[Class name]

[Semester]

[Faculty]

[Date]

**Biodiversity research using digitized, internet-based natural history collections**

**Learning Objectives:**

1. *Understand* the value of museum specimens for biodiversity research and knowledge
2. *Analyze* digitized museum specimens to answer a provided question
3. *Apply* the understanding to *create* a new question that could be answered using museum specimens

**Handouts:**

1. GBIF instructions (Monfils et al 2019)
2. iDigBio instructions (Monfils et al 2019)
3. this packet

**By the end of the class period, turn in:**

1. Group exercise questions, filled out (hard copy)
2. Self reflection, filled out (hard copy)

**Timeline:**

10 minutes – introduction to materials and case example of a study using museum specimens

50 minutes – small groups to collect and analyze data

15 minutes – time to answer self reflection questions

**Introduction**

On Tuesday we discussed an introduction to natural history collections and museums as places that reflect both our environment past and present – and how societies past and present engage with those objects and ideas. Today we’re exploring the primary sources themselves! We’re using digitized natural history collections to answer and pose questions about the environment

Adapted from Monfils et al 2019:

***Specimens*** are individual plants, animals, or artifacts housed in a collection. They are generally dead (e.g. taxidermied animals, dried plants) or never alive (e.g. minerals, seeds).

***Specimen data*** are based on archived biological specimens housed in a natural history collection. Scientists, naturalists, and explorers have been collecting and preserving specimens for hundreds of years. Today, we can interact directly with the specimens collected by Darwin, Lewis & Clark, and Teddy Roosevelt! Preserved with the specimens is a variety of information about the organism (e.g., collector, collection date, location, habitat, images, community assemblage, phenology). Specimens can be further examined to verify the data point or to yield additional information on the collected organism as scientists build on previous research or identify new questions to investigate. Preserved specimens from natural history collections are a treasure trove of data and information and have been used to study a variety of topics, such as evolutionary relationships, pesticide use, host-parasite evolution, and zoonotic disease transmission, etc.

***Digitized collections*** are online records of physical collections that natural history museums and other archives make available to enable more research and researchers to ask and answer questions with their specimens. In 2010, museums and other collection holders initiated a massive data mobilization effort to provide digital databases of these archived specimens. This data is aggregated in searchable portals that provide broad access to information on individual specimens, images of the specimens, and associated data. These efforts have vastly increased the accessibility and utility of these data.

Your group can choose from one of several questions to explore using the data portals.

Question choices (pick one, fill out the question in your group’s table):

How does bird diversity vary at continental scales?

How does bird diversity vary over time?

How does bird body size vary by species?

How does bird body size vary over time?

**References**

Monfils, A., Linton, D., Ellwood, L., Phillips, M. (2019). [Data is the New Science](http://dx.doi.org/10.25334/Q4RR0R). [Biodiversity Literacy in Undergraduate Education](https://qubeshub.org/groups/blue_data), QUBES Educational Resources. [doi:10.25334/Q4RR0R](http://dx.doi.org/10.25334/Q4RR0R)

**Group Exercise**

|  |  |
| --- | --- |
|  |  |
| Question: |  |
| Prediction (then): |  |
| Hypothesis (If): |  |
| Assumptions: |  |
| Experimental Design |  |
| Independent variable(s): |  |
| Dependent variable(s): |  |
| Type of resulting graph  (line or bar): |  |
| How will you know that you’ve answered the question? |  |

**SPACE PROVIDED for data collection, notes, and graphing**

|  |  |
| --- | --- |
|  |  |
| **DESIGN YOUR OWN QUESTION - that could be answered using digital natural history collections (and fill out table hypothetically)** |  |
| Prediction (then): |  |
| Hypothesis (If): |  |
| Assumptions: |  |
| Experimental Design |  |
| Independent variable(s): |  |
| Dependent variable(s): |  |
| Type of resulting graph  (line or bar): |  |
| How will you know that you’ve answered the question? |  |

**Self reflection questions**

NAME:

Had you previously used digital natural collections before?

What did your team discover about bird diversity using digitized museum specimens?

What other data would you have liked to have to further explore that question?

Does exploring museum data portals influence how you feel about the value of collections? Why or why not?