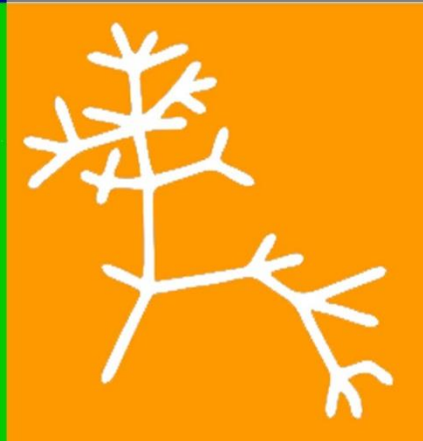


The
Endless
Forms
TCN



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Barbara Thiers*

*The New York
Botanical Garden*

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NYBG



BOTANICAL RESEARCH
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Plant to planet!



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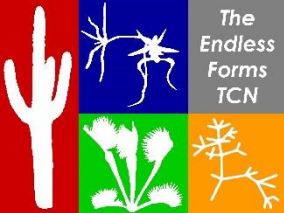


TEXAS
The University of Texas at Austin



ILLINOIS NATURAL
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PRAIRIE RESEARCH INSTITUTE

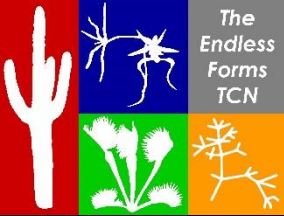




Project Introduction

- Collaborative grant between 15 herbaria, botanical gardens, museums, and universities
- The New York Botanical Garden is the lead institution
- Digitize 2,000,000 herbarium specimens of carnivorous, epiphytic, and succulent plants in 15 families from all global regions
- Host a Ethical Data Sharing Workshop at SPNHC 2019
- Focus appreciation on EF plants and the role of collections in conservation in a general audience, especially youth in underrepresented groups

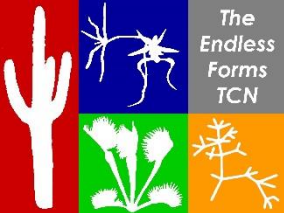




A Synopsis of Year One

- 36% of the promised specimens were digitized within the first year of this project across all institutions
- 53 tours or open houses across the included institutions discussed or otherwise highlighted this TCN.
- 57 students (primarily undergraduate, but also including high school and recent college graduates) have received some form of training and professional development across all institutions.
 - training in GIS analysis, specimen digitization and data curation. A smaller subset of these were involved in implementing a Conservation Internship for high school students

