CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT

O Level

Biology

Session: 1974 June
Type: Question paper
Code: 550

BIOLOGY 550/1

ORDINARY LEVEL

PAPER 1

(Two hours and a half)

Answer **all** *parts of Question* 1 *and any* **three** *other questions.*

SECTION 1

Answers to Section 1 *must be handed in with your answers to Section* 2, *and attached to the* **FRONT** *of your answer papers; they should be tied so that the pages will lie flat when opened.*

Candidates are advised not to spend more than one hour on Section 1.

Question 1

(*a*)

	Human milk per 100 g	Cow's milk per 100 g
Water	88 g	88 g
Protein	1·2 g	3·3 g
Fat	3·5 g	3·6 g
Lactose (milk sugar)	6·5 g	4·7 g
Ascorbic acid (Vit. C)	4 to 8 mg	0·7 to 3 mg

Comparison of human milk with cow's milk

Examine the table and answer the following questions.

(i) Which of the substances deficient in cow's milk compared with human milk is essential for energy?

.....

(ii) How would you compensate for this deficiency in the diet of a baby who is fed on cow's milk?

.....

(iii) Which of the substances deficient in cow's milk compared with human milk is essential for a baby's health?

.....

(iv) How would you compensate for this deficiency in the diet of a baby who is fed on cow's milk?

.....

.....

(*b*)

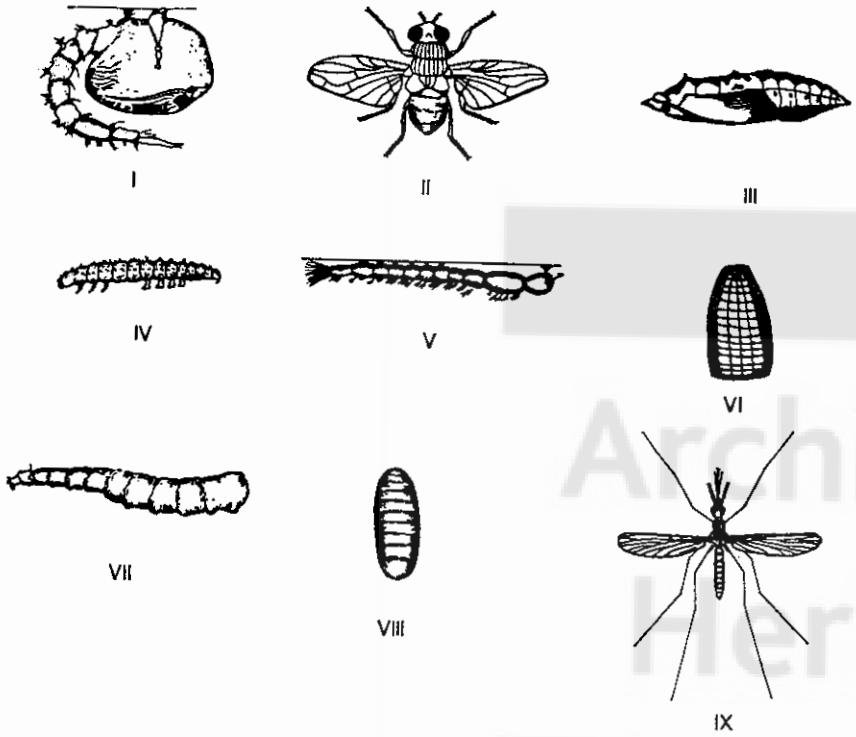


Fig. 1
All organisms are drawn to different scales.

Examine Fig. 1 and answer the following.

(i) Write down a sequence of three numbers to indicate **three successive stages** in the life history of any **one** insect species shown.

.....

.....

.....

(ii) Name the insect whose life cycle you have indicated.

.....

(iii) Name a disease spread by number II **or** a disease carried by number IX in Fig. 1.

No. ..... Disease .....

(iv) Some specimens of number VII in Fig. 1 were placed in the following experimental situations. In each case describe their behaviour.

A. Specimens placed on damp sawdust.

.....

