CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT

O Level

Biology

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Type: Question paper
Code: 550

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550/1

BIOLOGY

ORDINARY LEVEL

PAPER 1

(Two hours and a half)

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

SECTION 1

Answer **all** *parts of the question.*

1 (*a*) The following two experiments were carried out with oat seedlings. In Experiment 1, three groups of oat seedlings of the same size were used. The plants in the first group were left intact to serve as a control. The tip was cut from the coleoptiles in the second group and then the tip was replaced on the cut surface of the plant. In the third group the tip was cut off and discarded. All the plants were then grown in the dark for 4 hr.

In Experiment 2, three groups of oat seedlings were used. The first was left untreated. In the second group the tip of each plant was cut off and a block of thin agar 1 mm. thick was placed on the top of the cut coleoptile. The tip was then put back on top of the agar. [*Note.* Agar permits diffusion.]

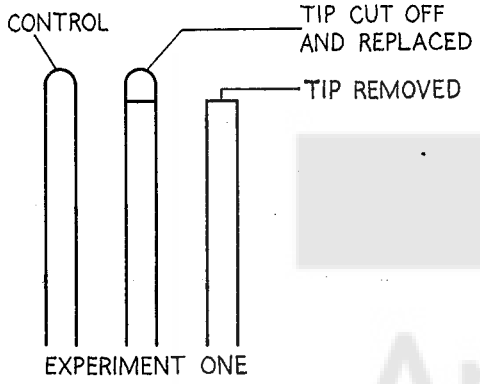

Fig. 1

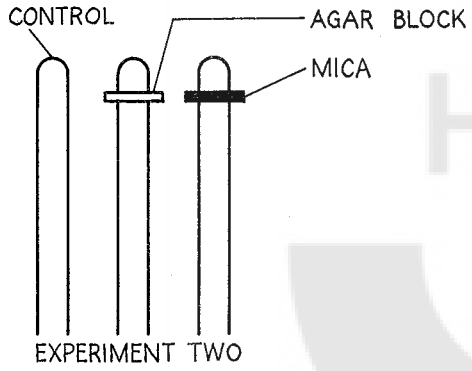

Fig. 2

The tips were removed from the plants in the third group but a thin sheet of mica, which prevents diffusion, was placed on the cut coleoptile before replacing the tip. All plants were then grown in the dark.

What results would you expect in each experiment? Give reasons.

If the plants in Experiment 2 were illuminated from the right side only at the beginning of the experiment, what results would you expect after a few hours? Give reasons.

(*b*) The table below indicates the changes in body temperature, metabolic rate, heart rate and respiration which take place when a marmot (a small mammal) hibernates.

	Non-hibernating	Hibernating
Body temperature	34–39° C.	3–8° C.
Basal metabolism (cal. per sq. metre of body surface per 24 hr.)	410	27
Heart rate per min.	80	4–5
Respiratory rate per min.	25–30	0·2

Account for each of the changes shown.

(*c*) A living frog was placed on a board as shown in Fig. 3 with one of its hind feet extended over the hole in the board.

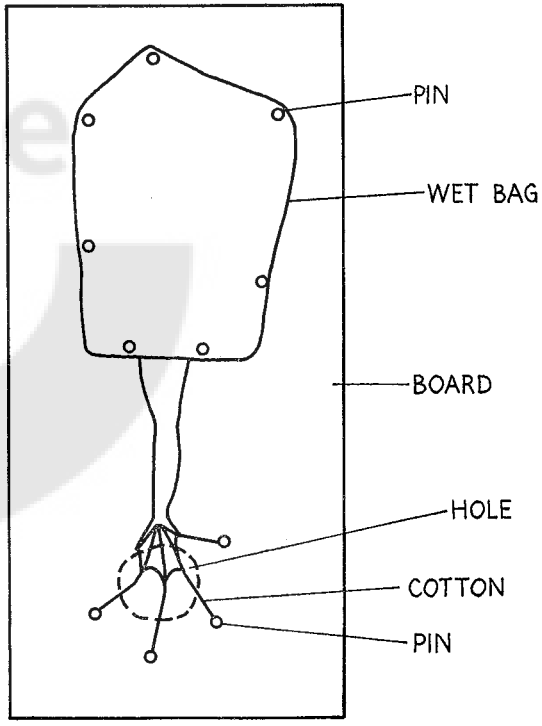

Fig. 3

The board was placed on the stage of a microscope and the web of the foot was examined under low power.

What would you expect to see if you carried out this examination?

(*d*) A textbook gives the following instructions for carrying out an experiment:

(i) Sterilize enough sand to fill two flower pots which have also been sterilized. Cool the sand and fill the pots.

(ii) Wash ten legume (e.g. lupin) seeds with a fungicide and then rinse them with distilled water and allow them to dry.

(iii) Crush some legume roots and place them in a little distilled water and stir until the water looks milky.

