Name: \_\_\_\_\_\_\_/1 pt

Packet: \_\_\_\_\_\_\_/134 pts \* - 25 pts for replacing packet

Part 1: \_\_\_\_\_\_\_/20 pts \* - 10 pts if you did not clean up

Part 2: \_\_\_\_\_\_\_/20 pts properly

Part 3: \_\_\_\_\_\_\_/20 pts

Reflection: \_\_\_\_\_/5 pts

Total: \_\_\_\_\_\_\_/200 pts

The Discovery of *Jelly bellicus!*

*Using jelly beans to explore Natural Selection*

**Oh! The drama of it all…**

*Captain Dan and his crew were sailing from South America to Australia when they encountered a severe storm. The ship tossed in the sea for days before coming to rest on an island somewhere in the South Pacific. The ship was badly damaged and most of the supplies had fallen overboard during the storm. Dan and his crew were very hungry, and the island didn’t promise much in the way of food. After setting foot on the unusual cedar shaving terrain, the crew discovered tiny organisms hiding in the grass. They named them* Jelly bellicus *because the organisms reminded them of a sweet treat back home. Upon closer inspection the crew realized that there were eight different varieties of* Jelly bellicus. *The crew began gobbling up as many of the delicious critters as they could find. Soon the number of* Jelly bellicus *was reduced to just a few, and the crew began fighting for what was left.*

**Part 1: Cryptic coloration**

**Directions**

1. On the tables in the Results section, list the eight different *Jelly bellicus* varieties (jelly bean colors) discovered by Captain Dan and his crew.
2. Fill your tray with the cage litter.
3. Count the jelly beans in your presorted bag. You should have 10jelly beans of each color for a total of 80 candies.
   1. ***SAFETY NOTE***: The jelly beans are not fit for consumption. *Do not eat them*!!

***\*\* Breaking the rules will cause you to throw up all of your food. Serious infractions result in immediate death! \*\****

1. Sprinkle the bag of jelly beans around your tray. Mix them into the cage litter to make them harder to find.
2. On the teacher's direction, take 30 seconds to find as many jelly beans as you can. All four crewmembers should search at the same time.
   1. ***SAFETY NOTE***: You may only use your specially designed *Jelly bellicus* foraging tool to collect each specimen to eat. You cannot grab a handful of habitat and sort through it for your meal!
3. Record the color (variety) and number of jelly beans found for each crew member in the “breakfast” chart below.
4. Put all collected jelly beans back into the box to simulate moving to a new location.
5. Repeat the procedure for “lunch” and “dinner.”

**Part 1: Cryptic coloration**

**RESULTS:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Breakfast (Part 1: Cryptic Coloration) | | | | | | | | |
| Member | *Jelly bellicus* Color | | | | | | | |
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| TOTAL |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lunch (Part 1: Cryptic Coloration) | | | | | | | | |
| Member | *Jelly bellicus* Color | | | | | | | |
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| TOTAL |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dinner (Part 1: Cryptic Coloration) | | | | | | | | |
| Member | *Jelly bellicus* Color | | | | | | | |
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|  |  |  |  |  |  |  |  |  |
| TOTAL |  |  |  |  |  |  |  |  |
| TOTAL for all Meals |  |  |  |  |  |  |  |  |

**Part 1: Cryptic coloration**

**ANALYSIS & CONCLUSION:**

1. Which jelly beans were best suited to this environment? Explain why those *Jelly bellicus* varieties did so well.
2. Which jelly beans were not suited to the environment? Explain why those varieties did not do so well. What happened to them?
3. Explain the advantage of cryptic coloration.
4. Predict what could happen to the *diversity* of the *Jelly bellicus* population over time if the foraging of Captain Dan and his crew continues for many generations. BE SPECIFIC in your prediction (that is, which genetic traits will be passed on? Which will not survive? Why?).

**The drama continues…**

*After eating mainly spotted red* Jelly bellicus, *several of the crew members became ill. Those that hadn’t eaten the spotted* Jelly bellicus *felt fine. The spotted critters must have been poisonous! It was difficult to determine which red* Jelly bellicus *had spots, so most of the crewmembers avoided red* Jelly bellicus *altogether.*

**Part 2: Mimicry**

**Directions**

1. As a class, select a jelly bean color that also has a spotted variety. The spotted variety of this color is now poisonous.
2. Place all 80 jelly beans in the tray.
3. On the teacher's direction, search for 30 seconds.
4. **Avoid** the color that you have chosen as poisonous. If you pick up a “poison” jelly bean, *you must stop and skip the rest of the meal*.
5. Record the number and type of jelly beans found for each crewmember in the breakfast chart below.
6. Put all 80 jelly beans back in the box to simulate moving to anew location.
7. Repeat the procedures two more times for lunch and dinner.

**Part 2: Mimicry**

**RESULTS:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Breakfast (Part 2: Mimicry) | | | | | | | | |
| Member | *Jelly bellicus* Color | | | | | | | |
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| TOTAL |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lunch (Part 2: Mimicry) | | | | | | | | |
| Member | *Jelly bellicus* Color | | | | | | | |
|  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |
| TOTAL |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dinner (Part 2: Mimicry) | | | | | | | | |
| Member | *Jelly bellicus* Color | | | | | | | |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |
| TOTAL |  |  |  |  |  |  |  |  |
| TOTAL for all Meals |  |  |  |  |  |  |  |  |

**Part 2: Mimicry**

**ANALYSIS & CONCLUSION:**

1. Which jelly bean is the “model”? Which is the “mimic”?
2. What advantage does the mimic have?
3. Give a real example of mimicry.
4. How did your foraging strategy change between Part 1 and Part 2?

