INTI INTERNATIONAL UNIVERSITY

FOUNDATION IN SCIENCE (CFSI)
BIO1204: BIOLOGY 2
FINAL EXAMINATION: MAY 2014 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) State **FOUR (4)** types of connective tissues and **ONE (1)** function of each tissue.

(8 marks)

(b) (i) If you added pepsinogen to a test tube containing protein dissolved in distilled water, not much amino acid can be produced. What inorganic substance can you add to the tube to accelerate the digestion of protein?

(1 mark)

(ii) State **TWO (2)** functions of the substance mentioned in (i) in human digestive system.

(3 marks)

(iii) Complete Table 1.1.

Table 1.1

Part of guts where digestion occurs	Enzyme	Substrate	Products
Stomach	(i)	(ii)	Amino acids
Duodenum	(iii)	Lipid	(iv)
Duodenum	(v)	Starch	(vi)
Ileum	(vii)	(viii)	glucose

(4 marks)

(c) Figure 1.1 shows three stages in the cardiac cycle.

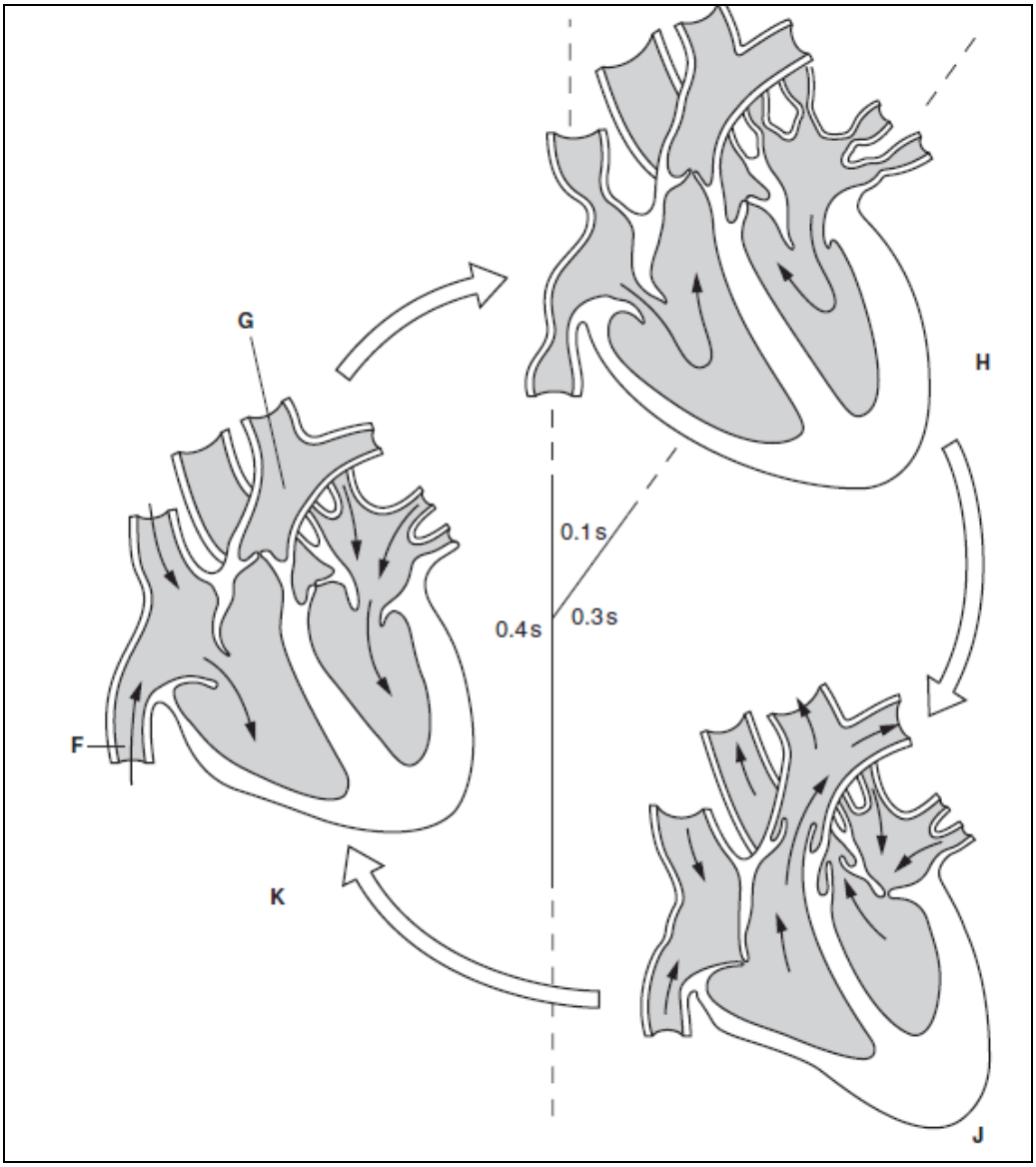


Fig. 1.1

(i) Fig. 1.1 indicates that one heart beat takes 0.8 second. State the heart rate in beats per minute.

(1 mark)

(ii) Explain why the walls of the atria have thinner muscle than the walls of the ventricles.

(2 marks)

(iii) Complete the table to show what is happening to the following parts of the **left** side of the heart at each of the stages, **H**, **J** and **K** as shown in Fig. 1.1.

Stage	Left atrium	Left ventricle	AV valve	Aortic valve
H	contracts to force blood into left ventricle	(A)……	Open	Closed
