

Class	Register Number	Name
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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2011
Secondary Three

BIOLOGY

Paper 2

Theory Paper

Friday

14 October 2011

1 hour 45 minutes

0915 – 1100 hr

Additional materials: Writing papers and graph paper

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write your name, register number and class in the spaces at the top of this page and on any separate answer paper used.

Section A (40 marks)

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

Section B (30 marks)

Answer **all** questions including questions **5, 6** and **7 Either** or **7 Or**.

Write your answers on the separate writing paper provided.

At the end of the examination,

1. fasten all your work securely together;
2. tick **7 Either** or **7 Or** next to the number 7 in the grid below to indicate which question you have answered.

INFORMATION FOR CANDIDATES

The intended number of marks is given in the brackets [] at the end of each question or part question. You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.

Examiner's Use	
Section A	
Section B	
5	
6	
7 Either	
7 Or	
Total	

This document consists of **12** printed pages.

CL, ST, WLF

NANYANG GIRLS' HIGH SCHOOL

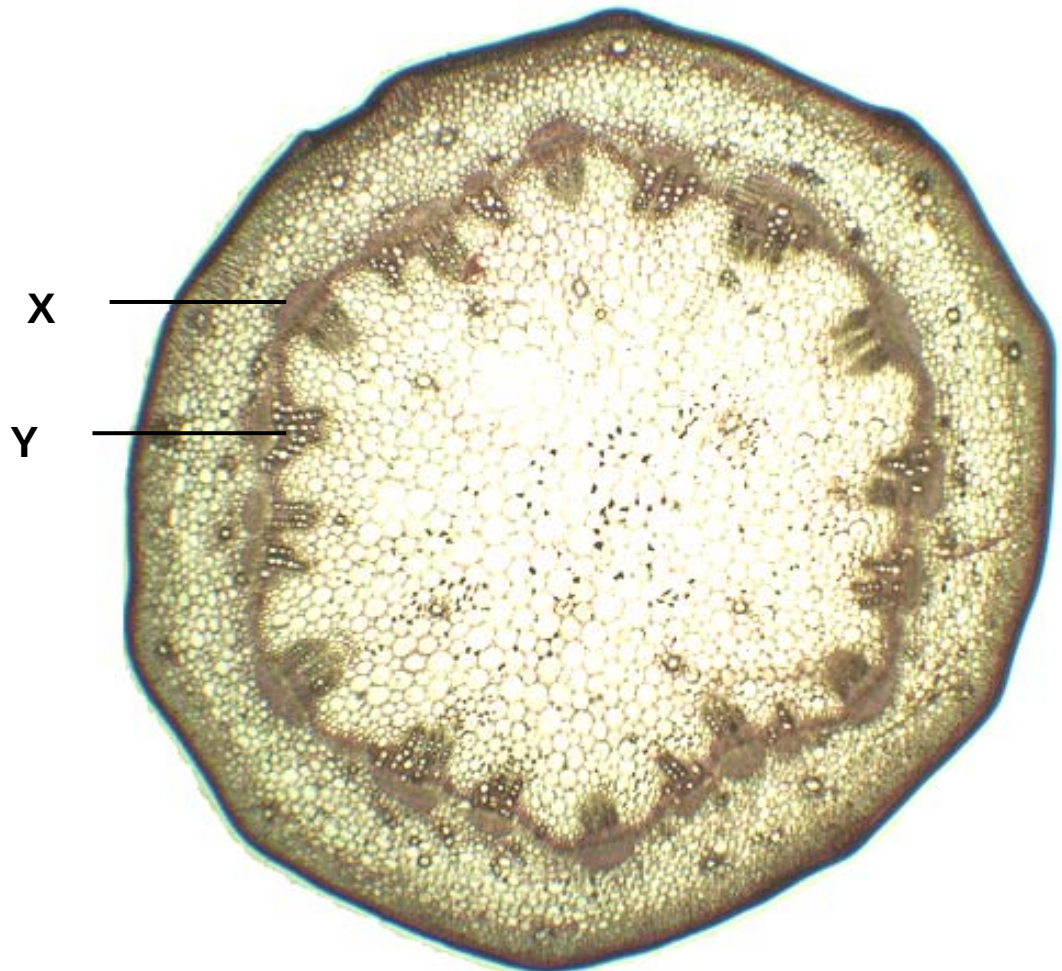
[Turn over

Section A

Answer **all** questions.

