# LABORATORY 12: Visiting the Herbarium and Open Lichen Lab.

**Herbarium Tour**

Herbaria (herbarium singular) are repositories of plant material. There are more than 4,400 herbaria worldwide registered with Index Herbariorum (https://sweetgum.nybg.org/science/ih/). These collections may vary in size from a few thousand specimens to more than 8 million specimens. Collections are often pressed, dried, and glued to herbarium sheets, but some specimens may be pickled (i.e., placed in ethanol or formaldehyde) to preserve the three-dimensional structures. Specimens alone have little to no scientific value, as there is no metadata in which to contextualize the specimen. The most valuable scientific collections have accompanying information such as the date, locality, habitat which allow future researchers a more comprehensive understanding of the material.

Even though these materials are dead, they hold enormous scientific value. 1) They provide a physical record of *what* organism is being studied – this means the material can be reexamined and redetermined if taxonomic concepts change in the future. 2) We know *when* the specimens were collected and at what reproductive stage – this allows us to track phenology, which is especially important in a changing climate. 3) The locality data tells us *where* the specimens was collected – which informs our understanding of the taxon's historical distribution. 4) DNA can be extracted from historical collections – this allows us to use old material for modern methods.

Specimens may be ordered in a variety of ways, but the most common ways are either phylogenetically or alphabetically. Now that a good deal of major systematic relationships have been sorted out at the ordinal and familial level, many herbaria opt to organize material phylogenetically, as there is less movement required when taxa change names.

Unlike most vascular plants, bryophytes and lichens are not preserved by pressing the plants and gluing them to herbarium sheets. Instead, they are dried without pressing to preserve their three-dimensional morphology. Rather than gluing them to a sheet, we place them in folded paper packets which accommodate the loose plant material. On each of the packets, a label with the metadata for each of the specimens is glued.

**Part 2: Open Lab to Review Lichens**

The lab today will be an open lab where you can explore all the material we have covered during the previous labs. Remember that next week will be your lab assessment.

While this is not an exhaustive list, for the lab assessment, you will be expected to know how to:

- Identify and describe morphological structures of lichens and how this relates to their biology.
- Identify and describe reproductive structures of lichens and how this relates to their biology.
- Identify the photobionts in a lichen (green algae vs cyanobacteria).
- Correctly key lichens to genus or species.
- Interpret chemical spot tests.