The Field Museum

CHICAGO BOTANIC GARDEN

The Field Museum and the
Chicago Botanic Garden proudly present the

5th Annual Undergraduate Research Symposium 2013

Research presentations and poster presentations by undergraduate research interns from the Field Museum and the Chicago Botanic Garden

Program and Abstracts

Friday, August 16

Simpson Theatre

National Science Foundation
WHERE DISCOVERIES BEGIN

PROGRAM

Note: these are preliminary titles, check whether you like the distribution of talks

8:00 – 8:45am Poster set-up in West Door Lobby in front of Simpson Theatre, mounting board, easels, push pins and tape provided

9:00 – 9:15 am **Opening of the Symposium, Welcome**, (opening remarks by P. Sierwald, K. Angielczyk, J. Fant and D. Larkin)

Session 1:

Moderator: Kenneth Angielczyk
curator,Field Museum

9:15 – 9:30am **Microsatellite patterns in two *Castilleja* subspecies *affinis* and *neglecta***
Hosin West, University of New Haven, and Chicago Botanic Garden

9:30 – 9:45am **Analyzing the genetic component in caste determination of Neotropical Army Ants**
Andrew Burchill, University of Chicago, and Field Museum of Natural History

9:45 – 10:00 am **Elucidating the lichen genus *Lecanora***
Patricia Brandt, University of Chicago and Field Museum of Natural History

10:00 – 10:15am **Bizarre biology: morphogenesis of the freshwater bryozoan *Plumatella vaihiriae* (Phylactolaemata)**
Andrea Rummel, University of Chicago, and Field Museum of Natural History

10:15 –11:00am **Speaker Group Photo, Coffee Break**

Group photo of all speakers and poster presenters in West Door Lobby at 10:35 sharp, please assemble with Stephanie Ware
Coffee Breakfor all: in West Door Lobby at Field Museum, please do not take food or drink into Simpson Theatre

Session 2:

Moderator: Anna Braum

Graduate student, Northwestern University, and Chicago Botanic Garden

11:00 – 11:15am	**GIS-based spatial analysis of rare plant populations on gravel hill prairies: Habitat suitability modeling** *Christopher Wright*, University of Washington, Bothell, and Chicago Botanic Garden
11:15 – 11:30 am	**Illuminating the Tree of Life: A case study in the evolving relationship between taxonomy and phylogeny** *Joshua Stevens-Stein*, University of Chicago, and Field Museum of Natural History
11:30 – 11:45pm	**Assessment of the effects of the introduction of *Echinacea pallida* in the pollination of native *Echinacea angustifolia* in western Minnesota** *Dayvis Blasini*, Northeastern Illinois University, and Chicago Botanic Garden
11:45 – 12:00noon	**Seeding restorations: Evaluating seed viability to improve restoration outcomes** *Jessica Riebkes*, Central College, and Chicago Botanic Garden
12:00 – 12:15noon	**Does the attempt to restore golden Indian paintbrush to a former habitat or raising the species in isolation have an effect on genetic diversity** *Alexander Shaffer*, Northwestern University, and Chicago Botanic Garden
12:15 – 1:00pm	**Lunch Break**

Lunch: provided for speakers, poster presenters and mentors in *Lecture Hall II*, ground floor, Field Museum, follow Stephanie Ware, Petra Sierwald and Ken Angielczyk

Audience **Lunch options**: Corner Bakery, first floor; McDonalds, ground floor

Session 3:

Moderator: David Clarke
Postdoctoral Research Associate,Field Museum

1:00 – 1:15pm **Decomposition and fungal diversity in restored tallgrass prairies**
Mariah Allen, Lake Forest College, and Chicago Botanic Garden

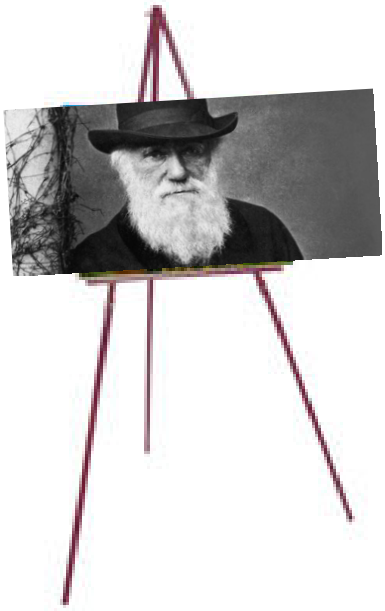
1:15 – 1:30pm **The contribution of soil aggregates to carbon sequestration in restored urban grasslands**
Jenifer Yost, Lake Forest College, and Chicago Botanic Garden