J	(B)……	(C)……	Closed	(D)……..
K	(E)……	relaxes and fills with blood from left atrium	Open	(F)……

(6 marks)

Question 2

(a) Fig. 2.1 shows an interaction between the cells involved in a cell mediated immunity response.

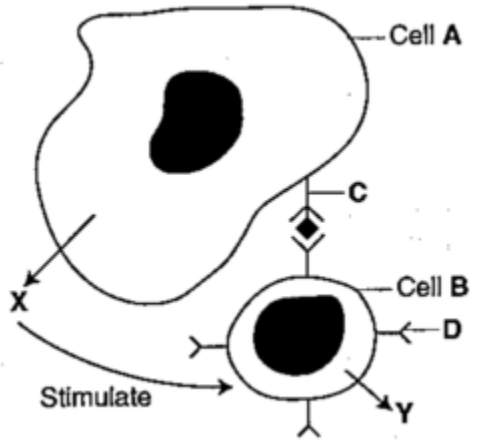


Fig. 2.1

(i) Identify cell A, cell B, structures C and D.

(4 marks)

(ii) Explain the relationship between the function of cell A with structure C.

(4 marks)

(iii) State the name and function of substance X secreted by cell A.

(3 marks)

(iv) State the name and function of substance Y secreted by cell B.

(4 marks)

(b) Samples of blood of Janet and Calvin were tested to determine the blood type. Table below shows the result of the test.

Patient	Anti-A serum	Anti-B serum	Anti-D serum
Janet	No Agglutination	No agglutination	Agglutination
Calvin	Agglutination	No agglutination	No agglutination

(i) Identify the blood type for Janet and Calvin including rhesus type.

(1 mark)

(ii) To whom should Janet **NOT** give blood to? Why?

(3 marks)

(c) Fig. 2.2 shows the events that occur between **TWO (2)** neurons at a synapse. Explain what happens at stages labeled A, B and C respectively.

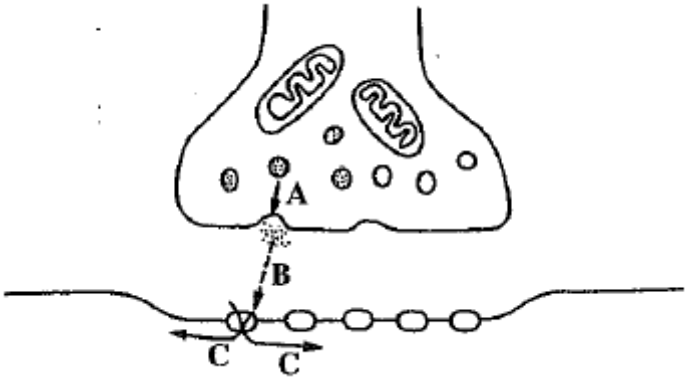


Fig. 2.2

(6 marks)

Question 3

(a) Fig. 3.1 shows a section through the proximal tubule of kidney nephron showing details of cell structure as seen with the electron microscope.