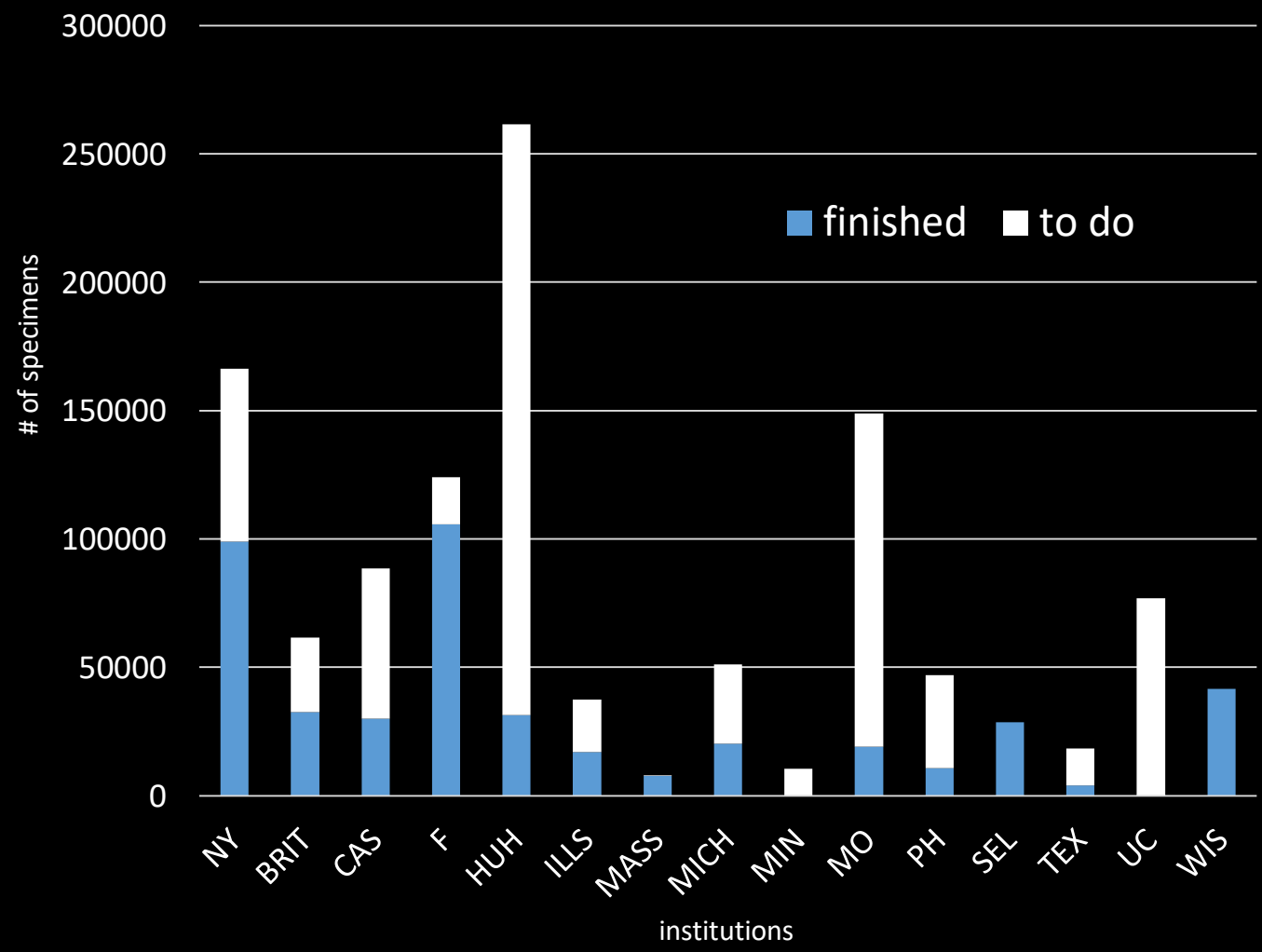




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Digitization

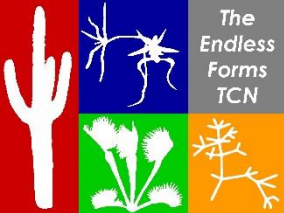
Barcoding (as of July 2019)



447,815 specimens barcoded (39% of total)

In year 1, 46% of institutions have barcoded at least 50% of their committed specimen totals

A few institutions encountered unexpected personnel changes and equipment back-orders, which occasionally hindered barcoding



Outreach

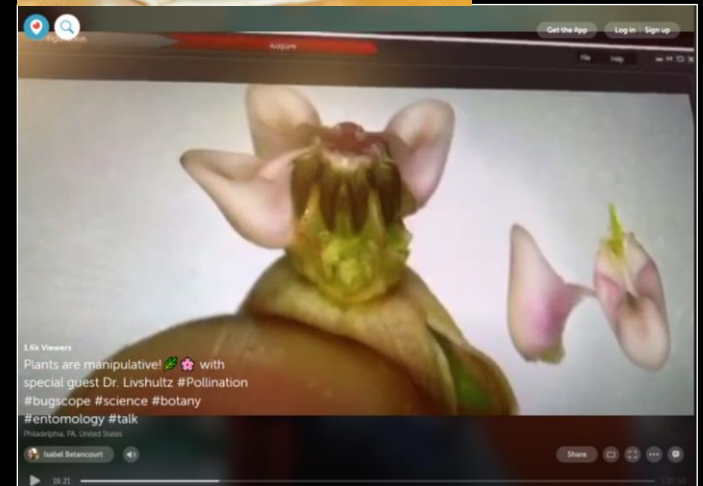
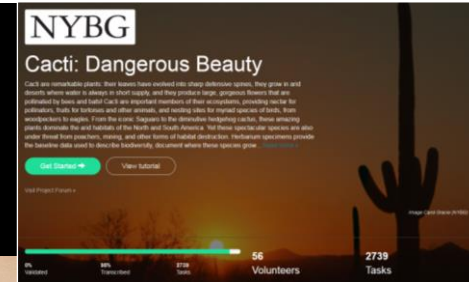
- National and local media highlighted the Award (e.g., Popular Science)
- Virtual Expeditions (Notes from Nature, DIGIVOL)
- NYBG hosted an educational 'conservation internship' with 5 NYC high school seniors for a month, with the students working on preliminary species conservation assessments. **Come hear my 'Lightning Talk', Azalea room @ 3:30**
- Tatyana Livshultz (Drexel / Philadelphia Academy) discussed pollination of Apocynaceae on "#Bugscope" on the "IsaBetaBug" Periscope channel. More than 1000 people logged in to the live broadcast
<https://www.pscp.tv/w/1dRJZmgnaXDGB>;
<http://www.thebugandthebeetle.net/bugscope>

