**Protein Synthesis: *Determine the Traits of an Organism***

In this simulation, you will examine the DNA sequence of a fictitious organism - the Snork. Snorks only have one chromosome with nine genes on it. Your job is to analyze the genes of its DNA and determine the traits of the organism. Each gene has two versions that result in a different trait being expressed in the snork.

|  |  |  |
| --- | --- | --- |
| **Genes** | **Amino Acid Sequence** | **Description (phenotype)** |
| Gene 1 - body covering | val - ser - leu | hairless |
|  | val - ser - lys | hairy |
| Gene 2 - body shape | tyr - pro - gln - gln - lys | plump |
|  | val - pro - thr - pro - lys | skinny |
| Gene 3 - legs | leu - leu - leu - pro | 3 legged |
|  | leu - leu - ser - ala | 2 legged |
| Gene 4 - head shape | ala - val - val | round head |
|  | val - ala - ala | square head |
| Gene 5 - tails | his - lle | tail |
|  | his - his | no tail |
| Gene 6 - body pigment | ser - pro - val | blue pigment (hair/skin) |
|  | val - phe - tyr | pink pigment (hair/skin) |
| Gene 7 - eyes | asn - lle - leu - leu - pro – thr | small diamond shaped eyes |
|  | asn - lle - pro - pro - pro - thr | large round eyes |
| Gene 8 - mouth | val - asn - asn - ala | circular mouth |
|  | asn - asn - asn - ala | rectangular mouth |
| Gene 9 - ears | phe - ser - his | pointed standing-up ears |
|  | phe - phe - his | rounded floppy ears |

DNA was obtained from the snorks and needs to be transcribed into its complementary RNA strand. Your job is to analyze each RNA sample and determine the phenotype (how the organism looks) based on the sequence.

**PROCEDURE:**

1. You have been assigned a sample of DNA from a volunteer snork. Your job is to first transcribe the complementary mRNA of your assigned DNA sample(s).

2. Using the amino acid chart (codon chart), translate the genes in the mRNA into proteins. Remember that AUG is the "start" codon, and it signifies the beginning of a gene. The end of a gene will be signaled with one of the three "stop" codons (UAA, UAG, and UGA). There may be some "junk" in between genes - Watch out!

3. After you have finished translating your mRNA strand into proteins, determine the organism's phenotype (how the organism looks). The genes are in order.

4. Sketch a picture of your assigned snork(s).Use pretty colors!

*Note: Genes are separated by vertical lines. The first group is Gene 1, the second groups is Gene 2, etc.*

**Snicker Snork**

|  |  |
| --- | --- |
| DNA | TAC | CAG TCG TTT | ATG GGG GTT GTC TTT | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | GAG AAT TCA CGC |CGA CAA CAC | GTA GTA | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | CAA AAA ATG | TTA TAG AAT GAC GGG TGG | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | TTA TTG TTA CGG | AAA AGA GTG | ATT |
| RNA |  |
| Amino Acids |  |

**Use the genetic code to determine the phenotype of your snork:**

Body covering:

Body Shape: Legs:

Head shape: Tail:

Body Pigment: Eyes:

Mouth: Ears:

**Sketch a picture of your assigned snork(s) on the next page. Use colors!**

*Note: Genes are separated by vertical lines. The first group is Gene 1, the second groups is Gene 2, etc.*

**Snuffle Snork**

|  |  |
| --- | --- |
| DNA | TAC |CAT AGA TTT | CAA GGA TGA GGT TTC |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | GAA GAG GAG GGG | CAA CGC CGA | GTA GTG | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | CAT AAA ATA | TTA TAA GAA GAC GGG TGT | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | TTA TTA TTA CGT | AAG AGC GTG | ATT |
| RNA |  |
| Amino Acids |  |

**Use the genetic code to determine the phenotype of your snork:**

Body covering:

Body Shape: Legs:

Head shape: Tail:

Body Pigment: Eyes:

Mouth: Ears:

**Sketch a picture of your assigned snork(s) on the next page. Use colors!**

*Note: Genes are separated by vertical lines. The first group is Gene 1, the second groups is Gene 2, etc.*

**Snapple Snork**

|  |  |
| --- | --- |
| DNA | TAC | CAG TCG TTT | ATG GGG GTT GTC TTT |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | | GAG AAT TCA CGC | CAA CGC CGA | GTG TAA | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | AGA GGG CAT | TTA TAA GAG GAG GGG TGG | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | CAA TTA TTA CGT | AAG AAA GTA | ATT |
| RNA |  |
| Amino Acids |  |

**Use the genetic code to determine the phenotype of your snork:**

Body covering:

Body Shape: Legs:

Head shape: Tail:

Body Pigment: Eyes:

Mouth: Ears:

**Sketch a picture of your assigned snork(s) on the next page. Use colors!**

*Note: Genes are separated by vertical lines. The first group is Gene 1, the second groups is Gene 2, etc.*

**Snoopy Snork**

|  |  |
| --- | --- |
| DNA | TAC | CAT AGG GAG | ATG GGG GTT GTC TTT | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | AAT AAT GAC GGG | CAC CGT CGA | GTA TAA | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | AGA GGG CAT | TTG TAA GAA GAC GGG TGT | |
| RNA |  |
| Amino Acids |  |

|  |  |
| --- | --- |
| DNA (cont.) | TTA TTG TTA CGG | AAA AGA GTG | ATT |
| RNA |  |
| Amino Acids |  |

**Use the genetic code to determine the phenotype of your snork:**

Body covering:

Body Shape: Legs:

Head shape: Tail:

Body Pigment: Eyes:

Mouth: Ears:

**Sketch a picture of your assigned snork(s) on the next page. Use colors!**