**THEORIES OF EVOLUTION**

**QUESTION 1**

1. Ancestral giraffes originally had short necks, they frequently stretched/used their necks to reach the leaves from the tall trees. As a result their necks became longer, this acquired characteristic was passed onto the next generation. Therefore, the offspring produced had longer necks than the previous generation.

2. There is no evidence that structures used more frequently become more developed, and there is no evidence to show that acquired characteristics are inherited. OR

 Phenotypic characteristics of an individual are based on the individual’s genotype and do not developed during one’s lifetime based on its use. It is the genes of an individual that are inherited by their offspring during fertilisation.

3. Evolution by natural selection

4. Within the population there existed variation, some giraffes had long necks and others had short necks. There was a change in the environmental conditions/competition amongst the giraffes for food. They had to reach higher in the trees to get leaves. Those that had long necks were able to reach the leaves high in the trees and those that had short necks were unable to reach the leaves in the trees. Those with short necks did not survive. Those with long necks survived and reproduced. The gene/genotype for long neck was passed onto their offspring. Over many generations there were more individuals within the population that had long necks.

5. Changes within a population are a result of environmental characteristics working randomly on a population, nature selects the characteristic that survives based on genetic variations that are best suited to that particular environment.

**QUESTION 2**

1. Punctuated equilibrium-explains the speed at which evolution occurs. It involves long periods of time where species do not change/change is gradual through natural selection know as equilibrium alternating with short periods of time where rapid changes occur through natural selection.

2. Organisms do not change for a long period of time due to a stable environment

3. Rapid changes occur/new populations vary greatly from the original population as a result the new population can no longer reproduce with the original population.

**QUESTION 3**

1. A-Darwinism B-Punctuated equilibrium

2. a) Evolution happens as a result of natural selection gradually over time, there are many intermediate species.

 b) Evolution involves long period of time where there is no change/very little change which alternates with natural selection bringing about rapid changes in a short period of time followed by a long period of equilibrium. This results in different species originating rapidly from the ancestral species.

**QUESTION 4**

1. Differences in the genetic make-up of the sperm and ova will result in the zygotes having different genetic make-up when fertilistion occurs. Random mating between organisms within a species results in a different set of offspring from each mating pair.

2. Discontinuous variation-the rats are either black or white, there are no intermediate colours.

3. Table showing differences between Darwinism and Punctuated equilibrium

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| **Darwinism** | **Punctuated equilibrium** |
| Gradual change | Rapid change |
| Takes place over a long period of time | Takes place in a short period of time |
| Change is continuous | Long periods of time with no change |