Fig. 1.2 shows the effect of daily injections of growth hormone, over a five day period, on the body mass and excretion of urinary nitrogen in female rats.

A control group of rats did not receive the injections.

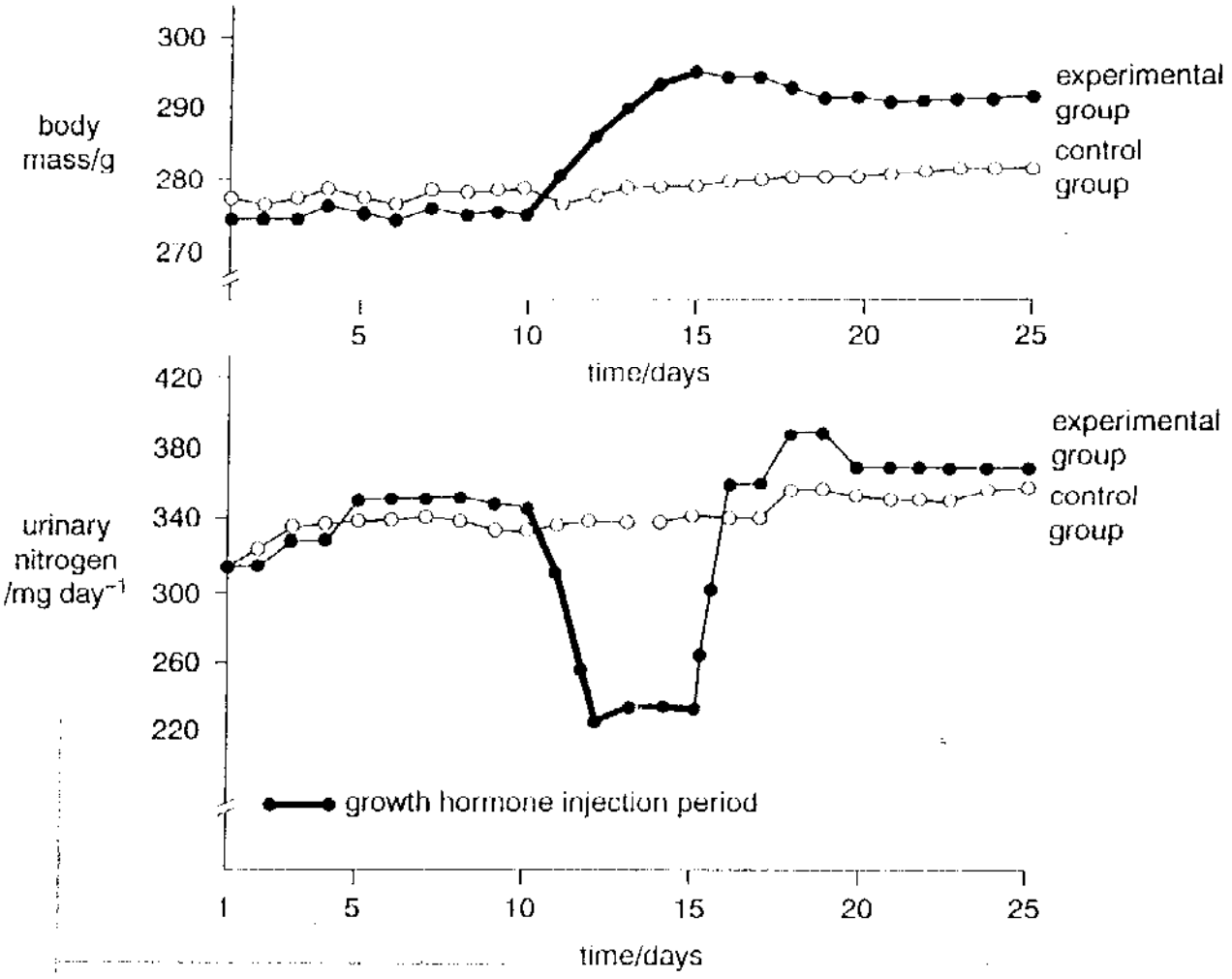


Fig. 1.2

(d) State **two** factors that should have been taken into account in selecting the control group of rats.

1. .....

2. ..... [2]

With reference to Fig. 1.2,

(e) **(i)** describe the effects of growth hormone injections on body mass and urinary nitrogen;

body mass .....

