



**ELIZADE UNIVERSITY,
ILARA-MOKIN,
ONDO STATE**

FACULTY: BASIC & APPLIED SCIENCES

DEPARTMENT: BIOLOGICAL SCIENCES

SECOND SEMESTER EXAMINATION

2013/2014 ACADEMIC SESSION

COURSE CODE: BIO 202

COURSE TITLE: ECOLOGY and EVOLUTION

DURATION: 2 HOURS

SIGNATURE

INSTRUCTIONS

NAME:.....MAT.No:.....

HOD's

SECTION A EVOLUTION MULTIPLE CHOICE QUESTIONS

Circle the correct answer. Answer all

- 1 A researcher studying the evolution of flight in birds is focusing on:
 - A. Microevolution
 - B. Macroevolution
 - C. The bottleneck effect

2. What was the mechanism of evolution that Darwin proposed?
 - A. Natural Selection
 - B. Macroevolution
 - C. Genetic drift
 - D. Chromosomal basis of inheritance

- 3 In every population there is variation. It is important that this variation
 - A. Involves a variety of colors
 - B. Is heritable
 - C. Is not noticeable
 - D. Is acquired during an organisms lifetime

- 4 During natural selection, some organisms will survive & reproduce better than others. This is due to:
 - A. Random chance
 - B. Humans choosing which animals to breed
 - C. Environmental pressures resulting in organisms with certain traits having the best reproductive success
 - D. Luck

- 5 Which statement about adaptation is NOT true?
 - A. A species may become adapted to its environment in response to environmental pressures.
 - B. A species is perfectly adapted to its environment from the beginning.
 - C. As favored traits spread through the population, a species will become adapted to its environment.
 - D. When an environment changes, or when individuals move to a new environment, natural selection may result in adaptation to the new conditions, sometimes this results in a new species.

- 6 How can allele frequencies change from one generation to the next?
 - A. Genetic drift

- B. Natural selection
- C. Mutation
- D. Migration
- E. All of the above

7 Which of the following is NOT due to random chance?

- A. Genetic drift
- B. The bottleneck effect
- C. Natural selection
- D. The founder effect

8 After a catastrophe reduces the size of a population, the survivors may have a different set of allele frequencies. This is called

- A. The bottleneck effect
- B. Natural selection
- C. The founder effect
- D. All of the above

9 Which of the following could be considered a definition of evolution?

- A. a change in the genetic makeup of an individual
- B. a change in environmental conditions
- C. a change in the physical characteristics of an individual
- D. a change in the gene pool of a population

10 Which of the following statements is true?

- A. Natural selection acts directly on phenotype, but populations evolve.
- B. Natural selection acts directly on genotype, but individuals evolve.
- C. Natural selection acts directly on a population's gene pool, but individuals evolve.
- D. Natural selection acts directly on individuals, but genes evolve.

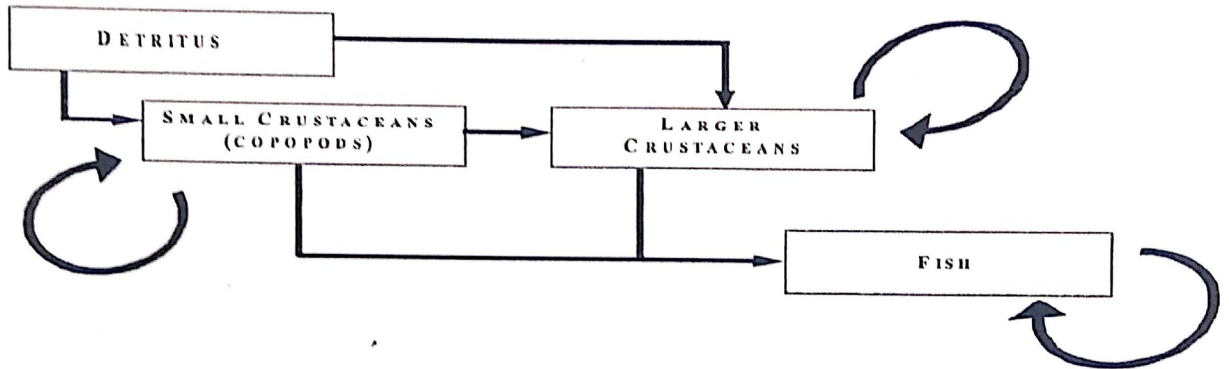
SECTION B ECOLOGY ANSWER ALL SHORT ANSWERS

1 The bathypelagic zone refers to water of a depth deeper than 1000m. 74% of the volume of the worlds oceans are bathypelagic. This make the bathypelagic zone the biotic space of the greatest volume on earth. However although huge in volume the Bathypelagic zone is very sparsely populated. The temperature of this zone varies from 1to 5°C, nutrients are in a reasonable supply and O₂ is not a limiting factor. Light intensity is 6×10^{-9} % that of the surface light intensity.

