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2022 Biological Diversity Lab Stations Booklet

Station #1

Look at the following plants/plant parts presented in front of you (spider plant, mother of thousands, onion, jade plant, fern and potato). **These plants all represent asexual reproduction.**

A. Record observations regarding the plants and their parts. Identify the functions of some parts, where possible.
B. Use the guide provided to identify and record what type of asexual reproduction each plant is demonstrating.

C. How would you describe the genetic diversity between the parent plant and the offspring? **Explain** why.

Station #2

A. What do you observe under the microscope? **Draw and label** what you see.

B. What is the purpose of this cell? Is this used in sexual or asexual reproduction?

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C. Organize the images and terms at the station to show the correct sequence of sexual reproduction. **Draw** and label your sequence here:

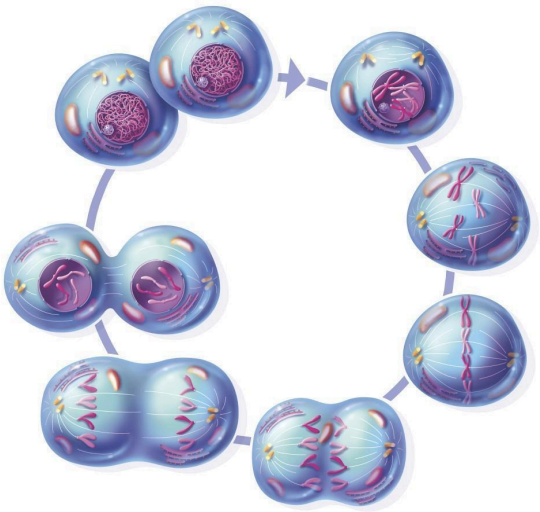
D. Use the provided iPad to research the process of **in vitro fertilization**. Summarize the process below (use an extra sheet if you need more space)

E. Complete the Asexual and Sexual Reproduction handout in your booklet (both sides)

Station 3

A. Read the front side of the Meiosis and Mitosis Handout in your booklet.

B. Look at the cells under the microscope. Can you see cells in stages similar to this image? If so, which ones? What is this process is called? What is the purpose of this process?



C. Read and complete the table on the back of the Meiosis vs. Mitosis handout in your booklet.

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Station 4

A. Watch the video FuseSchool Selective Breeding (https://www.youtube.com/watch?v=fHS-OY9XDZc) on the iPad to understand the processes of artificial selection.

B. Look at the images in front of you. Are these examples of Natural Selection or Artificial Selection? **Explain how you know.**

C. Use the iPad to research the process of **artificial insemination**. How does this process contribute/link to what you observed in Part B?

D. Check out this video: https://youtu.be/F-XTUpLmhPc (Science Today: From Wild Wolves to Man's Best Friends)

Station 5

During the industrial revolution in England (1760-1840's), pollution in the form of smoke and soot made the trees and buildings turn black. Peppered moths *(Biston betularia)* were abundant in the area and were a key food source for birds. Complete the following activity to investigate the impact of industrialization on moth populations.

A. Person one organizes the "moths" by spreading them out evenly in the box and making sure there is no overlap. For the dark moths - place the moths with the darkest sides up. DON'T SHOW YOUR GROUP!!

B. One member of the group selects moths:
   a) **You are a bird, and you have 5 seconds to capture as many moths as you can.**
   b) **You can only pick up one moth at a time.**
   c) **Record the number of each colour moth that you caught in the table below**

C. Replace the moths, mix, and repeat for each group member.

	Dark Moths	**Light Moths**
Group Member 1		

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Group Member 2		
Group Member 3		
Group's Total		
Class Total		

D. Answer the following questions
   a. What colour of moth was consumed by the birds most frequently? Explain why.

   b. What concept is this activity demonstrating?

   c. What changes would you expect to happen to the population of peppered moths over time? Why?

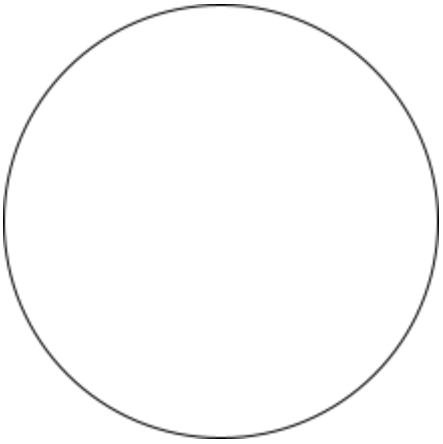
Station 6

Look at the organisms under Microscope A, compare this to the organism under Microscope B. This is a multicellular animal known as a **Hydra.** These organisms have a unique form of reproduction.

A. What type of reproduction is represented here?

B. Is this an example of sexual or asexual reproduction?

C. Draw the organism from microscope B here:



D. How would you describe the genetic diversity between the parent and the offspring? **Explain** why.

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Station 7

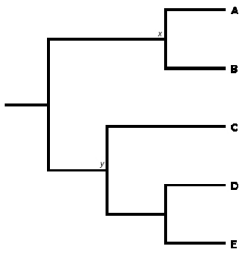
Taxonomy is the practice of classifying living organisms. Carl Linnaeus is often called the Father of Taxonomy. His system for naming, ranking, and classifying organisms is still in wide use today. The following organisms are classified as follows:

