

Making a Classroom Database

with the Beaty Biodiversity Collections Database



Ideal for Grades: 2-4

Appropriate for Grades: K-12

Materials Needed: laptop or tablet with internet for accessing the database, writing materials, activity sheets (see pages 17-20)

The goal of this activity package is to walk students and educators through the process of cataloging museum specimens in a digital database. This activity package contains a short user's guide for the Beaty Biodiversity Museum (BBM) database, and specifically, highlights some of the key functions that the database possesses with respect to filtering museum data.

The main activity in this package tasks students with creating their own record for a unique specimen they find in nature that can ultimately be compiled to create an analog classroom database for living things in the community. Students will then practice sorting and filtering themselves by specific criteria in an interactive, movement-based activity that mimics the way the BBM database groups information.

Embedded inside this activity package are potential adaptations for older and younger groups of students. At the end of the package, there are a few additional exercises you can try with your class that further cement learning about scientific databases and their functions. All activities are flexible and can be mixed and matched.

Curriculum Connections:

- This activity package connects across BC's K-12 curricula. Some specific curriculum points include, but are not limited to:
 - **Grade 2 Arts Education:** Experience, document and share creative works in a variety of ways.
 - **Grade 3 Science:** Living things are diverse, can be grouped, and interact in their ecosystems.
 - **Grade 4 Mathematics:** Regular changes in patterns can be identified and represented using tools and tables.

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A Walk-Through the Database

A database is a system of collecting and organizing data. The Beaty Biodiversity Museum has recently reconstructed their database which catalogs specimens across various collections in the museum. The database is a living, digital catalog that continues to grow every day alongside the museum.

The Beaty Biodiversity Museum's online database is available at the following link:

<https://collections.beatymuseum.ubc.ca/>

Look up "*Sambucus racemosa*" in the database. This is the scientific name for red elderberry, a local plant species in British Columbia. Click on the first record. Records in the database, such those that come up when you search "*Sambucus racemosa*", can appear as the following image:

×

Occurrence | May 5, 1920

***Sambucus racemosa* subsp. *racemosa* L.**

May 5, 1920

Canada

1 image

Summary

Multimedia



Scientific name

Sambucus racemosa subsp. *racemosa* L. Inferred

Classification

Plantae > Tracheophyta > Magnoliopsida > Dipsacales > Viburnaceae > Sambucus

Dataset

University of British Columbia Herbarium (UBC) - Vascular Plant Collection

Basis of record

Preserved specimen

Record

Institution

GrSciColl institution
Beaty Biodiversity Museum

Institution code
BBM

Institution ID
<http://biocol.org/urn:lsid:biocol.org:col:15106>

Owner institution code
BBM

Collection

GrSciColl collection
UBC Herbarium

A Walk-Through the Database Cont.

Each record in the database has specific pieces of information attached to it.

Some examples of information collected for museum records include, but are not limited to: **scientific name, taxonomic classification, geographic data, collection date, information about the person making the record, and a unique catalogue number to represent each specimen.**

Note that records that have images attached to them have an image icon in the “Features” column of the search table.

1,256 results				
Scientific name	Features	Catalogue number	Locality	
 <i>Sambucus racemosa</i> subsp. <i>racemosa</i> L.	 	V043637	Vancouver	

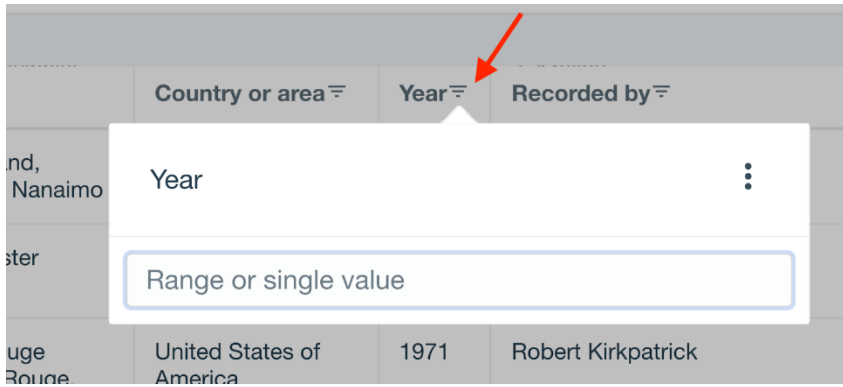
Browsing through database images, you may notice that preserved specimens look different than live specimens. This is a great opportunity for comparing and contrasting with your students, and images are a great entry point into the BBM database. You can view all the images currently in the database by clicking “Gallery” in the top-most navigation bar.



Figure 1: Photograph of live *Sambucus racemosa* (right). Photo from Wikimedia user Robert Flogaus-Faust.

A Walk-Through the Database Cont.

When searching museum records, it is also helpful to know that records can be sorted. For example, if you are interested in looking through records of "*Sambucus racemosa*" from the year 1910, you would simply click the filter button inside the "Year" column, type "1910", and click "Apply".

