

(b) What can we learn from the sequence of fossils in rock strata? *[6 marks]*

(c) How does the evidence derived from the study of comparative anatomy support the idea of evolution of species? *[8 marks]*

SECTION B (*OPTIONS*)

Human Ecology

5. (a) Distinguish between carriers and reservoirs of disease. *[3 marks]*

(b) Discuss the role of humans and other animals as carriers and reservoirs of **two named** transmissible diseases. *[10 marks]*

(c) For **each** of the **two** diseases described in (b) explain some methods used to prevent infection. *[7 marks]*

6. (a) Describe the main characteristics of *Australopithecus* fossils, including

geographic location; *[2 marks]*

antiquity; *[2 marks]*

anatomy. *[4 marks]*

(b) Provide comparable information for *Homo erectus*. *[8 marks]*

(c) Compare what is known about culture, food gathering and food processing in these two hominid fossil types. *[4 marks]*

Environmental Biology

7. Today more and more people are concerned about the warming up of the Earth's atmosphere due to the **greenhouse effect** and its consequences.

(a) Explain the mechanism responsible for it. *[4 marks]*

(b) Discuss **three** human activities responsible for the greenhouse effect. *[6 marks]*

(c) Discuss

(i) **three** possible long term consequences of it; *[6 marks]*

(ii) **two** actions to prevent **each** of the above consequences. *[4 marks]*

8. Describe in detail a particular investigation you have conducted to estimate the density and distribution of **animal** and **plant** populations in a specific area that you have studied. In your answer include

(a) a description of the characteristics of the area; *[3 marks]*

(b) a description of **two** of the methods used for each population; *[8 marks]*

(c) a discussion of your results; *[6 marks]*

(d) an evaluation of the reliability of the methods used. *[3 marks]*

Green Plants

9. (a) What do you understand by the term 'limiting factor'? *[3 marks]*

(b) Describe briefly how any **two** 'limiting factors' affect the distribution of a plant community in a given area. *[10 marks]*

(c) Define 'ecological succession' and give a brief description of **one** example of this process. *[7 marks]*

10. (a) Define photoperiodism. *[2 marks]*

(b) Explain how flowering plants can be grouped on the basis of photoperiodism. *[5 marks]*

What adaptive advantages are there for the plants in the different groups? *[5 marks]*

(c) What chemical substances are involved in photoperiodism? Give details of the experimental evidence supporting that involvement. *[8 marks]*

Molecular Biology

11. (a) What are restriction enzymes? Briefly explain how they work. *[3 marks]*

(b) Explain how restriction enzymes and gel electrophoresis can be used to study variation among different bacterial strains. *[11 marks]*

(c) Discuss the effectiveness of the above methods. Which differences among strains can or cannot be detected? *[6 marks]*

12. (a) Name and describe the structure of a bacterial, plant or human **virus**. *[5 marks]*

(b) Enzymes play an important part in virus reproduction. Compare the reproduction of DNA viruses and RNA viruses, noting the role of enzymes. *[6 marks]*

(c) Discuss whether or not viruses can be classified as living organisms. *[9 marks]*
