Genome Wars: Rules of the Game

Genome Wars is a game designed to illustrate the process of evolution by natural selection.

**OBJECTIVE:** Construct a genome that survives and reproduces better than any others in the population of players. The genome with the largest population at the end of the game (a set # of turns) wins.

**GAME PLAY OVERVIEW**

 1. GENOME CONSTRUCTION: Each player or team constructs a genome by selecting 4 alleles. All of the genomes in the game are called the “population.”

 2. GENE POOL ROUND 1: determine who goes first by determining allele frequencies.

3. EVOLUTION: The population evolves through natural selection over a number of turns. The evolution round

ends when a set number of turns have taken place, or there is only 1 team with a positive population.

 5. GENE POOL ROUND 2: the frequency of each allele in the population is determined.

 6. THE ORIGIN OF SPECIES: The winner is the team with the highest population that **also has** the most frequent allele in their genome.

PHASES IN DETAIL

GENOME CONSTRUCTION

 In the first part of the game, players or teams construct the genome of a haploid prokaryote. Each genome must have 4 alleles in it, from the following choices:

|  |  |
| --- | --- |
| Allele | Bonus Environment |
| Autotrophy | Surface Water |
| Heterotrophy | Jungle |
| Symbiotic | Coral Reef |
| Spore Former | Desert |
| Resistance | Hospital |
| Fast Reproduction\* | -- |
| Adaptability\*\* | -- |

\* Fast reproducers get no roll modifiers. However, if their population increases, it does so by 2 at a time instead of the usual 1. (3 on a natural roll of 12)

\*\* Adaptable populations lose only 1 population during a mass extinction

A genome MAY have more than 1 copy of each allele. Each additional copy results in an additional +2 bonus above the usual +3 (see the modified roll table). You may NOT have more than 1 copy of the fast reproduction or adaptability alleles.

GENE POOL ROUND 1

After all teams have completed their genomes, the initial allele frequencies must be determined:

 Allele frequency = # of copies of allele in population / total # of alleles in population

The team with the lowest frequency allele begins the game. If there is a tie, go to the second lowest frequency… etc.

EVOLUTION

 Before beginning the evolution phase, roll a die to determine the beginning environment.

 **Environment Table**

 1 – Surface water 4 – Hospital

 2 – Jungle 5 – Coral Reef

 3 – Desert 6 – Reroll

 Each team begins play with a population size of 3. The population size can never go below zero.

TURN SEQUENCE:

 1. The player or team whose turn it is will roll 2 dice. The result is the “natural roll.”

 2. Each other player or team will modify the natural roll by adding +3 to the total IF they are in their bonus environment. The result is the “modified roll.” Use the modified roll to determine your population change this turn.

|  |  |
| --- | --- |
| Modified Roll | Population Change |
| 2-5 | -1 |
| 6-8 | 0 |
| 9-12+ | +1 (+2 if fast reproducer) |

 3. The team whose turn it is will consult the following table to determine what additional effects of the turn will be.

|  |  |
| --- | --- |
| NaturalRoll | Result |
| 2 | Environment Change! Reroll on the environment table. The new environment lasts until another 2 is rolled. There is no change to your population size. |
| 3-4 | Mass Extinction! All teams lose 2 population. This happens INSTEAD of the normal population change. Adaptable genomes lose 1 population |
| 5-6 | Population -1 |
| 7-8 | Mutation! select one of your alleles and replace it with a different one. Your population does not change this turn. |
| 9-11 | Population +1 |
| 12 | Population +2 |

 4. The evolution phase of the game ends when a set number of turns have taken place or there is only one team with a population > 0.

 **Example Turn**: The orange team is playing with these alleles: autotrophy, spore former, fast reproducer, and resistance. The environment is “hospital.”

 An opposing team rolls the dice, and the result is a 7. Since it is not their turn, the orange team uses the Modified Roll table. Since they have the resistance allele, their modified roll in the hospital environment is 7+3 = 10. Their population increases by 2, since they have the fast reproduction allele.

 The opposing team consults the natural roll table since it is their turn. 7 indicates a mutation, so they switch one of their alleles. Since the environment is the hospital, they definitely would choose…

GENE POOL ROUND 2

 At the end of the game, all allele frequencies must be determined:

 Allele frequency = # of copies of allele in population / total # of alleles in population

THE ORIGIN OF SPECIES

 The winner is the team with the highest population. If there is a tie, the winner is the team that **also has** the most frequent allele in their genome (2nd tie-breaker = 2nd most frequent allele, etc.).