



A Level

Biology

Session: 1957 June
Type: Question paper
Code: 30

DISPATCH OF DISSECTIONS AND RETURN OF SPECIMENS

A label bearing the candidate's number in pencil (not indelible) must be firmly fixed with string to the actual dissection. Each dissection is to be covered with a pad of cotton wool soaked in 2% formalin and then wrapped in waxed paper (wrappings from packets of breakfast cereals are excellent). The dissections, together with all slides and specimens, are to be returned to Cambridge in the containers in which they were sent to the school. Addressed labels are provided and the box(es) containing the dissections and specimens must be clearly marked on the outside with the centre number and name of the school. **If this is not done, sorting is made very difficult and schools may not be credited with having returned their specimens. Specimens not returned in good condition will be charged to the school.**

BIOLOGY

212

ADVANCED LEVEL

PAPER I

*(Two hours and a half)**Answer five questions.*

Candidates should give labelled diagrams where they make the answer clearer.

1. Show how the skin of a **named** fish and of a **named** mammal is adapted for the special conditions of aquatic and terrestrial life. Discuss the significance of their skin colour.
2. Green plants absorb nitrogen in the form of nitrates from the soil; green plants are eaten by animals; animals excrete nitrogen in the form of urine (or urea). Trace what happens in plants and animals during this part of the nitrogen cycle.
3. Buds occur on **annual** green plants and there are "buds" on *Hydra*. Give an account of the structure and function of each.

4. Describe and compare the female reproductive organs of a frog and a **named** mammal. Give details of how the young of each animal are supplied with nutrients until they are able to feed independently.

5. Striped muscle fibres are found in mammals and xylem fibres are found in flowering plants. Describe, with the aid of diagrams, their structure and functions.

6. With the aid of diagrams, describe the structure and reproduction of *Mucor*. Compare its method of nutrition with that of any **named** parasitic fungus.

7. What do you understand by "alternation of generations"? Illustrate your answer by reference to a flowering plant, *Pellia* (or *Funaria*) and *Spirogyra*.

8. Describe **three** experiments from the results of which you can deduce the essential features of aerobic respiration in plants.

9. Write an essay on the control of disease in plants and animals.

BIOLOGY

213

ADVANCED LEVEL

PAPER II

*(Two hours and a half)**Answer five questions.*

Candidates should give labelled diagrams where they make the answer clearer.

1. Define transpiration and translocation. How would you show experimentally, using potted plants, the effect of changes in external conditions upon transpiration?
2. To what do you attribute the biological success of insects?
3. "More animals are born than can possibly survive" (C. DARWIN). Discuss this statement in relation to the theory of natural selection.

4. Describe the life-histories of **two** animals and **two** plants found in any **one** habitat you have studied, and point out the ways in which the life-histories are adapted to the particular environment.

5. Describe the blood vascular system carrying blood to and from the liver of a **named** mammal, and compare the composition of the blood in the vessels you have named.

6. By means of labelled diagrams, show the structure of the stem of a woody plant. How is the structure correlated with the functions of the stem?

7. Describe the female reproductive organs of a **named** flower. Show with the aid of diagrams what happens to these organs from the time of pollination until the seed leaves the plant.

8. Compare and contrast the ways in which animals and plants respond to the stimulus of light.

9. Why are chemical fertilisers used on agricultural land? What particularly valuable properties does the dung of domestic animals have as manure?

BIOLOGY

214

ADVANCED LEVEL

PRACTICAL TEST

(Three hours)

The examiners expect candidates to spend on each question approximately the time indicated in brackets at the end of the question.

All drawings must be made on plain paper and, if possible, the answers should be tied up in the set order.

1. Dissect the frog provided, **K1**, to display (a) the alimentary canal, (b) the glands associated with the alimentary canal, (c) the hepatic portal system. Proceed as follows:

(i) Pin out the frog, ventral side uppermost, on the cork provided and open the body cavity under water.

(ii) Remove the median portion of the pectoral girdle, and in the case of the female remove also the ovaries and oviducts.

(iii) Displace the lobes of the liver, the stomach and the small intestine, holding them in position by suitably placed pins, so that the hepatic portal system may be traced and displayed.

Make an accurate drawing of your dissection, labelling the organs and the veins of the hepatic portal system displayed.

(75 minutes.)

2. You are provided with (a) 0.5% starch solution, (b) solution **K 2**. Carry out the following instructions and tabulate your results.

(i) Make up the contents of three test-tubes as follows:

Tube 1. 10 c.c. starch solution.

Tube 2. 10 c.c. starch solution, 5 c.c. solution **K 2**.

Tube 3. 10 c.c. starch solution, 5 c.c. solution **K 2** which has been previously boiled for about one minute.

