

P530/2
BIOLOGY
(Theory)
Paper 2
Nov./Dec. 2018
2½ hours



UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

BIOLOGY
(THEORY)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of six questions.

Answer question one in section A plus three others from section B.

Candidates are advised to read the questions carefully, organise their answers and present them precisely and logically, illustrating with well labelled diagrams where necessary.

SECTION A (40 MARKS)

1. Figures 1 and 2 show the results of experiments carried out on two species of flour beetle, *Tribolium* and *Oryzaephilus*, which were grown together in slightly different environments. In figure 1 *Tribolium* and *Oryzaephilus* were grown in plain flour culture while in figure 2 they were grown in a culture which had glass tubings. For each experiment four adult beetles of each species were introduced in the culture and the population size of each species was determined at regular intervals. Study the information and answer the questions that follow.

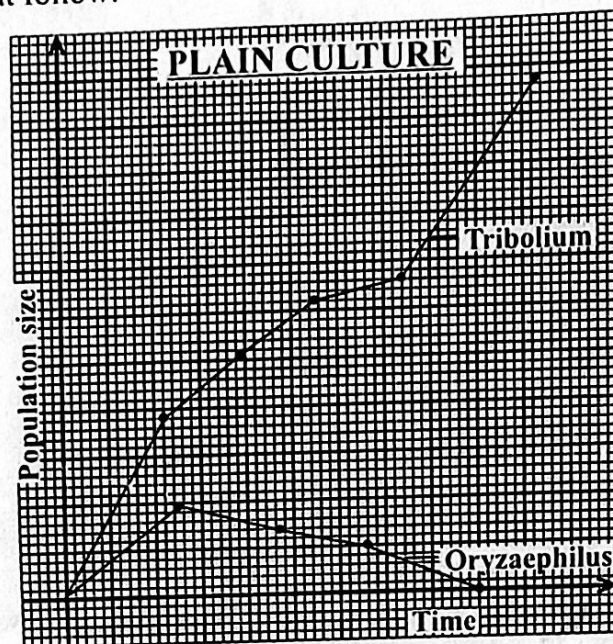


Fig. 1

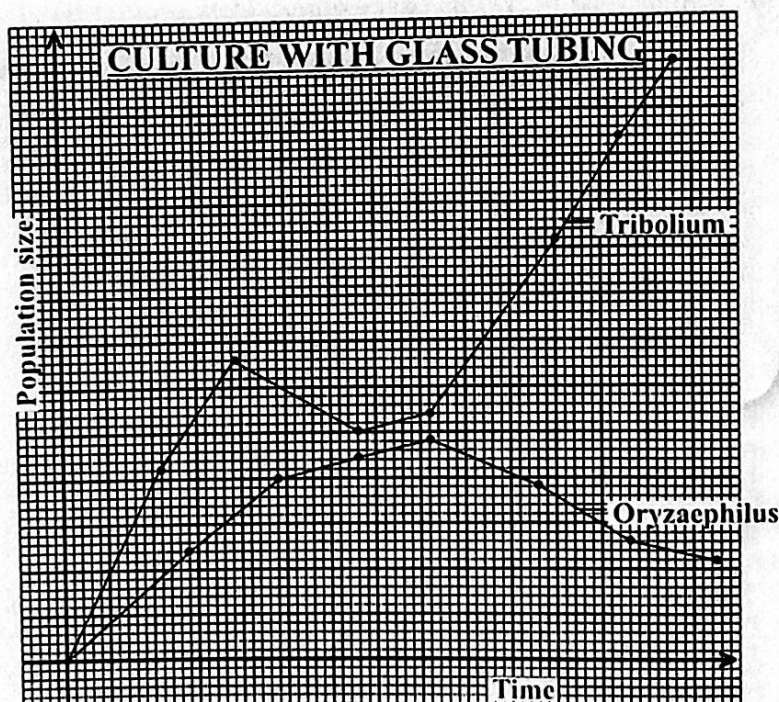


Fig. 2

- (a) Compare the population growth during the time of the experiment for *Tribolium* and *Oryzaephilus* beetles in:
- (i) figure 1. (06 marks)
 - (ii) figure 2. (07 marks)
- (b) Explain the population growth of the two species in:
- (i) figure 1. (05 marks)
 - (ii) figure 2. (05 marks)
- (c) Suggest what is being demonstrated by the interaction of the two species in:
- (i) figure 1. (03 marks)
 - (ii) figure 2. (04 marks)
- (d) From the interaction of the species in figures 1 and 2, explain the effects of interspecific competition. (05 marks)
- (e) Suggest what would happen if:
- (i) the experiment in figure 2 was continued for some time. (2½ marks)
 - (ii) *Oryzaephilus* beetle was grown alone. (2½ marks)

SECTION B (60 MARKS)

Answer three questions from this section.

2. (a) Giving examples, explain the effect of:
- (i) increased selection pressure on a population. (07marks)
 - (ii) stabilising selection pressure on a population. (07 marks)
- (b) Explain how comparative anatomy supports the process of evolution. (06 marks)
3. (a) Describe structural characteristics of cells of meristematic tissues. (03 marks)
- (b) Distinguish between apical and lateral meristems. (03 marks)
- (c) Describe structural adaptations of vascular tissues for support. (14 marks)

4. In *Drosophila*, the gene for wing length and shape of the abdomen are sex linked. The genes for long wing and broad abdomen are dominant over those for vestigial wings and narrow abdomen.
- (a) Work out the phenotypes resulting from a cross between a vestigial winged and broad abdomen male and a homozygous long winged and narrow abdomen female fly in the
- (i) F_1 generation. (06 marks)
- (ii) F_2 generation. (04 marks)
- (b) A cross between a female from the F_1 generation in (a) (i) with a vestigial winged and narrow abdomen male fly gave the following results;
- Long winged, narrow abdomen flies = 35.
Long winged, broad abdomen flies = 17.
Vestigial winged and narrow abdomen flies = 36
Vestigial winged, broad abdomen flies = 18.
- Account for the phenotypes and their relative numbers in the cross. (05 marks)
- (c) Explain why *Drosophila* are commonly used in genetic experiments. (05 marks)
5. (a) Explain the factors that affect the rate of heart beat in mammals. (06 marks)
- (b) Describe:
- (i) the initiation and control of heart beat in humans. (10 marks)
- (ii) maintenance of blood flow in humans. (04 marks)
6. (a) What advantages do endotherms have over ectotherms? (03 marks)
- (b) Explain the body responses of endotherms to cold environmental conditions. (08 marks)
- (c) Describe the role of the following in temperature regulation.
- (i) Thermoreceptors. (04 marks)
- (ii) Hypothalamus. (05 marks)