Write your answers in the spaces provided.

- 1 **Fig. 1.1** shows the cross section of a dicotyledonous stem.



(Flickr photo by Shihchuan 2010. Available for download under a Creative Commons license
<http://www.flickr.com/photos/epingchris/5110418885/in/photostream/>)

Fig. 1.1

- (a) (i) Identify structures **X** and **Y** in **Fig. 1.1** [1]

X: _____ **Y:** _____

- (ii) List two substances that are found in structure **X**. [1]

- (b) The functions of 3 different regions **R1**, **R2** and **R3** are described below. [3]

R1 Storage region

R2 Region of active cell division and differentiation

R3 Protective region

Identify **R1**, **R2** and **R3** and label them on **Fig. 1.1**.

- 1 (c) (i) Draw and label longitudinal sections of structures **X** and **Y**. [2]

Structure X

Structure Y

- (ii) Scientists had decided to use structure **Y** to replace the hepatic vein in the human body. [1]
Suggest **one** important modification that must be incorporated and explain why.

- (d) (i) Suggest how sampling of specimens can be conducted in order to produce a drawing of a typical dicotyledonous stem. [1]

- (ii) Suggest how substances from structure **X** can be collected with the help of aphids. Controls must be included. [1]

[Total: 10]

2 (a) Fig. 2.1 shows the structure of a short chain of amino acids.

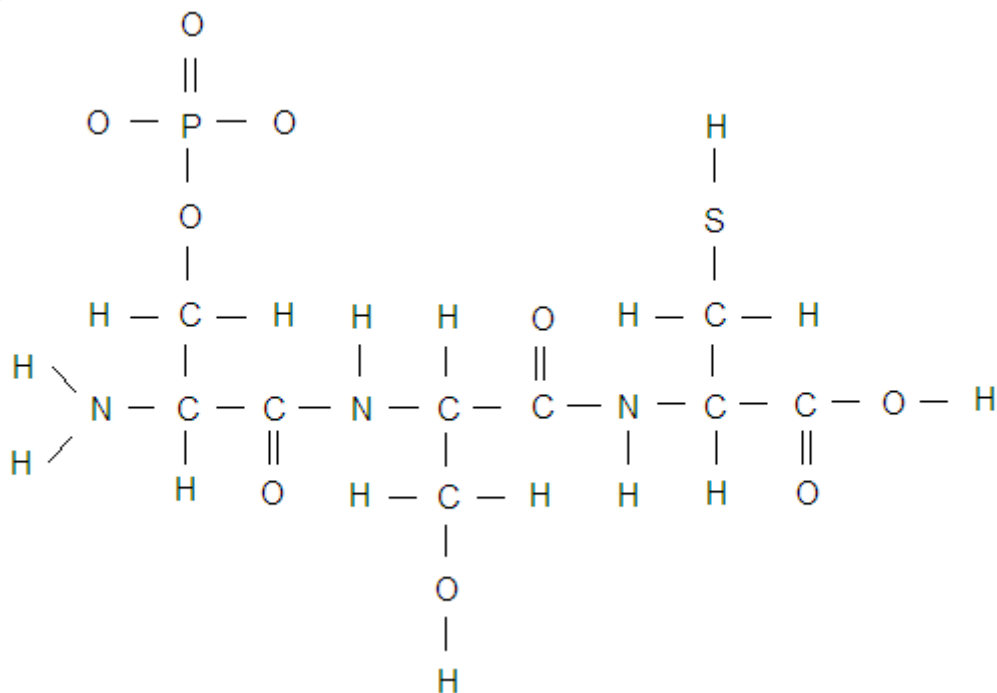
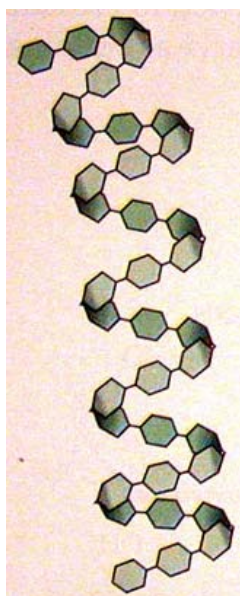


Fig. 2.1

- (i) Circle each amino acid completely to show the total number of amino acids in this short chain. [1]
- (ii) What is the type of bond formed between two amino acids? [1]

(b) Fig. 2.2 shows the structure of a polysaccharide.

