Science Communication Strategy

Biological Collections @ Cornell

Rosemary Glos

BIOG 3500, Fall 2019

Table of Contents

Background

Biological collections are a priceless scientific and historical resource that remain on the forefront of research across multiple disciplines.

Broadly speaking, biological collections are defined as both living stocks (organisms) and repositories of preserved biodiversity specimens and materials.[1] These collections - whether of plants, insects, vertebrates, fungi, etc. - provide resources for biodiversity research and serve as valuable teaching tools. Preserved collections provide snapshots of a species or community at a particular point in time and space, while living collections preserve genetic diversity, contribute to ex situ conservation, and function as "living laboratories."[2] Many collections continue to grow as biologists submits types and vouchers, researchers create new specimens over the course of a project, or curators acquire additional accessions to fill taxonomic gaps.

Despite the key role that biological collections play in biodiversity research, many people – especially laypeople such as university donors and administration - fail to realize just how important they are. This often results in insufficient funds for collection maintenance and improvement.[3] Although they *may* contain old materials, biological collections are not outdated! They contain crucial pieces of information that are helping us tackle the world's greatest problems. Innovative and interdisciplinary uses for natural history collections are already helping us solve issues related to biodiversity loss, emerging pathogens, threats to food security, and environmentally induced health issues, to name just a few[4]. In the past few decades, biological collections have become more accessible thanks to the advent of computerized specimen catalogues, more holistic sampling, and widespread data sharing.[5]

Audience

This science communication project seeks to convey the importance of Cornell's biological collections to a lay audience. This project is not designed to affect specific policy changes, but rather to increase awareness of Cornell's biodiversity collections among adult non-scientists who have an interest and/or stake in the science conducted at Cornell. It will also create materials that scientists themselves can use to communicate the value of the collections that they use.

I will reach slightly different audiences via four social media platforms. On **Instagram**, I will create content largely targeted at a non-scientific audience, since many of my followers are lay people with an interest in biodiversity issues. Likewise, I will direct my **Twitter** content toward scientists themselves, especially those who advocate for science communication and retweet SciComm-related material. Content produced for **Wikipedia** will be intended for lay people in

[1] The National Academies of Sciences, Engineering, and Medicine, "Biological Collections: Statement of Task."
[2] Suarez and Tsutsui, "The Value of Museum Collections for Research and Society"; Cook et al., "Natural History Collections as Emerging Resources for Innovative Education."
[3] Suarez and Tsutsui, "The Value of Museum Collections for Research and Society."
[4] Suarez and Tsutsui; Cook et al., "Natural History Collections as Emerging Resources for Innovative Education."
[5] Schindel and Cook, "The next Generation of Natural History Collections."

accordance with Wikipedia's mission to clearly present information to a broad audience. Lastly, I will upload my video to **YouTube**, thus facilitating sharing it across other social media.