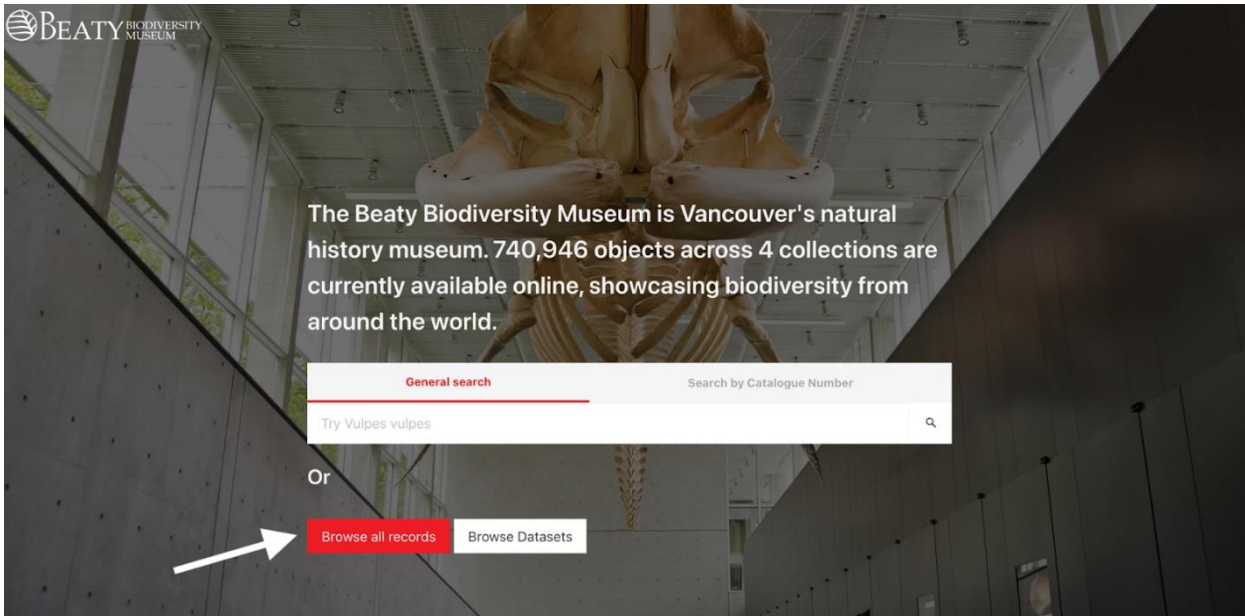


This can also be done for other filtering criteria. For instance, you could filter all records from Canada by following the same steps for the "Country or Area" column.

Tip: If filtering records using the "Scientific name" column, note that you are not restricted to searching at the species level. To see all amphibian records in the database, simply search "Amphibia" (**Class** Name) and click on the taxonomic group.

Making a Classroom Database Activity

With your students, browse through the museum records. On the database homepage, you can click “Browse all records” to view records from any and all collections.



Or, you can scroll down to view specific collections such as Beaty’s Tetrapod, Fish, Entomology, and Herbarium collections. Click “Specimens” to view the records in these collections. Please note that some museum collections have yet to be digitized but will be added.

Click on records of your choice and show your students what kind of information is collected for specimens in the museum as this will support them in the activity they will complete later on. **Also, show students how information in the database can be filtered such as by date or country.** Emphasize to students just how fast the database works to do this!

Making a Classroom Database Activity Cont.



In this activity, students will create their own records for organisms found in their local community to be compiled in a classroom database. Students can be tasked with locating a specimen near their home to catalog in a given time frame, OR this activity can be completed during class time as outdoor education.

Simply tell students that their task is to find a unique specimen in their school community to catalog for a class database similar to Beaty's and bring them outside to begin their search.

Acting as scientists, students will locate a specimen of interest, illustrate a picture of it to the best of their ability, and record important information about their specimen. The attached **"Cataloging a Specimen Activity Sheet"** (Page 17) has the following prompts for students to fill out that you can refer to when explaining:

1. Organism Name - *What is your specimen called?*
2. Classification - *Is your specimen a plant? An animal? Other?*
 - Note that this can be adapted for older and younger groups of students. For younger students, plant/animal/other classification may be appropriate. For older students, feel free to use more specific taxonomic groupings as you see fit (ex. mammals, amphibians, etc.)
3. Catalogue Number - *Give your specimen a unique ID number! Consider using your initials, the date, your birthday, etc.*
4. Recorded by - *What is your name? Who is making this record?*
5. Date - *Some indication of when the record was taken. See note below.*
 - If this activity is being done within a single block of class time, consider asking students to record the time instead of the date as this will allow students to sort themselves chronologically in the activity that follows. Otherwise, if the activity is to be done within a larger span of time at home, the date will be just fine.
6. Country - *In what country was the record taken?*
7. Habitat - *Where, specifically, was your specimen found? (i.e., on a rock, on the big oak tree in the school courtyard, on the grassy field, etc.)*

See an example of the activity sheet completed on Page 18.

The interactive portion of this activity involves having students act as their records in a classroom database and sort themselves into groups based on different criteria, just as data can be sorted by different criteria using the Beaty database.

Making a Classroom Database Activity Cont.



Once students have completed making their database records for a specimen of interest, they can arrange themselves around the classroom with their records in-hand. Explain to students that databases like Beaty's organize data in a systematic way that allows information to be filtered at the click of a button.

Tell students that their task is to determine how long it would take them to sort data in their classroom database in comparison. **Some ideas for how you can ask students to sort themselves include:**

- All plant specimens in one group
- All animal specimens in one group
 - Note that this can be an opportunity for differentiation: instead of simply asking students to step forward if their specimen is an animal, you can ask them to sort themselves into taxonomic groupings like mammal, amphibian, insect, etc.
- By specific catalogue numbers
- By habitat details (for example, step forward if your specimen was found on a tree, step forward if your specimen was found on the field or courtyard, etc.)

Feel free to ask students to sort themselves however you please. This activity might look a number of different ways - students may wish to physically create groups when sorting, or they can stand in a line and step forward from the line when the criteria being called out applies to them. It can even be delivered as an indoor PE activity, for example: "If your specimen has fur, do 10 jumping jacks!".

For older groups of students, this activity can be framed as a challenge. For instance, how fast can you sort yourselves into groups based on classification (ex. all animal specimens in one group, all plant specimens in one group, etc.)?

Data downloaded from the database in the form of spreadsheets can be sorted by date or alphabetized in a matter of seconds. How long would it take your students to order themselves BY SPECIMEN **alphabetically** or in **chronological order** (by time if all the data is collected on the same day)?

