

LABORATORY #12 -- BIOL 111

Evolution Board Game

The First Creature appeared on land. The Second followed. The First ate grass, The Second became a predator. The First camouflaged itself, The Second developed keen eyesight. The First escaped by water—The Predator learned to swim. The First hid in a burrow, the Second had to eat roots. More and more animals appeared on Earth and food was becoming in short supply... The eternal struggle between predator and prey for survival—survival of the fittest—this is “Evolution”.

“Evolution” the game is based on the theory of **Charles Darwin**. It allows players to create their own species of animals with their own abilities while fighting to control the one important resource—**food**. By regulating the population of your creatures, obtaining new useful abilities and fighting off opponents, you must survive till the end of the game and stand at the head of the food chain.

At the beginning all players receive 6 cards; with them you can either create a creature or place an ability on an already created one: for example make it huge or poisonous, a swimmer, or burrower .

The game is turn-based and each turn is divided into separate phases:

1. Players create creatures and apply abilities to them;
2. With the help of a dice the amount of food is decided;
3. Players, turn-by-turn take food tokens from the pile to feed their creatures: some need only one, while others, depending on their abilities may require two, three or even more to satisfy their hunger;
4. Animals that are not completely fed will starve and become extinct. Some creatures will be eaten by carnivores at the table. The completely fed animals survive and grant their player more cards to create new creatures and new abilities.

Once the deck is empty everyone counts their points. Points are awarded for each creature that survived and for each ability on them. The winner is the one who creates the most balanced ecosystem.

Procedure

Every table becomes a team. I will show you a YouTube video explaining how to play. The game’s instructions are included below for reference. We’ll all play an experimental game first to learn how to play. This should last about 10 min. The team will then play one or two full games. When these game(s) are finished, prepare your report

Helpful Instructional Video:

<https://www.youtube.com/watch?v=OzDigM1vcNU>

EVOLUTION

The Origin of Species

Rules of the Game

An astonishing diversity of life forms inhabits our planet. The evolutionary theory explains what differences have arisen from the struggle for existence, when each species used a different approach for survival. Some species adapted to forage on previously unfit resources; others gained advantage by learning to defend themselves from predators effectively; still others moved into habitats where they alone could survive. New adaptations arose in different groups of animals. For example dinosaurs, birds and mammals evolved flight independently. All the adaptations "invented" by evolution were recombined and tested by natural selection. During this process some species went extinct, while others came to dominate the planet.

In Evolution, you are the one who combines different traits (adaptations) of animals, and grows your own population while dealing with an ever changing amount of food resources. By regulating the number of animals, gaining new useful traits and struggling with other players, your population can fight for survival, and by the end of the game, dominate the planet!

Winner

The player with the largest number of victory points at the end of the game is the winner. Points are awarded to a player for all his surviving animals and their traits.

Preparation

Mix the deck thoroughly. Each player gets 6 cards from the top of the deck; these cards are now the player's hand. The deck is put at the center of the table with  facing up. The food tokens are placed near the deck: red ("food bank"), blue ("extra food") and yellow ("fat"). Then each player rolls a die. The player whose throw is the highest starts the game

The game turn

Each turn of the game consists of four phases:

- development phase
- food bank determination phase
- feeding phase
- extinction and draw phase

During each phase players act in order moving clockwise from the first player. The phase of development and the phase of feeding may include several rounds; after the first round is over, the first player acts again, etc. The player who can't or doesn't want to act passes.

Development Phase

During this phase you may play your cards by putting them from your hand onto the table in front of you. You may play each card either as an animal (with  facing up) or as a trait of an existing animal (with  facing down). If you play a card as a trait, put the card underneath the corresponding animal (or pair of animals).

Some of the cards carry two traits, with one trait at the top and the other (e.g. Carnivorous) on the bottom of the card. When playing such a card, you should decide which of the two traits you will use, and place the card with the desired

trait on the top. This decision is final, and you can't change your mind and use the second trait later in the game.

Some cards, such as "Communication", can only be played onto a pair of animals. Such cards are placed between the two cards onto which they are played.

The development phase includes several rounds. Each player can play just one card at a time, starting from the first player and going clockwise in order. During this phase you may play any number of cards from your hand. If you don't want to play a new animal or add a new trait to existing animals, you say: "I pass". You must pass if you have no cards left. After passing, you can't choose to play more cards during this phase. The phase ends after all players pass.

Food Bank Determination Phase

The amount of food available during this turn is determined at this time. The amount is indicated by the dice, depending on the number of players:

- 2 players - number indicated by **one dice + 2**
- 3 players - sum of **two dice**
- 4 players - sum of **two dice + 2**

The first player rolls the dice. When the amount of food is determined, the corresponding number of red tokens is put in the center of the table; this is **the food bank** for the current turn.

Feeding Phase

During this phase players in order take one red food token from the food bank and put it on the top of one of their animals. The first player takes the first token, and other players continue clockwise, going in several rounds if necessary and if there are enough tokens.

You may only take one red token from the food bank at a time. However, some traits, such as "Communication", allow to take several tokens.

