Frost Entomological Museum

2024 Annual Report

PennState
College of
Agricultural Sciences

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Introduction

Note from the Director

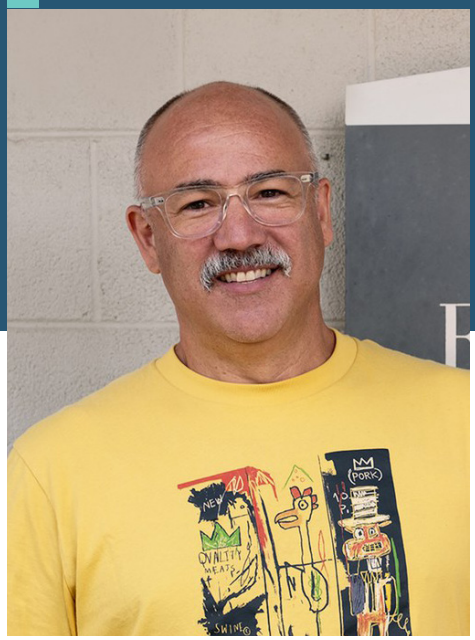


Photo credit: Michael Tribone

Andrew R. Deans, Ph.D.

Professor of Entomology and Director of the Frost Entomological Museum

As you can see from the numbers in this report, 2024 was another year of growth and maturity at the Frost Entomological Museum. We opened the year with another large grant from the National Science Foundation (>$750,000), focused on training the next generation of taxonomists. The research focuses primarily on gall wasps (Cynipidae) and the insects associated with their plant galls (especially parasitoid wasps). We're rearing lots of insects and expect to develop an even stronger Hymenoptera collection over the coming months. Exciting! We also received a number of important donations, especially diverse collections of insects from alumni and affiliates. Given our recent storage expansion (>50% increase in capacity), we hope more entomologists will designate the Frost Museum as their repository of choice, both for personal collections and for research vouchers.

We also witnessed a surge in interest from students hoping to acquire curation, outreach, and research experience at a natural history collection. We now offer an internship course (ENT 495) for these students, and it has proven to be very popular. We also offered Insects and Natural History Collections (ENT 320) for the first time as an official course, which will be offered annually moving forward.

I am very proud of our increased engagement and growing resources, and I look forward to capitalizing on new opportunities in 2025. We should have a lot to report in our next annual report: infrastructure upgrades, new faces, and a new biodiversity project. As always, we thank you for your continued interest and support. Hoping to see you at the Frost in 2025.

-Andy Deans

Mission

The mission of the Frost Entomological Museum is to preserve in perpetuity the collections of the Department of Entomology at Penn State and its partners, to facilitate research on arthropods and on collections practices, to disseminate research results broadly, to serve as a resource for science education and training, to foster a sense of curiosity about the natural world, and to instill responsibility in all people to make our world a better place.

Photo credit: Michael Tribone

General Information

Street Address
Frost Entomological Museum
160 Curtin Road
State College, PA 16802