Have your students sort themselves and find out! As an added challenge, you can tell students that, like a database, they cannot talk to one another while sorting.

Making a Classroom Database Activity Cont.



In other variations of this activity, you might ask students to self-select sorting criteria and see what arises spontaneously. If students were asked to come up with their own criteria to sort into two groups, they might, for example, choose to sort by specimens that are green versus specimens that are not green. Consider how a sorting rule can build in complexity. Sorting by specimens that can photosynthesize versus specimens that cannot photosynthesize may yield the same results, but demonstrates a more solid grasp of scientific concepts.

Other layers you might consider adding to this activity include:

- Having students swap record sheets so they have to familiarize themselves with information that they did not collect personally.
 - Note that this is a powerful teaching point when it comes to the benefits of a database. There is a certain degree of information interpretation that human beings must do when sorting or filtering. A database, on the other hand, sorts information systematically.

While it would be harder for your students to sort information they are not personally attached to (such as when using someone else's database record), the Beaty database is able to sort millions of specimens collected by a vast number of recorders, not necessarily because of expertise or familiarity with the specimens like a human might need, but through following specific protocols. The goal of this activity is to demonstrate how time-consuming it can be for humans to attempt to follow the same protocols.

- Additionally, students will have to practice interpreting each other's hand-writing which speaks to a classic dilemma when transferring specimen data into a digital database. Specimens in the museum range in their quality of labels and are frequently written in script or use non-intuitive abbreviations. Indeed, labels can pose quite a challenge for museum curators to read!

You can find more on this topic here, on the Wisconsin State Herbarium's website:

<https://herbarium.wisc.edu/public-outreach/virtual-tour/>

- Consider incorporating other languages!
 - This activity could provide opportunities for language-learning. For example, you might consider calling out your criteria for sorting in another language, such as French. If students are learning their numbers in French, you might ask students to create six-digit number codes for their catalogue numbers and "search" specific catalogue numbers in the class database by reading them out in French for students to identify.
 - ELL students may fill out their specimen record sheets in their home languages, adding a layer to the information interpretation students will practice if they swap records with each other before sorting. This also brings up an interesting talking point about the BBM database and language. As the BBM is predominantly an English-speaking institution, records in the database are searchable using English and scientific nomenclature. However, the BBM database feeds into the GBIF (Global Biodiversity Information Facility) interface which is searchable in other languages.

Making a Classroom Database Activity Cont.



Visit the GBIF interface here:

<https://www.gbif.org/hosted-portals>

- Join in on the fun!
 - Once students have gotten comfortable with filtering information in their class database, perhaps they can choose a sorting rule that is a secret to *you*. Students will have a blast watching you observe their groups and try to guess how they have decided to group themselves. Scientists go through a similar practice of making a sorting rule when investigating an organism's taxonomy.
 - This can also work the opposite way around (i.e., you can put your students in groups and have THEM guess *your* sorting rule)!
- Try it in small groups with a gallery walk!
 - After some database exploration and data filtering, you may wish to split students into groups of 4-5 so that they may practice sorting themselves.

In small groups, students can get familiar with each other's records and come up with a sorting rule by which they can be sorted. When finished sorting, you can have groups walk around the space in a gallery style to try and guess each other's sorting rules. The attached "**Guess My Sorting Rule Activity Sheet**" (Page 19) gives students a place to make their guesses. Number groups off before they begin the activity. Feel free to make fewer/larger groups for an added challenge.

Altogether, you can go over each group's sorting rule and students can answer the final reflection question.

- Some adaptations for primary students:
 - For lower primary students (K-1), you may choose to forgo the sorting activity altogether and instead have students practice their oral language skills. You can point and "click" a student with a pointer-like tool and ask them to share information about their specimen, just as you would click on a record in the database to learn more about it.

As students are relying on each other's cooperation to do this sorting and filtering work, you can remind them how these functions are carried out in the Beaty database with a few simple clicks of a button and emphasize how much longer it takes human beings to sort data in real time.

Students will come to understand that this is the power of databases like Beaty's. They make information more accessible, back-up museum records, and certainly make our researchers' lives easier.

