Liberating Data for Biodiversity Research—the WeDigBio Event
An Undergraduate-level Classroom Exercise in Citizen Science

Learning Objective
The world's 3 billion biodiversity research specimens—bugs on pins, fish in jars, plants on sheets, fossils in trays, etc.—document the what, when, and where of the perhaps 9 million species on Earth. Each is a time capsule, a window to the morphological and genomic diversity for a species at a location at a particular moment in time stretching back several centuries for extant organisms and hundreds of millions of years for fossil organisms. By aggregating data from these specimens we bring into sharper focus historical changes to life on Earth with which to better predict future change. The objectives of this exercise are to familiarize you with the information content of biodiversity specimens and their labels, the breadth of that information across geographic space and/or time, a useful resource for finding biodiversity specimen information, and the value of citizen science contributions. Upon completion of this exercise, students will be able to: interpret biodiversity specimen labels, differentiate among categories of label information, relate information on individual specimen labels to information collected by the nationwide community, and construct an aggregate picture of the temporal and spatial extents of specimens based on label data.

Timeframe
We will be contributing to a global event entitled Worldwide Engagement for Digitizing Biocollections (WeDigBio) that runs from October 22 to 25, 2015. During those four days there will be many others contributing biodiversity specimen label transcriptions along with us, some in classroom settings, some at parties onsite at museums, and some at their home computers.

*Exercise 1—transcribe label data from ten specimens and reflect on what you saw*

Read through the questions below so that you have them in mind as you transcribe label data from ten specimens. Answer them on a separate sheet of paper.

   a. If you register with the transcription platform, what is your username? It can be used to assess your work. If you are under 18, do not register with the transcription platform.

   b. In what ways were the specimen labels similar over the set of ten that you transcribed? In what ways might this similarity facilitate research?

   c. In what ways did the specimen labels vary over the set of ten? To what do you ascribe this variation?

   d. What did you see on the specimen labels that you did not understand?

   e. Provide one thing that you had expected to see on a specimen label that did not appear on them. Why might that bit of information be absent?

Exercise 2—build an aggregate picture of the temporal extent of your ten specimens

Mark the collection years of the ten specimens that you transcribed using the Timeline Tracker game board below and answer the following questions on a separate sheet of paper.

a. In what ways might the collection methods (e.g., the means of getting to a collection site or catching the specimen or assigning a latitude and longitude, etc.) have changed over the time span of your collections? How might this have affected the relative research value of the specimens collected in the earliest year vs. the latest year?

b. Look up the year of establishment of a local city, state, or national park or other conservation land and provide the name and year. Biodiversity collections are often critical to our understanding of the diversity that we are trying to preserve with our parks and conservation lands. Did any of the specimens predate the establishment the local park?
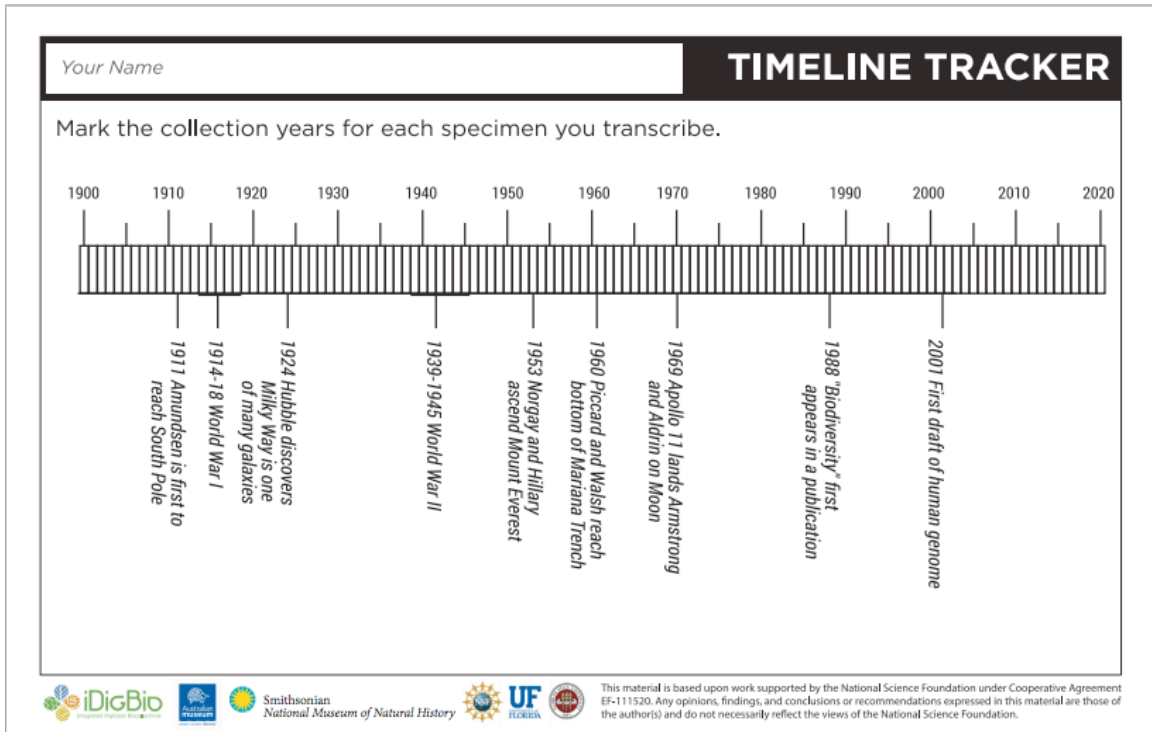
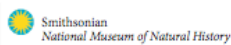*Exercise 3—build an aggregate picture of the spatial extent of your ten specimens*