(ii) Place the three test-tubes in a beaker of water maintained at approximately 35–40° C. and leave them there while performing the remaining tests.

(iii) After one minute test the contents of each tube with iodine solution and continue testing at one-minute intervals, for a period of 15 minutes. [These tests may be done conveniently by placing a series of drops of iodine solution on a white tile, and adding to them a drop of liquid from each tube in turn.]

(iv) Finally, test the contents of each tube with Fehling's solution.

Give a concise explanation of your results, suggesting the identity of solution **K 2**. (50 minutes.)

3. Cut transverse sections of specimen **K 3**, stain selected sections to differentiate the lignified tissues, and mount them temporarily for microscopic examination.

Make an accurate labelled plan diagram to show the disposition of the tissues in a complete section. (55 minutes.)

BIOLOGY**215**

SCHOLARSHIP PAPER

PAPER III

(Two hours and a half)

Answer **four** questions, including at least **one** from each Section. Candidates should give labelled diagrams where they make the answer clearer.

SECTION A

1. Write an essay on "The response of living organisms to the force of gravity."
2. Discuss the cell concept in plants and animals. Comment briefly on the function of the different parts of the cell.
3. What did Mendel discover? How did his discoveries influence the theory of Evolution?

SECTION B

4. What are hormones? How do they play their part in the physiology of a mammal?
5. What groups of "worms" parasitize man and domestic animals? Considering specific examples, explain why a knowledge of their life-histories is important in controlling them.
6. In what ways does social life in insects differ from the social life of man?

SECTION C

7. Discuss the ways in which perennating plants store food reserves. What advantages does man take of the fact that plants do this?
8. What is meant by the germination of a seed? Discuss the part played by enzymes during this process.
9. Write an essay on sugars in plants.

PRACTICAL BIOLOGY INSTRUCTIONS**K**

PAPER 214 (ADVANCED LEVEL)

THURSDAY, 4 JULY 1957

Each candidate must be provided with the following:

- (i) Dissecting instruments, dissecting dish and pins, a hand lens.
- (ii) Test-tubes and stand, 400 ml. beaker, glass rods, 10 ml. graduated pipette, thermometer 0–100° C., bunsen burner, tripod, wire gauze, white tile, iodine solution, Fehling's solution.
- (iii) Razor for section cutting, watch glasses, slides, cover glasses, microscope, and stains normally used by candidates.

If there is a shortage of microscopes or other apparatus, the supervisor in charge of the examination may direct a candidate to start with a particular question and may limit the time during which the microscope or apparatus may be used. Each candidate must have the sole use of a microscope for at least one and a half hours.

THE FOLLOWING MATERIALS ARE TO BE PROVIDED LOCALLY:

- (i) 0.5% starch solution, labelled as such, which is free from reducing sugar; it should be tested just before the examination to ensure that no reducing sugar is present.
- (ii) 0.2% diastase solution; the solution, to be labelled "Solution K 2." Candidates are to be provided with not less than a boiling tube full of each of these solutions.

THE FOLLOWING MATERIALS WILL BE SENT FROM CAMBRIDGE:

- (i) Plain paper for drawings.
- (ii) Animal for dissection, together with cork mats on which the dissection is to be pinned by the candidate and returned to the examiner.
- (iii) Plant material for sectioning; one tube per candidate, labelled specimen K 3.

The parcels containing the animals for dissection should be opened immediately on arrival. The animals for dissection should be kept moist with 2% formalin; they should be well rinsed with water before being given to the candidates.

QUESTIONNAIRE.

In order to minimise 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 **enclose it with the scripts.**

LABELLING, PACKING AND DISPATCHING OF DISSECTIONS TO THE EXAMINER.

A label bearing the school's centre number and the candidate's index number, written in pencil (**not indelible**), should be attached to each dissection with string.

Each candidate's dissection should be left pinned to the cork mat as it has been drawn, covered with a small pad of cotton wool soaked in 2% formalin and wrapped in waxed paper (waxed paper from breakfast cereal packets is suitable); it should be placed in the tin in which it was sent from Cambridge and posted to

MR S. A. COLE,
"DIANTHUS,"
HAROLD ROAD,
UPPER NORWOOD,
LONDON, S.E. 19.

RETURN OF SPECIMENS TO CAMBRIDGE.

All slides, non-perishable specimens and the tins and tubes in which the specimens were sent must be returned to Cambridge. Addressed labels are supplied for this purpose. **The centre number and name of the school must be written on this label. If this is not done, sorting is made very difficult, and schools may not be credited with having returned their specimens.** Non-perishable materials not returned in good condition will be charged to the school.