.....

.....

B. Specimens placed in the path of a powerful light beam.

.....

.....

.....

(*c*) Complete the following sentences by adding the appropriate words chosen from the following list.

recessive	one	offspring
dominant	two	phenotype
heterozygous	three	genotype
homozygous	four	
generation	parent	

Each word may be used once, more than once or not at all.

Two guinea pigs with the ..... 'brown coat', were mated together and their seven offspring were in the ratio five brown to two white. The brown parents were of the ..... Bb, so that the white form must have been the double ..... bb. If the brown guinea pigs of the F_1 .... were then mated with the white guinea pigs of the F_2 ....., their offspring would be in the ratio of ..... brown to ..... white.

(*d*) Study Fig. 2 carefully, and then answer questions (i) to (vi).

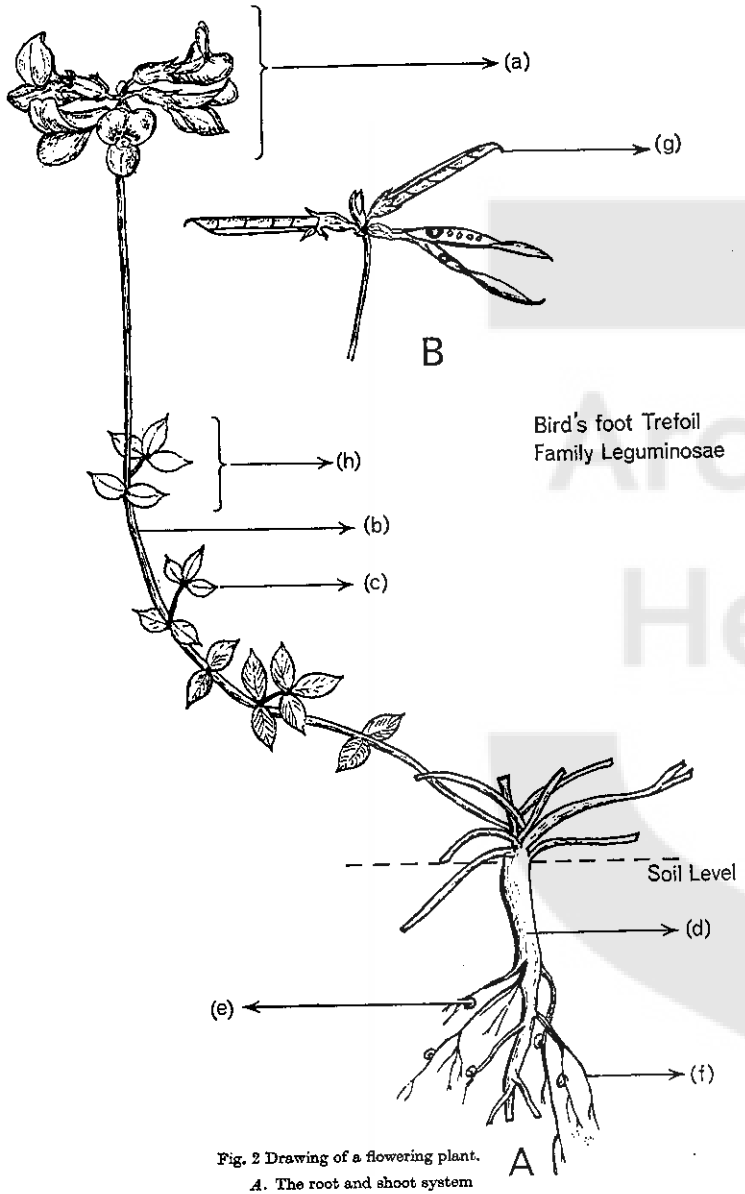


Fig. 2 Drawing of a flowering plant.
A. The root and shoot system
B. Mature fruits.

(i) Name the structures indicated in the drawing by the following letters:

(a) .....

(b) .....

(c) .....

(d) .....

(h) .....

(ii) State **three** functions of the structure labelled (f):

(iii) Name the structure labelled (e).