Taxon	**Common Darter Dragonfly**	**Scorpion**	**Water Beetle**	**Earth Centipede**	**June Beetle**	**Eastern Lubber Grasshopper**
Kingdom	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia
Phylum	Arthropoda	Arthropoda	Arthropoda	Arthropoda	Arthropoda	Arthropoda
Class	Insecta (Hexapoda)	Arachnida	Insecta (Hexapoda)	Chilopoda	Insecta (Hexapoda)	Insecta (Hexapoda)
Order	Odonata	Scorpiones	Coleoptera	Geophilomorpha	Coleoptera	Orthoptera
Family	Libelluidae	Buthidae	Dytiscidae	Geophilidae	Scarabaeidae	Romaleidae
Genus	*Sympetrum*	*Hottentotta*	*Rhantus*	*Pachymerium*	*Cotinis*	*Romalea*
Species	*striolatum*	*tamulus*	*alutaceus*	*ferrugineum*	*nitida*	*guttata*

A. How should the genus and species of organisms be properly written? Write out two examples from the chart.

B. Organize the organisms into groups that are most closely related and record your groupings. Which organisms differ the most?

C. Can you build a phylogenetic tree using all of the organisms? Draw a tree below or on a piece of paper using a format similar to this; **however, you should create you own version of a tree, as this one won't work perfectly.** Attach your drawing to your booklet.



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Station 8

A. Look at the image of the Cheetah chasing the Thomson's Gazelle. What is meant by the term "Evolutionary Arms Race"? (Hint: think about the adaptations that would evolve as a result of the interaction between the two organisms. Arms Race Definition**:** a competition between nations for superiority in the development and accumulation of weapons)

B. Look at the image of the peacock. Are female and male peafowl different from one another? Explain how and why they might be different? What term(s) could be used to describe their differences?

C. Do you think that male peafowl (peacocks) are different from one another? Explain.

D. What would influence/cause the evolution of a peacock's large tail? **(hint: what is the purpose of the tail?)**

Station 9

This activity will demonstrate why a difference in beak size can significantly impact a bird's ability to survive. You will act as finches and fight for survival by "eating" as many seeds as possible within the allotted time.

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You will use two different types of tools to represent different beak types to see which is best suited to collect and "eat" food under different conditions.

A. Write down careful observations of your tools (or "beaks"), the box environment, and the seeds.

- Observations of beaks:

- Observations of the environment (Hint: Consider the substrate and how it will affect access to seeds):

- Observations of seeds

B. Based on your observations, make a prediction about each beak's ability to pick up enough food in your environment under the three different food conditions listed below.

- **Optimal Conditions -** Plenty of both small and large seeds:

- **Drought Condition 1:** Only a few large seeds (beans) (remember that they have to be crushed):

- **Drought Condition 2:** Only a few small seeds (rice) (HINT: Small seeds can fall into small, less accessible spaces within the AstroTurf):

C. Read the instructions at the station and complete the activity. Record your results below

Trial (30 seconds)	**Drought 1 (only beans)**		**Drought 2 (only rice)**	
	Beak Type		Beak Type	
	Small	Large	Small	Large
1				
2				
Total				

Small = small beak (Tweezers); Large = large beak (large pliers)

D. Based upon your results, what can you conclude about each bird's ability to collect food and survive in your model environment under the three different conditions described in Part B? Were your predictions accurate?

Station 10

A. Look at the skulls in front of you. All of the skulls represent **variation between species.** What are some key differences in the structure **(anatomy/morphology)** that you observe in these species?

B. Based upon your observations, can you identify the **types of food** that each species may consume? What **niche** does each organism fill (ex. Herbivore)? **Be specific and explain your choices.**

C. Can you identify other **adaptations** that each species has based upon the anatomical (structural) features of the skulls? Be as specific as possible.

D. Can you predict the species of each skull?

Station 11: Yellowstone National Park Food Web

A. Select 3 cards to build a simple **food chain**. Record your food chain below.

B. Now using all of the cards, **create a food web**. Record your food web on this page or a separate page. On the diagram of the food web that you have drawn, show the flow of energy from one organism to another using arrows (→).

C. Wolves were **extirpated** (removed) from Yellowstone National Park in 1926. How would their extirpation have changed the organisms living in the park? Specifically identify how the removal of the wolves from Yellowstone **directly** impacted at least three separate species.

D. Identify at least three species that were **indirectly** impacted by the removal of wolves from the park. Provide detail to your response.

E. Wolves are known as a keystone species. What is a keystone species?

F. Watch the video How Wolves Change Rivers on Vimeo and then revisit/reflect on your answers to the previous questions.

Station 12

A. Read the "What is Trait?" slide show. Make sure you understand what the following terms mean: **Allele, Dominant, Recessive, Homozygous, Heterozygous.** Write your definitions below.

B. Traits are passed to offspring through genetic material. A genotype is the genetic material (the combination of genes) that an organism possesses and a phenotype is the observable characteristics or traits of an organism based upon their genotype. From the slides you read before, the organism with Hh would have a heterozygous genotype (Hh) and would have a phenotype of straight thumbs.

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C. You will complete the instructions to “Build a Baby Dragon” to investigate how genotypes and phenotypes work together. Record your genotype sand phenotypes in the table and glue your competed dragon on the last page of the booklet.

My Baby Dragon

Trait	Genotype	Heterozygous or Homozygous	Phenotype
Neck Length			
Eye Colour			
Horn?			
Spikes?			
Tail length			
Body Colour			
Colour of Wings			
Number of Toes			
Belly Colour			
Colour of Spikes			
Freckles			
Fire Breathing			
Ear Frills?			