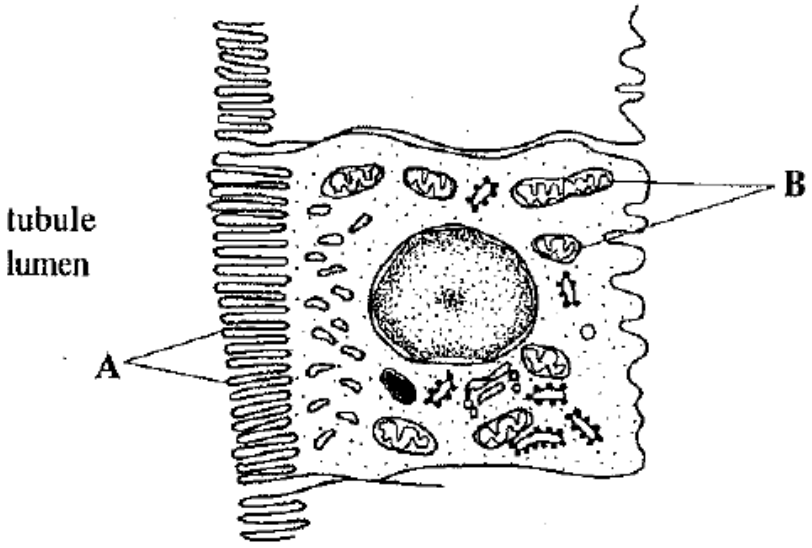


Fig. 3.1

(i) Identify structure labeled A and B.

(2 marks)

(ii) Describe how A and B assist reabsorption from the glomerular filtrate.

(2 marks)

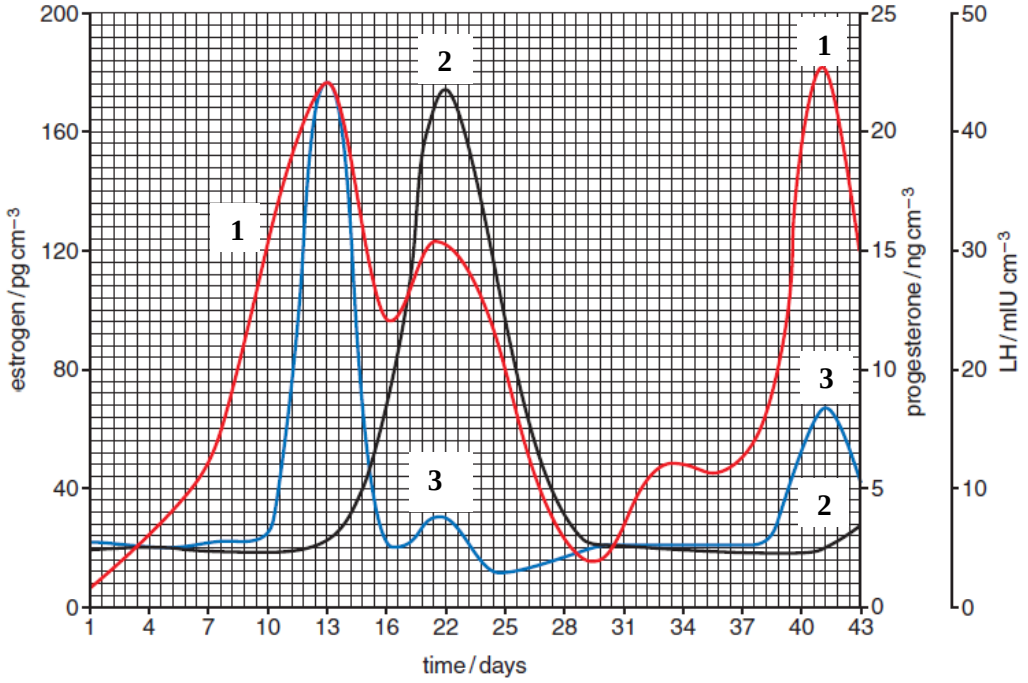
(iii) State **ONE (1)** difference between glomerular filtrate and blood.

(1 mark)

(iv) Describe the mechanism of glucose reabsorption into the proximal convoluted tubule cells from the lumen.