1:30 – 1:45pm **The role of soil fungi in C-sequestration**
Allison Buiser, Knox College, and Chicago Botanic Garden

1:45 – 2:00pm **Mulch-Munching through the Ages: one-thousand legs - up close and personal**
Madeleine Metz, Emory University, and Field Museum of Natural History

2:00 – 2:45pm **Coffee Break and Poster Session**

Poster Session: Poster presenters, please stand by your poster, so that members from the audience can ask questions.



Coffee Break for all: in West Door Lobby at Field Museum, please do not take food or drink into Simpson Theatre

Session 4:

Moderator: Lauren Umek

Graduate student, Northwestern University and Chicago Botanic Garden

2:45 – 3:00pm	**A molecular phylogenetic survey of *Borrelia* from migratory birds: Are migratory birds potential vectors for Lyme disease?** *Sarah Kurtis*, University of Chicago, and Field Museum of Natural History
3:00 – 3:15pm	**The Bats of Kenya**: **assessing the species limits of cryptic species** *Kyle Reid*, Olive Harvey College, and Field Museum of Natural History
3:15 – 3:30pm	**A new dicynodont from the late Permian of Tanzania** *Ben Otoo*, Amherst College, and Field Museum of Natural History
3:30 – 3: 45:pm	**How to grow a dinosaur: the ontogeny of the Middle Triassic archosaur *Asilisaurus kongwe*** *Christopher Griffin*, Cedarville University, and Field Museum of Natural History
3:45- 4:00 pm	**Closing Remarks:**Drs Dan Larkin and Jeremie Fant,Chicago Botanic Garden
4:00 pm	**End of Symposium**

ABSTRACTS

Title: Decomposition and fungal diversity in restored tallgrass prairies
Mariah Allen, Lake Forest College, and Chicago Botanic Garden, Glencoe, IL [oral presentation]

> The interns will ask for guidance how to write the Abstract:
> Abstract length: about 300 words
> An abstract is a short summary of your completed research. If done well, it makes the reader want to learn more about your research.
> These are the basic components of an abstract in any discipline:
> **1) Motivation/problem statement:** Why do we care about the problem? What practical, scientific, or theoretical gap is your research filling? [= the big picture]
> **2) Methods/procedure/approach:** What did you actually do to get your results? (e.g. analyzed DNA of several species of primates, targeting the following genes…., examined the morphology of the gills of ten bivalve species, etc.)
> **3) Results/findings/product:** As a result of completing the above procedure, what are your results? Did you discover a new species? Illustrated new morphological details of bivalve gills or beetle mandibles? Contributed novel DNA sequences for a particular gene or group of species?
> **4) Conclusion/implications:** What are the larger implications of your findings, especially for the problem/gap identified in step 1?

Title: Which species of tropical canopy tree species access the water source provided by underground caves on the Yucatan Peninsula and are their natural fungal symbionts present in these portions of the root system?
Kevin Amses, Humboldt State University, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

Title: Assessment of the effects of the introduction of *Echinacea pallida* in the pollination of native *Echinacea angustifolia* in western Minnesota
Dayvis Blasini, Northeastern Illinois University, and Chicago Botanic Garden, Glencoe, IL [oral presentation]

Title: Elucidating the lichen genus *Lecanora*
Patricia Brandt, University of Chicago and Field Museum of Natural History, Chicago, IL [oral presentation]

Title:
William Buchman, New Trier High School, and Field Museum of Natural History [poster presentation]

Title: The role of soil fungi in C-sequestration
Allison Buiser, Knox College, and Chicago Botanic Garden, Glencoe, IL [oral presentation]

Title:Analyzing the Genetic Component in Caste Determination of Neotropical Army Ants

Andrew Burchill, University of Chicago, and Field Museum of Natural History, Chicago, IL [oral presentation]