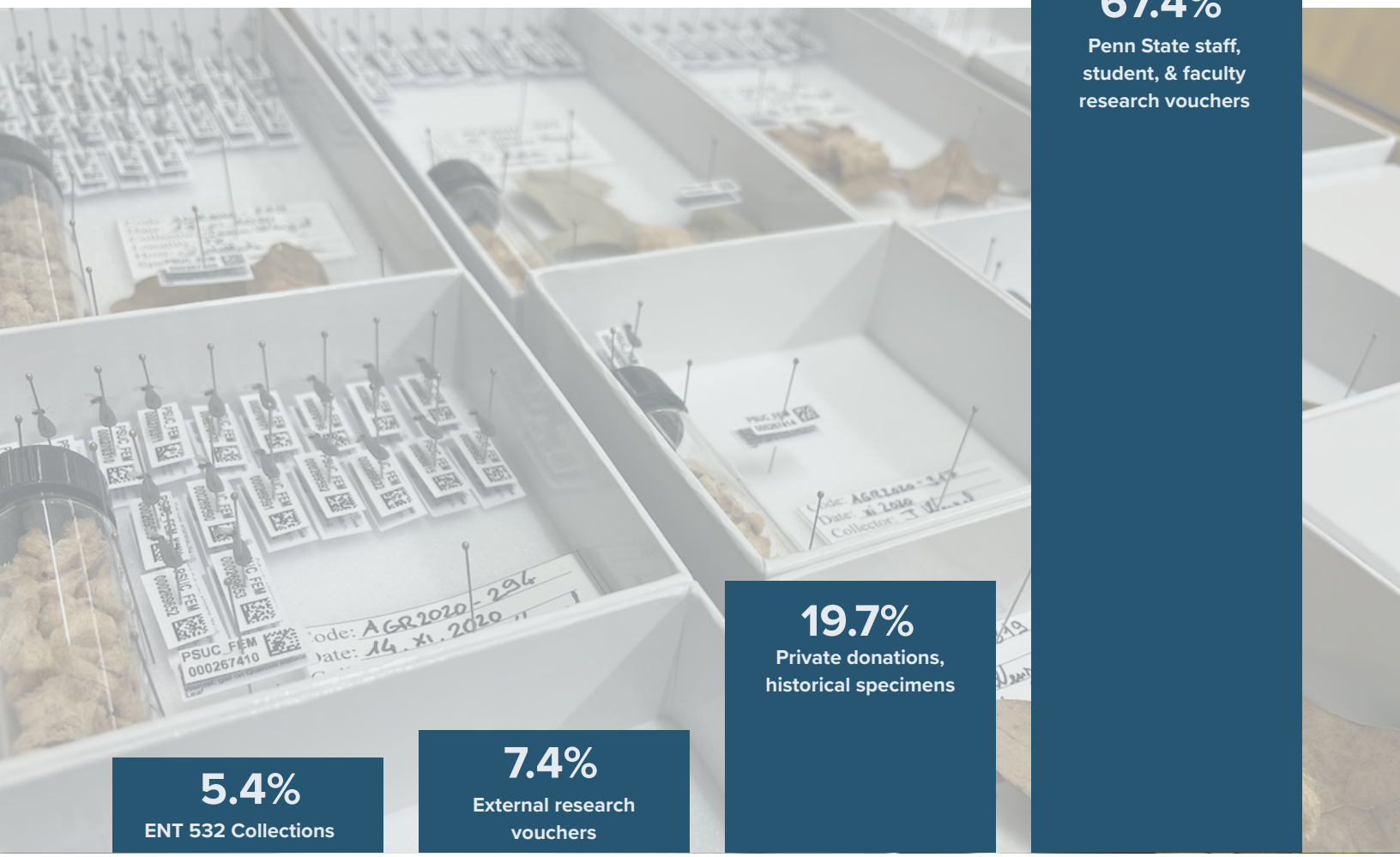
Website Address
https: //ento.psu.edu/frost

Email Address
frost.museum@psu.edu

Collections

Specimen growth

This year saw the collections grow by approximately **20,000** specimens. The recent growth is chiefly due to research specimens vouchered at the Frost from large-scale projects like long-term monitoring at the Fruit Research and Extension Center (FREC), the López-Uribe Lab's Pennsylvania Bee Monitoring Program, and collaborative gall wasp rearing efforts in the department. Multiple private donors and external researchers also entrusted us with the care and stewardship of their collections.