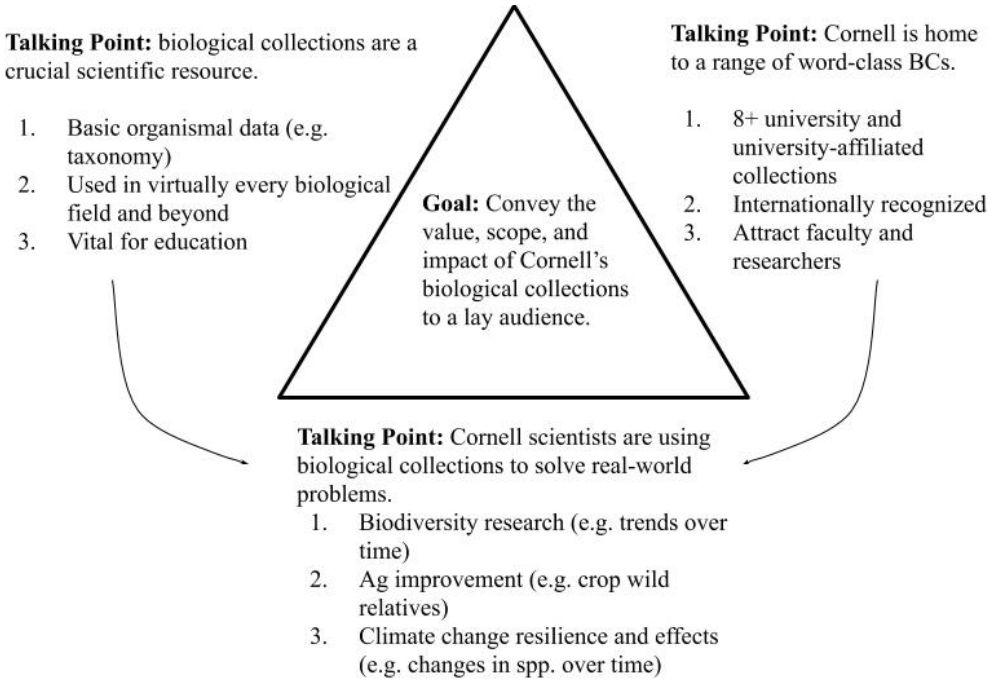
Goals

The goals of this project are threefold:

1. Convey the importance of biological collections in research across multiple disciplines (**value**).
2. Raise awareness about the extent of Cornell's biological collections (**scope**).
3. Demonstrate how Cornell's biological collections are helping scientists solve real-world issues (**impact**).

I will consider the project successful if I manage to spark conversations, both in person and across social media platforms, about the value, scope, and impact of biological collections. Audience members should come away with a more holistic view of biological collections at Cornell, not just as a series of separate resources but as the foundation of biodiversity research at the university.

Messaging Triangle



Press Release

Cook et al. (2014) – See Appendix A for the full release.

Natural History Collections Can Help Transform Undergraduate Education

A new generation of scientists benefits from active, specimen-based inquiry

How do undergraduate educators ensure that they are enabling tomorrow's scientists to become effective solvers of our looming environmental and health crises? A team of 17 researchers from across the United States argues that natural history collections hold the answer. They demonstrate how the physical specimens and digital data associated with natural history collections can help shift undergraduate science education from its focus on passive absorption of material to active, curiosity-driven inquiry. The authors, who hail from several well-known universities and natural history museums, published their findings in the August 2014 issue of *BioScience*.

Blog post

A blog post introducing my project can be found here.

Multimedia

a. **Video**: *From the Baileys to Today: The Palm Collection at Cornell University* (here)

   This 6 minute video tells the story of Cornell's 30,000-specimen palm collection, beginning with the exploits of Liberty Hyde Bailey and leading up to modern research on the iconic plants.

b. **Podcast**: *A Conversation with Dr. Chelsea Specht* (here)

   I sit down with Cornell's Barbara McClintock Professor of Plant Biology and CALS Associate Dean for Diversity and inclusion to talk about biological collections and why we need them.

c. **Infographic**: Biological Collections @ Cornell (see Appendix B)

   This infographic outlines the *scope* of biological collections at Cornell. It is designed to demonstrate that they contain specimens from nearly every living functional group in the ecosystem.

Digital Platforms

a. **Twitter** (see Appendix C)

   The scientific community is extremely active on Twitter. Scientists across multiple disciplines use the platform both to communicate with other scientists and to share their research with laypeople. My own following on Twitter is modest in size, but it includes several organizations (e.g. State Darwin Museum, GSU Natural History) and individuals (e.g. Science in Real Life) who actively promote science communication, especially in topics relating to biological collections and natural history research. The vast majority of my followers are scientists, many of them at Cornell, so I sought to create informative

and eye-catching content that help them communicate the importance of biological collections with their (presumably larger) following.