.....

.....

.....

urinary nitrogen .....

.....

.....

..... [4]

(ii) suggest reasons for the changes in urinary nitrogen.

.....

.....

..... [2]

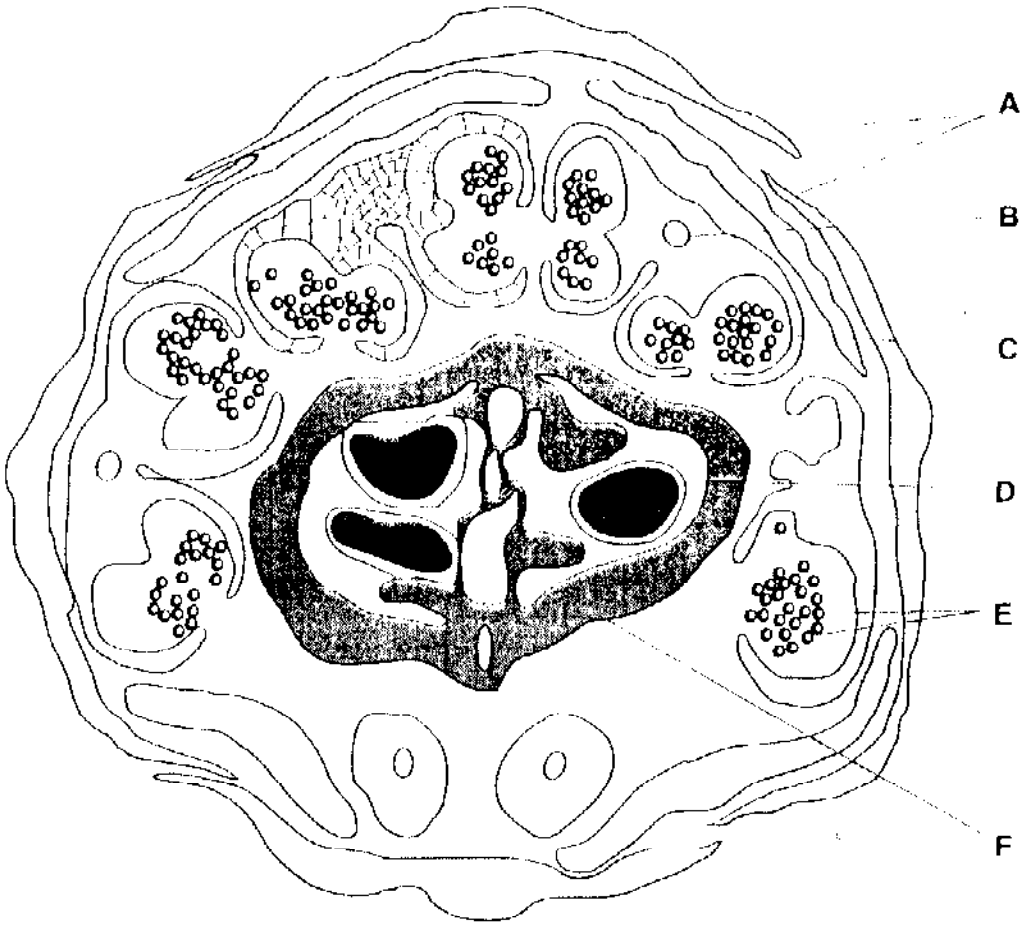
Extracts from human pituitaries are no longer used to treat people with deficiencies of growth hormone.

(f) Suggest **one** reason why this is so.

..... [1]

[Total: 15]

2 Fig. 2.1 shows a horizontal section of a flower bud of shepherd's purse, *Capsella bursa-pastoris*.



Magnification x40

Fig. 2.1

(a) (i) Name structures **A** to **F**.

A .....

B .....

C .....

D .....

E .....

F ..... [3]

(ii) Calculate the actual maximum diameter of the shepherd's purse flower bud in Fig. 2.1, showing your working.

working .....

.....

actual maximum diameter ..... [2]

In an experiment to investigate the effect of the length of the **dark period** on the production of flower buds by soybean plants, the light period was kept constant at **either** four hours **or** sixteen hours, while different intervening lengths of dark period were given to separate sets of ten plants. The total number of flower buds that formed in each of the sets of plants was recorded.

