

PHILLIP BARDEN

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FEDERATED DEPT OF BIOLOGICAL SCIENCES
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CURRENT POSITION

Assistant Professor – Department of Biological Sciences
New Jersey Institute of Technology

Fall 2017 -

EDUCATION

PH.D. Comparative Biology
American Museum of Natural History, Richard Gilder Graduate School
Advisor David Grimaldi June 2015

B.S. Ecology & Evolution
Arizona State University, School of Life Sciences
Advisor Jennifer Fewell December 2009

PUBLICATIONS (*DENOTES UNDERGRADUATE AUTHOR)

15. Macazana, C.*, Ware, J.L. & **Barden, P.** In Preparation. Relative diversity and composition of eusocial insects in a South American inundation forest.
14. **Barden, P.** & Ware, J.L. In Review. Relevant Relicts: the impact of fossil distributions on biogeographic reconstruction in ants and dragonflies. *Insect Systematics and Diversity*
13. **Barden, P.**, Boudinot, B.E. & Lucky, A. In Press. Where fossils dare and males matter: combined morphological and molecular analysis illuminates the tangled history of the spider ant genus *Leptomyrmex* Mayr (Hymenoptera: Dolichoderinae). *Invertebrate Systematics*
12. **Barden, P.**, Herhold, H.W. & Grimaldi, D.A. 2017. A New Genus of Hell Ants from the Cretaceous (Hymenoptera: Formicidae: Haidomyrmecini) with a Novel Head Structure. *Systematic Entomology* 42: 837-846.
11. **Barden, P.** 2017. Fossil ants (Hymenoptera: Formicidae): ancient diversity and the rise of modern lineages. *Myrmecological News* 14: 1-30 [Invited Contribution]
10. **Barden, P.** & Grimaldi, D.A. 2016. Adaptive radiation in socially advanced stem-group ants from the Cretaceous. *Current Biology* 26(4): 515-521 [Cover Article with #9]
9. Engel, M.S., **Barden, P.**, Riccio, M. & Grimaldi, D.A. 2016. Morphologically Specialized Termite Castes and Advanced Sociality in the Early Cretaceous. *Current Biology* 26(4): 522-530
8. Ware, J.L. & **Barden, P.** 2016. Incorporating fossils into hypotheses of insect phylogeny. *Current Opinion in Insect Science* 18: 69-76. [Invited Contribution]
7. Grimaldi, D.A. & **Barden, P.** 2016. The Mesozoic family Eremochaetidae (Diptera: Brachycera) in Burmese amber and relationships of Archisargoidea. *American Museum Novitates* 3865: 1-29

6. Arillo, A., Grimaldi, D., Peñalver, E., Pérez-de la Fuente, R., Delclòs, X., Criscione, J., **Barden, P.**, & Riccio, M. 2015. Long-proboscid Brachyceran flies in Cretaceous amber (Diptera: Stratiomyomorpha: Zhangsolvidae). *Systematic Entomology* 40(1): 242-267
5. **Barden, P.** & Grimaldi, D. 2014. A diverse ant fauna from the mid-Cretaceous of Myanmar (Hymenoptera: Formicidae). *PLoS One* 9(4): e93627
4. Payne, A., **Barden, P.**, Wheeler, W. & Carpenter, J.M. 2013. Direct optimization, sensitivity analysis, and the evolution of the hymenopteran superfamilies. *American Museum Novitates* 3789: 1-20
3. **Barden, P.** & Grimaldi, D. 2013. A new genus of highly specialized ants in Cretaceous Burmese amber (Hymenoptera: Formicidae). *Zootaxa* 3681(4): 405-412
2. **Barden, P.** & Grimaldi, D. 2012. Rediscovery of the bizarre Cretaceous ant *Haidomyrmex* Dlussky (Hymenoptera: Formicidae). *American Museum Novitates* 3755: 1-16
1. Holbrook, C.T., **Barden, P.M.** & Fewell, J.H. 2011. Division of labor increases with colony size in the harvester ant *Pogonomyrmex californicus*. *Behavioral Ecology* 22(5): 960-966