The week-long "Meet the Collections" Twitter thread was designed to provide an introduction to six of the University's largest natural history collections. Each post was intended, per my message triangle, to the communicate the *value, scope,* and *impact* of each collection in 280 characters or fewer. It focuses on Cornell collections, but the overall messages applied to collections across the world.

i. Twitter thread: "Meet the Collections"

1. 11/17: Liberty Hyde Bailey Hortorium
2. 11/18: Cornell University Plant Pathology Herbarium
3. 11/19: Cornell University Insect Collection
4. 11/20: Cornell University Museum of Vertebrates
5. 11/21: Macaulay Library @ Cornell Lab of Ornithology
6. 11/22: Cornell Botanic Gardens

I also released a thread outlining a 2018 paper by David Schindel and JA Cook describing the concept of "Next-Generation Collections" (NGCs) and demonstrating the importance of biological collections as a whole.

Impact: 12,668 people saw the "meet the collections" thread and 247 people interacted with it. 20 people retweeted it. Retweeters included the collections themselves (@MacaulayLibrary, @InsectsCornell), curators at Cornell (e.g. insect collection curator Dr. Corrie Moreau), curators at other collections (e.g. Joel Gibson, curator of the entomology collection at the Royal BC Museum) and a smattering of professors and grad students from institutions across the country. When the Macaulay Library saw that I was featuring collections, they made a post of their own and mentioned me in it (screenshot in Appendix C).

b. Wikipedia. (see Appendix D)

On this platform, I targeted articles that shape how laypeople understand the significance of natural history collections.

The most obvious articles to edit would be "natural history collection" and "biological collection," but neither of these have entries (yet). Instead, "biological collection" redirects to "scientific collection," a page that is badly in need of edits to correct typographical errors, improve the formatting, and provide a more global focus (the current examples seem suspiciously skewed toward Europe, especially Germany). Unable to perform a widespread overhaul, I focused on rewriting the lead, which is the first, and sometimes only, portion of a Wikipedia article that users read.

The Wikipedia biography for one of the most influential contributors to Cornell's botanical collections, L.H. Bailey, is surprisingly sparse. I added a section on his (extensive) contributions to palm taxonomy.

Lastly, I performed some short clarifying edits on the entry for "herbarium."

c. Instagram (see Appendix E)

I maintain a public Instagram account on which I share my own photographs of the natural world (mostly plants) alongside images of my botanical illustrations, tree climbing trips, and life on my family's farm. My followers include a large number of local individuals and businesses (farmers, artists, etc.) in addition to amateur and academic botanists from across the globe. I also co-manage the Liberty Hyde Bailey Conservatory Instagram account, where I share weekly snapshots of flowers and foliage in the Hortorium's living collection.

I employed the Instagram "stories" feature on my personal account to highlight biological collections concurrently with the Twitter thread. There is very little overlap between my Twitter and Instagram followings, so I employed stories in order to expand my audience.

Impact: Stories were seen by 38-60 people, most of them non-scientists. I received a few reactions from people impressed by the size and scope of the collections. Macaulay Library featured my post about them in their own story.

d. **YouTube.** I will upload my video to YouTube which, in addition to inviting views on that platform, will make it easier to share the story on other social media. *The video is not yet public on YouTube because I have not yet received feedback on it from Anna and Robert at the Hortorium. Once I here from them, I will feel comfortable sending it out into world.*

Public Event

What: Cornell BioCollections Fair
When: September 25, 2020 (Homecoming Friday)
Where: Mann Library entrance

"The Cornell BioCollections Fair will bring the university's internationally recognized natural history collections to YOU! Representatives from all major collections at Cornell will be in attendance with selected specimens from the collections, hands-on activities, and information about how to get involved with biodiversity research. PLUS complete the Cornell Collections Scavenger hunt for cool biodiversity-themed prizes!"

The fair coincides with Homecoming weekend so that returning alumni can see the vibrancy of their alma mater's natural history collections and become motivated to support them. Current students and staff are also encouraged to stop by. The Fair will be advertised via posters on the Mann Library doors and corkboards across campus, a PowerPoint advertisement shown before science classes (esp. PLBIO, ENTOM, BIOG), and schedules provided to homecoming attendees.