Fig. 2.2 shows the results of the investigations in constant four hour and sixteen hour light periods.

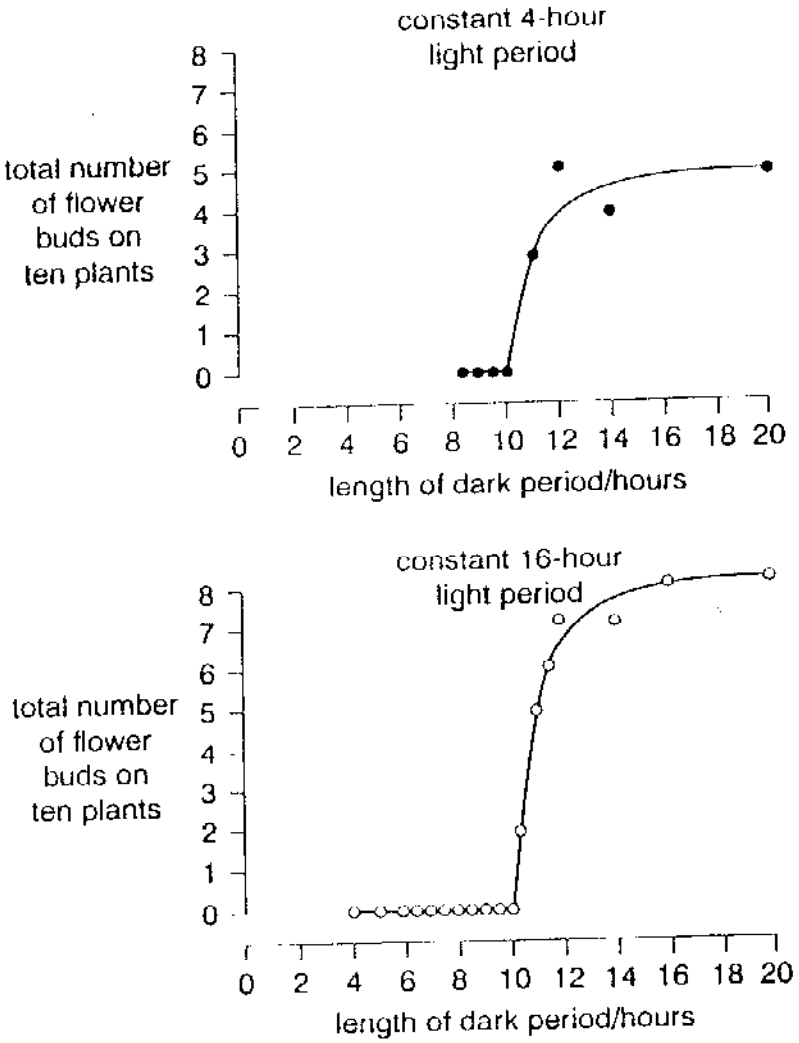


Fig. 2.2

(b) With reference to Fig. 2.2,

(i) describe the effect of varying the length of the dark period, with a constant light period of four hours, on the production of flower buds by soybeans;

.....

.....

.....

..... **[3]**

(ii) compare the effect of increasing the dark period, at constant four and sixteen hour light periods, on the production of flower buds by soybeans;

.....

.....

.....

..... [3]

(iii) explain whether soybean is a short day plant or a long day plant.

.....

.....

..... [2]

(c) Suggest why the majority of plants growing in equatorial regions show no response to day length.

.....

..... [2]

[Total: 15]

3 **Either**

(a) (i) Describe how you would measure and compare the relative growth rates of two different varieties of a crop plant. [8]

(ii) Explain the commercial advantages and disadvantages of propagating crops asexually. [8]

(iii) Explain briefly how cells with identical genotypes can develop into many different types of cells in the same organism. [4]

Or

(b) (i) Describe the structure of the mammalian testis, including reference to its microscopic structure. [8]

(ii) Describe spermatogenesis, indicating how genetic variation is brought about in the process. [8]

(iii) Outline the ethical problems that are raised by *in vitro* fertilisation (IVF). [4]

OPTION 5 – HUMAN HEALTH AND DISEASE

1 Fig. 1.1 shows the volume of oxygen taken up by a person during a period of strenuous exercise, and during periods of rest before and after the exercise. For aerobic respiration to supply the energy required during the period of exercise, an oxygen uptake of 3 dm^3 per minute was required. The shaded area labelled **A** shows the difference between the volume of oxygen required and the volume of oxygen taken up. This difference is known as the oxygen deficit.