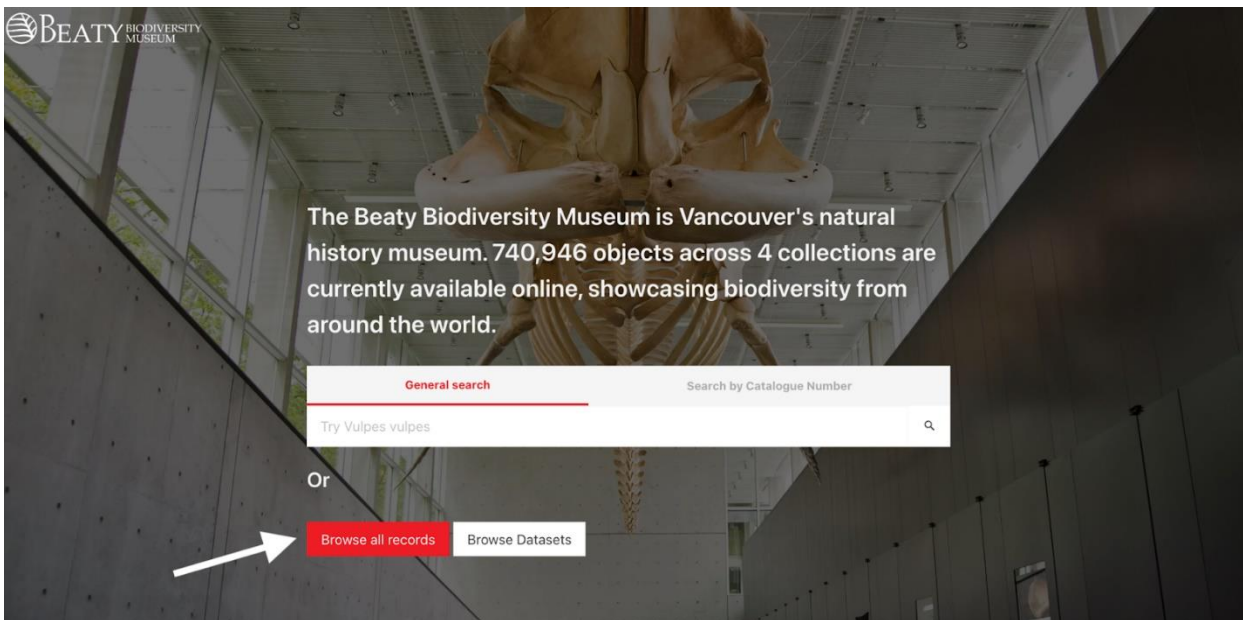
Additional Database Exercises

The following exercises will build on your students' learning about the BBM database by practicing various database functions through games. These exercises ask powerful questions about the strengths and pitfalls of scientific databases, as well as challenge students to explain their critical thinking. They can stand alone as their own lessons.

These exercises can be adapted for primary students, but are likely more suitable for intermediate and upper intermediate grades.

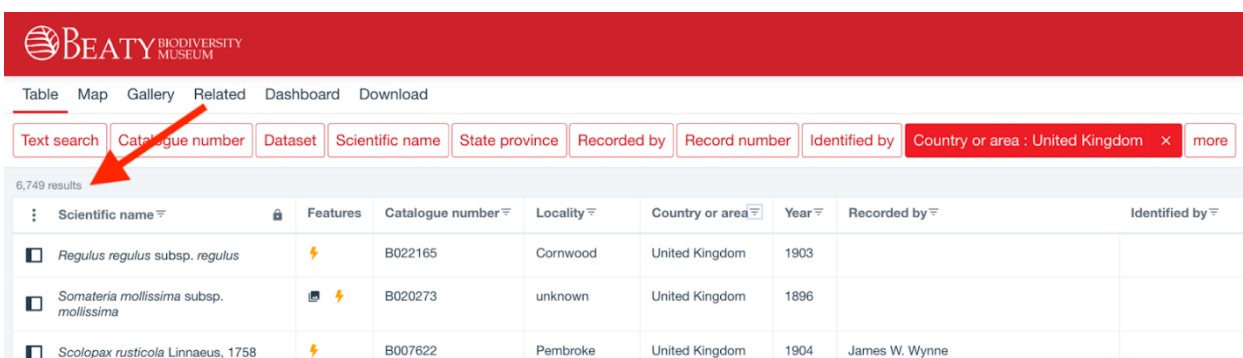
1. Country Guessing Game

- Click "Browse all records" on the database homepage.



- Ask students to guess countries with the least number of records. Use the filtering tool to sort records from specific countries and check their answers, reminding students what those steps look like when filtering data in the database. The number of search results (records) will appear in small numbers at the very top of the data table.

Here is, for example, the **number of records from the UK as of June 2024**.



Scientific name	Features	Catalogue number	Locality	Country or area	Year	Recorded by	Identified by
<i>Regulus regulus</i> subsp. <i>regulus</i>		B022165	Cornwood	United Kingdom	1903		
<i>Somateria mollissima</i> subsp. <i>mollissima</i>		B020273	unknown	United Kingdom	1896		
<i>Scolopax rusticola</i> Linnaeus, 1758		B007622	Pembroke	United Kingdom	1904	James W. Wynne	

Additional Database Exercises Cont.

- **Extension 1:** Have students reason *why* a country has more or less records than others. This can be a powerful social studies connection - students may think about borders and country creation, factors that make some geographic regions harder to study, changes in place names, etc.

Students might identify, for example, that Canada often has the highest number of records which makes sense considering the BBM is a Canadian institution.

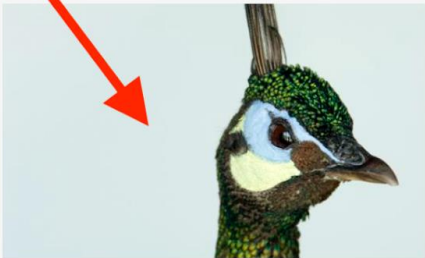
2. Map Guessing Game

- Scroll down on the database homepage and choose a collection to explore. This example will feature the BBM's Tetrapod collection.

Collections

Among our two million treasured specimens are the third-largest fish collection in Canada and a myriad of fossils, shells, insects, fungi, mammals, birds, reptiles, amphibians, and plants from around BC and across the world. If you would like to go to a particular dataset (such as Birds, Lichen, or Mammals) click on the red button below instead.

[View Individual Datasets](#)



Cowan Tetrapod Collection

The Cowan Tetrapod Collection was founded in 1943, but the oldest specimen dates from 1849. With over 40,000 specimens representing over 2,500 species, the collection is the second-largest scientific collection of birds,



Spencer Entomology Collection

Over half a million pinned specimens, 75,000 alcohol-preserved specimens and 25,000 specimens on slides showcase BC and the Yukon's spectacular insect diversity. Past collectors' particular projects have shaped the collection, and

Additional Database Exercises Cont.

- Click the “Specimens” column at the top of the data table to view all records in the collection.