The following diagram shows a general food web for the bathypelagic zone

BATHYPELAGIC FOOD WEBS

The bathypelagic zone is the deep ocean. No light reaches this depth from the surface therefore there are no photosynthetic 1st producers. Therefore energy is very scarce and food webs only have 2 or 3 links because of this and because of the frequency of size-unrelated omnivory and cannibalism. O₂ is low but not the critical factor that energy is, therefore the defining features of creatures in this zone are those of energy conservation. Plankton conc. At this depth is very low 0.01 mg/m³, one 7mg copepod in a box 9m x 9m x 9m (deep water plankton has fallen from above). All animals in bathypelagic zone are ectotherms



a Using the information given, explain why the food web does not include producers

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(2 marks)

b Explain why does the food chain contain so few links

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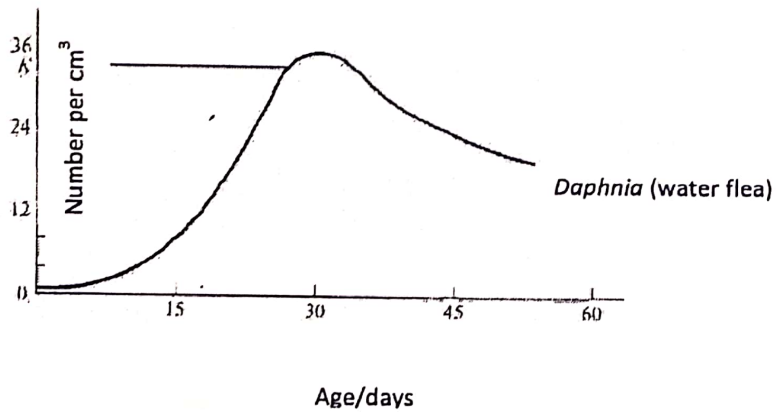
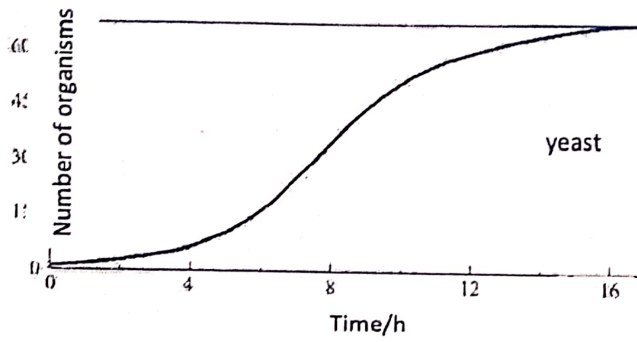
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(2 marks)

c From the information presented above and your answers to 1 & 2, would you expect creature in the bathypelagic zone to be ectotherms or endotherms. ["warm or cold blooded"]

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2 Two types of population growth curve:



a) Compare the growth patterns exhibited by the two populations.

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[3marks]

b) Suggest an explanation for the growth pattern exhibited by the Daphnia.