Many organisms exhibit instances of polyphenism, in which a single genotype can result in various, discrete phenotypes, depending on environmental cues. The Neotropical army ant species *Eciton burchellii* provides an excellent study system for polyphenism, because as a eusocial insect, they have a large number of morphological castes present within one colony. The sterile, non-mating workers can be divided into four castes that exhibit functional specialization. Although it is believed that caste determination in army ants is primarily accomplished through different doses of juvenile hormone, recent studies suggest there may be a genetic component as well. Queens are highly polyandrous, and there is evidence that some paternal lineages may have higher propensities for developing into certain castes. In order to address this issue, 240 individuals from 10 colonies in South America were sampled. Back leg lengths were measured and used as a proxy for individual body size and caste. DNA was also extracted and three microsatellite loci were used to assign patrilines in the colonies. Interpatriline variation could then be statistically assessed. Approximately 106 patrilines were detected, a larger number than what other studies have estimated, implying that queens may be even more polyandrous than previously believed. Initial analyses suggest that there is no genotypic bias on caste phenotype, although increased sampling is needed for a more robust analysis. In future research, geometric morphometrics could be applied to further characterize morphological variation and caste division in *Eciton burchellii*. Workers born from a single cohort should also be sampled to control for time-related effects and partriline shifting.

Title: The impacts of carbon addition on reinvasion

Ben Girgenti, Brown University, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

Title:

PENDING (ECCo) *Jessie Gordon, Jan Emily and Tonika White*, mentor Alison Paul (will know for sure by Tuesday)

Title: How to grow a dinosaur: the ontogeny of the Middle Triassic archosaur *Asilisaurus kongwe*

Christopher Griffin, Cedarville University, and Field Museum of Natural History, Chicago, IL [oral presentation]

Title: Characterizing phenotypes in *P. aeruginosa* mutants under aerobic and anaerobic conditions

Lisa Guan, University of California, Berkeley, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

Title: Phylogeny of the genus*Artocarpus* (Moraceae) using plastid markers

Robert Harris III, Carleton College, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

Title: Comparing genetic diversity in thistle populations

Rosalba Herrera, Loyola University, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

Title: A molecular phylogenetic survey of Borrelia from migratory birds: Are migratory birds potential vectors for Lyme disease?
Sarah Kurtis, University of Chicago, and Field Museum of Natural History, Chicago, IL [oral presentation]

Title:
Alex Layng, *Liza Connolly* and *Nicole Karpus*, mentor Paul Mayer

Title: Optimizing ecological niche models for *Cynometra bauhiniifolia*
Matthew Lichty, Knox College, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

Title:
Lucking intern, and Field Museum of Natural History, Chicago, IL [poster presentation]

Title:
Jessica Magolan, Lydia Nichols-Russell, Muzit Gebretensae and *Mary Szabo*, mentor Abigail Derby

Title: Investigating microsatellite markers in four species of *Oenothera*: *O. brachycarpa*, *O. hartwegii*, *O. serrulatus*, and *O. lavandulifolius*
*Jame*s *Medina*, Oberlin College, and Chicago Botanic Garden, IL [poster presentation]

Title: One-thousand legs: up close and personal
Madeleine Metz, Emory University, and Field Museum of Natural History, Chicago, IL [oral presentation]

Title: birds
Daniel Montgomery, ….. and Field Museum of Natural History, Chicago, IL [poster presentation]

Title: Nutrient availability of white lady slipper orchids (*Cypripedium candidum*) affects presence of mycorrhizal partners
Geralle Powell, Wellesley College, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

Title: Describing a New Cryptodont Dicynodont from the Permian of Tanzania
Ben Otoo, Amherst College, and Field Museum of Natural History, Chicago, IL [oral presentation]

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Kyle Reid, Olive Harvey College, and Field Museum of Natural History, Chicago, IL [oral presentation]

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Brendon Reidy,Northeastern Illinois University, and Field Museum of Natural History, Chicago, IL [poster presentation]

Title: Seeding restorations: Evaluating seed viability to improve restoration outcomes
Jessica Riebkes, Central College, and Chicago Botanic Garden, Glencoe, IL [oral presentation]

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Andrea Rummel, University of Chicago, and Field Museum of Natural History, Chicago, IL [oral presentation]