Collection code | CTC

Cowan Tetrapod Collection

From [Beaty Biodiversity Museum](#)

 Ildiko Szabo • Chris Stinson

 [beatymuseum.ubc.ca](#)

 Canada › Vancouver

 46,000 specimens

 43,194 specimens in GBIF

[Edit](#) 

[About](#) [Specimens](#) [Dashboard](#)

Description

The Cowan Tetrapod Collection was founded in 1943, but the oldest specimen dates from 1849. With over 40,000 specimens representing over 2,500 species, the collection is the second-largest scientific collection of birds, mammals, reptiles, and amphibians in British Columbia. It holds large, representative samples of nearly all species—and most subspecies—of British Columbia’s terrestrial vertebrates and marine mammals. Important specimens representing global biodiversity are also housed here including the rare red

- Click “Map” to see where all of the records in the collection are mapped geographically.



Collection code | CTC

Cowan Tetrapod Collection

From [Beaty Biodiversity Museum](#)

 Ildiko Szabo • Chris Stinson

 [beatymuseum.ubc.ca](#)

 Canada › Vancouver

 46,000 specimens

 43,194 specimens in GBIF

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[Scientific name](#) [Verbatim scientific name](#) [Catalogue number](#) [Recorded by](#) [Identified by](#) [more](#)

[Table](#) [Map](#) [Gallery](#) [Related](#) [Download](#)

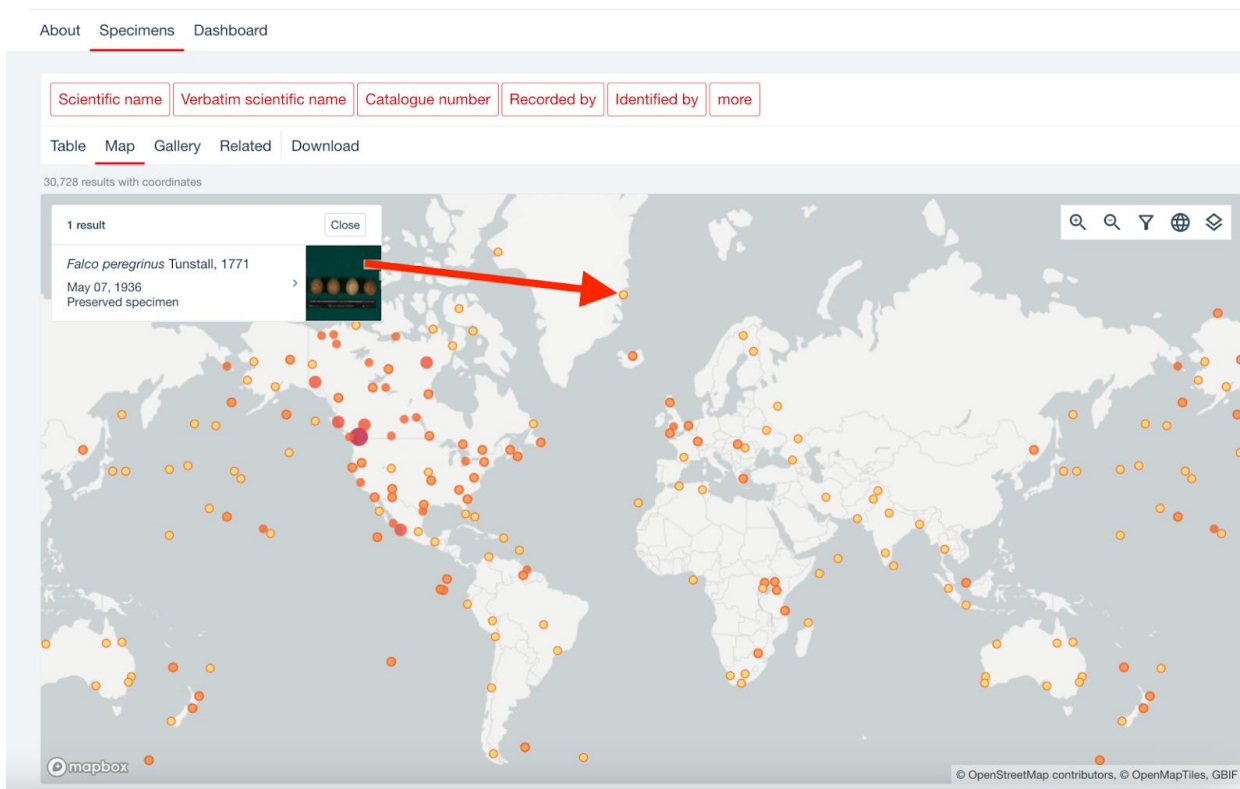
43,194 results

Additional Database Exercises Cont.

- The geographic locations of records in the collection are indicated with dots on a map. Briefly show the map of records to your students. Have students test their geographical knowledge by asking them to identify a country that they think a record came from based on map location only.

For an added challenge, test students by removing the map from their range of sight and having them recall countries from memory.

To view exactly where a record comes from, click on the dot. Note that when you zoom in on the map, country names will appear.