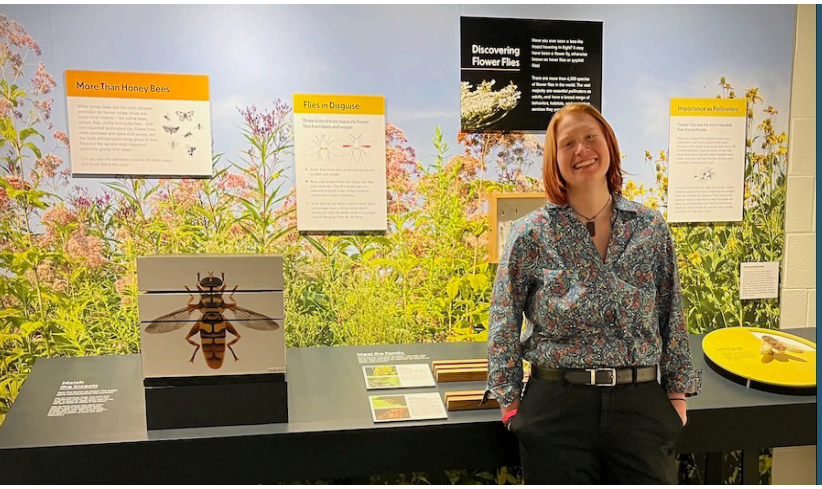


Approximate contributions to specimen growth in 2024

Student Internship Highlights

Bri Pearsall (Forestry ‘28) improved the health and accessibility of the sphinx moth collection (Sphingidae). She rehoused specimens into archival unit trays, updated the taxonomic names and labels, and reorganized the collection. She processed 74 drawers of specimens while learning about sphinx moth natural history, taxonomy, and collections care.

Parker Przybylski (Geobiology ‘25) improved the health and accessibility of both the stick insect (Phasmida) and cricket/grasshopper (Orthoptera) collections. They rehoused specimens into archival trays, reassociated broken limbs, updated taxonomic names and labels, and reorganized the collections to reflect our current understanding of different family groups. Parker also digitized the Phasmida, making their occurrence records publicly accessible online. To celebrate Earth Day, they hosted a table at Millbrook Marsh’s Earth Fest and talked with people about the importance of insects in our everyday lives.



Kat Wysnewski (Art Education ‘25) was awarded the Apes Valentes Student Award for a project digitizing flower flies (Syrphidae) and developing an exhibit for the museum’s public space. Kat digitized more than 500 specimens of flower flies, and fabricated an exhibit entitled “Discovering Flower Flies”. The exhibit highlights the diversity, biology, and importance of flower flies as pollinators.

Research Highlights

Louis Nastasi (Ph.D. candidate) is finishing up his dissertation and had an incredibly productive year. His research focuses on the taxonomy and systematics of gall wasps (Cynipidae: Aulacideini & Ceroptresini), and he published 11 peer reviewed articles in 2024 on these groups. He has discovered range expansions, developed taxonomic keys, and described dozens of new species of gall wasps. He is now working on a large-scale phylogeny of Cynipoidea which will help us better understand the evolution and behaviors of this group.

Michael Skvarla (Asst. Research Professor of Arthropod Identification) has discovered and published new plant host records for the white peach scale insect (Diaspididae: *Pseudaulacaspis pentagona*) and new state records for the crape-myrtle bark scale (Eriococcidae: *Acanthococcus lagerstroemiae*) and bicolored pavement ants (Formicidae: *Tetramorium bicarinatum*). These discoveries were made through public inquiry and sample submission to the Insect ID Lab in the Department of Entomology. These specimens are now vouchered at the Frost.

Photo credit: JoVonn Hill

Tara Presnall (Mechanical Engineering ‘25) is comparing the structural integrity of thirteen different brands of insect pins commonly used by entomologists. Tara’s project focuses on evaluating mechanical performance through measurements of bending and tip sharpness by using both a mechanical bend test and analysis of laser images, respectively. Specimen pins are expected to maintain structural integrity for hundreds of years, and the results from this study will help scientists and preparators select the best quality pins for their entomological research.