Appendix A

Full Press Release

[return to strategy outline]

Natural History Collections Can Help Transform Undergraduate Education

A new generation of scientists benefits from active, specimen-based inquiry

How do undergraduate educators ensure that they are enabling tomorrow's scientists to become effective solvers of our looming environmental and health crises? A team of 17 researchers from across the United States argues that natural history collections hold the answer. They demonstrate that the physical specimens and digital data associated with natural history collections can help shift undergraduate science education from its focus on passive absorption of material to active, curiosity-driven inquiry. The authors, who hail from several well-known universities and natural history museums, published their findings in the August 2014 issue of *BioScience*.

At most undergraduate institutions, basic biology classes rely heavily on lectures, demonstrations, and PowerPoint-style presentations. Although these are low-budget and easily conveyed to large audiences, the authors argue that such passive forms of pedagogy fail to provide students with authentic, inquiry-driven experiences. American students are falling behind their industrialized neighbors in science, technology, engineering, and math (STEM) subjects, just as humanity faces increasing climate change, biodiversity loss, threats to food security, and more. Fortunately, the estimated 2-4 billion specimens contained in worldwide natural history collections offer unparalleled opportunities for students to investigate those pressing environmental and societal challenges.

As an "irreplaceable record of past biodiversity," the specimens in natural history collections constitute a priceless measure of anthropogenic impacts on the environment. Students can use museum specimens to explore questions related to speciation, morphological variation, genetics, ecology, behavior and more. They are typically eager to connect abstract biological theories with tangible objects. "For many students," note the authors, "specimen-based learning invigorates their fundamental fascination with diversity" and encourages them to use the (often neglected) methods of the naturalist. Moreover, the authors stress that the educational use of natural history collections need not be limited to the interrogation of physical specimens; the growing availability of museum data in digital format means that all students can metaphorically unlock the cabinet drawers.

Determined to enhance the role of natural history specimens in inquiry-based learning, the authors are participating in Advancing Integration of Museums in Undergraduate Programs (AIM-UP!), a National Science Foundation (NSF)-funded Research Coordination Network composed of museum scientists and educators. They outline several key conceptual areas in biology education that would benefit from greater use of natural history specimens, including genetic variation, biotic responses to environmental change, and newly emerging pathogens.

The authors offer previews of two place-based educational modules that employ natural history data. The modules, one on Floridian flora and the other on island biogeography in Alaska, allow students to generate original hypotheses, test them, and draw conclusions based on analysis of field and climate data, specimen records, DNA sequences, and more. With today's unprecedented accessibility to museum specimens and their associated data, the authors argue that biological educators have much to benefit by leveraging these sources of information for their Web-savvy students. With so much information available at their fingertips, write the authors, "student scientists anywhere in the world can spend a metaphorical night at the museum"!