Title: Modeling fitness and heritability in hybrid offspring of *E. pallida* and *E. angustifolia*
Marie Schaedel, Carleton College, and Chicago Botanic Garden, Glencoe, IL [poster presentation]

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Alexander Shaffer, Northwestern University, and Chicago Botanical Garden [oral presentation]

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Joshua Stevens-Stein, University of Chicago, and Field Museum of Natural History, Chicago, IL [oral presentation]

Title:
Mark Swanson, … and Field Museum of Natural History, Chicago, IL [poster presentation]

Title: Microsatellite patterns in two *Castilleja* subspecies *affinis* and *neglecta*
Hosin West, University of New Haven, and Chicago Botanic Garden, Glencoe, IL [oral presentation]

Title: GIS-based spatial analysis of rare plant populations on gravel hill prairies: Habitat suitability modeling
Christopher Wright, University of Washington, Bothell, and Chicago Botanic Garden, Glencoe, IL [oral presentation]

Title: The contribution of soil aggregates to carbon sequestration in restored urban grasslands
Jenifer Yost, Lake Forest College, and Chicago Botanic Garden, Glencoe, IL [oral presentation]

2013 FMNH REU Projects

2013 FMNH REU participants, projects and college/university

REU participant: *Patricia Brandt*, pbrandt@uchicago.edu, junior, University of Chicago
Project: Diversity of tropical lichens
Advisor: Dr. Thorsten Lumbsch (Botany, curator)

REU participant: *Andrew Burchill*, andrewburchill@uchicago.edu, junior, University of Chicago
Project: The evolution of nomadic swarm raiders: Determining the genetic component of army ant castes
Advisor: Dr. Corrie S. Moreau (Zoology – Insects, curator) and Max Winston (graduate student)

REU participant: *Christopher Griffin*, chrisgriffin@cedarville.edu, junior, Cedarville University
Project: How to Grow a Dinosaur
Advisor: Dr. Kenneth Angielczyk (Geology, curator) and Dr. Sterling J. Nesbitt (postdoctoral fellow)

REU participant:*Madeleine Metz,* mmmetz@emory.edu, sophomore, Emory University
Project: One-thousand legs: up close and personal
Advisor: Dr. P. Sierwald (Zoology – Insects, curator)

REU participant: *Ben Otoo*, botoo14@amherst.edu, junior, Amherst College
Project: Describing a New Cryptodont Dicynodont from the Permian of Tanzania
Advisor: Dr. Kenneth Angielczyk (Geology, curator)

REU participant: *Joshua Stevens-Stein*, jstevensstein@gmail.com, sophomore, University of Chicago
Project: The Open Tree of Life: toward a global synthesis of phylogenetic knowledge
Advisor: Dr. Richard Ree (Botany, curator)

REU participant: *Kyle Reid*, Kreid15@student.ccc.edu, sophomore, Olive Harvey College
Project: The Bats of Kenya*:* assessing the species limits of cryptic species
Advisor: Dr. Bruce Patterson (Zoology – Mammals, curator) and Dr. Paul Webala

REU participant: *Andrea Rummel,* arummel25@gmail.com, junior, University of Chicago
Project: Colonial Animals: One genetic individual and many bodies
Advisor: Dr. Scott Lidgard (Geology, curator)

REU Site:Access to Global Biodiversity Studies for Undergraduates (supported by the National Science Foundation, DBI: 08-49958: PIs Petra Sierwald and Peter Makovicky; DBI 11-56594: PIs. Petra Sierwald and Kenneth Angielczyk, see at: http://fieldmuseum.org/about/c-r-research-experiences-undergraduates-reu

Affiliated Summer High School, undergraduate and graduate Interns

High School Intern: *William Buchman*, willbuchman@gmail.com, New Trier High School
Advisor: William Simpson (Geology, collections manager)

Intern *Camila Duarte* (kmicaduarte@gmail.com), graduated 2009 from Universidade Federal de Santa Maria (Brzil)
Project: Microsatellite analysis of Rufous-capped *Eleania*, a bird endemic to the white sand forests of Amazonia
Advisor: Dr. John Bates (Zoology – Birds, curator)

Undergraduate intern: *Clarisse de Figueiredo* (cmendese@bowdoin.edu).
Project: Microsatellite analysis of Rufous-capped *Eleania*, a bird endemic to the white sand forests of Amazonia
Advisor: Dr. John Bates (Zoology – Birds, curator)