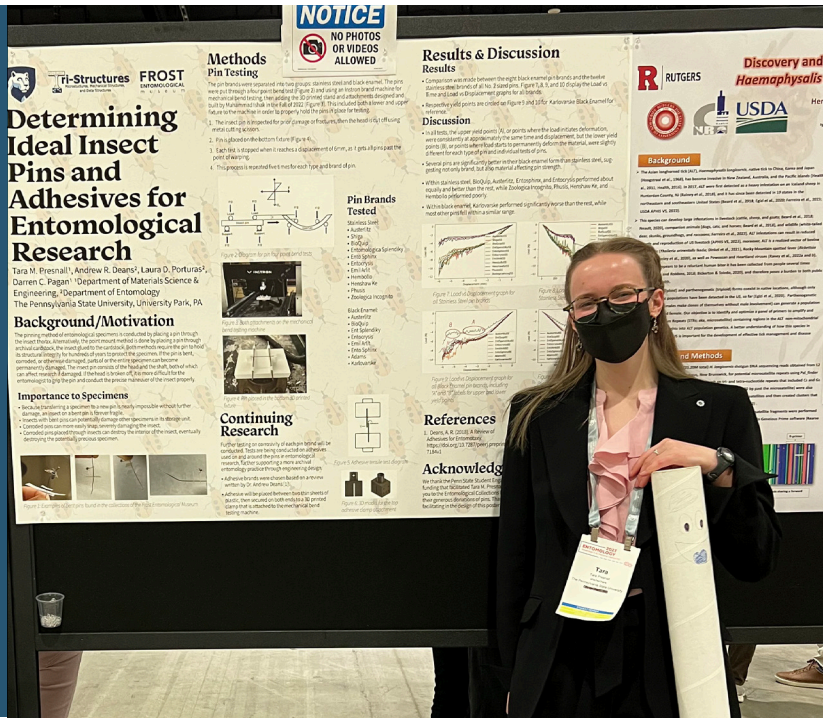


Photo credit: Lourdes Chamorro

Photo credits: Andrew R. Deans

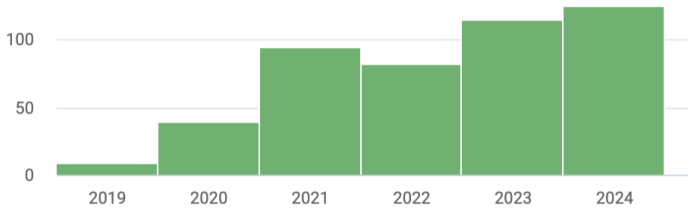
Museum Director, Andrew R. Deans, and his two graduate students, Charles Davis and Louis Nastasi, published an ontology for plant gall phenotypes. This ontology (GallOnt) provides the means to standardize the way researchers describe the observable physical properties of plant galls. Standardization helps ensure that future datasets from different researchers and projects can be more readily compared or combined.

4,183
Research specimens borrowed

13
Loans to internal and external researchers

12
Researcher visits & specimen reference requests

125
Research works citing Frost biodiversity data



Data citations by year

The Global Biodiversity Infrastructure Facility (GBIF) provides information about literature that has cited datasets with contributor data. In 2024, 93 journal articles, 1 capstone, 3 book sections, 1 conference proceeding, 16 preprints, 5 reports, and 6 theses cited GBIF datasets which include our data.

Examples of research using Frost specimen data:

Esperon-Rodriguez M. et. al. (2024) **Evaluating the impact of protected areas in lowering extinction risks in a biodiversity hotspot.** Biological Conservation 297:110728. https://doi.org/10.1016/j.biocon.2024.110728.

Conservation Assessment
This study evaluates environmental drivers of extinction risk for Mexican flora and fauna and assesses the impact of currently established protected areas.

Tuomola, J. and Hannunen, S. (2024) **Assessment of the suitability of the Finnish climate for *Popillia japonica*.** Food Risk Assess Europe, 2: 0029E. https://doi.org/10.2903/fr.efsa.2024.FR-0029

Invasion Biology
The Finnish Food Authority assessed ecoclimatic suitability of Finland for *Popillia japonica* to determine likelihood of establishment and whether the country needs to conduct annual surveys in compliance with EU plant health regulations.

Tang, T. et al. (2024) **Global risk dynamics of *Borrelia miyamotoi* in the context of climate change.** Environmental Microbiology, 26(10), e70000. https://doi.org/10.1111/1462-2920.70000

Human Health
This study evaluates the habitat suitability of 4 vector species of ticks to determine likely distributional shifts of *Borrelis miyamotoi* under current climate projection models.