.....

(iv) What does (e) contain, and what are the functions of its contents?

Contents of (e) .....

Functions .....

(v) Name the structure labelled (g) at the end of the pod in drawing *B*.

.....

(vi) One of the fruits shown in drawing *B* has opened. How are the seeds dispersed?

(*e*)

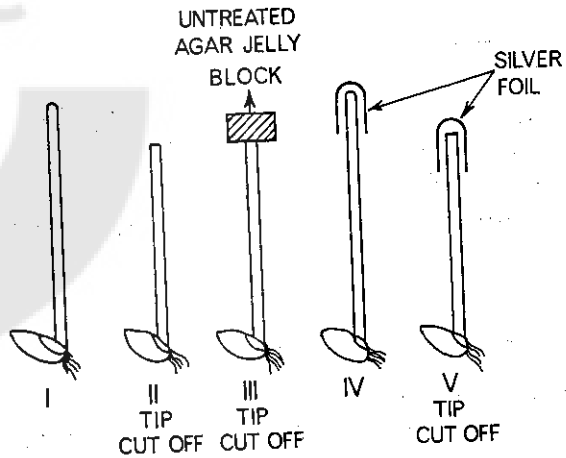


Fig. 3

Fig. 3 shows five oat coleoptiles (I–V) treated in different ways and subjected to unilateral light.

(i) Which of the coleoptiles would respond by bending after some hours of exposure to unilateral light?

(ii) What substance is produced in the plant to bring about this response?

(iii) Where is this substance produced?

(iv) What is the name given to this response?

(v) Describe briefly the control experiment that you would set up to confirm that any reaction of the coleoptile is due to unilateral light.

(*f*)

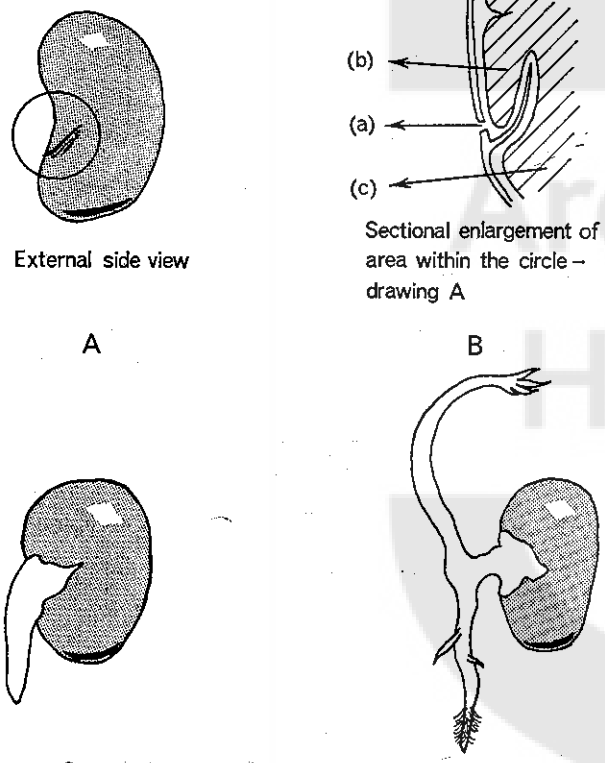


Fig. 4

The figure shows the external view of a seed and subsequent stages of its germination.

(i) What is the name and the function of the aperture labelled (a) in diagram *B*?

Name .....

Function .....

(ii) What are the names of the structures labelled (b) and (c) in diagram *B*?

Structure (b) .....

Structure (c) .....

(iii) What external conditions must be present to bring about the change from *A* to *C*?

(iv) Name **three new** structures which have grown between the stages *C* and *D*. Give **one** function of each structure named.

Structure	*Function*
1.	.....
2.	.....
3.	.....

