

Immune system

Question Paper

Level	Pre U
Subject	Biology
Exam Board	Cambridge International Examinations
Topic	Animal physiology
Sub Topic	Immune system
Booklet	Question Paper

Time Allowed: 57 minutes

Score: /47

Percentage: /100

Part - A

- 1 Skin cancer cells may be grown in culture and examined using the technique of immunofluorescence in which antibodies are used to attach fluorescent dyes to specific molecules within the cells.

Fig. 22.1 is an immunofluorescent light micrograph of skin cancer cells. The DNA in the large cell nuclei is stained blue. These nuclei are typical of cells undergoing division in cancer. Proteins in the cytoplasm are stained green.

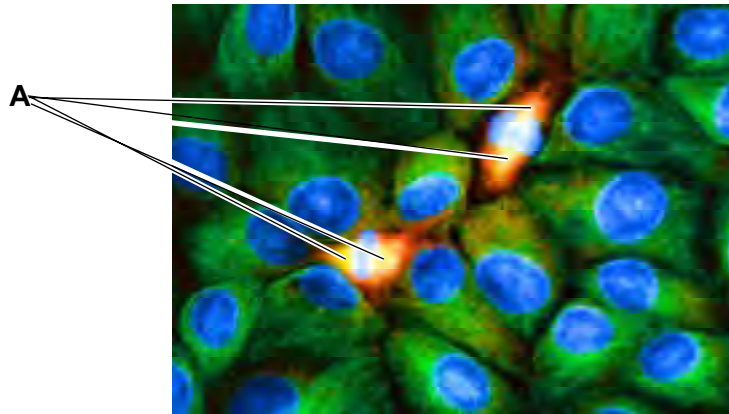


Fig. 22.1

- (a) (i) Suggest why proteins in the cytoplasm of the non-dividing cells in Fig. 22.1 are not evenly distributed.

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..... [1]

- (ii) There are two cells in the process of dividing. Each of these cells has two areas stained bright yellow, labelled **A** on Fig. 22.1.

Suggest the identity of these two areas and outline their function.

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..... [3]

(b) Before the skin cancer cells could be stained with antibodies, the cells had to be fixed and treated with a mild detergent to increase the permeability of the cell surface membranes.

(i) State why it is necessary to increase the permeability of the cell surface membranes before staining cells using the technique of immunofluorescence.

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..... [1]

(ii) State **and** explain two advantages of using immunofluorescence in studying the changes that occur in cells during cell division.

advantage 1

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advantage 2

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..... [4]

[Total: 9]

- (b) Using Fig. 3.1 as a guide, describe the events that occur in the nucleus of the T cell to produce a functional molecule of mRNA encoding a CD protein.

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- (c) Explain why the cuts made in pre-mRNA are necessary for the T cell to produce a functional CD protein.

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- (d) Suggest possible functions for the 'cap' and the poly-A region attached to the mRNA.

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Part - B

- 3 One laboratory method for investigating possible evolutionary relationships between mammals uses immunology and is summarised in Fig. 3.1.