Engagement

Informal Learning

4
New Exhibits

- Leafminers: Inside and Out
- Cabinet of Curiosities (collaborative exhibit by multiple Penn State collections hosted by the HUB)
- 2024 Hexapod Haiku Selection Exhibition
- Discovering Flower Flies

>2000
Visitors to the public space

>200
Visitors for behind-the-scenes tours and museum events

17
Specimen display loans curated for outreach and extension events

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>420
Poets, from 38 countries participated in the Hexapod Haiku Challenge

Education

Formal Learning

Penn State courses that borrowed specimens

Course Name	Code	Semester
Field Crops Entomology	ENT 316	Spring
Basic Concepts & Biodiversity	BIOL 110	Spring
IPM of Ornamentals	ENT 314	Spring
Insect Connections	ENT 202	Spring
Introduction to Entomology	ENT 313	Spring
Insects & Nat. Hist. Collections	ENT 320	Fall
Principles of IPM	ENT 457	Fall
Insect Biodiversity & Evol.	ENT 532	Fall
Basic Concepts & Biodiversity	BIOL 110	Fall

Penn State courses with in-person experiences at the Frost

Course Name	Code	Semester
Tech & AI in Living Systems	ENT 597	Spring
Entomology Internship	ENT 395	Spring
Tech & AI in Living Systems	ENT 597	Fall
Invert Zoology	BIOL 417	Fall
Field Nat. History for Teachers	SCIED 118	Fall
Introduction to Creative Writing	ENGL 50	Fall
Principles of Env. Interpretation	RPTM 325	Fall

External field trips to the Frost

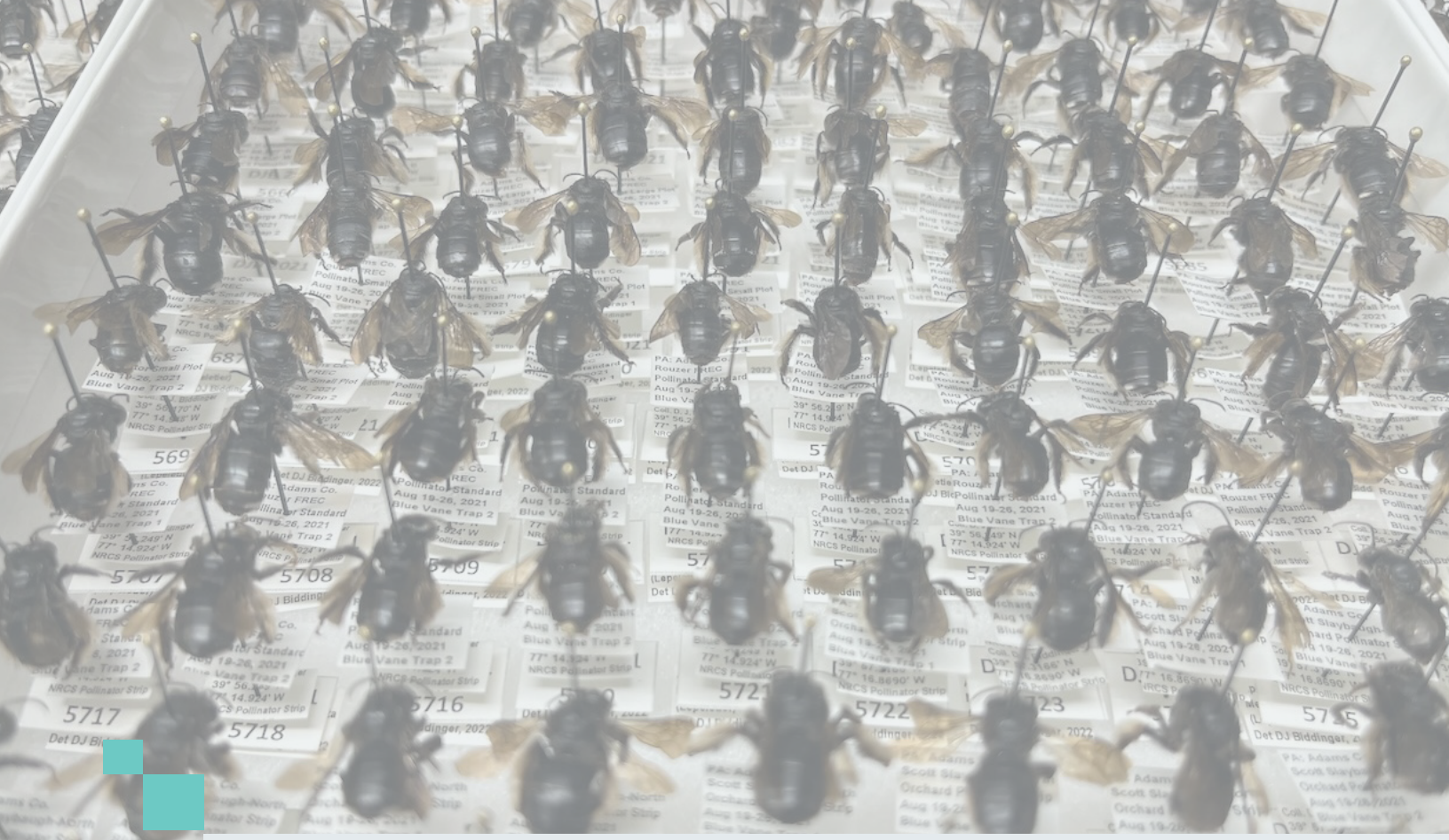
School Name	Grade	Semester
Kings Academy	multi	Spring
C.E. McCall Middle School	7	Spring
Ferguson Township Elementary	3	Spring
Winchester Thurston	6	Spring
Delta Middle School	6-8	Spring
Penns Valley Intermediate	6-8	Spring
Delta Middle School	6-8	Fall
Lock Haven Uni - Entomology	Undergrad	Fall

