# Biology in Focus Questions

## Check Your Understanding - 7.1

1. Distinguish between biotic and abiotic factors.

2. Distinguish between 'ecosystem' and 'environment'.

3. List two abiotic factors.

4. List and briefly describe the main differences between aquatic and terrestrial environments.

5. Explain how abiotic factors in an ecosystem can select certain organisms over others. Provide an example.

## Check Your Understanding - 7.2a

1. List two abiotic factors and two biotic factors that act as selection pressures in an ecosystem.

2. Distinguish between the abundance and the distribution of a species.

3. List three significant factors that affect abundance and distribution of organisms in Australian ecosystems.

4. Briefly describe how an ecologist would go about recording the distribution of plants in a rainforest ecosystem.

5. Propose a method you would use to estimate population numbers of kookaburras in an area.

6. Describe an investigation you conducted using the quadrat method. List one advantage and one disadvantage of this method.

7. Choose the best technique to capture:
   a) a ground dwelling insect
   b) an aquatic insect
   c) a nocturnal insect
   d) a large roaming mammal.

8. Describe an emerging technology used to estimate abundance and distribution of populations. Find one advantage and one disadvantage of this technology.

9. A new school is being built and you have been given the responsibility of planning the equipment purchases for the science department. Write a list of the items you would recommend should be purchased to enable students to complete a field trip that involves the estimate of distribution and abundance of a few local species of plants and animals.

10. Outline some of the advantages and disadvantages of using computer technology in the field of ecology.

## Check Your Understanding - 7.2b

1. Name the most likely environmental pressure affecting the abundance of different eucalyptus species in south-east New South Wales (Fig. 7.11).

2. Identify two factors that might determine the distribution and abundance of mangroves in their estuarine environment.

3. Look at the data from Figure 7.13. Select the data that provides evidence for the suggestion that food is considered to be an environmental pressure in Antechinus stuartii.

4. State the purpose of the control for the investigation shown in Figure 7.13.

5. Explain how knowledge of the distribution and abundance of species can be used to make predictions about the diversity of species within an environment.

6. Choose one abiotic factor and explain how a change in this factor could influence a population of a named organism.

7. The below Figure shows organisms living in a marine rock pool.
   a) List three biotic factors acting as selection pressures in this pool.
   b) List two biotic factors acting as selection pressures in this pool.
   c) Explain how the abundance of the species at different locations in the rock pool can lead to inferences about the abiotic and biotic characteristics each species is most suited to.
   d) Predict the impact on species diversity over time if there is a change in a selection pressure. In your answer, name the selection pressure, the species affected and the expected change in the population.

FIGURE Profile sketch of a marine rock pool
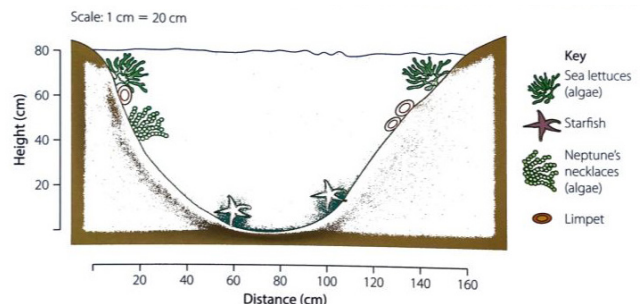


8. Provide support for the statement that 'examining population trends can lead to inferences about what biotic and abiotic factors a species is most suited to'.

9. Using an example, illustrate how selection pressures can change a population of organisms over time.

# Check Your Understanding - 8.1

1. Define the term 'adaptation'.
2. List the three different types of adaptations that an organism can have.
3. Outline the three main abiotic factors that terrestrial organisms in Australia need to be adapted to if they are going to survive.
4. List the adaptations shown by the bilby

# Check Your Understanding - 8.2

1. Define structural adaptation.
2. Describe the main survival problems facing desert plants in Australia.
3. List two adaptations of desert plants that assist them in overcoming the problems listed in your answer to question 2.
4. Outline the main survival problems facing animals in Australia.
5. Describe two adaptations of animals that assist them in overcoming each of the problems listed in your answer to question 4.
6. Explain why you would not find broad-leafed tropical plants living in the Australian desert.

## Review Questions

1. Distinguish between structural, physiological and behavioural adaptions.
2. Distinguish between an ectotherm and an endotherm.
3. Describe the adaptions for a tree living in a cold, alpine region where there is heavy snowfall in the winter months.
4. State three structural adaptions that plants may have to assist their survival living in high salt conditions.