(*g*)

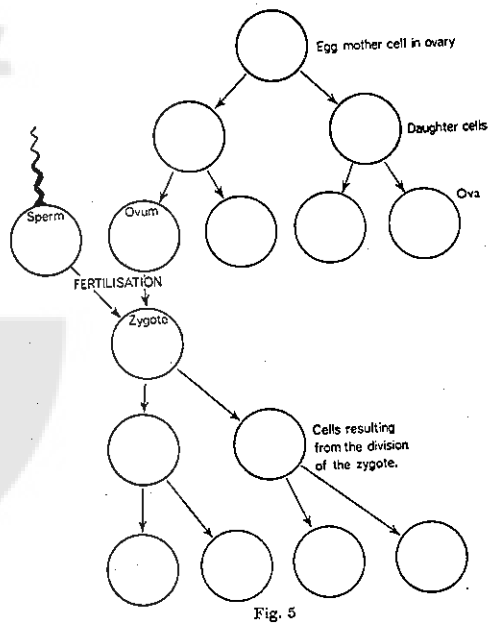


Fig. 5

Fig. 5 shows a sequence of cell divisions. The circles are purely diagrammatic and are not intended to represent the relative sizes of the cells.

Assuming that the species represented has 46 chromosomes in the nucleus of each body cell, place numbers in **each** of the circles to show the number of chromosomes in the nucleus at each stage.

SECTION 2

Answer **three** *questions from this section and hand them in with your answer to Section* 1. *All papers should be tied together securely, but loosely, so that the examiner can turn the pages over easily.*

Large labelled diagrams should be given only where they make the answer clearer.

2 (*a*) What is *humus* and why is it an important constituent of the soil? By what means could a farmer increase the humus content of his soil?

(*b*) Describe in outline how atmospheric nitrogen could eventually, and by different ways, become part of the cytoplasm in the cells of a **named** herbivore. (Details of digestion and enzyme processes are not required.)

3 (*a*) (i) What is *osmosis* and how is it involved in opening and closing stomata?

(ii) How and why are stomata important in the gaseous exchange of a leaf?

(*b*) Describe an experiment, with a control, to demonstrate that carbon dioxide is necessary for photosynthesis in a leaf.

4 (*a*) (i) What is *digestion* and why is it necessary?

(ii) What categories of foodstuff need to be digested? For each category, give an example of a food which is a good source of the foodstuff and say what end-products of digestion are formed from this foodstuff.

(iii) What other components would be needed to make up a balanced diet? Why do these not require digestion?

(*b*) (i) Outline two examples of digestion **in plants**.

(ii) What part is played in digestion by the liver?

5 (*a*) (i) What transport systems occur in a flowering plant?

(ii) What materials does each system carry?

(iii) Where do these materials come from, and where are they taken?

(iv) How would you demonstrate the presence of **one** of the transport systems mentioned in (i)?

(*b*) Describe transportation by the blood of a mammal. (Details of blood vessels are not required.)

6 For each of the following, describe where it is situated and how its functions are performed.

(*a*) contractile vacuole

(*b*) diaphragm

(*c*) relay (internuncial) neurone

(*d*) iris

(*e*) semicircular canal

7 (*a*) What are the main parts of a mammalian skeleton? Show how the various skeletal functions are performed by these structures.

(*b*) (i) Draw, and label fully, a detailed section through a mammalian joint such as a hinge joint.

(ii) Show how the skeleton and joints of an insect are constructed to serve their particular functions. To what extent are these functions the same in mammals and insects?

8 (*a*) Explain why *haemophilia* is more common in men than in women. How could a man who is **not** haemophilic have some sons who are haemophilic and others who, like himself, are not?

(*b*) When a white flowered plant was pollinated with pollen from a red flowered member of the same species the resultant seeds gave a generation of pink flowered plants.

Explain, with the help of diagrams, what you would expect the next generation of flowers to be if

(i) the pink flowered plants were allowed to self-pollinate,

(ii) the pink flowered plants were crossed with the white flowered parent.

550/2

BIOLOGY

ORDINARY LEVEL

PRACTICAL BIOLOGY

(*One hour and a half*)

Answer **all** *the questions.*

Written answers should be kept to the **lines**.

