Topic 5.2: Natural Selection

**Essential Idea: The diversity of life has evolved and continues to evolve by natural selection.**

**5.2.NOS: Use theories to explain natural phenomena- the theory of evolution by natural selection can explain the development of antibiotic resistance in bacteria**

List three trends that have been observed in the development of antibiotic resistance.

(**List:** Give a sequence of brief answers with no explanation.)

Use a graph to illustrate antibiotic resistance over time.

**5.1.U1: Evolution occurs when heritable characteristics of species change**

**Define evolution**

(**Define:** Give the precise meaning of a word, phrase, or physical quantity.)

**5.2.U1: Natural selection can only occur if there is variation among members of the same species**

Define variation.

(**Define:** Give the precise meaning of a word, phrase, or physical quantity.)

Explain why natural selection can only function if there is variation in a species.

(**Explain:** Give a detailed account including reasons or causes)

**5.2.U2: Mutation, meiosis and sexual reproduction cause variation between individuals in a species**

List sources of genetic variation.

(**List:** Give a sequence of brief answers with no explanation.)

**5.2.U3: Adaptations are characteristics that make an individual suited to its environment and way of life**

Define adaptation.

(**Define:** Give the precise meaning of a word, phrase, or physical quantity.)

List examples of adaptations.

**(List**: Give a sequence of brief answers with no explanation.)

**5.2.U4: Species tend to produce more offspring than the environment can support**

State that species have the ability to produce more offspring than the environment can support.

(**State:** Give a specific name, value or other brief answer without explanation or calculation.)

Use an example to illustrate the potential for overproduction of offspring in a population.

**5.2.U5: Individuals that are better adapted tend to survive and produce more offspring while the less well adapted tend to die or produce fewer**

Outline how a “selective pressure” acts on the variation in a population.

(**Outline:** Give a brief account or summary)

List examples of “selective pressures.”

(**List:** Give a sequence of brief answers with no explanation.)

Explain the effect of the selective pressure on the more and less adapted individuals in a population.

(**Explain:** Give a detailed account including reasons or causes)

**5.2.U6: Individuals that reproduce pass on characteristics to their offspring**

Contrast acquired characteristics with inheritable characteristics.

**(Compare** Give an account of similarities and differences between two(or more) items or situations, referring **and** **contrast** to both(all) of them throughout.)

State that only inherited characteristics can be acted upon by natural selection.

(**State:** Give a specific name, value or other brief answer without explanation or calculation.)

**5.2.U7: Natural selection increases the frequency of characteristics that make individuals better adapted and decreases the frequency of other characteristics leading to changes within the species**

Compare the reproductive success of better and less well adapted individuals in a population.

**(Compare**: Give an account of similarities and differences between two(or more) items or situations, referring **and** **contrast** to both(all) of them throughout.)

Explain the cause of the change in frequency of traits in a population through natural selection.

(**Explain:** Give a detailed account including reasons or causes)

**5.2.A1: Changes in beaks of finches on Daphne Major**

Outline the role of Charles Darwin and Peter and Rosemary Grant in the study of Galapagos finches.

(**Outline:** Give a brief account or summary)

Explain how natural selection leads to changes in the beaks of Galapagos finches with changes in weather conditions.

(**Explain:** Give a detailed account including reasons or causes)

**5.2.A2: Evolution of antibiotic resistance in bacteria**

Explain how natural selection leads to changes in antibiotic resistance.

(**Explain:** Give a detailed account including reasons or causes)

List reasons why evolution of antibiotic resistance has been rapid.

(**List:** Give a sequence of brief answers with no explanation.)

Outline the effect of not completing a full dose of antibiotics on the development of antibiotic resistance.

(**Outline:** Give a brief account or summary)

**6.3.U9: Some strains of bacteria have evolved with genes that confer resistance to antibiotics and some strains of bacteria have multiple resistance**

List five measures that can be taken to avoid the development of antibiotic resistance.

(**List**: Give a sequence of brief answers with no explanation.)

Explain why multiple drug antibiotic resistance is especially dangerous.

(**Explain**: Give a detailed account including reasons or causes)

State an example of a multidrug resistant bacteria.

(**State:** Give a specific name, value or other brief answer without explanation or calculation.)

**(HL) 10.2.U3: Variations can be discrete or continuous**

Contrast discrete with continuous variation.

**(Compare**: Give an account of similarities and differences between two (or more) items or situations, referring **and** **contrast** to both (all) of them throughout.)

State an example of a discrete variation,

(**State:** Give a specific name, value or other brief answer without explanation or calculation.)

State an example of a continuous variation.

(**State:** Give a specific name, value or other brief answer without explanation or calculation.)

**(HL) 10.3.A1: Identifying examples of directional, stabilizing and disruptive selection**

Define stabilizing, disruptive and directional selection.

(**Define:** Give the precise meaning of a word, phrase, or physical quantity.)

Use graphs to illustrate or identify stabilizing, disruptive and directional selection.

**Key Terms:**

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| Darwin  sexual  reproduction  ​meiosis  ​overproduction  resistance  plasmid transfer  Wallace  ​natural selection  gametes  ​generation  pesticides  progressive  change  evolution  ​camouflage  ​gene transfer  ​fitness  frequency  Galapagos finch  Variation  ​inheritance  ​survival of fittest  ​antibiotics  mechanisms  population mutation  adaptation  alleles  penicillin ​ |  |  |  |  |