Mark the collection locations of the ten specimens that you transcribed using the Geo Locator game board below, fill out the following table, and answer the question below it on a separate sheet of paper. For each specimen that you transcribe you will do a search for additional specimens identified as the same species at www.idigbio.org/portal/search. iDigBio provides data about more than 44 million specimens to the world. The data that you transcribe today will likely eventually be served at iDigBio and/or the Global Biodiversity Information Facility (www.gbif.org). Your contribution will fill a hole in our understanding of these species.

Species ID of Specimen	State/Province (or Country) in which Specimen Collected	Does iDigBio already have a specimen of that species from that location? (Y/N)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

a. Why is it valuable to document the full geographic range of a species in our biodiversity research collections?

Suggestions for Instructors

These exercises can be completed during class in a computer lab or outside of class. There might be efficiencies introduced if they are done in-class, since you can answer any questions that arise immediately and provide answers to the whole group, rather than back-and-forth in emails. Should you assign the exercises in class, we encourage you to leave time at the end for discussion of student answers and observations.

For the purpose of the exercises, we encourage you to select one or two projects registered with WeDigBio (https://www.wedigbio.org/find-a-project). If two, it might be productive to select projects with alternative specimen types (e.g., plants on sheets and bugs on pins), especially if you are choosing to assign Exercise 1. You might choose to lead them through a specimen transcription at the transcription platform(s) at the beginning of class, but we believe that a better idea is to ask them to become familiar with the platform and the exercises prior to class.

For exercises 2 and 3, full-sized gameboards are available at https://www.wedigbio.org/content/games. It will be necessary to print these out separately if the print is too small in this document. For exercise 3, it might be necessary to find a similar map with a geographic scope more appropriate for your selected transcription projects.

While the exercises were written for the WeDigBio event, they can be assigned at any time throughout the year. It is just a matter of finding active transcription projects at a transcription platform. You can find mention of the platforms at the WeDigBio project list (https://www.wedigbio.org/find-a-project).

Should you have questions or comments, feel free to contact us at amast@bio.fsu.edu (Austin Mast) and eellwood@bio.fsu.edu (Libby Ellwood). We would love to hear your suggestions and stories.

Further Resources
For additional reading on the topic of public participation in the generation of digital data about biodiversity collections, we encourage you to read the following:

Ellwood E. R., B. A. Dunckel, P. Flemons, R. Guralnick, G. Nelson, G. Newman, S. Newman, D. Paul, G. Riccardi, N. Rios, K. C. Seltmann, and A. R. Mast. 2015. Accelerating the digitization of biodiversity research specimens through online public participation. *BioScience* 65: 383–396.

For additional educational resources related to biodiversity research collections, we encourage you to visit the following:
  iDigBio's Education webpages (www.idigbio.org/education)
  Advancing Integration of Museums into Undergraduate Programs website (www.aim-up.org)
  Collections Education website (www.collectionseducation.org)

License and Acknowledgements