AWARDS AND FUNDING (TOTAL ~\$480,000)

National Science Foundation Funding

- 2015 NSF Postdoctoral Fellowship in Biology #1523788 (\$138,000)
 2013 NSF Doctoral Dissertation Grant #1313547 (\$15,557)
 2012 NSF Graduate Research Fellowship #131549 (\$134,000)

Graduate and Undergraduate Institutional Grants and Awards

- 2010 American Museum of Natural History: Richard Gilder Graduate School Graduate Fellowship (~\$173,000 + tuition)
 2009 Arizona State University: Howard Hughes Medical Institute funded School of Life Sciences Undergraduate Researcher Fellowship
 2008 Arizona State University Travel Grant: West Coast Biological Sciences Undergraduate Research Conference
 2007 Arizona State University Dean's List Award
 2007 Arizona State University: National Institutes of Health funded Minority Access to Research Careers (MARC) Fellowship (~\$20,000)

Other Awards

- 2016 Entomology Society of America Snodgrass Memorial Award
 2013 Entomological Society of America Student Travel Award (\$1,200)
 2011 Ford Foundation Predoctoral Fellowship Honorable Mention

COURSE INSTRUCTION

- Adjunct Assistant Professor CUNY: City College of New York (BIO 485: Evolution) Summer 2015
Teaching Assistant Columbia University (EEEE W3915: Comparative Social Evolution) Spring 2012
Instructor American Museum of Natural History (Principles of CT-Scanning) Summer 2012

PAST ACADEMIC POSITIONS HELD

<u>National Science Foundation Postdoctoral Fellow</u> Rutgers University <i>Sponsor Jessica Ware</i>	2015-2017
<u>Adjunct Assistant Professor</u> CUNY: City College of New York	Summer 2015
<u>Graduate Research Fellowship</u> American Museum of Natural History	2010-2015
<u>NSF REU Fellow</u> American Museum of Natural History	Summer 2009
<u>Research Training Program Fellow</u> Smithsonian National Museum of Natural History	Summer 2008
<u>Lab Technician & Undergraduate Researcher</u> Arizona State University	2007-2010

ADDITIONAL COURSEWORK, TRAINING, AND FIELDWORK

- 2017 Fieldwork: Australia. Collected extant ants and termites from localities in Queensland for genetic sequencing.
- 2016 Next Generation Phenomics Workshop. *Portland, Maine*. Seminars and related training in next generation phenomic tools including data collection, analysis, and citizen science outreach.
- Fieldwork: Guyana. Field collected ants and termites near Georgetown and in the Rupununi. Also mentored undergraduates on individual projects focused on animal behavior and ecology.
- 2014 Collections Research. The Harvard Museum of Comparative Zoology, Natural History Museum (London), and University of Rennes/Muséum national d'Histoire naturelle (Paris).
- Imaging Workshop. *Austin, Texas*. Short course developed through iDigBio related to digital imaging of paleontological specimens: photography, CT-scanning, 3D scanning and printing.
- 2012 Synchrotron Imaging. Performed high energy, high resolution imaging of fossil specimens at the Argonne National Laboratory Advanced Photo Source as part of interdisciplinary team.
- Fieldwork: India. Collected fossil amber material through collaboration with local paleontologists and mining industry in Gujarat.
- 2010 California Academy of Sciences AntCourse. *Sabah, Borneo*. Workshop providing training in identification, systematics, fieldwork, and curation techniques.

PRESENTATIONS (LAST 5 YEARS) *==UNDERGRADUATE MENTEE

- 2016 Louis Stokes Alliances for Minority Participation Poster Session
October 7, Annual Meeting, New Brunswick, New Jersey
Guzman, C.*, Ware, J.L. & **Barden, P.** Population structure of *Nasutitermes* in Karanambu, Guyana. Contributed Poster.
Macazana, C.*, Van Aken, T., Mayur, K, Ware, J.L. & **Barden, P.** Observing the effects of recurrent flooding on the composition of eusocial insects in Guyana. Contributed Poster.