**MORE drama... (!!!)**

*Captain Dan and his crew were stranded for months. As time went on, the* Jelly bellicus *population began to change. Some of the organisms seemed to thrive and reproduce, while others became scarce, and some disappeared completely. Overall, it was becoming more difficult to find food. Captain Dan and his crew had to find something else to eat if they were going to survive.*

**Part 3: Population shift**

**Directions**

1. Place 80 jelly beans in the box.
2. On the teacher's direction, search for food for 30 seconds.
3. Record the number and type of jelly beans consumed in the first generation chart below.
4. **DO NOT** return the collected jelly beans to the box. Put the collected candies back in the bag. They have been “consumed” and are no longer part of the gene pool.
5. Determine the number and type of survivors left in the box. Generation 1 started with 10 of each. To find the number of survivors, subtract the number consumed from 10.
6. Assume that the survivors live and reproduce. For each pair of survivors left in the box, *add 2 more jelly beans of the same type*. If you have an odd number of survivors, round down.

Example: 8 survivors = 4 pairs = 8 offspring

7 survivors = 3 pairs = 6 offspring

1. Repeat the procedure two more times to simulate the next 2 generations. To determine the survivors for generations 2 and3, subtract the number of consumed candies from the “new total” in the previous generation.

**Part 3: Population shift**

**RESULTS:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Generation 1 (Part 3: Population Shift) | | | | | | | | |
| Combined Crew | *Jelly bellicus* Color | | | | | | | |
|  |  |  |  |  |  |  |  |
| Number  consumed |  |  |  |  |  |  |  |  |
| No. of  Survivors |  |  |  |  |  |  |  |  |
| No. of  Offspring |  |  |  |  |  |  |  |  |
| New Total  (survivors + offspring) |  |  |  |  |  |  |  |  |
| Generation 2 (Part 3: Population Shift) | | | | | | | | |
| Combined Crew | *Jelly bellicus* Color | | | | | | | |
|  |  |  |  |  |  |  |  |
| Number  consumed |  |  |  |  |  |  |  |  |
| No. of  Survivors |  |  |  |  |  |  |  |  |
| No. of  Offspring |  |  |  |  |  |  |  |  |
| New Total  (survivors + offspring) |  |  |  |  |  |  |  |  |
| Generation 3 (Part 3: Population Shift) | | | | | | | | |
| Combined Crew | *Jelly bellicus* Color | | | | | | | |
|  |  |  |  |  |  |  |  |
| Number  consumed |  |  |  |  |  |  |  |  |
| No. of  Survivors |  |  |  |  |  |  |  |  |
| No. of  Offspring |  |  |  |  |  |  |  |  |
| New Total  (survivors + offspring) |  |  |  |  |  |  |  |  |

**Part 3: Population Shift**

**ANALYSIS & CONCLUSION:**

1. Create a line graph for your results from Part 3. Be sure to label the X- and Y-axes and include a Title and Key. Use a different color line for each variety (color) of *Jelly bellicus*.
2. Did any of the species become extinct (disappear from the box)? If so, which ones? Did any become endangered (less than 4)? If so, which ones and how many were left?
3. Which population grew the most? Use numbers to support your answer!
4. Was your prediction in Part 1 about the diversity of the *Jelly bellicus* population correct? If so, why? If not, why not?
   1. Overall, what has happened to the diversity of the *Jelly bellicus* population? How might this affect the future of the jelly bean population? BE SPECIFIC in your answer.
5. In the natural world, the environment is constantly changing. Can you imagine a different environment where a different variety of *Jelly bellicus* would survive better? Describe that environment and how it would affect the survival of *Jelly bellicus*.
6. What Darwin said can be summed up in 4 statements:
   1. **Variation:** Different individuals have different traits.
   2. **Heredity:** Traits can be passed on from parent to offspring.
   3. **Competition**: There is competition so that some individuals survive and reproduce more than others.
   4. **Natural Selection**: The individuals whose traits best fit them to the environment are the ones that are most likely to survive, reproduce, and pass on their genes to the next generation.
      1. Describe an example of **variation** that you saw in this activity.
      2. Describe an example of **heredity** that you saw in this activity.
      3. Describe an example of **competition** that you saw in this activity.
      4. Describe an example of **natural selection** that you saw in this activity.

**What now???**

*Captain Dan and his crew were successfully rescued when a ship passed by the island and saw their S.O.S. signal. This was fortunate for the* Jelly bellicus *who had nearly been wiped out by this new invader. If they hadn’t been rescued, Dan and his crew may have eliminated all of the* Jelly bellicus *from the island.*

**Part 4: Extension**

**CONCLUSIONS:**

1. How does an ecosystem change with the introduction of anew species (such as the introduction of Dan and his crew to the island)?
2. In a short paragraph, compare this simulation with real natural selection. What was the same? What was different?

**Further Analysis**

1. What observations can you make from the Jelly Bellicus?

2. How are the Jelly Bellicus’ simulating living organisms?

3. What do you think the word “adaptation” means? You may not use your book!

4. Why is it necessary to come up with a simulation for evolution?