The Team

The faculty, staff, students, and volunteers work hard to help us fulfill our mission. Thank you!

Andrew Deans, Ph.D., Director and Professor of Entomology
David Biddinger, Ph.D., Curator of Hymenoptera and Research Professor
Heather Hines, Ph.D., Associate Professor of Biology & Entomology
Margarita López-Uribe, Ph.D., Associate Professor of Entomology
Michael Skvarla, Ph.D., Assistant Research Professor of Arthropod Identification
Julie Urban, Ph.D., Associate Research Professor
Nash Turley, Ph.D., Postdoctoral Researcher
Charles Davis, Graduate Student Researcher
Camilo Flórez Valencia, Graduate Student Researcher
Alexela Hoyt, Graduate Student Researcher
Codey Mathis, Graduate Student Researcher
Louis Nastasi, Graduate Student Researcher
Tara Presnall, Undergraduate Researcher
Ahmad Aslam, Undergraduate Researcher
Bri Pearsall, Undergraduate Intern
Parker Przybylski, Undergraduate Intern
Kat Wysnewski, Undergraduate Intern
Will Wilson, Undergraduate Intern
Laura Porturas, Collection Manager
Michael Tribone, Multimedia Specialist
Sarah Kania, Assistant for Bee Collection - López-Uribe Lab
Kate Anton, Lab Manager and Beekeeper - Grozinger Lab
Antonio Casadei, Entomology Technician
Cecil Smith, Entomology Technician
Lucy Carlsen, Museum Assistant
Anne Burgevin, Poet & Hexapod Haiku Challenge Judge
Megan Martin, Graduate Student Collections Volunteer
Nina Gropp, Graduate Student Collections Volunteer
Ben Partyka, Undergraduate Collections Volunteer
Miah Ruiz, Undergraduate Collections Volunteer
Kylie Hoang, Undergraduate Collections Volunteer
Victoria Lee, Undergraduate Collections Volunteer
Sarah Browning Mills, Undergraduate Collections Volunteer
Jael Scott, High School Collections Volunteer
Entomology Graduate Student Organization, Outreach Volunteers

The cover photo was taken by Louis Nastasi, and all other uncredited photos in this report were taken by Laura Porturas.



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