(4 marks)

(b) Blood samples were taken from a 29 year old woman each day for a period of 43 days. The concentrations of estrogen, progesterone and luteinising hormone (LH) in each sample were measured. The results are shown in Fig. 3.2.



1: Estrogen; 2: Progesterone; 3: LH

Fig. 3.2

(i) Estimate the length of the woman's menstrual cycle. Show how you worked out your answer.

(2 marks)

(ii) The luteal phase is the part of the cycle when a corpus luteum is present in the ovaries. It begins immediately after ovulation, and ends when menstruation starts. Use Fig. 3.2 to suggest when the luteal phase began and ended.

(2 marks)

(iii) Name the organ that secretes LH.

(1 mark)

(iv) Describe **THREE (3)** roles of LH in the menstrual cycle.

(3 marks)

(c) Explain homeostasis of calcium in blood.

(8 marks)

Question 4

(a) Give **FIVE (5)** differences between monocots and dicots.

(5 marks)

(b) Fig. 4.1 shows the cross section of the root and the routes of water from the soil to root xylem.

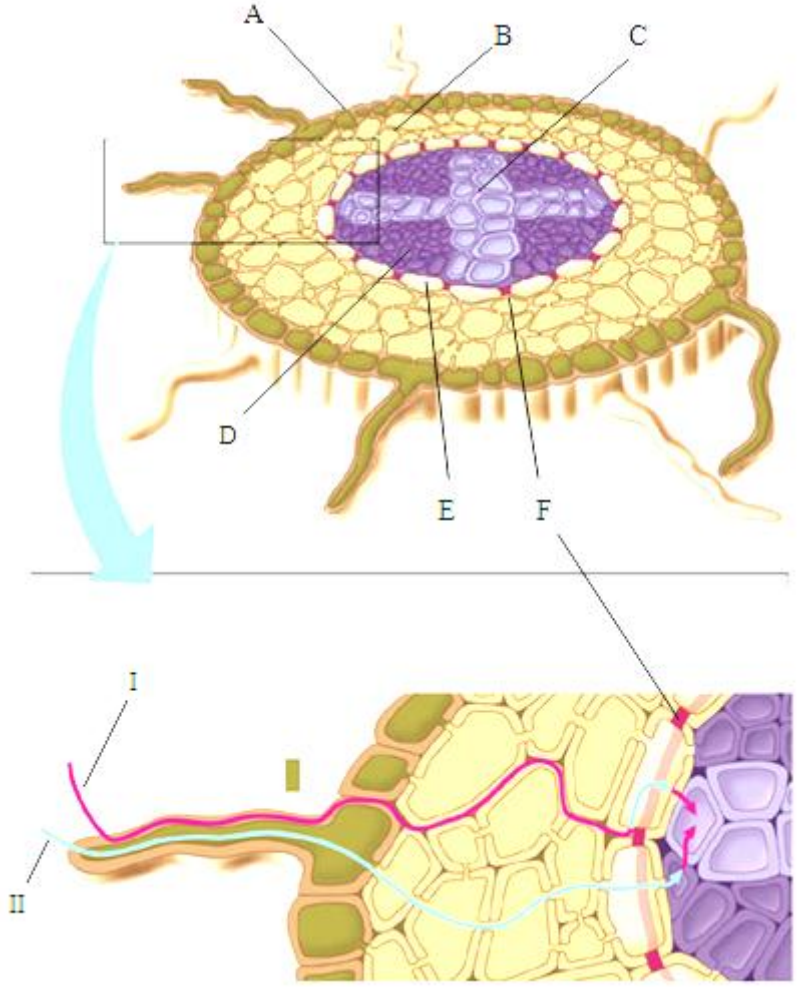


Fig. 4.1

(i) Name the structures labeled with A, B, C, D, E and F.