(iv) In one flower pot place five of your seeds.

(v) In the other flower pot put the other five seeds and pour on some of the liquid from the crushed legume roots.

(vi) Place both pots in a similar dark place and water from time to time with nitrogen-free culture solution.

(vii) When germination is visible place the pots in a well-lighted room.

What is the purpose of the experiment?

What results would you expect? Account for the operations given in the instructions.

Section 2

Answer **four** *questions from this section.*

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

2 Point out any similarities in the structure and nutrition of *Amoeba* and *Mucor* (or *Rhizopus* or *Penicillium*).

Why is *Amoeba* considered to be an animal? Why is the mould fungus you selected classed as a plant although it lacks chlorophyll?

What is the economic importance of mould fungi?

3 **Either** (*a*) Describe how water in the soil is absorbed by the roots of a plant, and indicate how some of the water may eventually reach the leaf and be transpired.

Or (*b*) Describe how water in the alimentary canal of a mammal is absorbed, and indicate how some of the water may eventually reach the skin and be exuded in sweat.

4 Make a large labelled drawing to show the structure of a grass flower you have studied. How is pollination brought about in flowers of this type? What experiments could you carry out to confirm your statements?

5 In what ways are (*a*) the wings of birds, (*b*) the fore limbs and hind limbs of mammals, adapted for locomotion?

You should restrict your answer to **one** bird and **one** terrestrial mammal that you have studied.

6 (i) What do you understand by 'respiration'?

(ii) Why is the burning of sugar in a test-tube considered not to be respiration?

(iii) How would you attempt to show experimentally that the process of respiration occurs in micro-organisms?

7 Write an account of the external and internal changes that occur (*a*) when a seed germinates to form a seedling; (*b*) when a caterpillar forms a pupa and then an imago.

8 (*a*) What are viruses, and why is a study of viruses important?

(*b*) How would you demonstrate the action of catalase? Where is this enzyme found in a mammal, and what is its function?

(*c*) What is adrenalin? Briefly state its functions.

9 Describe a simple ecological study you have carried out to investigate the relationships of living organisms to their environment.

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BIOLOGY

ORDINARY LEVEL

PAPER 2. PRACTICAL BIOLOGY

(One hour and a half)

Answer **all** *the questions.*

Answers should be worked on **both** *sides of the plain paper provided.*

1 (i) Examine specimen **D 1** and make a large labelled drawing of it.

(ii) What type of plant organ is **D 1**? Give your reasons, and state how you think **D 1** was produced by the parent plant.

(iii) Given suitable conditions, how would **D 1** grow, if it is planted?

(iv) Test **D 1** for starch and reducing sugars. State how you carry out your tests and write down your results.

(v) Examine **D 2** and list the ways in which it differs from **D 1.**

2 (i) Describe specimen **D 3.**

(ii) Remove the external fatty tissue from the outside of **D 3**, taking care not to cut off the optic nerve. Describe the position of this nerve.

(iii) Place **D 3** with the front surface (i.e. the cornea) downwards in the dish provided. Cut it around the 'equator' and lift off the top hemisphere. Remove the jelly-like contents from the lower hemisphere with forceps and seeker. Identify this jelly and state its functions.

(iv) Describe the position of the lens inside **D 3** and then remove it carefully. Comment on the shape and structure of the lens, and explain how they are related to the functions of the lens.

(v) Investigate the structure of the eyeball, and describe the layers and their functions. When describing the internal layer reference should be made to the position and appearance of the blind spot.

D

ORDINARY LEVEL

PRACTICAL BIOLOGY INSTRUCTIONS

PAPER 550/2

Each candidate taking the examination is to be provided with:

(i) a hand lens, a scalpel or sharp penknife or razor blade, a pair of scissors, a pair of forceps, a seeker, a small dish, e.g. a saucer; Iodine solution, Fehling's solution (or Benedict's solution), test-tubes and rack or other means to stand the tubes; test-tube holder, bunsen.

(ii) **D 1**, a Jerusalem artichoke.

(iii) **D 2**, a carrot without leaves.

(iv) **D 3**, a preserved ox eye.

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 attached report form *and return it with the scripts*.

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.**

Messrs T. Gerrard and Co., Ltd., Gerrard House, Worthing Road, East Preston, nr Littlehampton, Sussex; Messrs Flatters and Garnett, 309 Oxford Road, Manchester; and Messrs Harris Biological Supplies Ltd., Oldmixon, Weston-Super-Mare, Somerset, have been given full details of the specimens required. Schools wishing to purchase their specimens from one of these firms are advised to send their orders to the firm of their choice as early as possible. It should be understood that the financial responsibility for such transactions belongs to the schools concerned and not to the Syndicate. Orders, which must be made on the enclosed card, must be sent in *a sealed envelope*. At the time of printing it is not possible to give any indication of the price per specimen. If such information is required, schools should write direct to the suppliers and not to the Syndicate.

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.**