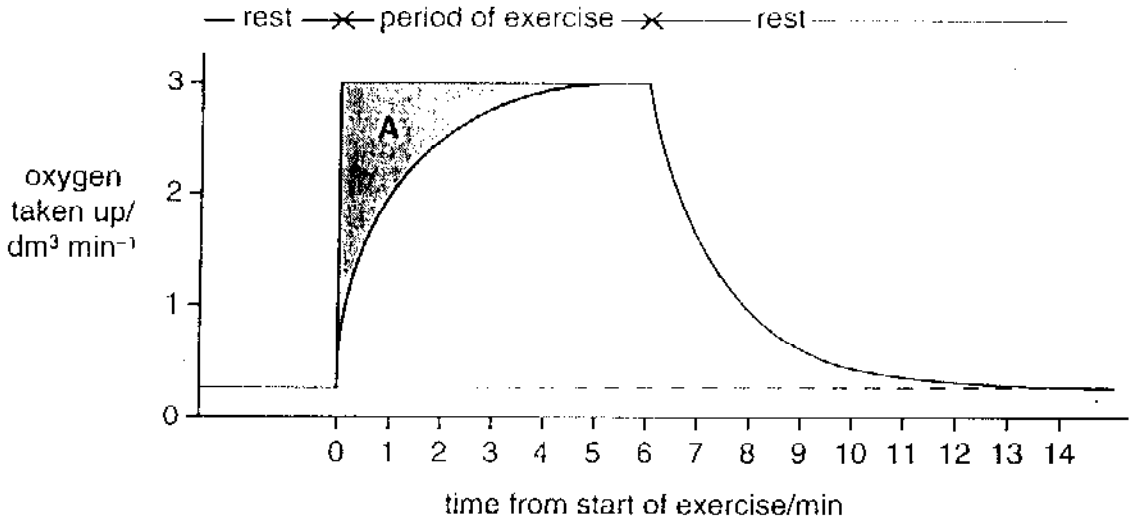


Fig. 1.1

(a) List **three** long-term health benefits of regular exercise.

1. resistance to diseases
2. removal of stress (free need)
3. ↑ in lung capacity [3]

(b) Explain why it takes several minutes for oxygen uptake to reach the required level of 3 dm^3 per minute.

.....

.....

.....[2]

For the first few minutes of rest **after** this period of exercise, more oxygen is taken up than during the period of rest **before** exercise. This volume of oxygen is known as the oxygen debt.

(c) On Fig. 1.1, shade the area which corresponds to the oxygen debt. [1]

(d) (i) Explain briefly why the concentration of lactate (lactic acid) increases in the blood during this period of exercise.

.....

.....

.....[2]

(ii) Explain why the concentration of lactate in the blood continues to rise for a short period after exercise has stopped.

.....

.....

.....

.....[2]

(e) (i) Explain why there is an oxygen debt.

.....

.....

.....

.....[3]

(ii) Suggest why the oxygen debt is larger than the oxygen deficit.

.....

.....

.....[2]

[Total : 15]

2 Table 2.1 shows leading causes of death in developed and developing countries in the year 1985. **Numbers** of deaths in millions for all the disease categories are shown. Fig. 2.1 shows **percentages** of total deaths for two of the disease categories shown in Table 2.1.

Table 2.1

disease category	*number of deaths in developed countries* / millions	*number of deaths in developing countries* / millions
Infectious and parasitic diseases	0.5	16.5
Cancers	2.2	2.5
Circulatory and degenerative diseases	5.7	6.5
Pulmonary diseases, e.g. bronchitis and emphysema	0.4	2.3
Maternal and perinatal causes	0.1	3.7
External causes (accidents and violence)	0.7	2.4
Other and unknown causes	1.4	4.1
TOTAL	11.0	38.0