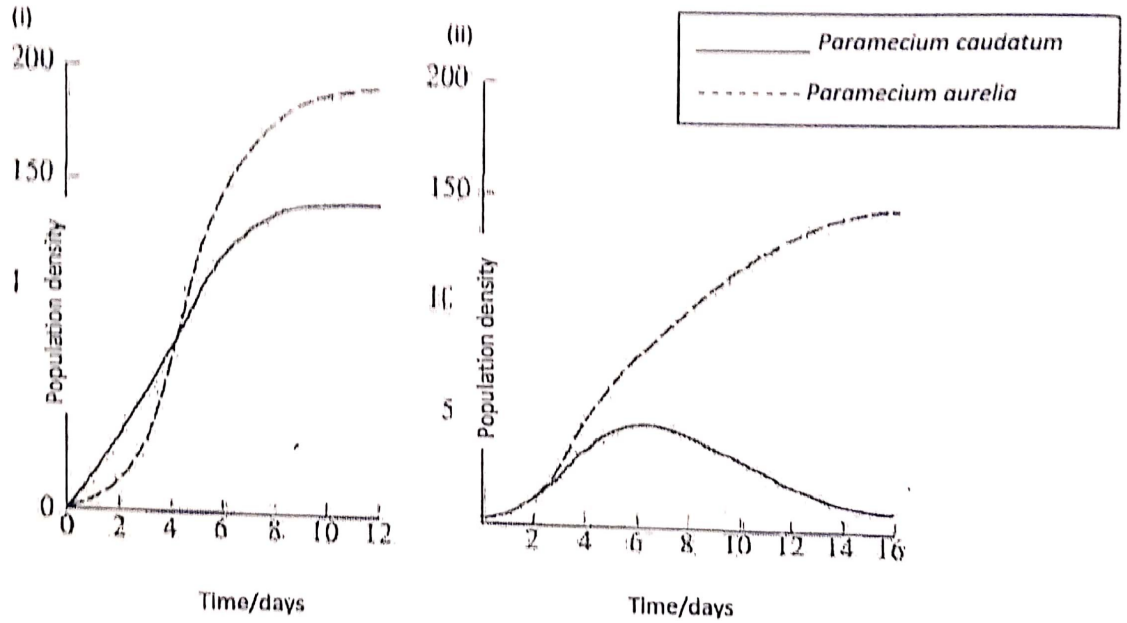
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[2marks]

3. Interspecific competition between two species of *Paramecium* (i) cultured separately; (ii) cultured together.



a) Compare the growth curves of the two species when cultured separately.

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[2 marks]

b) Describe how the growth patterns exhibited by the 2 species were different when cultured together.

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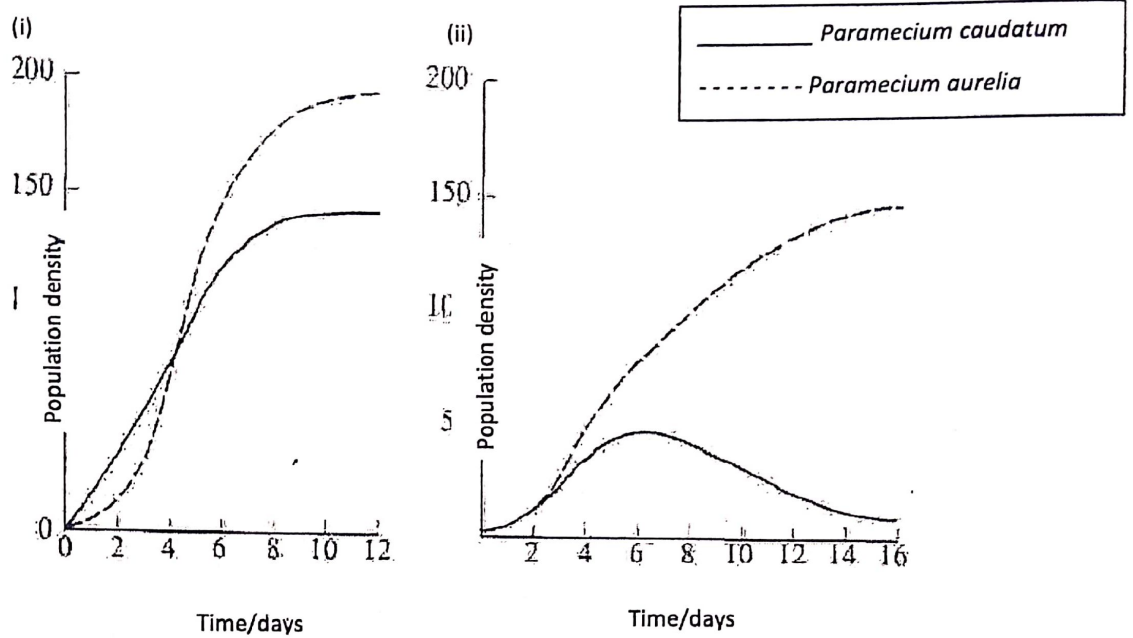
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[2 marks]

c) By referring to principles of interspecific competition, suggest an explanation for these differences.

3. Interspecific competition between two species of *Paramecium* (i) cultured separately; (ii) cultured together.



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[2 marks]

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SECTION C ECOLOGY & EVOLUTION

ANSWER QU. 1 OR 2 and 3 - 5

1] What is evolution? Discuss the different types of Evolution!

2] What are the evidences in support of the theory of Evolution?