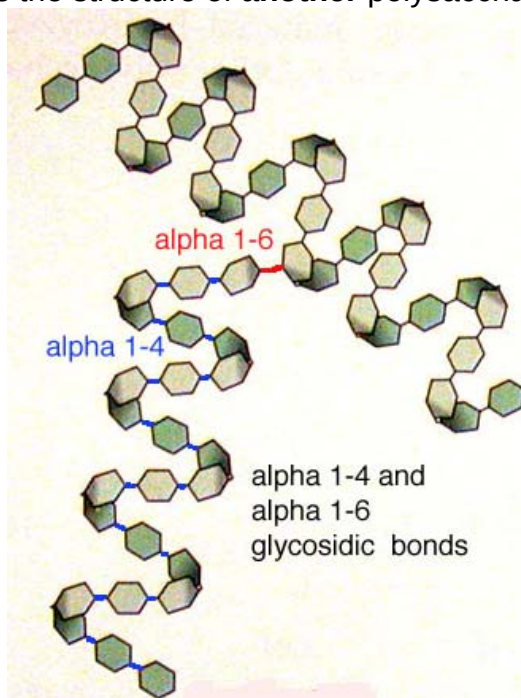


Source: http://www.bio.miami.edu/dana/226/226F08_2print.html

Fig. 2.2

- 2 (b) Based only on what can be seen in **Fig. 2.2**, suggest three reasons why this polysaccharide can be suitable as storage compound in cells. [3]

- (c) **Fig. 2.3** shows the structure of **another** polysaccharide.

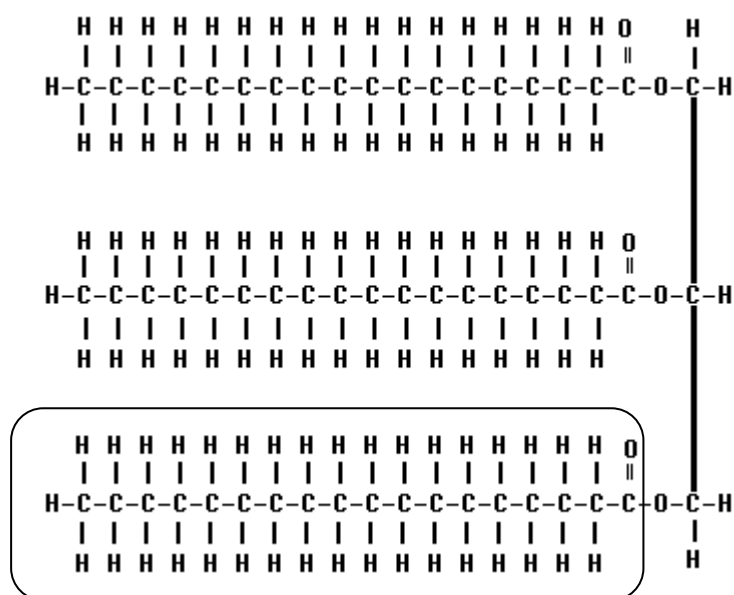


Source: http://www.bio.miami.edu/dana/226/226F08_2print.html

Fig. 2.3

- Suggest with reason, whether it is possible or impossible to identify this polysaccharide. [1]

2 (d) Fig. 2.4 shows the structure of a fat molecule.



Source: <http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/F/Fats.html>

Fig. 2.4

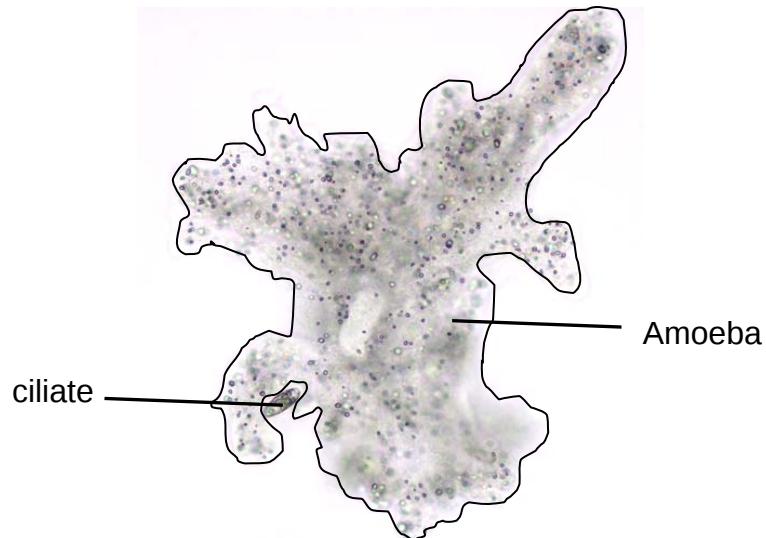
(i) What is formed when one of the fatty acid chains is replaced by a phosphate group? [1]