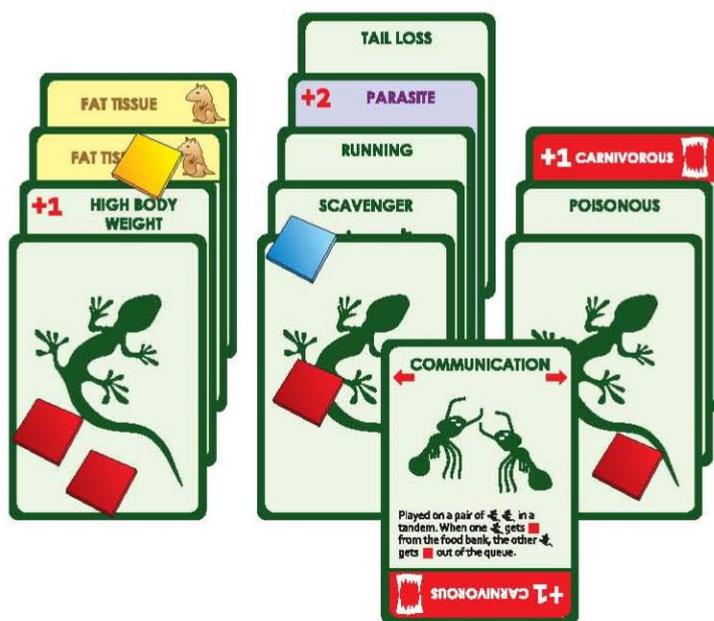
As a result of their additional traits, your animals can also get blue "extra food" tokens during this phase.

An animal with **one food token** on the top of it is considered **FED**, unless it carries traits which increase its food requirements. Such cards show a number at the top left corner, indicating how many

additional food tokens are required to feed the animal. For example, an animal (which, by itself, requires one food token) with the HIGH BODY WEIGHT trait (+1) carrying a PARASITE (+2) is only considered fed if it has four food tokens on the top of it.

Any animal can be fed by red or blue food tokens, or any combination thereof.

Important! A fed animal can't get more food tokens, except to fill its FAT TISSUE (see Fat Tissue section below). If all your animals are fed and their FAT TISSUE is filled you can't obtain more tokens from the food base or in other ways.



After all animals are fed and their FAT TISSUE is filled, or the food bank is empty and all players have used any traits of their animals they wanted to use, the feeding phase is over. Any remaining red tokens in the food bank are set aside.

Extinction and Draw phase

At the beginning of this phase all animals which are not fully FED are put into a discard pile, along with their traits, and all the pairwise traits associated with them. Each player has his own discard pile. The cards are put into a discard pile with  facing up. You may look at cards in your own discard pile, but not in other players' piles.

The first player now deals new cards to players from the top of the deck. The cards are dealt one at a time in order, beginning with the first player. Each player gets in total the following number of cards: **1 + the number of surviving animals** belonging to the player. If the deck is empty it's possible that one or more players get fewer cards than they are due.

If a player has no surviving animals and his hand is empty then he takes **6 cards** from the deck during this phase.

After the cards are dealt the turn is over. All food tokens except the fat tokens are removed from the cards and set aside. The new turn starts with the development phase; the role of first player passes clockwise from the first player of the previous turn.

End of the Game

After the deck is empty the last turn begins. After the extinction phase of the last turn the victory points are counted. Each player is awarded victory points as follows:

- **+2 points** for each surviving animal;
- **+1 point** for each trait of a surviving animal;
- **additional points** for the traits which increase food requirements: **+1 point** for Carnivorous or High Body Weight; **+2 points** for Parasite.

If several players have an equal number of victory points, the one who has the most cards in the discard pile is the winner.

Traits

An animal may combine any number of traits. However, **no animal can have two identical traits**, with the exception of the FAT TISSUE trait and pairwise traits.

You may only add traits to your own animals. The only exception is the Parasite trait, which you may only add to another player's animal.

The  sign in the description of a trait on a card denotes an "animal". The  sign denotes a red token from the food bank. The  sign denotes a blue extra food token which you can get as a result of using some traits.

Some traits such as High Body Weight or Swimming have permanent effects; others can only be used at specific moments during the game. For example the Running, Tail Loss, and Mimicry traits can only be used when an animal is to be eaten by a Carnivore.

If your animal has several traits which can be used at the same time, you decide in which order to use them. For example if your animal is attacked by a Carnivore, you can first use the Running trait (i.e. try to run away), and, if your attempt failed, use the Tail Loss trait (i.e. survive by losing one of your traits).

Some of the traits may be only used during your feeding round. This means that when you are to take a red token from the food base, **you may use this trait together with, or instead of, taking a token**. This is possible even if there are no tokens left in the food bank.

Some traits, such as Carnivorous, Piracy, or Hibernation Ability, may only be used once per turn or every other turn. After using such a trait, rotate the card of the trait horizontally to identify that it has already been used in this turn. At the end of the turn, you may rotate the cards back into the vertical position.