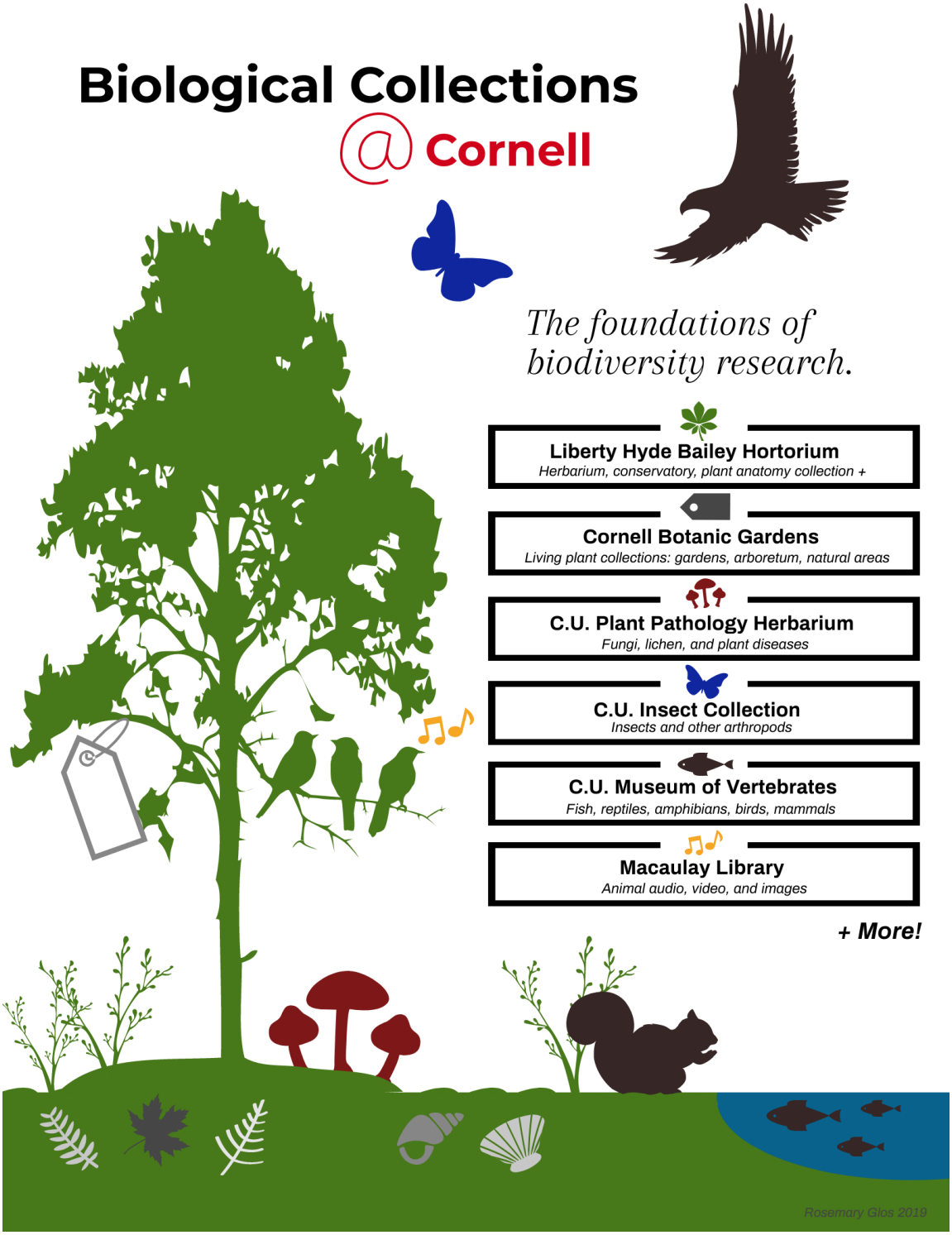
###

"Natural History Collections as Emerging Resources for Innovative Education" is available at https://www.jstor.org/stable/10.2307/90006897