(ii) Suggest a change to the physical property when (d)(i) occurs. Explain. [3]

[Total: 10]

- 3 (a) Compare and contrast diffusion with osmosis. [2]

- (b) Fig. 3.1 shows an amoeba capturing a ciliate.



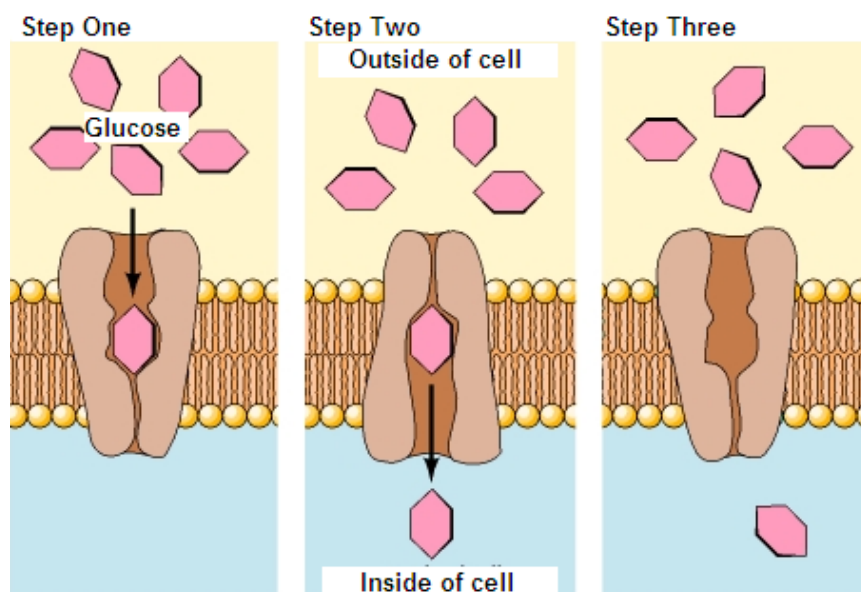
(Flickr photo by Marc Perkins 2011. Available for download under a Creative Commons license <http://www.flickr.com/photos/occbio/5619021445/in/set-72157626372633771/>)

Fig. 3.1

- (i) Explain how the amoeba is able to capture the ciliate. [2]

- (ii) Bread moulds do not capture food but release enzymes to digest the food outside the body of the bread mould. Describe the process that makes this possible. [1]

- 3 (c) **Fig. 3.2** shows one possible way that glucose molecules can be transported across the cell membrane.



Source: <http://www.ncbi.nlm.nih.gov/books/NBK9847/figure/A1991/?report=objectonly>

Fig. 3.2

- (i) State the process which allows glucose molecules to move across the cell membrane. Give **two** reasons, based solely on information from **Fig 3.2**, to support your answer. [3]

- (ii) Using only information from **Fig 3.2**, suggest **one** possible way to increase the rate of glucose uptake by the cell and explain how it works. [2]

[Total: 10]

4 **Fig. 4.1** shows the external features of a mammalian heart.