Carnivorous Trait

This trait may be used during your feeding round. At this round **don't take food tokens from the food bank**. Instead, use your Carnivorous animal to attack one of the animals on the table, and if it succeeded in eating this animal get **two blue extra food tokens**. Each Carnivorous animal may only use its Carnivorous trait once a turn. In each feeding round only one of your Carnivorous animals may use its Carnivorous trait. Your Carnivorous animal may attack any animal on the table that is not protected by additional traits, including your own animals or another Carnivorous animal. For the animal eaten, all its traits and all pairwise traits associated with it are put into a discard pile. A Carnivorous animal can't attack and eat other animals if it is fully fed and has no empty Fat Tissue. You can use the Carnivorous trait even if there are no tokens left in the food bank.



Fat Tissue

A single animal may have several Fat Tissue traits. At any time during the game, when your animal with this trait which is already FED and can receive another food token, you can deposit it into its Fat Tissue. In this case, exchange the food token for a yellow fat token and put it on the top of the Fat Tissue card. You can put no more than one fat token on the top of each Fat Tissue. If there are fat tokens on the top of each Fat Tissue, the Fat Tissue is considered filled and the animal can't get additional food tokens during this turn.



You may use the yellow fat token only during your feeding round. **Instead** of getting one red token from the food base take **any number** of yellow fat tokens from **one of your animals** and convert them into blue food tokens. This conversion isn't considered the same as **getting food tokens** and isn't bound up with using other traits of the animal.

Pairwise Traits

Pairwise traits are played on a pair of animals simultaneously. You can't play two identical pairwise traits onto the same pair of animals. If one of the animals is put into a discard pile, all pairwise traits associated with it are also put into the discard pile. During any player's action during a feeding round you can use each pairwise trait only once; however, you can use each trait during each feeding round. You decide in which order to use your pairwise traits to get food tokens for them. For example, if both Communication and Symbiosis traits are played onto the same pair of animals, you can first take a red token from the food bank to feed the symbiont, and if the symbiont is then fed, immediately take a second red token for the other animal.

If there are not enough tokens of a certain color at some point during the game, you can use tokens of another color or self-made tokens to substitute for them.

Playing with Two Game Sets

You can mix cards from two game sets to accommodate up to 8 players. The size of the food bank is then determined as follows:

- 5 players - sum of **three dice + 2**
- 6 players - sum of **three dice + 4**
- 7 players - sum of **four dice + 2**
- 8 players - sum of **four dice + 4**

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FIRST TURN

The game starts. Two players are playing: Alex (♠) and Dan (♣). Each has 6 cards in his hand. Alex makes the first move.

Development phase

1 Alex plays the first card as an animal (♣).

2 Dan also plays the first card as an animal (♣).

3 Alex adds a new trait Poisonous to his ♣.

4 Dan adds the Camouflage trait to one of his ♣ to defend it from the carnivore.

5 Alex puts the third ♣ into game.

6 Dan adds Grazing trait to his camouflaged ♣ to deprive the opponent of food.

7 Alex says "Pass", deciding to save one card for the next turn.

8 Dan adds the Fat Tissue trait to his ♣, hoping to save food for the next turn.

Food Bank Determination Phase

Alex rolls a die. The roll is . This is a two-player game, so 2 should be added to the die result. Therefore, the food bank during this turn is **6 food tokens**.

$$\text{♠} \quad \text{2} + 2 = \text{6 red diamonds}$$

Feeding Phase

1 Alex is the first to take . He puts it on one of his ♣.

2 Dan takes for his ♣ (because they are Communicating). He uses the Grazing trait and destroys another .

3 Alex uses his Carnivorous animal to attack and eats one of Dan's ♣. The Carnivorous animal gets .

4 Dan loses the eaten ♣, all its associated traits, and the obtained in the previous round.

5 Dan turns one of the into , filling the Fat Tissue of the surviving ♣, and destroys the second remaining with the Grazing trait.

Extinction and Acquisition of New Cards

There are no tokens left in the food bank. All animals that are not fed die.

1 Alex loses one of the ♣ which is not fed.

2 Dan's ♣ survives.

3 All food tokens except the fat tokens are removed from the deck.

4 The players get new cards from the top of the deck, for a total of **1 + the number of surviving animals**. Alex gets 3 cards; Dan gets 2 cards.

The turn is now over. In the next turn Dan will make the first move in all phases.

Comment: in order to win, it is very important to play the right cards in the development phase and to distribute food properly in the feeding phase. Note that in this example, in the second round of the feeding phase, Alex could have taken the red food token for his second ♣, and could have used the Carnivorous trait in the third round. In that case all his animals would have been fed, and he would have had a tactical advantage by the end of the turn.

Name _____

Requirements Lab 12

1. On the back of this page, describe the most successful ecosystem (from the winner). Explain how the traits utilized made it the most successful. **(10 pts) Note---this is worth 10 of your 15 points!**

2. Why do carnivores require more food than "ordinary" critters? Why do critters with parasites require more food than "ordinary" critters? (1 pt)

3. Give two reasons why parasites and carnivores are necessary to maintain a healthy ecosystem. (1 pt)

4. How does the game correspond with the idea of Natural Selection (differential survival and/or reproduction)? (3 pts)