Appendix B

Infographic

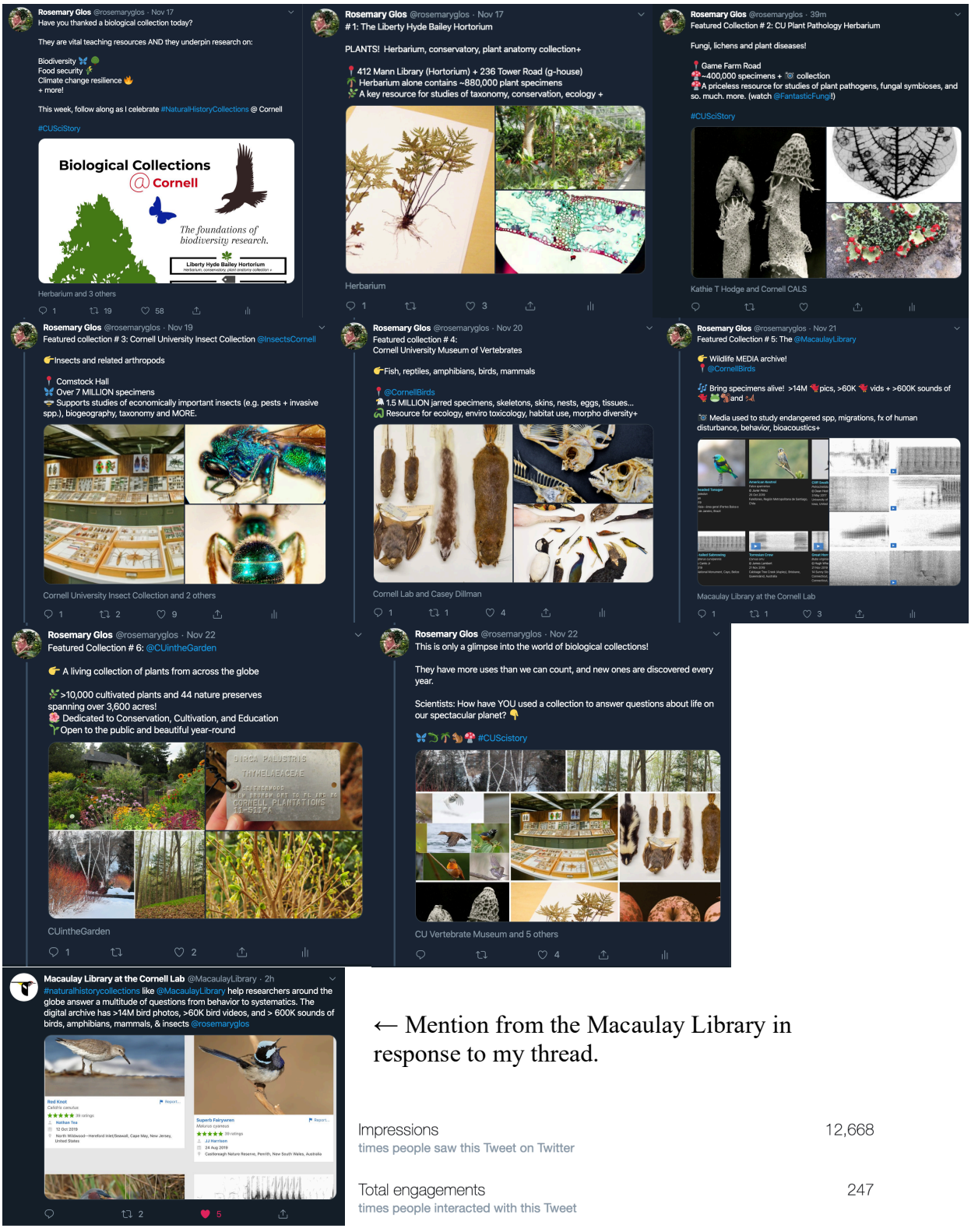
[return to strategy outline]



Appendix C

"Meet the Collections" Twitter Thread

[return to strategy outline]



← Mention from the Macaulay Library in response to my thread.

Impressions times people saw this Tweet on Twitter	12,668
Total engagements times people interacted with this Tweet	247

Appendix D

Wikipedia Contributions

[return to strategy outline]

Scientific Collection

[Completely rewrote the lead, which was full of typos and lacked full sentences. Four sources added.]

Scientific collection

From Wikipedia, the free encyclopedia

A **scientific collection** is a collection of items that are preserved, catalogued, and managed for the purpose of scientific study.[1]

Scientific collections dealing specifically with organisms plants, fungi, animals, insects and their remains, may also be called **natural history collections** or **biological collections**.[2]. The latter may contain either living stocks or preserved repositories of biodiversity specimens and materials.[3]

Scientific collections hold a tangible portion of the cumulative evidence base in such fields as biology (especially taxonomy and evolutionary biology), geology, and archaeology.[1] They may be stored and managed by governments, educational institutions (e.g. colleges and universities), private organizations (including museums), or individuals.