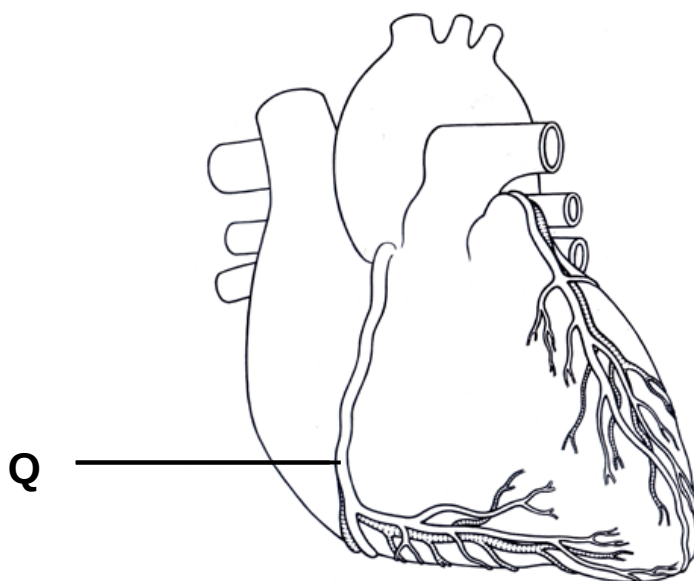


Fig. 4.1

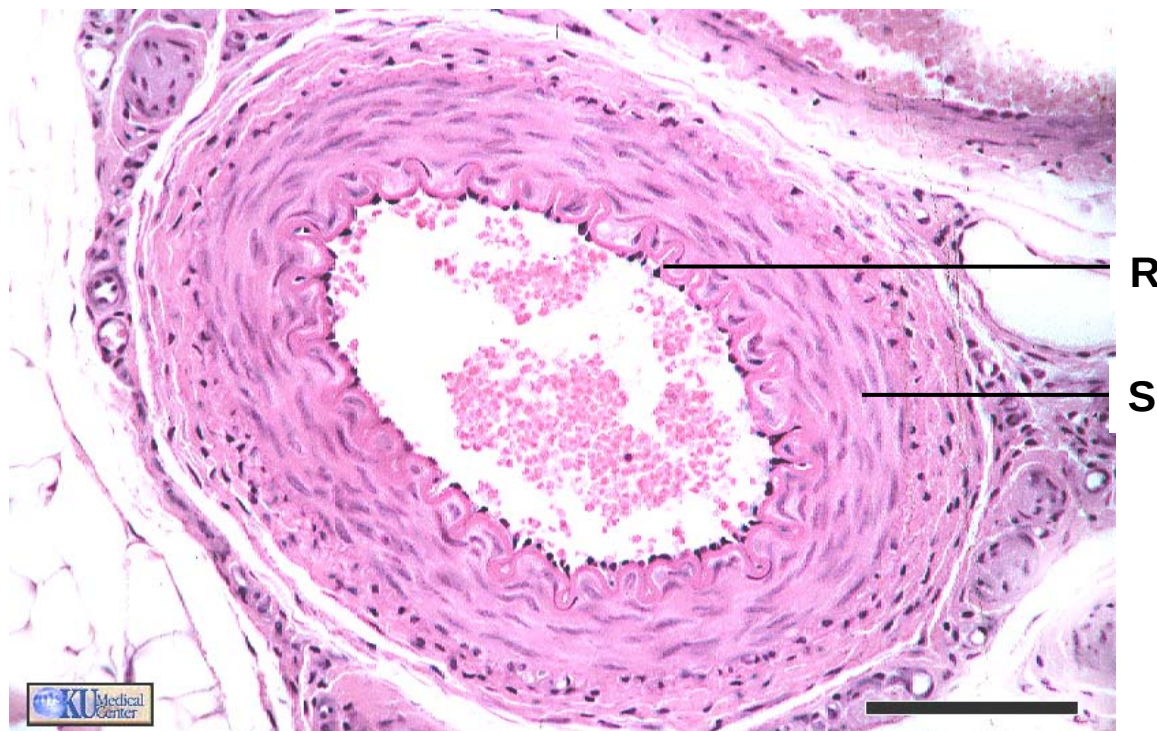
(a) Identify structure Q.

[1]

Q: _____

(b) Using arrows on **Fig. 4.1**, show the flow of oxygenated and deoxygenated blood through the vessels transporting blood between the heart and lungs. [2]
You may wish to use 'solid' and 'dashed' lines to distinguish oxygenated and deoxygenated blood flow.

(c) **Fig. 4.2** is a micrograph of a transverse section through structure Q.



Source: http://blog.lib.umn.edu/trite001/studyinghumananatomyandphysiology/2008/02/artery_vein_capillary_which_on.html

Fig. 4.2

(i) Name the tissues **R** and **S**. [1]

R: _____

S: _____

(ii) State **two** ways in which a transverse section of a vein would be different. [2]

1. _____

2. _____

(iii) Suggest why tissue **R** is folded. [1]

(d) Discuss possible links between diet and a **named** heart disease associated with structure **Q**. [3]

[Total: 10]

Section B

Answer all **three** questions from this section.