3] a) In Evolution are basically similar structures that have been modified for different functions. Give 3 examples.....

b) What do such structures in a) indicate in evolution?.....

c) Structures that serve the same function but are quite dissimilar in both structure and development are Give 3 examples.

d) Which two of the examples listed above can be both a) and c).....

e) Nonfunctional remnants of structures in organisms that were functional in their ancestors are termed Give 3 examples

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4] Parasites are organisms that live on or in host organisms. The populations of many organisms may be reduced by the effects of parasites. Feather mites are small parasites found on the wing feathers of many birds. The mites feed on the oil that the birds produce. This oil keeps the feathers in good condition.

Birds unable to oil their feathers properly use more energy in maintaining their body temperature. This results in less energy being available for other processes.

Scientists investigated the relationship between the numbers of feather mites and the breeding success of one species of bird, the great tit.

(a) Use the information above to suggest how feather mites could affect breeding in

great tits,

[2 marks]

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(b) The scientists located a large number of great tit nests. They sampled these at random.

For each nest they recorded

- the total number of eggs laid
- the number of chicks that hatched from the eggs
- the number of chicks that survived to leave the nest

- the total number of feather mites on the two parent birds.

4 (b) (i) Explain why the scientists sampled the nests at random.

(2 marks)

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The scientists calculated the percentage of each pair's eggs from which chicks survived to leave the nest. They called this 'breeding success per pair'.

The table shows some of the data that the scientists obtained.

Total number of feather mites on both parent birds	Breeding success per pair
0	86
2	100
5	64
10	82
14	70
15	85
170	42

4 (b) (ii) Do these data support the hypothesis that the presence of feather mites reduces the ability of great tits to reproduce successfully? Give reasons for your answer. [3 marks]

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4 (c) The oil that a great tit puts on its feathers is made in an oil gland at the base of the tail.

The bird uses its beak to spread the oil over its feathers. This is called preening.

Preening takes place in early morning and evening and empties the oil gland each

5 (a)

Great tits, *Parus major*, are birds that form male-female pairs. The male of each pair then establishes an area of territory, which he defends against other great tits by singing and threat displays.

The birds build a nest within the territory in which the eggs are laid and young chicks are reared. Weasels, *Mustela nivalis*, are predators which eat eggs and young chicks.

Fig. 6.1 shows how the territory size of great tits affects the risk of nest predation by weasels.

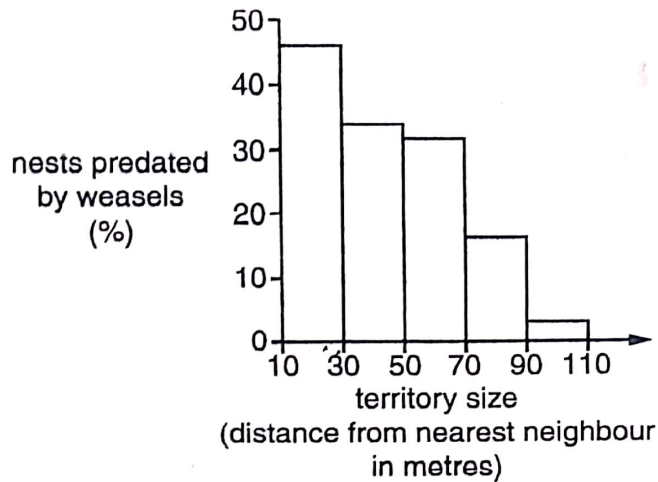


Fig. 5.1

(i) Describe the relationship shown in Fig. 5.1.

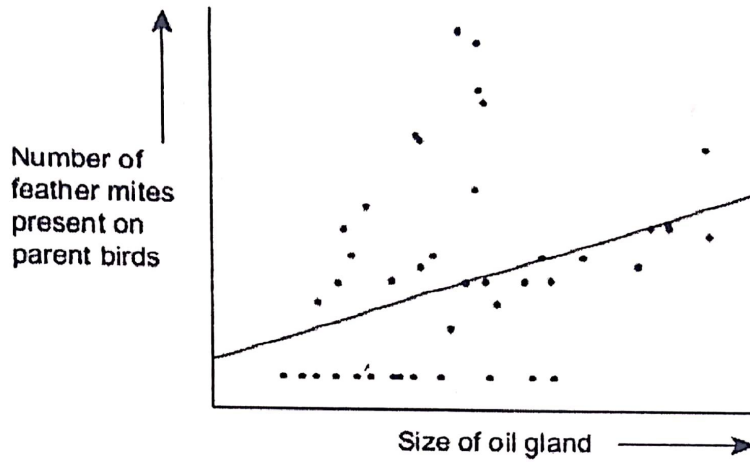
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(ii) Suggest and explain what effect weasels may have on the population size of the great tit.