(3 marks)

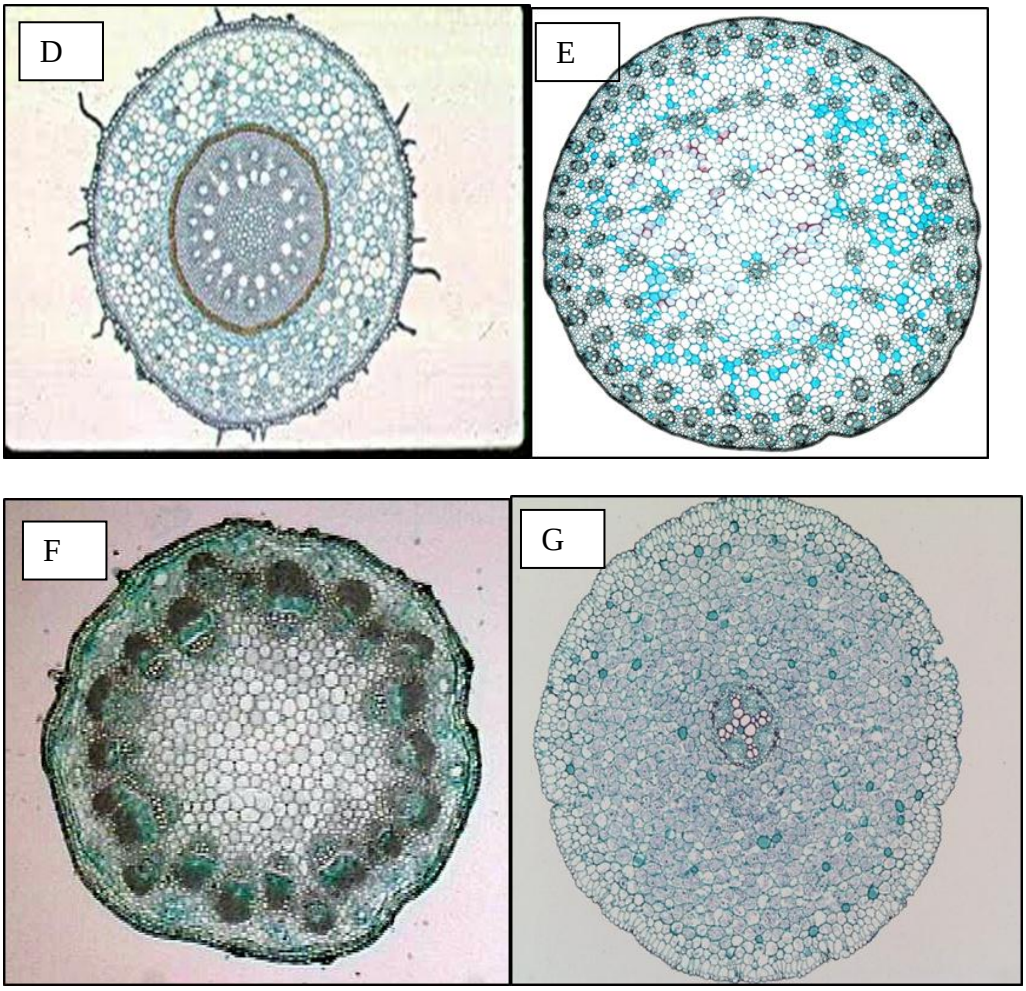
(ii) What is the function of the structure F?

(2 marks)

(iii) Name the routes of water and solutes labeled I and II.

(2 marks)

(c) Diagram D, E, F and G show the structures of angiosperm.



Identify which diagram represent the following:

(I) Monocot root
(II) Dicot root
(III) Monocot stem
(IV) Dicot stem

(4 marks)

(d) Plants X was exposed to a range of light and dark treatments as shown in the diagram below. Shaded bars represent the period of darkness and unshaded bars represent the period of light. Fig. 4.2 shows the result of each treatment on flowering.