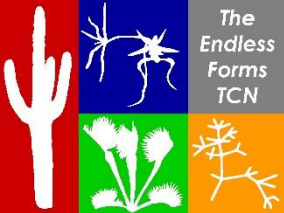
These beautiful images preserve plant species that might otherwise disappear forever

Plant scans are beautiful images—and important scientific documents.

By Eleanor Cummins | December 13, 2018

In 1859, Charles Darwin finally published his long-gestating theory of natural selection in *On the Origin of Species*. Famous for his descriptions of Galapagos turtles and birds' ever-changing beaks, the English scientist concluded, "from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved."





Outreach

The Hand Lens: NYBG's new online platform for leveraging specimen-based science stories (<http://sweetgum.nybg.org/science/the-hand-lens/>)

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Floral Fireworks



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Utah Agave



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Being Loved To Death – A Third of Cacti at Risk of Extinction



By **Lin Li**

May 17 2019

As the many plants to be digitized in the [Endless Forms project](#), members of the Cactaceae family are not only unique and charismatic, they are considered one of the most threatened plant groups in the world.

The body of a cactus is composed of succulent stem segments; the spines are modified leaves that are hardened and sharp, providing protection for the plants against herbivores. Yet, these prickly plants can burst out the most beautiful flowers you have ever seen. The flowers are showy and quite large with dozens of stamens and petals, ranging from creamy white to dark purple. Cacti are distributed throughout North and South America. The highest diversity occurs in the Sonoran and Chihuahuan deserts in North America, the Andean region, and the dry scrub forests of eastern Brazil. Known as a symbol of the desert, cacti have special morphological adaptations that allow them to flourish in dry and arid habitats; and they are an important component of the arid zone flora in the New World deserts.

Unfortunately, many species of Cactaceae are subject to high population vulnerability. A recent global Cactaceae assessment indicates that 31 % of all cacti are critically endangered.¹ In addition to slow growth rate, restricted distribution in small areas, and habitat fragmentation, illegal trading and poaching have become major causes for population decline of Cactaceae. The soaring popularity of cactus in the past decade have brought poachers to steal specimens from national parks and other protected areas. In 2014, more than 2,600 stolen cacti were seized at the US borders, up from 411 the year before.²

The herbarium at the New York Botanical Garden currently holds more than 11,000 cactus specimens that will soon be fully digitized. Herbarium specimens are a valuable source for conservation assessments. Data associated with the specimen such as locality and collection date can provide information on how changing environment conditions may influence the biology of the species. In addition, the number of verified specimens can be extremely useful as the "first pass" in sorting the species into categories used by the [IUCN Red List](#)—such as critically endangered, endangered, and vulnerable. Taxonomists who work in herbaria also play an important role in identifying the species threatened with extinction.

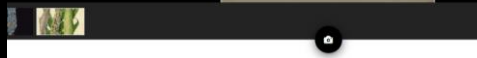
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Monstera



via by Frances W. Horne for Flora Borinquena



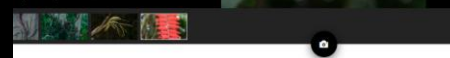
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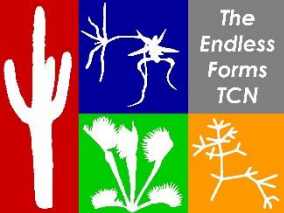
Main Narrative • Fancy Foliage
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Air plants



via! Photo by C. A. Grace





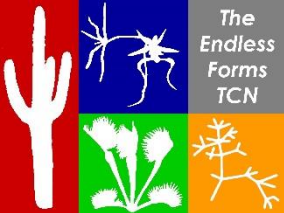
Ethical Use of Specimen Data



- We will be hosting an Ethical Use of Specimen Data Workshop at SPNHC in Edinburg, Scotland, 2020
- All groups and collections types will be covered
- Speakers and participants from outside of the museum community are welcomed

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The Endless Forms TCN

Thank you!

Melissa Tulig

Kim Watson

Lin Li

Elizabeth Rivas

Nadine Hill



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