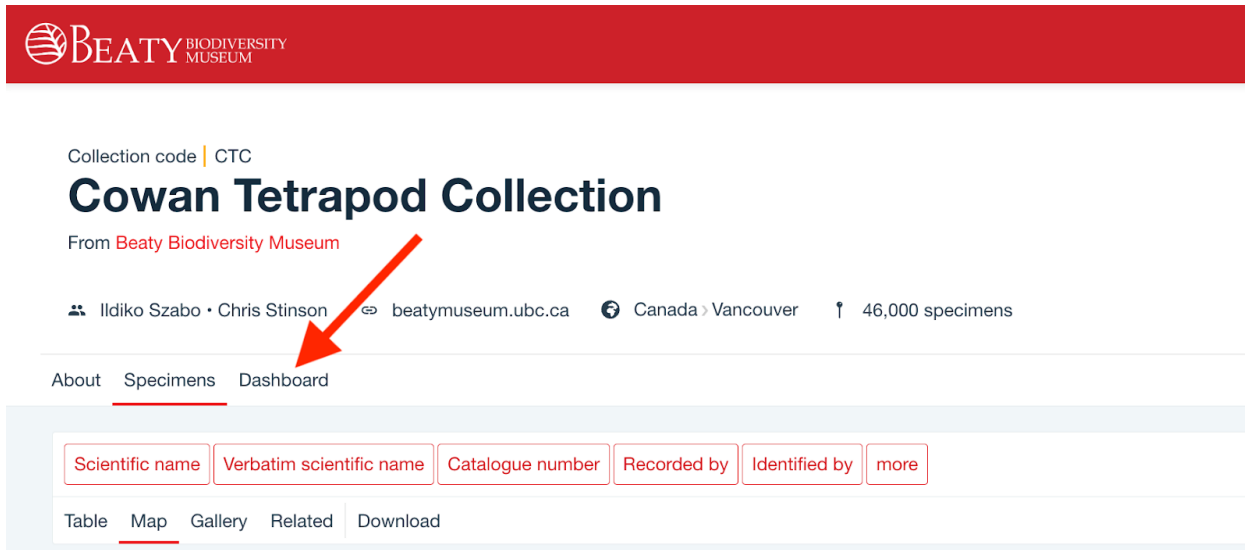


- Extension 1:** Students might identify records on the map that are free-floating (ex. in the middle of the ocean when their recorded country says different). Why might this be?

Sometimes, there are genuine mismatches between database records and specimen labels that BBM employees are working on trouble-shooting. At other times, there can be errors or missing information in initial data collection.

Additional Database Exercises Cont.

- **Extension 2:** To view a breakdown of country data that outlines the greatest and the fewest number of occurrences, click “Dashboard” and scroll down to the bottom of the page where it says “Country or area”.



Collection code | CTC

Cowan Tetrapod Collection

From Beaty Biodiversity Museum

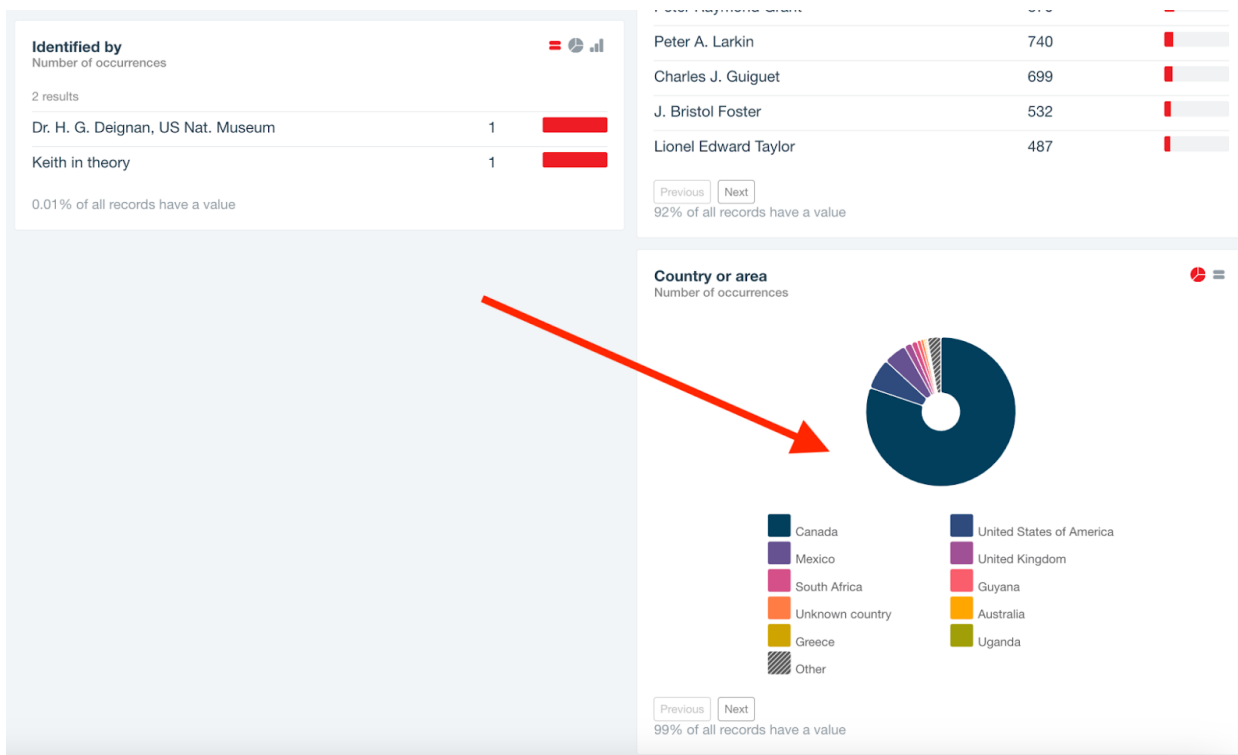
Ildiko Szabo • Chris Stinson | beatymuseum.ubc.ca | Canada > Vancouver | 46,000 specimens

About Specimens **Dashboard**

Scientific name Verbatim scientific name Catalogue number Recorded by Identified by more

Table **Map** Gallery Related Download

First, you will see a pie chart that makes the country with the greatest number of records easy to identify.

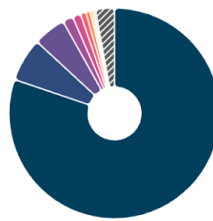


Additional Database Exercises Cont.

- Show the pie chart to your students and ask: **What is the country with the greatest number of records? Why might this be?**

Note that the pie chart will group the countries with the fewest number of records in an “other” category. To view those countries, click the written data icon and toggle through the next button at the bottom to view the countries with the fewest number of records in the collection (the country with the least number of records will be on the final page).