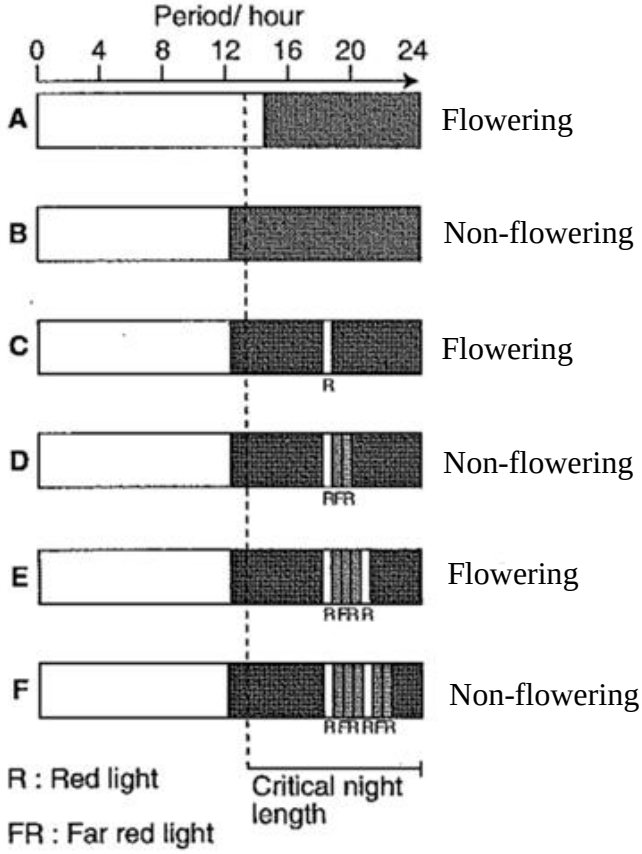


Fig. 4.2

(i) Based on the results of A and B, state the photoperiodic group this species belongs to. Explain your answer.

(2 marks)

(ii) Refer to treatments C, D, E and F, explain the effects of red and far red lights on the flowering of this plant.

(4 marks)

(e) State **THREE (3)** benefits that are provided by fungi in a plant's root.

(3 marks)

Question 5

(a) The tiger, *Panthera tigris*, is classified as an endangered species by the International Union for the Conservation of Nature and Natural Resources (IUCN). The IUCN publishes an annual list of endangered species called the Red List. Fig. 5.1 shows the number of tigers in the wild between 1900 and 2010.

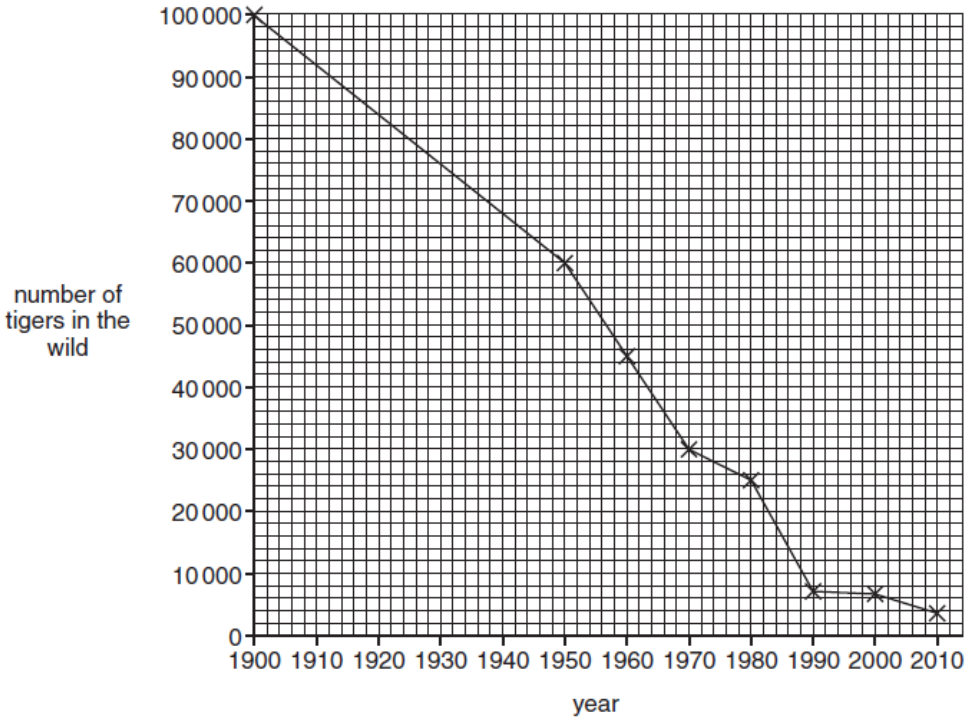


Fig. 5.1

(i) Calculate the overall rate of decrease in number of tigers between 1900 and 2010. Give your answer to the nearest whole number.

(2 marks)

(ii) Suggest **FIVE (5)** reasons why a named species has become endangered.