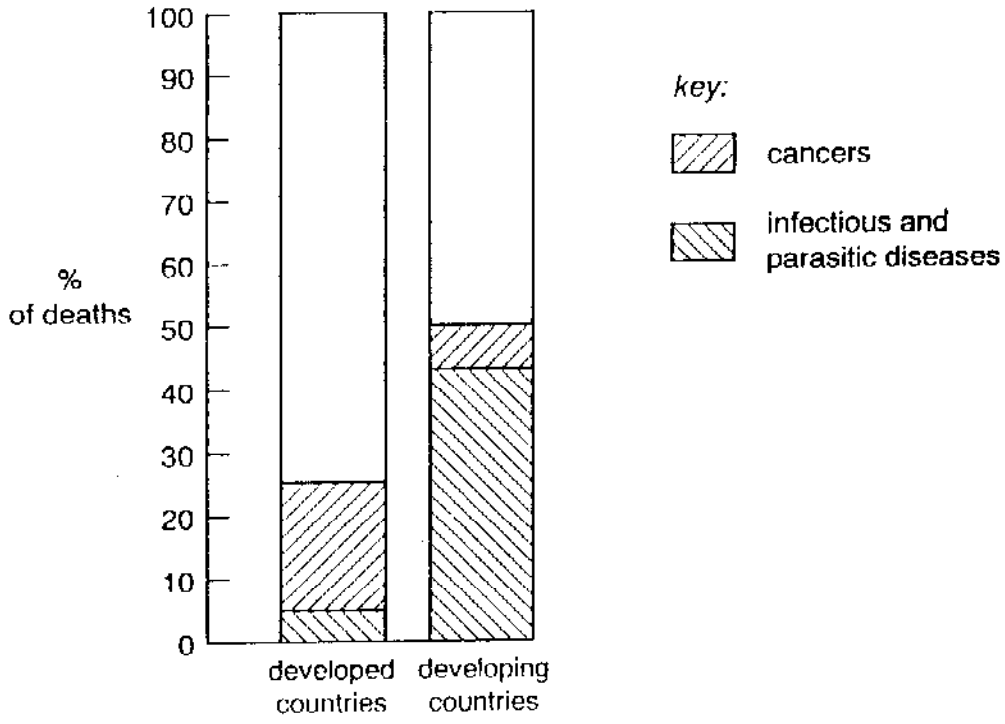


Fig. 2.1

(a) **(i)** With reference to Table 2.1, calculate the percentage of deaths from circulatory and degenerative diseases in developed and developing countries. Show your working.

Developed countries

Developing countries

[2]

(ii) Add the percentages you have calculated in **(i)** to the relevant columns in Fig. 2.1 and shade appropriately the blocks you have added. [1]

(iii) State the advantage of converting numbers of deaths to percentage of deaths in the case of circulatory and degenerative diseases.

.....

.....[1]

(iv) Explain briefly the reasons for the differences in the percentages of deaths from circulatory and degenerative diseases between developed and developing countries.

.....

.....

.....

.....[3]

One of the major causes of death in the 'Other causes' category in Table 2.1 is malnutrition, which may be a result of protein deficiency.

(b) State **two** symptoms of severe protein deficiency.

1. .....

2. .....[2]

Measles is one of six major infectious diseases targeted for prevention by means of vaccination in the World Health Organisation's Expanded Programme on Immunisation. Despite this, measles remains a leading cause of death in developing countries.

(c) Suggest **two** reasons for this.

1. .....

2. .....[2]

The World Health Organisation has been unsuccessful in eliminating malaria.

(d) **(I)** Explain why it is difficult to eliminate malaria.

- mobile pplsm
- plasmodium have various forms
- political & financial problems to sustain progs & prvtn measures.
- mosquitoes hv many different strains & different species.[3]

(II) Name the causative organism of malaria.

- plasmodium.....[1]

[Total : 15]

3 **Either**

(a) **(i)** Distinguish between physical and psychological dependence on drugs. [6]

(ii) Describe the effects of alcohol on the brain. [6]

(iii) Discuss the possible consequences for a family of excessive alcohol use by one of its members. [8]

Or

(b) **(i)** Describe how atherosclerosis develops. [6]

(ii) Explain how atherosclerosis may lead to death. [6]

(iii) Discuss the factors that should be taken into account when deciding how to share limited resources between **prevention** and **treatment** of coronary heart disease. [8]

PLEASE DO NOT WRITE
IN THIS SPACE