Drawings should be made in the **spaces** *provided.*

Use sharp pencils for your drawings.

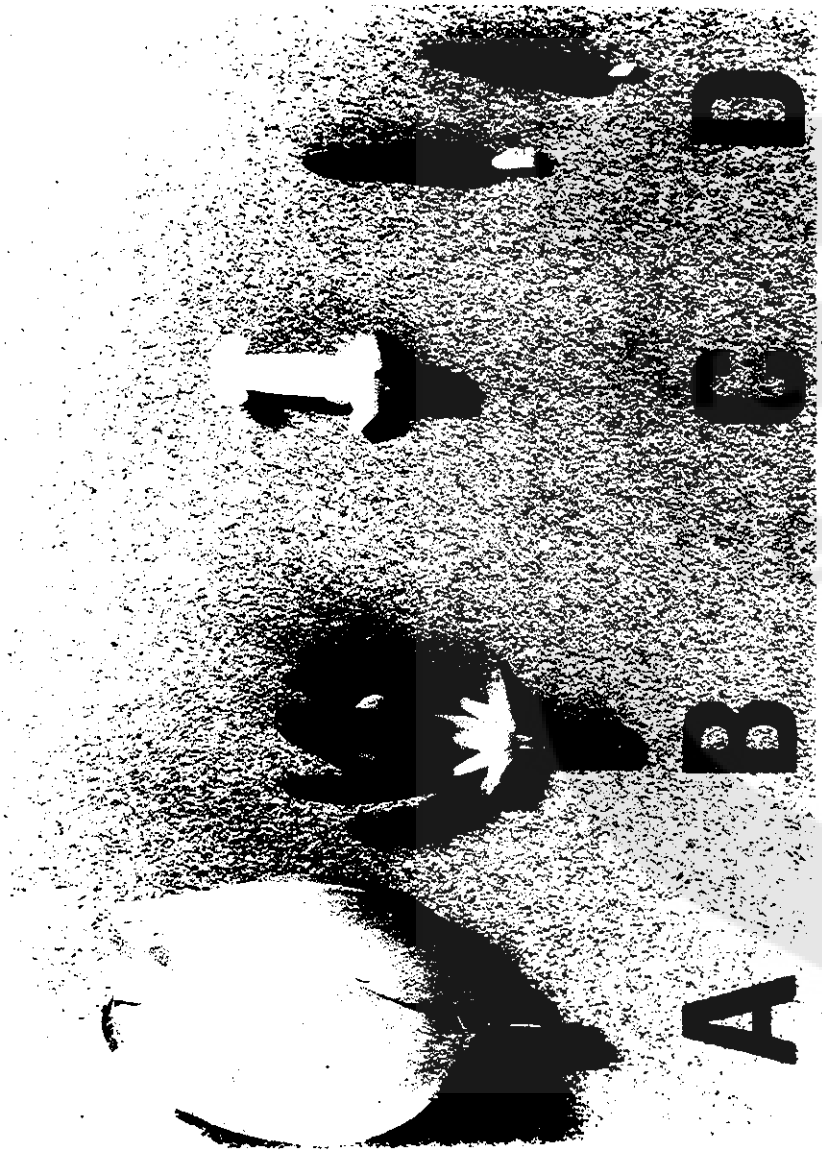
Coloured pencils or crayons should not be used.

No additional sheets of writing paper to be inserted in this book.

Work on additional sheets **will not be marked**.

Question 1

Examine carefully the structures shown in the photograph.



(*a*) Structure A is the complete flower, whereas structure B has the outer parts removed.

Name the parts removed .....

(*b*) Examine the structures B and C. Make a drawing of structure B the **same size** as in the photograph. Label your drawing fully.

(*c*) The actual length of the complete structure was 4 cm. Measure your drawing and state the magnification of your drawing. .....

(*d*) Name the parts shown in C. .....

(*e*) Name the structure D. .....

(*f*) What can you deduce **from the photograph** about the way in which this flower might be pollinated? Give your reasons.

.....