- 2016 International Congress of Entomology
September 26, Quadrennial Meeting, Orlando, Florida
Barden, P. & Ware, J.L. A tale of two datasets: consilient approaches toward detailing the evolutionary history of ants (Hymenoptera: Formicidae). Contributed talk.
- International Conference on Fossil Insects, Arthropods and Amber
April 28th, Triennial Meeting, Edinburgh, UK
Barden, P., Ware, J.L. & Grimaldi, D. The ants (Hymenoptera:Formicidae) of early Eocene Indian amber. Contributed talk.
- 2015 Willi Hennig Society Meeting
June 29th, Annual Meeting, New York, New York
Barden, P., Boudinot, B.E. & Lucky, A. Paleontological evidence elucidates the biogeographic history of the dolichoderine ant genus *Leptomymex* Mayr. Contributed talk.
- 2014 Entomological Society of America Meeting
November 19th, Annual Meeting, Portland, Oregon
Barden, P. & Grimaldi, D. Cretaceous context: understanding fossil ant diversity. Contributed talk.
- Evolution Meeting
June 22nd, Annual Meeting, Raleigh, North Carolina
Barden, P. Ants in the age of dinosaurs: a history from amber. Contributed talk.
- Social Insects In the North-East Regions Meeting
May 28th, Annual Meeting, Philadelphia, Pennsylvania
Barden, P. Life in the Cretaceous: ant diversity, ecology, and sociality one hundred million years ago. Contributed talk.
- Rockefeller University Seminar
Feb 27th, Social Insect Lab Seminar, New York, New York
Barden, P. Unearthing a History from Fossils: Ants through Time, Space, and Sociality. Invited talk.
- 2013 Entomological Society of America Meeting
November 13th, Annual Meeting, Austin, Texas
Barden, P. & Grimaldi, D. Uncovering a Cretaceous ant genus. Contributed talk.
- Evolution Meeting
June 25th, Annual Meeting, Snowbird, Utah
Barden, P. What 20 million-year-old Caribbean fossils can tell us about Indo-Australian ants today. Contributed talk.
- 2012 Entomological Society of America Meeting
November 12th, Annual Meeting, Knoxville, Tennessee
Barden, P. More data, more problems? Toward a total evidence phylogeny of the ants. Contributed talk.
- Rutgers-Newark Biology Seminar
October 23rd, Departmental Seminar, Newark, New Jersey
Barden, P. Unearthing a History from Fossils: Ants through Space, Time, and Sociality. Invited talk.
- 2011 Entomological Society of America Meeting
November 14th, Annual Meeting, Reno, Nevada
Barden, P. Rediscovery and reconsideration of the bizarre Cretaceous ant *Haidomyrmex*. Contributed talk.
- American Museum of Natural History Seminar Series
September 7th, Annual Meeting, New York, New York
Barden, P., Keller, R.A. & Grimaldi, D. Towards a comprehensive phylogeny of the ants: A history from molecules and fossils. Talk.