Country or area
Number of occurrences



Country or area
Number of occurrences

104 results

Canada	34,139	
United States of America	2,838	
Mexico	2,130	
United Kingdom	679	
South Africa	539	
Guyana	366	
Unknown country	263	
Australia	138	
Greece	127	
Uganda	108	

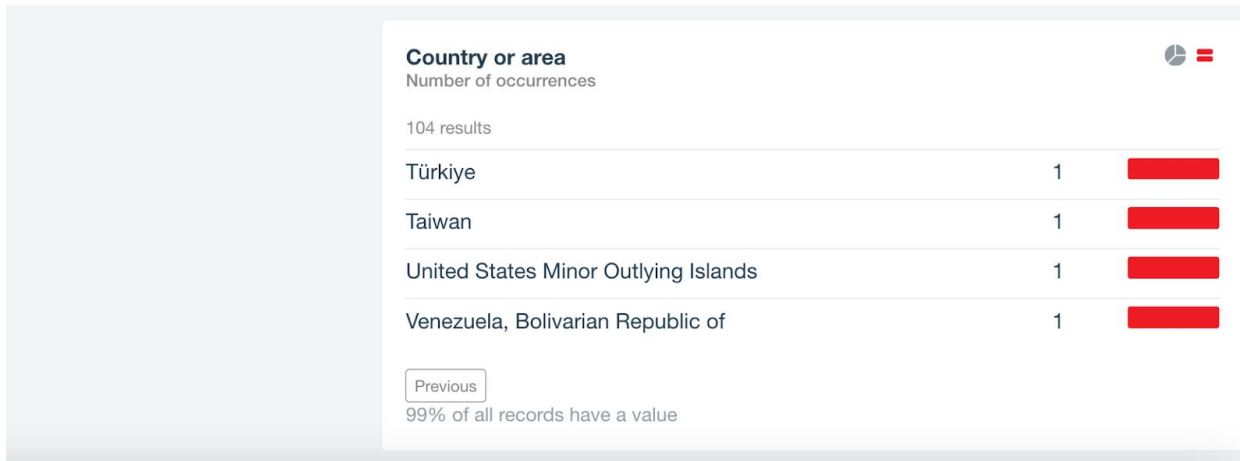
Previous

Next

99% of all records have a value

Additional Database Exercises Cont.

In this example, many countries are tied for the fewest number of records in the collection at 1 record. They will be alphabetically listed when they have the same number of records.



If your class is practicing representing data in graphic forms, you may wish to first view the map with your students, then ask them to predict what a pie chart for country data in the collection might look like. Afterwards, you can reveal the actual pie chart and compare together.

3. Accessibility Discussion Prompt

- Ask your students how easy they think it might be to access records using Indigenous names or common/vernacular names. Try a few examples in the database search bar and see what records come up. Are they the records you were looking for?
 - Discuss with students about any problems or concerns that come to their minds regarding the BBM database and accessibility. How easy would it be to find a record in the database using an Indigenous language? A language that uses different characters to English? How about a member of the public using a common name?
 - What improvements might your students envision for the database to make the data more accessible to everyone? Why do you think the database primarily uses scientific names?

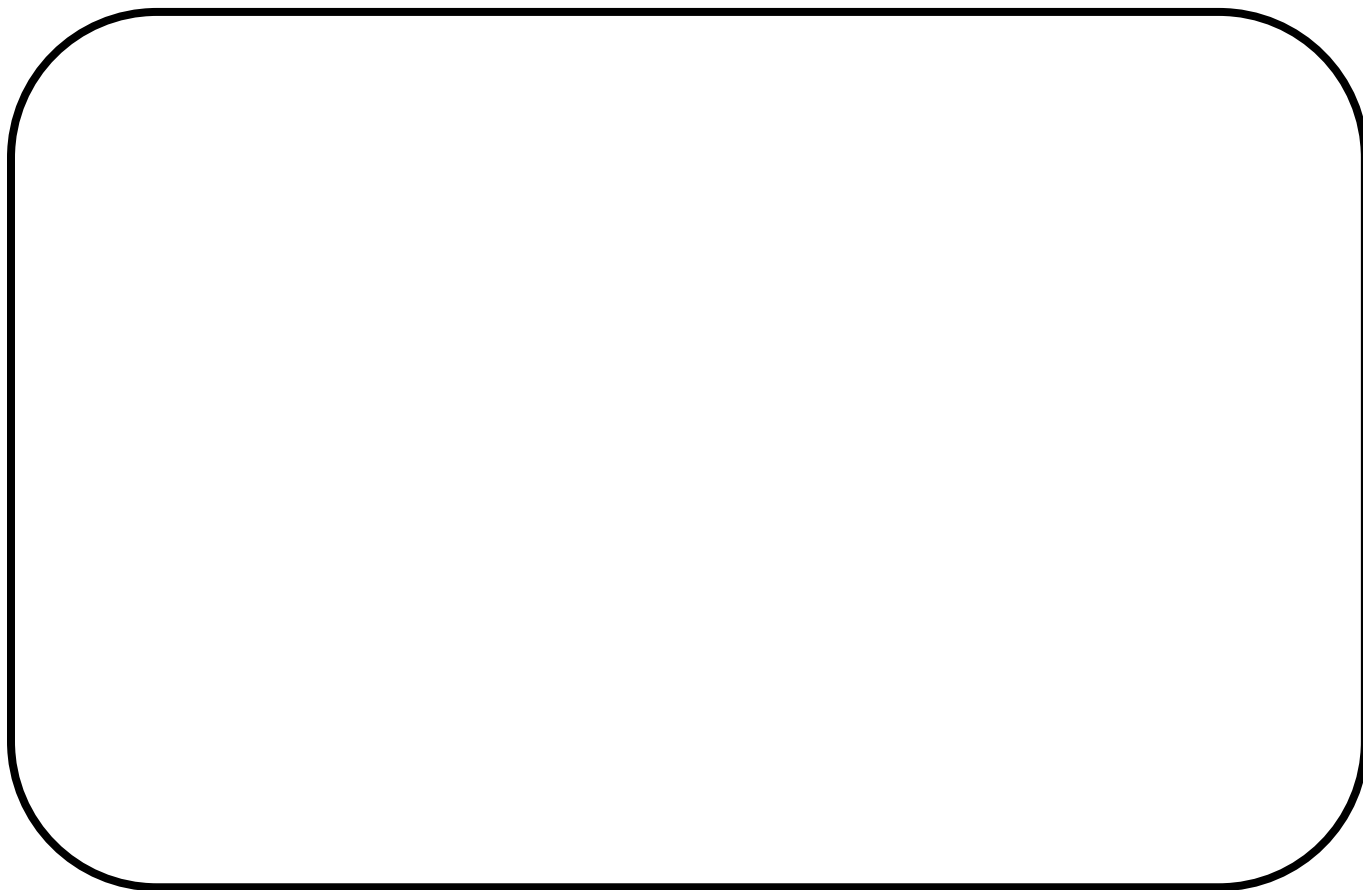
4. Database Wrap-Up Activity (Page 20)