(5 marks)

(b) Read the following passage.

The three-toed sloth, *Bradypus variegatus*, is a very slow-moving mammal found in Central and South America that spends most of its life living in trees.

The thick, long grey fur of the sloth in Fig. 5.2 has a green appearance. Individual hairs of the sloth have grooves in them where water can collect.

Research has shown that the green colour is due to the presence of algae living on the sloth's fur, the most common species being *Trichophilus welckeri*. Algae are eukaryotic, photosynthetic organisms.

Many other species of non-photosynthetic eukaryotes, both unicellular and multicellular, have been found living on the sloth's fur. These include different species of roundworms, insects and saprotrophic fungi.

Fig. 5.2

(i) Explain the ecological terms **population** and **community**, using examples given in the passage.

(4 marks)

(ii) Suggest why the sloth and its fur can be described as a small ecosystem.

(4 marks)

(c) Lancaster Sound in the Canadian Arctic is a very productive marine environment and supports large populations of sea birds and marine mammals.
Studies of the area have shown the importance of Arctic cod, *Boreogadus saida*, in the flow of energy to marine birds, such as guillemots and fulmars, and marine mammals, such as narwhals and belugas. Arctic cod forms the main, or only, source of food for many such animals.
The flow of energy through the food web in Lancaster Sound is shown in **Fig. 5.3**.

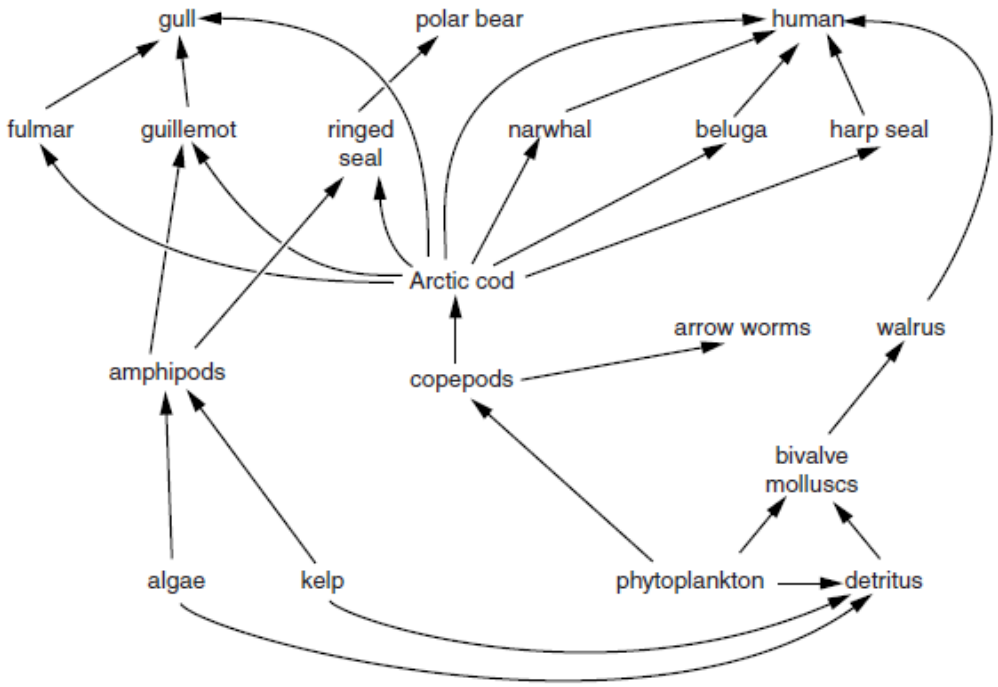


Fig. 5.3

(i) Name the trophic levels occupied by the following organisms in the food web in Fig. 5.3.
(a) kelp
(b) arrow worms
(c) narwhals

(3 marks)

(ii) The population of polar bears in the Lancaster Sound area is quite small in comparison to populations of animals that feed on Arctic cod. Using **only** the information shown in Fig. 5.3, explain why the population of polar bears is small.

(4 marks)

(iii) Populations of many fish species are under threat of extinction as a result of over-fishing. Explain the likely consequences of over-fishing of Arctic cod.

(3 marks)

-THE END-

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