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time. After preening, the oil gland is considerably smaller.

At the same time that the scientists recorded the number of feather mites on each great tit, they also measured the size of the oil gland. The graph shows their results and includes the scientist's line of best fit.



4 (c) (i) Describe the relationship between the number of feather mites present on each great tit and the size of the oil gland. (2 marks)

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4 (c) (ii) Explain how measuring the oil gland at the same time as counting the feather mites may have affected the reliability of the data. (2 marks)

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4(d) Feather mites eat pathogenic i.e. disease causing bacteria and fungi as well as oil. Explain how this may affect the breeding success of the birds. (2 marks)

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(b) The ochre starfish, *Pisaster ochraceus*, is a starfish that lives on rocky intertidal shores. It is the top predator in its habitat.

Fig. 5.2 shows part of the food web for this starfish.

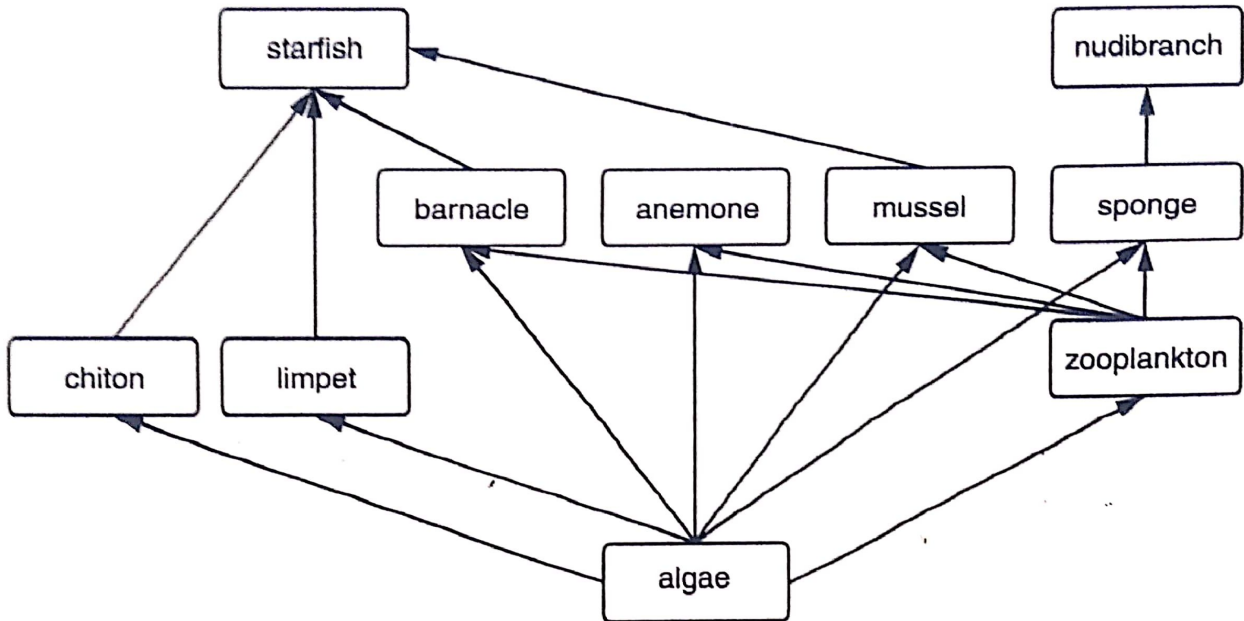


Fig. 5.2

An experiment was carried out in which all the starfish were removed from an 8 m × 2 m area of the shore. In an equivalent area of the same size, the starfish were not removed.

The population sizes of the other organisms in the food web were monitored at intervals. It was found that in the area in which starfish were removed:

- chitons and limpets disappeared
- anemones, sponges and nudibranchs decreased in abundance.

(i) Explain why two areas of the same size were monitored.

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- (ii) Using Fig. 5.2, explain why the chitons and limpets disappeared in the area from which starfish were removed.

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- (iii) Using Fig. 5.2, suggest the sequence of events that led to the decrease in abundance in nudibranchs in the area from which starfish were removed.

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[Total: 9]