- Distribute this wrap-up worksheet for students to fill out and cement their final thoughts about the BBM database. The worksheet asks students why databases are important and prompts them to share their learning from and experiences with the activities.
- **Please remember this activity package is flexible.** A reflection activity like this can stand alone. For instance, you could skip the main activity, but have students explore the database and complete this page instead.

Name: _____ Date: _____

Cataloging a Specimen Activity Sheet

Use this sheet to make a record for a unique specimen of your choice. Include an illustration and fill in the blanks.



Organism Name: _____

Classification: _____

Unique Catalogue Number: _____

Recorded by: _____

Date: _____

Country: _____

Habitat: _____

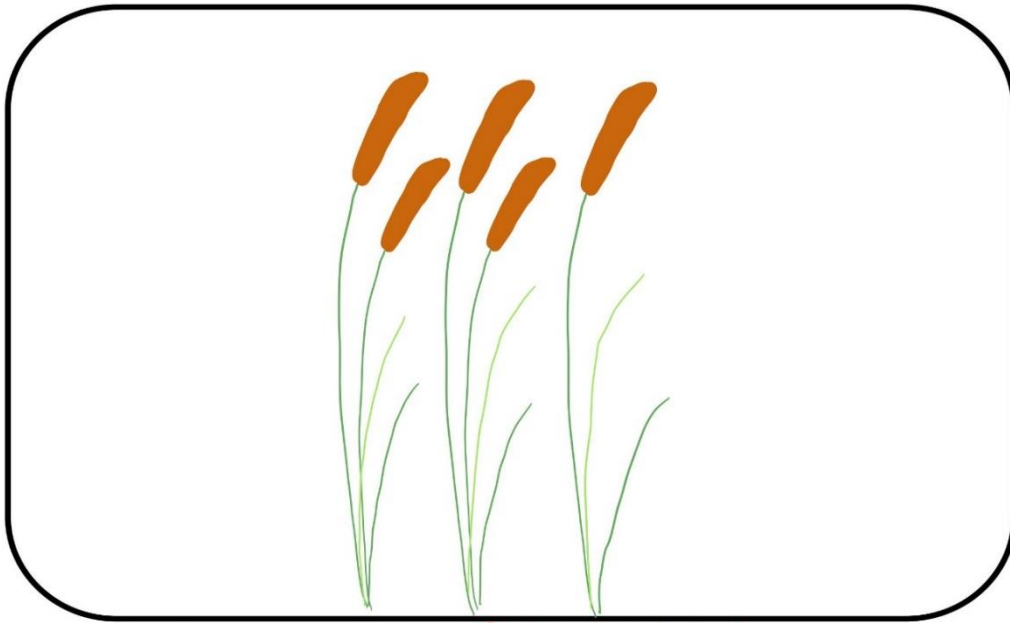
Cataloging a Specimen Activity Sheet (Sample)

A completed version of this activity sheet might look like the following. This activity is adaptable and can be completed in various ways. In this example, for instance, the red annotation emphasizes that students can write a short, descriptive title for their specimen if they are not sure how to identify it.

Name: Jane Smith Date: June 25th, 2024

Cataloging a Specimen Activity Sheet

Use this sheet to make a record for a unique specimen of your choice. Include an illustration and fill in the blanks.



Organism Name: Cattail if unknown, simply describe:
ex. tall grassy plant, hot dog shaped plant

Classification: Plant

Unique Catalogue Number: Z123456

Recorded by: Jane Smith

Date: June 25th, 2024

Country: Canada

Habitat: Meadow; By the water

Name: _____ Date: _____



Guess My Sorting Rule Activity Sheet

With your group, walk around and observe how other groups have sorted their specimens. Guess their sorting rule and use this sheet to record your thinking.

Group #1's Sorting Rule: _____

Group #2's Sorting Rule: _____

Group #3's Sorting Rule: _____

Group #4's Sorting Rule: _____

Group #5's Sorting Rule: _____

Which, if any, sorting rule surprised you the MOST? Why?

Name: _____ Date: _____

Database Wrap-Up Activity

Use this sheet to reflect on your experience with the Beaty Biodiversity Museum Database.



Why do you think databases are important? _____

What is the best feature of the BBM database? _____

What improvements could be made to the BBM database? _____

Describe your favourite specimen from the BBM database: _____

What kind of research question would you investigate using the BBM database? _____

The BBM database made me feel (colour one):