# Check Your Understanding 8.3

1. Distinguish between a physiological adaptation and a structural adaptation. Use examples to illustrate your answer.
2. Outline two physiological adaptations of plants that enable them to live in.:
   a) very cold environments
   b) high salt environments.
3. Outline two physiological adaptations of animals that enable them to live in:
   a) very cold environments
   b) very hot environments.

# Check Your Understanding 8.4

1. Define 'behavioural adaptation'.
2. Provide an example of a behavioural adaptation in a plant. Explain how it assists in increasing the plant's chances of survival.
3. State three behaviours used by an ectothermic animal to assist in regulating its body temperature.
4. Provide three behaviours used by an endothermic animal to assist in keeping cool during the heat of the day.
5. Outline one example of social behaviour in animals that increases the chances of survival of the group.

# Check Your Understanding 8.5

1. Outline the theory that Darwin considered could explain the diversity of life on Earth when he started his journey on the HMS Beagle.
2. Provide two observations that Darwin made and that started to change the way he thought about life on Earth
3. Explain the importance of his observations on the Galapagos Islands in solidifying Darwin's ideas.
4. Provide two examples of plants and/or animals that Darwin observed while in Australia that began to make him think differently about life on Earth.
5. List the five main tenets of Darwin's Theory of Evolution by Natural Selection.
6. Identify at least three other people who assisted Darwin with his work and/or influenced his ideas.

# Check Your Understanding 9.1a

1. Define biodiversity.
2. Outline the three main types of diversity and give an example of each.
3. Explain the relationship between biodiversity and evolution.
4. Describe the relationships between ecology, global change and evolution, and how global change may have led to extinction events.
5. Outline how bacteria can develop antibiotic resistance.

## Review Questions

1. How are theories validated in science?
2. What do scientists predict regarding the comparison of macromolecules in closely related species?
3. Describe the relationship between differences in macromolecules and relatedness.
4. Outline qualitative and quantitative evidence that supports the Theory of Evolution by Natural Selection.

## Check Your Understanding 9.1b

1. Outline the significant changes since the origin (beginning) of the evolution of life on Earth.

2. Outline the evidence to suggest that prokaryotic cells came before eukaryotic cells.

3. What was the impact of a lack of oxygen in the early atmosphere on the biodiversity of early life forms?

4. Suggest why some organisms appear to have changed very little over time.

5. Identify three major periods in the geological timescale and state the organisms that existed in and dominated each period.

6. Outline three extinction events and the subsequent rise of another dominant life form. Suggest reasons for each of these.

7. Discuss two examples where the environment may have influenced the evolution of plant species and their biodiversity.

8. What is the link between mutation, evolution and biodiversity?

9. Identify two species on Earth today that closely resemble their ancestors from millions of years ago. Explain why these may have retained their form with little change, over millions of years.

## Check Your Understanding 9.2a

1. Using an example, distinguish between microevolution and macroevolution.

2. What is selection pressure and how does it affect evolution?

3. Outline the mechanisms responsible for major evolutionary change.

4. How can competition and changes to the environment affect evolutionary change?

5. Explain how variation in the gene pool is important for evolution.

## Extra Questions

1. Whales possess a reduced hipbone even though they do not have legs. Explain why.

2. Using an example, suggest how analogous structures provide evidence of evolution. Is this convergent or divergent evolution? Explain why.

3. Use an example to explain the existence of the appendix in humans in evolutionary terms.

4. Embryos of fish, birds, reptiles and humans appear remarkably similar. Explain how this is evidence in support of the Theory of Evolution by Natural Selection.

5. Justify why both humans and dolphins have a humerus bone.

6. Describe what Alfred Wallace discovered about Asian bird species and the significance of this discovery.

7. Why are most of the fossils found of aquatic organisms and not terrestrial organisms?

8. A fossilised fish skeleton is found in sandstone at location X, 1 m from the surface. A very similar skeleton is found at location Y, 2m from the surface and 1 km away from location X. Another similar skeleton is found at location Z, 3m from the surface and 3 km away from location X.

   a) What can be inferred about the way in which the rocks were formed?
   b) What can be inferred about the age of the fossil atlocation Y?
   c) Draw a diagram to illustrate your answer.

9. How does biogeography provide evidence of macroevolution?

10. Using an example, outline how transitional forms support our understanding of evolution.

11. Using your understanding of cane toads, suggest why we should be extremely cautious about introducing new species into Australia.

12. Explain how the cane toad provides us with a glimpse of evolution.

13. Explain how human-imposed selection pressure has contributed to the surge in antibiotic resistance.