(*g*) List the changes that take place in this flower after pollination has taken place until the fruit is formed. Refer only to **external** changes.

.....

.....

Question 2

(*a*) Identify specimen **D 21**.

.....

(*b*) Make a labelled drawing of specimen **D 21**. State the magnification of your drawing.

Magnification × .....

(*c*) State the **functions** of the structures you have labelled:

Structure	*Functions*
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

Question 3

You are provided with specimen **D 22**, barley seedlings which have been germinating for 10 days.

Take the germinating seedlings and cut off the shoots and roots from the grain. Retain grain and shoots for testing.

(*a*) Crush the grain by means of the glass rod on the slide provided, and scrape half of the material into a test tube and test it with Benedict's/Fehling's solution. Leave the remainder on the slide and test with iodine solution.

Test reagent	Treatment	Observation	Deduction
Benedict's or Fehling's solution			
Iodine solution			

(*b*) Take the shoots which you have cut off and crush them on the slide with a drop of water. Scrape half of the material into a test tube and test the material with the Benedict's/Fehling's solution. Leave the remainder on the slide and test with iodine solution.

Test reagent	Treatment	Observation	Deduction
Benedict's or Fehling's solution			
Iodine solution			

(*c*) The seedlings were grown **in the dark**. Account for your results in (*a*) and (*b*). Your comments should refer to the original food reserves of the barley grain and the subsequent use of these by the growing embryo plant.

.....

.....

.....

.....

.....

D (A)

Home Centres

PRACTICAL BIOLOGY INSTRUCTIONS

PAPER 550/2

THURSDAY **20** JUNE 1974

Each candidate taking the examination to be provided with the following apparatus and materials:

Two test tubes; test-tube rack or other means to stand test tubes; means of holding test tube (folded paper is sufficient); bunsen burner; glass rod (about 15 cm is sufficient) – for crushing plant material; forceps; hand lens; scalpel or razor blade; Fehling's or Benedict's solution; iodine solution; two glass microscope slides.

A complete gill arch of the Herring labelled **D 21**.

At least two germinated barley seedlings showing split coleoptile, first leaf and roots, labelled **D 22**.

The seedlings should have been germinated **in the dark** for a period of about ten days, dependent upon the temperature. It is suggested that batches of barley fruits are germinated every day from day 15 to day 10 before the examination. They should be germinated on blotting paper or some other suitable material, but not in soil. (The seedlings should be clean and entire.)

A small packet of barley fruits is enclosed with these instructions.

(**D 21** can be shared one between two candidates.)

At schools where, under examination conditions, laboratory facilities are limited, Supervisors are permitted to make special arrangements for the sharing of apparatus.

In order to minimize the disadvantages of a practical examination at which the Examiner is not present, the teacher responsible for the practical examination is asked to complete the report form on the back of the first script where information concerns all candidates.

It is recognized that it may sometimes be impossible to provide certain specimens. If substitutions are necessary the specimen selected must be as near as possible to the one that is displaced. **No substitution may be made without first consulting the General Secretary at Syndicate Buildings.**

Should schools find difficulty in meeting examination requirements from stock or by other means, they may like to know that on this occasion specimens can be purchased from the Syndicate. Orders should be made on the special order form DKLST supplied with the covering circular QPD/3/KFM.

In order to check the suitability of apparatus and material the teacher responsible for preparing the examination is allowed to consult the question paper ten days before the paper is worked. The question paper must then be **replaced in the envelope, re-sealed and kept under lock and key with other question papers until the day of the examination.**

PRACTICAL BIOLOGY INSTRUCTIONS

PAPER 550/2 **D (A)**

THURSDAY **20** JUNE 1974 **(CARIBBEAN)**

Each candidate taking the examination to be provided with the following apparatus and materials:

Two test tubes; test-tube rack or other means to stand test tubes; means of holding test tube (folded paper is sufficient); bunsen burner; glass rod (about 15 cm is sufficient) – for crushing plant material; forceps; hand lens; scalpel or razor blade; Fehling's or Benedict's solution; iodine solution; two glass microscope slides.

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