**Biodiversity Lab Exercise**

**Objectives:**

To identify, classify and map various plants and animals living on the Mount Saint Mary’s Chalon campus.

To use a scientific app iNaturalist (built by the California Academy of Science) to help identify organisms and build an interactive public map of the biodiversity on the Mount Saint Mary’s campus.

Observe the key features (phenotypes) of organisms and generate hypotheses regarding the specific characteristics of these organisms. Think of the link between form and function.

**Before Class:**

**Background reading**: **Campbell Biology textbook (11th edition):**

Section 1.2 “Evolution Accounts for the Unity and Diversity of Life” Pages 11-16

Section 22.1 “The Darwinian revolution challenged traditional views of a young Earth inhabited by unchanging species” Pages 467-469

Section 56.1 “Human activities threaten Earth’s biodiversity” Pages 1259-1264

**To Do:**

1) Make an account at iNaturalist <https://www.inaturalist.org/> and download the app for your smartphone. iNaturalist is a global citizen science project that provides a platform that 1) helps individuals identify the organisms around through a combination of artificial intelligence and crowd-sourcing, 2) serves as a record of biodiversity around the world, and 3) builds a community of expert and budding naturalists.

See this popular press article for more info <https://www.cbc.ca/news/technology/citizen-science-nature-apps-1.5214817>. Spend a few minutes on the website and/or app. From the homepage navigate to Community>Project search for Mount Saint Mary’s University, join the project and spend a few minutes exploring the project and past observations.

2) Download a GPS locater (there are many for free in the app store)

**In Class Procedure:**

1. Work in pairs. Open the iNaturalist App and hit the explore icon to see a map of the area. Plan to explore areas of campus that have few observations.
2. You will explore the campus for about 40 minutes. The goal is to document and identify living examples of
	1. Two types of flowering plant
	2. Two types of tree
	3. Two birds
	4. Two insects
	5. Two others (Can be a non-bird and non-insect animal or a Fungi)
3. Record the following in your notebook as your **Results**:
	1. The location. Include GPS coordinates and a descriptive sentence.
	2. An illustration or original photo of the organism. Do not just post a picture of a similar organism from the internet. The images have to be your work. Take the time to get good quality photos and take multiple photos of each organism. For example for a tree take one photo of the whole tree, one of a close-up of the leaves, and one of the fruit or flowers.
	3. Species identifications. You will come back to the lab to try and identify your organism using guides on the internet and the iNaturalist App (more below). Write the proper scientific name in your notebook with the proper format. Note in the field you can quickly use iNaturalist to get an idea of your organism’s ID. Do not upload in the field- you will upload your observations back in the lab. To get a quick idea open iNaturalist hit observe take a quick pic, hit next, click the arrow “under what did you see” and write down a few suggestions then hit cancel. DO NOT share your organism at this point.
	4. One specific defining characteristic of each organism AND a hypothesis as to the importance or function of this characteristic Be descriptive in your characteristic and do not choose a trait that all organisms of that type have. For example, for the birds you identify do not use “beak” as the characteristic. Describe something specific about the beak. For example, the beak was long and pointed. Your hypothesis does not have to be correct but should be logical. For example, if you see a particular tree with thick rubbery leaves, you may hypothesize that the durability of the leaves helps the tree retain water.

4. Use iNaturalist. In the classroom or in the field, you can use iNaturalist to help you ID organisms. You can use iNaturalist in two ways 1) Directly post observations in the field and 2) Post photos later either on the app or on the computer after the IDs are well researched. We will only upload and contribute to high-quality and well-researched IDs once we have returned to the lab.

 1. Open the app and hit Observe. Here you have the option to upload a photo directly in the field or choose from your photo library. In this case, you will use your photo libraries after you have an idea about what the organism is and have agreed with your partner on the best photos.

 2. Photos: For each observation choose one or more photos from your photo library and hit done and next. Do not post photos with people in them.

 3. ID: Click the arrow under the “What did you see” tab. iNaturalist will make suggestions, scroll through the suggestions to pick the one that best matches your research.

4. Location: Pinpoint the exact location using the map. Use your notes to help you place it in the exact location. Hit save

6. Geoprivacy: Keep open

6. Captive/Cultivated: Most plants on campus are not wild so make sure you choose the YES option under the Captive/Cultivated tab. Most animals and fungi are wild so this option will likely be NO

7. Projects. You should have joined the Mount Saint Mary’s Project so it will be under your list of projects. Select this project and go back to the main observation sheet.

8. Once the photos, ID, Date, Geoprivacy, Captive/Cultivated, Projects are all filled in Hit Share.

9. At the end of the week open the app to 1) see if the community agrees with your IDs and 2) explore everyone’s observations.

**Notebook requirements (in the order shown):**

Date

Purpose – summarized in your own words

Methods – Where and when did you make your observations? What tools, guides, websites or apps did you use?

Notes and instructions from lab lecture

Results:

For each organism include the following in the order shown: You and your partner can have the same photos but all text and descriptions have to be in your own words.

1. The location. Include GPS coordinates and a descriptive sentence.
2. An illustration(s) or original photo(s) of the organism Do not just post a picture of a similar organism from the internet. The images have to be your own work.
3. Species identifications and full classification. Properly format the species ID *Genus species*. Include the full classification: Domain, Kingdom, Phylum, Class, Order, Family, Genus, species.
4. One specific defining characteristic of each organism AND a hypothesis as to the importance or function of this characteristic Be descriptive in your characteristic and do not choose a trait that all organisms of that type have. For example, for the birds you identify do not use “beak” as the characteristic. Describe something specific about the beak. For example, the beak was long and pointed. Your hypothesis does not have to be correct but should be logical. For example, if you see a particular tree with thick rubbery leaves, you may hypothesize that the durability of the leaves helps the tree retain water.

Conclusion paragraph\*

\*Your conclusion should include a summary of the major findings for your observations and the observations of the class (at the end of the week). What did you find? What did the class find? Did anyone from the community chime in with IDs? Did Artificial Intelligence accurately ID your organism? What processes have shaped in the past, are currently shaping, and will shape in the future the biodiversity of the campus?

**Items to order and set-up**

Magnifying glasses

Binoculars

Students must have downloaded iNaturalist and GPS app before class

**Lab lecture** **(for instructors)**

Go over biodiversity pages Section 1.2 “Evolution Accounts for the Unity and Diversity of Life” Pages 11-16 Section 22.1 “The Darwinian revolution challenged traditional views of a young Earth inhabited by unchanging species” Pages 467-469

Section 56.1 “Human activities threaten Earth’s biodiversity” Pages 1259-1264

Go over the classification system

Open iNaturalist and show them the map of campus (keep it open so they can see their observations in real-time) syllabus