

<u>Speciation</u> is when a **new** species evolves. They have changed so much from the original species that, if they have sex with them, they cannot produce fertile children.

- AlloPatric Speciation results from geographical isolation – two groups were originally separated, were exposed to different conditions over a long time, and evolved accordingly.
- SymPatric Speciation is when individuals are still mixed with the same group, but undergo enough variations to become a different species. (From different foods, breeding seasons, courtship behaviours, pollinators, incompatible sex organs, infertile children). These are called *mechanisms for reproductive isolation*.





- Same *Species* individuals can produce fertile children.
- Variations within species result from random mating of different individuals (called a wide gene pool), random separation of chromosomes in meiosis, crossing over, mutations.
- Continuous variation involves many genes, and is ongoing as that species develops.
- *Dis-Continuous* variation from 1 or 2 genes results in easy extinction. (More vulnerable to being killed if it focuses on just one or two genes that we all have.)
- Punctuated variation happens quickly, from sudden changes in surroundings (like tsunamis).

EVOLUTION HAPPENING RIGHT NOW



- Darwin's Galapagos finches.
- Bacterial pests and malarial protists developing resistance to medicines.
- Insects becoming resistant to specific pesticides
- H.I.Viruses still resisting all forms of Anti-RetroV
- Our own genetic modifications of crops.
- Selective breeding in plants and animals.

QUESTIONS Page 60

Question 1			10 X [2] = [20]		
1. C	2. C	3. A	4. D	5. B	
6. A	7. C	8. B	9. C	10. A	

Question 2

- Evolution
 Palaeontology
 Theory
 BioGeography
 Adaptation
 Evolutionary Tree
 Artificial selection
 Speciation
 Population
- 13 X [1] = [13]
 - HypoThesis
 HomoLogous
 Continuous
 Species

<u>Question 3</u> 1. B 2. C 3. E



- 1. E [1]
- 2. 2. E [1]



- Simpler fossils in lower levels come from older era. More recent organisms have had more time to evolve more. [4]
- 4. Nothing happens for a long time. Then suddenly conditions change to cause quick (punctuated) natural selection, and many changes result in a short time. It is so quick that the links between these changes may not be caught in fossil form.

Question 5

1. PentaDactyl [1]



(a) Long thumbs and fingers to grip branches. Freely rotating joints at shoulders.
 [1]

(b) Strong bones to attach swimming muscles. Short bones for streamlined arms. Large flat hands for swimming. [1]

[1]

[1]

(c) Long strong bones for wider wings.

- (d) Big bones for big muscles. "Arm" points down, to run. One toe (the hoof) hits the ground. [1]
- (e) Thick bones for digging muscles. Hands shaped like spade. Paws face backwards to push soil behind them. [1]



Question 6

- 1. BioGeographic
- All these plants had the same ancestor on Pangaea. Then continental drift split Pangaea – these plants were all on Gondwana in the south. The continents split further, each of the southern ones taking some plants with them.
- 3. Flightless birds. Alligators (South America) and Crocodiles (Africa) [2]

(a) Distance from the copper mine where seeds were collected.

(b) Number of seedlings surviving, and the heights they grew [2]

- Full heading [1]. Line graph [1]. Distance on X [1]. Number on Y [1]. Even spacing of units [1]. Points indicated [1]. Shape of graph [1].
- In evolution, the toughest survive. This grass had adapted a high tolerance for copper. It was able to withstand the toxicity, and utilise copper as a nutrient to its full benefit. They had adapted to conditions of copper in the soil, and were thriving on it.

- Those giraffes that consciously stretched out their necks got longer necks. This became part of that giraffe's genetic plan, and so its children inherited long necks. Those that did not use their necks stayed the same. Their children stayed the same. And so they were out-competed, and died out.
 [5]
- If you stretch your neck constantly, it does not get longer. Any characteristics you get in your life are not passed on to your children. (Chop off your ear – your child will still be born with ears!)
- 3. Natural Selection
- 4. There is variation in a population, so some girattes were born with slightly longer necks. This was a gene they passed on to their children. Those with shorter necks were outcompeted they could not reach the leaves in the tree. So they died off, and the shorter neck gene did not survive.
 [8]
- 5. There is more scientific evidence supporting it.



- 1. A=Darwinism B=Punctuated Equilibrium [2]
- (a) Environmental conditions change slowly, and so the changes in the butterfly happen slowly.
 [2]

(b) Equilibrium happens for a long time, and no changes occur. Then suddenly nature changes (natural disaster) and in a short time the genetic plan of the butterfly is selected for. [3]

[1]

Question 10

- 1. 64 days
- 2. 2. 64 35 = 29 day difference. [3]
- 3. How quickly the chicken grows to its slaughter-weight.
- They can kill the bird sooner and sell its meat there is a quicker turnover.



[2]

	5. <u>ARTIFICIAL</u>	NATURAL				
	People decide what to	Nature decides what is				
	select for.	best.				
	May breed new species.	Occurs only within one				
		species.				
	Rapid changes in few	Takes time to develop.				
	generations.	[7]				
6. 1 – Population must have variations within genes						
	2 – Over-production of children must occur.					
	 3 – Must be massive competition for resources. 4 – The environment needs to change. 					
5 – Only the genetic plans that fit into these						
	conditions will survive.	[5]				

1. Speciation



[1]

- All the squirrels were in the same group, and were reproducing. A river changed its course, and split the group. Each new group was exposed to different conditions over a long period of time, and evolved accordingly. What resulted was two different species with different characteristics – sex between them could not produce fertile children. [10]
- 3. Being fertile at different times of the year. Using different ways of looking sexy to attract a mate. Plants using different pollinating agents. Their sex gametes not being compatible with each other. Producing infertile children. [4]

- By allowing some *bacteria* to survive they become resistant. By increasing the power of the anti-biotic, unsuccessfully. [2]
- 2. Natural selection evolution in present times. [1]
- The original *bacteria* were exposed to AntiBiotics these killed off most of them. But some were unaffected, and survived. The survivors reproduced, passing on their resistant genes. So this *bacterium* now has a high level of resistant genes. So this *bacterium* now has a high level of resistance to AntiBiotics. [5]