Prior Knowledge: Before beginning the game, use the Learning Scale below to rate your knowledge of evolution. Place a check in the before box. You will re-rate yourself after you play the game.

<table>
<thead>
<tr>
<th>Rating Before You Play</th>
<th>Learning Scale</th>
<th>Rating After You Played</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 I can teach others how the mechanism of natural selection drives the biological process of evolution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 I can explain how the mechanism of natural selection drives the biological process of evolution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 I can describe some ways that the mechanism of natural selection drives the biological process of evolution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 With help, I can identify some of the process evolution and identify evidence of natural selection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 I do not understand how the mechanism of natural selection drives the biological process of evolution, but I plan to learn more in order to understand it.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part A: Charles Darwin’s Game of Survival - Learn About Natural Selection
A. What is natural selection? How does it work? Use the following link to learn about natural selection through the interactive Charles Darwin’s Game of Survival. Tiny URL: https://tinyurl.com/yb3mqa9m Long URL: http://coolsciencelab.com/who_wants_to_live_a_million_years.htm
B. Click “Learn About Natural Selection” to begin.
C. Read the screens and follow the directions to learn about natural selection. As you complete this part of the game, answer the questions on this section of the handout.

Every Species Exhibits Variations
1. Hover your mouse over the terms species and variations to show their definitions. Fill in the blanks below.
   Species: The basic classification in biology that describes a ______________ of ______________ that resemble one another and are able to ______________ among themselves.
   Variations: A ______________ in a characteristic or trait from one organism in a ______________ to another organism in the ______________ species.
2. Read what Darwin is saying from the bottom of the screen to answer the questions below:
   a. Are all members between a species exactly the same? ________________________________
   b. What are some variations that individuals within a species may have? ________________
   c. Can some variations be subtle? Can some be extreme? ________________________________

Many Traits Are Passed On From Parents To Offspring
3. Hover your mouse over the terms traits and offspring to show their definitions. Fill in the blanks below.
   Traits: Genetic ________________ among similar organisms in a species that is ______________ from one generation to another.
   Offspring: Children of a ________________; a ________________
4. Click to breed the pairs. Describe in your own words what occurred. ________________________________
**Survival of the Fittest**
Life in the wild is competitive, and organisms with the most beneficial traits will prosper. This is commonly known as “survival of the fittest”.

5. Hover your mouse over the term survival of the fittest to show the definition. Fill in the blanks below.

**Survival of the Fittest:** A summation of a theory of evolutionary processes that enable organisms that are for their to .

6. If an organism is born with traits that help it survive or attract mates, will it produce more or less offspring than a rival without those traits? 

7. Eventually, beneficial traits will do what within a species? 

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**Part B: Charles Darwin’s Game of Survival – Who Wants To Live A Million Years?**

Click on the “Survival Game” tab on the top of the game.

8. On the first screen Darwin welcomes you. What type of environment will your species have to survive based on the rules of natural selection? 

9. Click on “Proceed”. Choose individuals to create a population. What does Darwin say is the your goal of the game? 

10. Darwin says that the traits you use will affect your species rate of survival depending on your environment. What can diversity ensure? 

Look at the variations box to the upper left. Click through the different mutations by clicking on “more mutations”. Observe the different variations of the species. When you play the game in the next step, you will choose three different variations.

11. Click on the “Hints” book in the bottom right hand corner. Fill in the following table based on the pros and cons of the species different adaptations.

<table>
<thead>
<tr>
<th>Adaptation</th>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulky</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hairless</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Neck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short Legs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Legs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stripes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Part C: This Is Where We Get To Business!**

Click “Close The Book”. Then choose three different variations of adaptations to start the game. Remember Darwin’s hint of diversity! You will play this game a few times in order to live one million years! You will be writing down information for your FIRST and FINAL attempt at the game. Notice, that as the environment changes, traits suited to the new environment will survive. You will play until you succeed!

**Your First Try – YOU PROBABLY DIED!**

12. Describe the adaptations of the three mutations you selected. (use your table above) 

13. What changing environments did you encounter? 

14. Did you use any life rafts? If so, what did you change your mutation to in order to increase survival? 

15. Next time, what will you do differently to survive? 

---

**Play until you win! Keep Trying! Use Those Mutations to Your Advantage!**
Your Last Try – YOU SURVIVED!
16. Describe the adaptations of the three mutations you selected. __________________________________________

17. What changing environments did you encounter? ____________________________________________________

18. Did you use any life rafts? If so, what did you change your mutation to in order to increase survival? ________

19. Pretend you have to tell a friend how to beat the game really quickly? What two mutations would you recommend for a hot environment and why? ________________________________________________________________

Part D: Darwin’s Bio
Click on the “Darwin’s Bio” tab at the top of the screen. Use this information to answer the following questions.

20. What is the name of the ship that Darwin sailed on and served as a naturalist? _____________________________

21. What did Darwin discover in South America? __________________________________________________________

22. What did Darwin find in the Galapagos Islands? What did this lead to? ________________________________

23. What book did Darwin write? What did it introduce the world to? ________________________________

Part E: Quiz
24. Click on the “Quiz” tab on top of the screen to take the quiz. Write your final score here ________________

Part F: Conclusion
25. Write about the process of natural selection in your own words. Use and underline the terms evolution, adaptations, diversity, mutations, environment, population, and natural selection in your response.

________________________________________________________

________________________________________________________

________________________________________________________

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Part G: Rerate!
Rerate yourself on the learning scale on the first page to track your learning. Then, write any terms, concepts, or ideas you feel you should study. ________________________________

________________________________________________________

________________________________________________________

________________________________________________________

Super Fun and Quick Bonus Game! Click on the link below to play the Evolution Interactive from the PBS Nova website, by Rick Groleau. In this entertaining game, YOU change the environment of the species to see how random mutations help the species to survive.

Full URL: http://www.pbs.org/wgbh/nova/evolution/evolution-action.html

Tiny URL: http://tinyurl.com/84tln9k

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