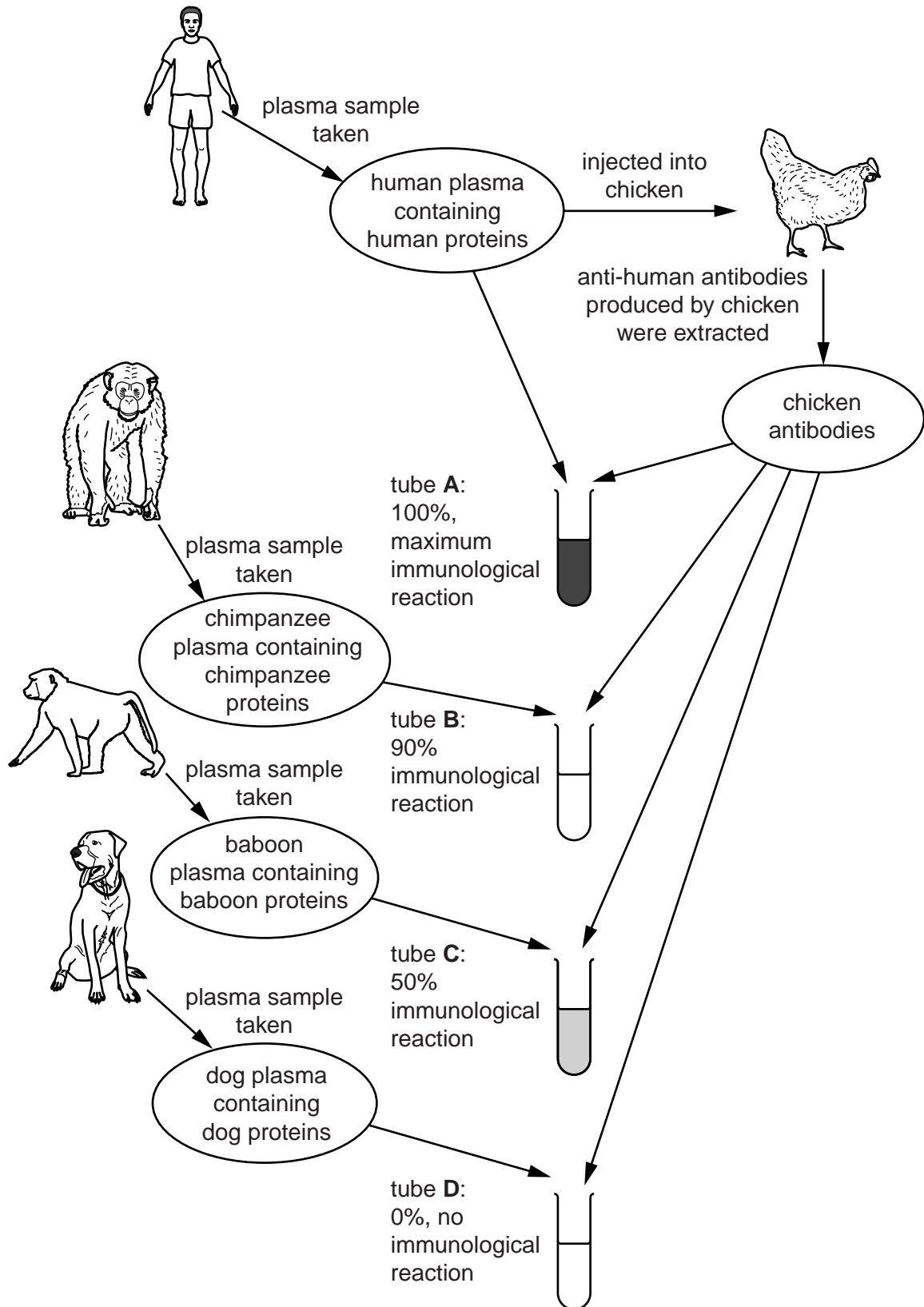


Fig. 3.1

(a) The immune system of birds is similar to that of mammals. With reference to Fig. 3.1,

(i) explain why injecting human proteins into a chicken causes an immune response

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(ii) suggest why investigators described the reaction of the chicken antibodies with the human proteins as 100% (tube **A**).

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(b) Describe **and** explain the conclusions which could be made about the evolutionary relationships between the **mammals** shown in Fig. 3.1.

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..... [5]

[Total: 9]

- 4 Fig. 1.1 is an electronmicrograph of a differentiated human B-cell (plasma cell) in the process of producing antibodies.

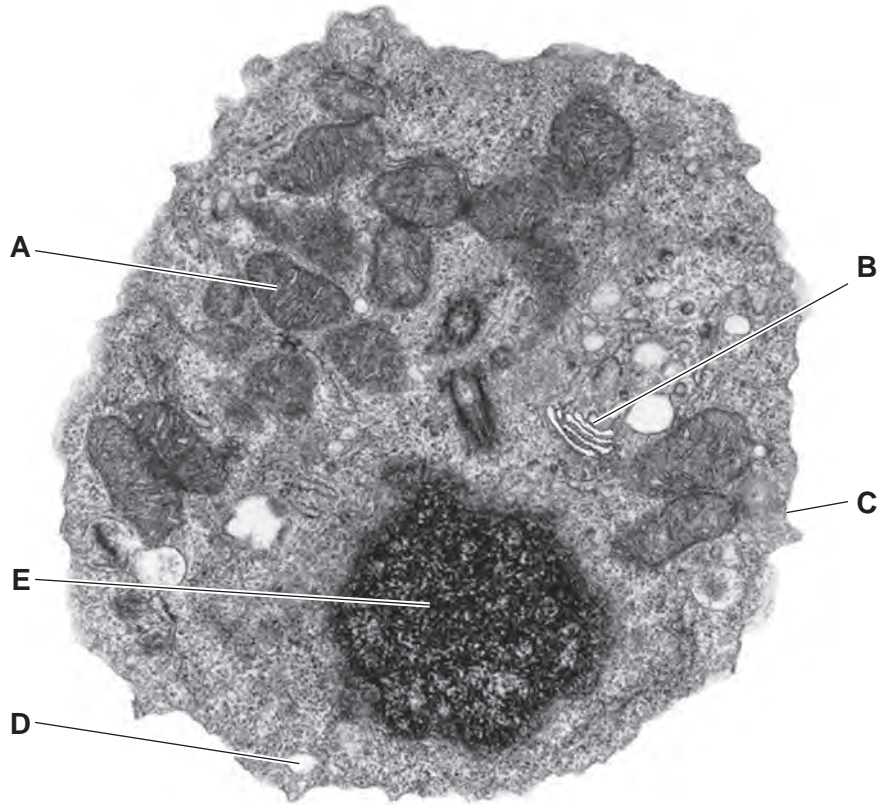


Fig. 1.1

(a) Name a part of the human body where B-cells

(i) are produced by division of stem cells,

.....[1]

(ii) produce antibodies.

.....[1]

(b) Name structures A and B.

A

B[2]