Undergraduate intern: PENDING (ECCo) *Jessie Gordon, Jan Emily* and *Tonika White*
Project:
Advisor: Alison Paul (ECCo)

Intern: *Charles Griggs* (cgriggs@middlebury.edu)
Advisor: Dr. Corrie Moreau (Zoology – Insects, curator)

Undergraduate intern: *Sarah Kurtis* (smkurtis@uchicago.edu), sophomore, University of Chicago
Project: A molecular phylogenetic survey of*Borrelia*from migratory birds: Are migratory birds potential vectors for Lyme disease?
Advisor: Dr. Jason Weckstein (Zoology – Birds), funded through an REU supplement to NSF DEB-1120054 to J. Weckstein

Undergraduate intern: *Alex Layng, Liza Connolly* and *Nicole Karpus*
Project: (Geology)
Advisor: Paul Mayer

Undergraduate Research: Field Museum of Natural History: : Projects and Advisors

Undergraduate intern: *Jessica Magolan, Lydia Nichols-Russell, Muzit Gebretensae* and *Mary Szabo*
Project:
Advisor: Abigail Derby (ECCO)

Undergraduate intern: *Jessica Mohlman*, jmohlman@fieldmuseum.org, Northland College
Advisors: Rebecca Collins, Alan Resetar (Zoology – Herpetology)

Undergraduate intern: *Daniel Montgomery* (, junior,? ?? University
Project:
Advisor: Dr. John Bates (Zoology – Birds, curator, Josh Engel)

Undergraduate Intern: *Brendon Reidy*, brendon.reidy@gmail.com, junior, Northeastern Illinois University
Project: Congruence between molecular phylogeny and phenotype features of the lichen genus *Pseudocyphellaria* in Hawaii: does morphology predict monophyletic species?
Advisors): Bibiana Moncada (Universidad Distrital Colombia), Robert Lücking

Intern:*Lynika Strozier* (lstrozier@fieldmuseum.org)
Advisor: Dr. Corrie Moreau (Zoology – Insects, curator)

Undergraduate intern: *Mark Swanson* (mswanso2@iwu.edu), junior, Wesleyan University
Project: Microsatellite study of Midwestern Barred Owls
Advisor: Dr. John Bates (Zoology – Birds, curator)

FMNH 2013 Phylogenetic workshop
Instructors: Dr. David Clarke (dclarke@fieldmuseum.org)
Ben Winger (bwinger@fieldmuseum.org)

CHICAGO BOTANIC GARDEN

2013 CBG REU participants, projects and college/university

REU participant: *Mariah Allen*, (allenma@mx.lakeforest.edu), senior, Lake Forest College
Project: Decomposition and fungal diversity in restored tallgrass prairies
Advisor: Dr. Louise Eggerton-Warburton and Lauren Umek

REU participant: *Kevin Amses*, (kra20@humboldt.edu), senior, Humboldt State University
Project: Which species of tropical canopy tree species access the water source provided by underground caves on the Yucatan Peninsula and are their natural fungal symbionts present in these portions of the root system?
Advisor: Dr. Louise Eggerton-Warburton and Benjamin Morgan

REU participant: *Dayvis Blasini*, (d-blasini@neiu.edu), senior, Northeastern Illinois University
Project: Assessment of the effects of the introduction of *Echinacea pallida* in the pollination of native *Echinacea angustifolia* in western Minnesota
Advisor: Dr. Stuart Wagenius

REU participant: *Allison Buiser*, (allisonbuiser@gmail.com), freshman, Knox College
Project: The role of soil fungi in C-sequestration
Advisors: Dr. Louise Eggerton-Warburton and Dr. Kathryn Schreiner

REU participant: *Lisa Guan*, (lisaguan2@gmail.com), senior, University of California, Berkeley
Project: Characterizing phenotypes in *P. aeruginosa* mutants under aerobic and anaerobic conditions
Advisors: Yun Wang

REU participant: *Robert Harris III*, (robertharris317@gmail.com), freshman, Carleton College
Project: Phylogeny of the genus *Artocarpus* (Moraceae) using plastid markers
Advisor: Dr. Evelyn Williams and Dr. Nyree Zerega

