**Station 1: Variation within a Species**

**Introduction:** You have a selection of individual specimens representing the seaweed species *Nereocystis luetkeana* (common name: Bull Kelp). *Nereocystis* is a large, iconic seaweed of British Columbia, can grow 10cm per day, creates underwater forests and is delicious eaten fresh or pickled. Your task is to explore similarities and differences within this species.

**IMPORTANT:** These are delicate and irreplaceable research collections. Do not handle collections until given instructions.

Q1: Describe **two features that are similar** between all of your specimens and **two features that are different** between some of your specimens.

Q2: Brainstorm a list of reasons to **explain the differences** observed between your specimens. *Hint: the specimen labels may be useful for this question.*

Q3: **How tall is this species?** Measure and record each specimen’s height using the provided tools (decide which is best for your species). Calculate average and size range (minimum and maximum).

|  |  |  |  |
| --- | --- | --- | --- |
| Accession # | Height (cm) | Accession # | Height (cm) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Average height: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Size range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q4: Choose one additional feature to measure or count.

Chosen feature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Average size or count: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q5: How confident are you in the **accuracy** of your measurements for Q3 and Q4? Why or why not?

Q5b: What could you do to improve your confidence?

Q6: How confident are you that your measurements **represent the entire species**? (i.e., how generalizable are your measurements).

Q6b: What could you do to improve your confidence?

Q7: Brainstorm a couple of reasons why you, as a researcher, may want or need to study museum collections of organisms instead of (or alongside) “live” or fresh specimens?

**Station 2: Exploring Research Ideas**

**Introduction:** You have a selection of individual specimens representing the species *Thuja plicata* (common name: Western Red Cedar). *Thuja plicata* is the official tree of British Columbia, grows up to 60m tall, and is culturally important for many First Nations groups. The UBC Herbarium has 47 collections of *T. plicata* and another 1000+ collections of related species in the family Pinaceae (pines, Douglas-fir, cedars, hemlocks, etc.) from BC and North America. Your task is to brainstorm research ideas using *Thuja plicata* as inspiration.

**IMPORTANT:** These are delicate and irreplaceable research collections. Do not handle collections until given instructions.

Q1: Take some time to **observe** the specimens. *Examples: What structures are included? Are there patterns that you find interesting? What does the label tell you?* *Do any thoughts pop up about this species ecology, chemistry, conservation, genetics, taxonomy, or something else?*

**Record** some of your observations and thoughts below.

Q2: What **types of data** could you collect from these research specimens? Get creative and don’t forget to think beyond the branches!

Q3: **Brainstorm a research question** (or two) based on your observations that uses some of the data types you just listed. Your questions don’t necessarily have to involve the UBC Herbarium collections.

Q4: Choose one question and **draft a hypothesis**. How could you test this hypothesis?

Q5: How could you use the UBC Herbarium collections help you answer this question?

**Bonus challenge:** If time allows, draft ideas for a second research project with a different and perhaps not-so-obvious connection to museum collections (e.g., mathematics, physics, computer science, etc.)

**Station 3: What’s in a Label?**

**Introduction:** You have a selection of individual specimens representing a mix of seaweed and conifer tree species collected across a variety of years and locations. Your task is to identify key information from the specimen labels and recognize the importance of good record keeping.

**IMPORTANT:** These are delicate and irreplaceable research collections and some are very old! Please do not handle collections until given instructions.

Q1: Choose one specimen to answer this question.

* What is the **genus** and **species** name?
* **Who** collected this specimen and **where** was it collected?
* What is this specimen’s **accession number**? What do you think the accession number is for?

Q2: From oldest to newest, **locate and record** the collection date, species name, and location for each specimen.

|  |  |  |
| --- | --- | --- |
| Collection Date | Species Name | Location |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

– What are **2 or 3 things you** **notice** about the way specimen information has been collected over the years?

– Why do you think the way or amount of collected specimen information has changed?

Q3: Many institutions are now making collection information available in digital databases online. What do you think are some **challenges and benefits** to this endeavour?

Q4: The specimen labels you see on each sheet are usually not made by the person who collected the organism, they are usually made much later by museum staff. The information used for a label comes from the notes made by the collector while in the field. Imagine you are collecting plants that you would like to preserve and use in a research study one year from now.

– What **types of information** might be important to record in your notebook?

– What can you do to ensure that your notes are connected accurately to each specimen?

Q5: Check out the examples of specimens that have been separated from their labels. Is there value in keeping those collections?