

● BIOLOGY

**Demonstrate understanding of the responses of plants & animals to their external environment**

**Migration**

Demonstrate understanding of the responses of plants & animals to their external environment

**(2011: 3)**

Waved albatrosses (*Phoebastria irrorata*) breed in colonies. Juvenile birds appear to have an in-built navigation behaviour, which helps them when they first fly out to sea. They return to the breeding colony after about two years, but are four to six years of age when they first breed.

Waved albatrosses are an example of a species that undergoes migration.



- (a) Define the term migration.
- (b) Birds returning to the colony for the first time already have a set of stereotyped behaviours, but require a period of learning to perfect the series of synchronised performances, such as preening, pointing, calling and bill clacking. The waved albatrosses then form monogamous relationships. Explain the purpose of these behaviours.
- (c) Waved albatrosses lay a single egg in a breeding season. Both parents take turns to incubate the egg over a period of 70 to 80 days. After hatching, the chick is brooded and guarded for three weeks until it is large enough to defend and thermo-regulate itself. The parents continue to feed the chick for a long period, up to 170 days, until it fledges and eventually leaves the nest. Albatrosses seldom lay eggs in consecutive years.
- Discuss the significance of the reproductive effort made by the albatross raising its young.
- In your answer:
- explain the investment made in raising the chick
  - consider the advantages and disadvantages to both the parents and the chick from this type of parental care

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- compare the outcome of this reproductive effort to that of a named animal that produces many offspring.

(2009: 1)

Every year monarch butterflies (*Danaus plexippus*) migrate from central and eastern North America to a forest region in central Mexico. The butterflies that leave the northern regions breed on the way south, and then die. The migration cycle is completed over a number of generations.



- (a) Monarch butterfly migration is an example of an innate behaviour. Explain why this monarch butterfly migration is an example of an innate behaviour, and **not** a learned behaviour.

The monarch butterfly migration begins as the days get shorter in early autumn. Scientists studying monarch migratory behaviour found that in natural, sunny conditions the butterflies oriented to the southwest. Under simulated overcast conditions, the butterflies showed no significant orientation in any direction.

- (b) Discuss this migratory behaviour of monarch butterflies with reference to:
- the stimuli that trigger monarch migratory behaviour
  - the benefits to be gained from this migration
  - the impact of this migration on current **and** future populations of monarch butterflies.

(2006:2 d,e)

In North America, monarch butterflies perform one of the longest migrations known in insects. They spend the northern hemisphere summer in the northern United States, but migrate south to Mexico for the winter. The butterflies feed extensively during the migration.

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- (d) Describe a change in an **environmental cue** that could trigger the monarch's migrations.
- (e) Discuss how this migration is of benefit in the life cycle of the monarch butterflies.

ANSWERS

(For full answers see NZQA)

**(2011:3)**

- (a) Migration is a regular return journey to a predetermined destination.
- (b) Courtship behavior is learning / mate selection / developing a pair-bond or similar.  
Gives reasons for courtship behaviour. (At least two reasons.)  
Eg: Innate behaviour needs to be developed / practised / modified before the outcome to develop a strong pair-bond / find a lasting mate can be achieved.  
Selection is crucial to reproductive success. It ensures future recognition so that aggression or agonistic behaviour is reduced between the courting couple in further matings.
- (c) The significance of the reproductive effort made by albatrosses may include the role of courtship in formation of a strong, lasting pair-bond, which will, itself, survive the process.  
AND Considers advantages and disadvantages of the k strategy and compares it with that of a named r strategist. Eg: The reproductive effort begins with formation of a strong pair bond, where individuals choose partners who will be strong enough to carry through the demanding parental care process.  
Albatrosses lay one egg only, which creates a risk, as the egg may break or the single chick may not hatch. 24 hr care by both parents helps ensure the egg will hatch. The chick is cared for and fed until it is able to look after itself, when the parents leave it. This leaves it at risk, but it still receives some care and food from the parents. The parents invest considerable time and energy in caring for the single chick, which means they are not likely to breed again for another two years. There is potential risk in returning to the same breeding colony year after year, due to potential changes. The albatrosses' investment can be contrasted to that of some molluscs or invertebrates, such as the oyster, where millions of offspring are produced and no care is given in raising them. Many will die, but a few will survive. The different strategies both have their risks and benefits.

**(2009: 1)**

- (a) Migratory activity cannot be learned from parents as they die along the way / happens across generations / breeding along the way.  
OR Migratory activity is innate as it persists even though the parents have died.
- (b) The stimuli that triggers migratory behaviour is change in day length / photoperiod. Migration provides better food AND reproductive success. Only the strongest / fittest will survive, strengthening the gene pool.

**(2006:2 d, e)**

- (d) Any reasonable environmental cue:
- (Southwards migration) triggered by shorter day length OR colder temperatures.  
Not change in temperature **OR** change in day length.
- (e)
- Migration allows the butterflies to maximise feeding.  
AND

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- Maximises breeding opportunities / better reproductive success in the US over summer. (Must have reproductive success)