REU participant: *Rosalba Herrera*, (rherrera1080@yahoo.com), freshman, Loyola University
Project: Comparing genetic diversity in thistle populations
Advisor: Dr. Jeremie Fant

REU participant: *Matthew Lichty*, (mlichty@gmail.com), junior, Knox College

Project: Optimizing ecological niche models for *Cynometra bauhiniifolia*
Advisors: Dr. Patrick Herendeen and Alexsandar Radosavljevic

REU participant: *Geralle Powell*, (gpowell@wellesley.edu), sophomore, Wellesley College
Project: Nutrient availability of white lady slipper orchids (*Cypripedium candidum*) affects presence of mycorrhizal partners
Advisors: Dr. Pati Vitt and Anne Nies

REU participant: *Jessica Riebkes*, (riebkesj1@central.edu), senior, Central College
Project: Seeding restorations: Evaluating seed viability to improve restoration outcomes
Advisors: Dr. Daniel Larkin and Rebecca Barak

REU participant: *Marie Schaedel*, (schaedem@carleton.edu), junior, Carleton College
Project: Modeling fitness and heritability in hybrid offspring of *E. pallida* and *E. angustifolia*
Advisor: Dr. Stuart Wagenius

REU participant: *Hosin West*, (HWest1@unh.newhaven.edu), senior, University of New Haven
Project: Microsatellite patterns in two *Castilleja* subspecies *affinis* and *neglecta*
Advisors: Dr. Jeremie Fant and Laney Widener

REU participant: *Christopher Wright*, (tophie187@gmail.com), senior, University of Washington, Bothell
Project: GIS-based spatial analysis of rare plant populations on gravel hill prairies: Habitat suitability modeling
Advisors: Dr. Pati Vitt, Susanne Masi, Rachel Goad, and Emily Yates

Affiliated Summer High School and Undergraduate interns

Intern: *Ben Girgenti*, (btgirgenti@gmail.com), sophomore, Brown University
Project: The impacts of carbon addition on reinvasion
Advisors: Dr. Louise Eggerton-Warburton and Lauren Umek

Intern: *Jame*s *Medina*, (jmmedina@oberlin.edu), junior, Oberlin College
Project: Investigating microsatellite markers in four species of *Oenothera*: *O. brachycarpa*, *O. hartwegii*, *O. serrulatus*, and *O. lavandulifolius*
Advisors: Dr. Jeremie Fant and Dr. Krissa Skogen

Intern: *Alexander Shaffer*, (alexandershaffer2015@u.northwestern.edu), junior, Northwestern University

Undergraduate Research: Chicago Botanic Garden: : Projects and Advisors

Project: Does the attempt to restore golden Indian paintbrush to a former habitat or raising the species in isolation have an effect on genetic diversity
Advisor: Dr. Jeremie Fant

Intern: *Jenifer Yost*, (yostjl@lakeforest.edu), senior, Lake Forest College
Project: The contribution of soil aggregates to carbon sequestration in restored urban grasslands
Advisors: Dr. Louise Eggerton-Warburton and Lauren Umek

REU Site:Plant Biology & Conservation Research Experiences for Undergraduates - From Genes to Ecosystems.(Supported by NSF awards DBI-0353752, DBI-0648972, and DBI-1062675) - See at: http://www.cbgreu.org/#sthash.XSNARY7C.dpuf

Participants

CharlesGriggs; charles-griggs@kappaleaguechicago.org, Proviso Mathematics and Science Academy

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Larkin, Dan, Chicago Botanic Garden, dlarking@chicagobotanic.org

Lumbsch, Thorsten, Dept. Botany, Field Museum of Natural History, tlumbsch@fieldmuseum.org

Patterson, Bruce, Dept. of Zoology, Mammals, Field Museum of Natural History, bpatterson@fieldmuseum.org

Rubin, Benjamin, University of Chicago and Dept. of Zoology, Insects, Field Museum of Natural History, brubin@uchicago.edu

Sierwald, Petra, Dept. of Zoology, Insects, Field Museum of Natural History, psierwald@fieldmuseum.org

Thayer, Margaret, Dept. of Zoology, Insects, Field Museum of Natural History, mthayer@fieldmuseum.org

Ware, Stephanie, Dept. of Zoology, Insects, Field Museum of Natural History, sware@fieldmuseum.org

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