The last question is in the form of either/or and only **one** of the alternatives should be attempted. Each question carries **ten** marks.

- 5** During vigorous exercise such as running, lactic acid accumulates within muscles. Lactic acid dissociates releasing hydrogen ions and the remaining compound then combines with sodium or potassium ions to form a salt called lactate. Blood lactate is the substance usually measured in athletes under laboratory conditions.

- (a) Describe the process which produces lactic acid in a runner during a running event. [3]
- (b) **Table 5.1** shows how the concentration of lactate in blood varies with the pace level of an untrained runner and a trained runner.

Table 5.1

Pace of the Runner / km/h	Concentration of lactate in blood / mM/L	
	Untrained Runner	Trained Runner
12	1.8	1.8
13	2.0	1.9
14	2.6	2.0
15	5.8	2.3
16	7.1	2.9
18	10.3	6.3
20	16.0	10.2

Source: The Marathon Training Center, USA (2011)

- (i) Plot a graph of the data presented in **Table 5.1** on the graph paper provided. [3]
- (ii) With reference to the data presented in **Table 5.1**, explain the relationship of training on the production of lactic acid in muscles and its effect on the performance of a runner. [4]
- 6** Clotting of blood protects the the body from the entry of foreign particles such as bacteria and fungi.
- (a) Describe how a blood clot is formed when there is a cut. [6]
- (b) Haemophilia is a inherited bleeding disease. A person suffering from haemophilia lacks a protein important to proper clotting. Suggest a treatment for haemophilia. [1]
- (c) Name and briefly discuss one other component of blood which has protective function. [3]

7 Either

- (a) Describe and explain what happens to proteins as they pass through the following regions of the alimentary canal. [6]
- (i) stomach
 - (ii) duodenum
 - (iii) the rest of the small intestine
- (b) Orlistat is a prescriptive drug given to patients who are severely overweight. It **inhibits** the action of the enzyme that catalyses the hydrolysis of fats. [2]
- (i) Based on your understanding of the mode of action of enzyme, suggest how this drug works. [2]
 - (ii) Explain how it affects the rate of fat digestion and absorption. [2]

7 Or

- (a) Describe and explain the gaseous exchange process occurring between a plant leaf and the atmosphere [5]
- (i) during the night
 - (ii) during daylight.
- (b) Explain how these processes might be affected during the day by an increase in atmospheric carbon dioxide. [3]
- (c) **Fig. 7.1** below shows a carnivorous plant, the pitcher plant. A pitcher plant has leaves that are modified to form tubes or cups. It secretes digestive enzymes into its leaf tube where insects or even small amphibians can be trapped. Suggest how this adaptation allows it to survive in nitrogen poor soil. [2]

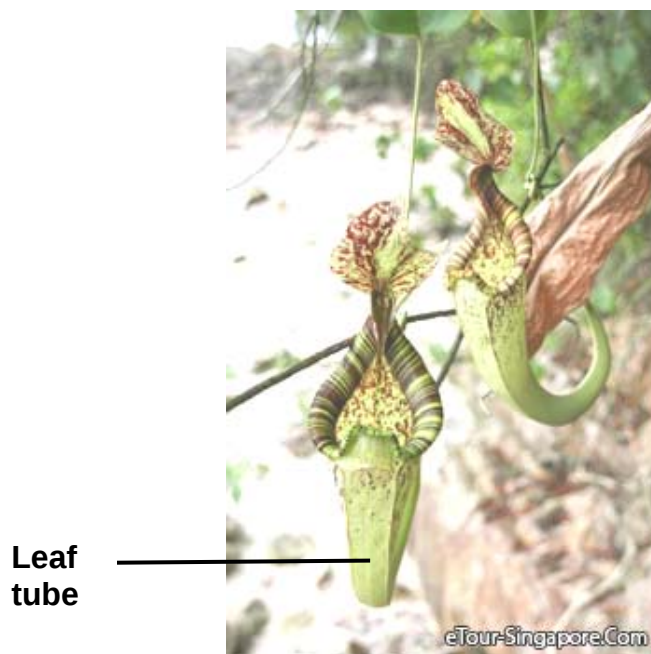


Fig. 7.1

Source: <http://www.etour-singapore.com/pitcher-plants-in-singapore.html>

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