Prominent uses of scientific collections include the systematic description and identification of biological species, the study and prediction of long-term historical trends (including impacts of climate change), the dating and analysis of historical objects (e.g. via wood samples and ice cores with annual rings), and the maintenance of teaching resources.[1][4]

Talk page:

Refurbished lead [edit]

I rewrote and reformatted the lead to fix grammatical errors and make it more concise and descriptive. RosemaryGlos (talk) 17:45, 12 November 2019 (UTC)

Many of the remaining sections need significant work to fix grammatical errors and improve the overall formatting/clarity. RosemaryGlos (talk) 17:46, 12 November 2019 (UTC)

Liberty Hyde Bailey [Crafted this section on his palm research. Five sources added.]

Palm Studies [edit]

Bailey made significant contributions to the taxonomic study of palms. His interest in the plants reportedly stemmed from his inability to answer his wife's questions about the plants during a family trip to Jamaica in 1910.[22]:182 After retiring as dean of the Cornell University College of Agriculture and Life Sciences in 1913, he devoted the better part of three decades to finding, collecting, and writing about palms.[23] He developed a detailed method of collecting palm specimens that included photographing the tree in its entirety, preserving flowers and fruits in alcohol, pressing flower clusters, and carefully folding sections of the leaves to fit herbarium sheets.[24]

Bailey traveled extensively in search of palms and other plants. In the 1920s, he was often accompanied by his daughter and scientific collaborator, Ethel Zoe Bailey.[23] Already in his fifties when he began studying palms, Bailey continued to collect into his 90s. He was frequently abroad on his birthday, March 15th. Thus, he could recall spending his 79th in Port-au-Prince, Haiti, his 82nd in Oaxaca, Mexico, his 88th in Trinidad, his 90th in Grenada, and his 91st at sea on a small sailboat between Sint Eustatius and Saint Kitts.[23] Friends and colleagues at Cornell hoped to hold a 90th birthday celebration for Bailey, and they did, but only after their guest of honor returned to Ithaca in May.[23]

When Bailey began studying palms, about 700 species had been identified. The number reached thousand by 1946, the rise due in large part to his intensive study of the family.[22]:219 Ill health finally forced Bailey to discontinue collecting abroad in 1949, at the age of 91.[23] He continued to study, compare, and write about his palm specimens. His ultimate goal was to produce an authoritative guide to all palms, titled *Genera Palmarum*.[23] When he died, he left behind a manuscript of the first page of the introduction. *Genera Palmarum* was ultimately published by Drs. Natalie Uhl and John Dransfield in 1987.[25] A second, expanded, edition was released in 2008.[26]

Talk page:

Added "Palm Studies" Section [edit]

I added a section about Bailey's extensive work on the "new world" palms. This article also probably deserves more info about his other botanical endeavors, especially his contributions to the taxonomy of cultivated plants and his work on the genus Rubus. RosemaryGlos (talk) 02:10, 19 November 2019 (UTC)

Herbarium [My edits highlighted. Two sources added]

Uses [edit]

Herbarium collections can have great significance and value to science, and have a large number of uses.[11][12] Herbaria have long been essential for the study of plant taxonomy, the study of geographic distributions, and the stabilizing of nomenclature. Linnaeus's herbarium, which contains over 4,000 types, now belongs to the Linnean Society in England.[13] Modern scientists continue to develop novel, non-traditional uses for herbarium specimens that extend beyond what the original collectors could have anticipated.[14]

Specimens housed in herbaria may be used to catalogue or identify the flora of an area. A large collection from a single area is used in writing a field guide or manual to aid in the identification of plants that grow there. With more

Talk page:

Novel uses [edit]

Under "uses," I added a quick sentence about the emergence of novel, non-traditional uses for herbarium specimens.[1] I also added the number of type specimens held by the Linnean herbarium to clarify its importance in context. [2] RosemaryGlos (talk) 00:46, 23 October 2019 (UTC)

1. ^ https://doi.org/10.3732/ajb.1700125
2. ^ https://www.linnean.org/research-collections/linnaean-collections

Appendix E

Instagram Stories

[return to strategy outline]