OUTREACH & SYNERGISTIC ACTIVITIES

- 2013-PRESENT **Mentorship**
LSAMP Carlos Macazana (Passaic County Community College student - molecular evolution and ecology)
Catalina Guzman (Rutgers-Newark Undergraduate student - population genetics and ecology)
Ahmed Abdelhamid (Rutgers-Newark Undergraduate student - 3D modeling and ecology)
Krista Barbour (Rutgers-Newark Undergraduate student - ecology and entomology)
AMNH Sophie Chen (AMNH International Baccalaureate student - paleontology and morphometrics)
Gwyneth Campbell (AMNH High school student - scientific illustration)
NSF-funded mentees Michael Acid (University of Missouri-St. Louis - entomology and animal behavior)
Stephanie Mafla-Mills (University of Missouri-St. Louis - population genetics and ecology)
Kenneth Butler (University of Guyana - ecology and biodiversity)
- 2016 **Amber Secrets – Exhibit Contributor**
The Houston Museum of Natural Science. Houston, Texas
Contributed media and text relating to the reconstruction of Cretaceous fossil ants using X-ray imaging.
- 2015 **NY Eats Bugs – Speaker**
The Explorer’s Club. New York, New York
An event highlighting innovation and future applications of entomophagy. Spoke to diners on insect diversity and evolution.
- 2014-15 **Project TRUE – Speaker**
Prospect Park Zoo. Brooklyn, New York
Project TRUE is an NSF funded WCS outreach program rooted in urban ecology. Discussions with high school students in biodiversity and ecology as well as scientific career routes.
- 2012-15 **Adventures in Science – Speaker and Demonstrator**
American Museum of Natural History. New York, New York
Classes with children grades 2-5 on amber formation, preservation of arthropods, and scientific process of paleoentomology.
- 2013-14 **Center for Talented Youth – Speaker**
American Museum of Natural History. New York, New York
Elementary and middle school students from the John Hopkins Center for Talented Youth attended museum programs focused on temporary exhibits. Presented talks entitled “How Evolution Works: From Ants to Whales” and “Poison Strategies in Animals”
- 2013 **Myrmex: A Comic Ant-thology – Contributor and Editor**
A crowd-funded collaborative effort between illustrators and scientists, Myrmex is a publicly available print and E-book resource for K-12 teachers. The book creatively covers concepts in general biology and biodiversity, and has been distributed to classrooms in New York City.
- 2011-13 **National Fossil Day – Demonstrator**
American Museum of Natural History. New York, New York
Museum-wide event for middle school students with hands-on demonstrations celebrating paleontology. Discussed methods and explored specimens with students using microscopes.
- 2013 **Maker Faire – Educator**
New York Hall of Science. New York, New York
Massive Disney funded fair with a focus on “do-it-yourself” technology and science education engagement. Spoke to fair attendees about CT-scanning and 3D printing as they relate to paleoentomology research.

- 2011 **Fellowship of the Young Scientist – Volunteer Co-Instructor**
American Museum of Natural History. New York, New York
 Weekly afterschool class for 3rd grade students relating to natural history with the aim of cultivating long-term interest in science. Assisted with presentations, demonstrations, and lesson plan development for course in historical scientific expeditions and exhibit design.
- 2011 **Meet the Scientist Program– Speaker**
American Museum of Natural History. New York, New York
 A series of three interactive lectures focused on making science accessible and interesting to New York City school children ages 7-11. Discussion centered around ant diversity, ecological importance, and the path toward becoming a scientist.
- 2011 **Picturing Science – Exhibit Contributor**
American Museum of Natural History. New York, New York
 Three-year exhibit highlighting imaging techniques that museum scientists employ. Contributed images and text showcasing CT-scanning technology and its application for exploring internal and external morphology of an amber ant fossil.

SELECTED POPULAR PRESS

- 2016 **These Tiny Saber-Toothed Terrors Are Among the World's Oldest Ants**
Smithsonian Magazine.
Ants locked in mortal combat for 99 million years
Canadian Broadcasting Corporation Radio: Quirks & Quarks.
Ant Warfare: Fossils Reveal Insects Locked in Mortal Combat
LiveScience.
Ancient Ants in Amber Were Like Today's Social Brawlers
Discovery News.
Ancient amber proves early insects were keen on high society
CNET.
- 2015 **Earning a Doctorate on the ‘Night at the Museum’ Campus**
New York Times.
The Six Most Incredible Fossils Preserved In Amber
Forbes Science.
- 2014 **Analyzing Extinct Ants in Amber**
American Museum of Natural History News.
- 2012 **A Cretaceous *Haidomyrmex* as the first trap-jaw ant?**
Myrmecos Blog.
- 2011 **The Critter People**
New York Times.

OTHER PROFESSIONAL SERVICE

- MorphoBank Early Career Committee 2016-Present
 Invited member of MorphoBank (digital repository of phenotypic information) early career steering committee.
- Guest Lectures Fall 2014/2016
 Columbia University – Insect Diversity
- Comparative Biology PhD Program Committee Representative 2012-2014
 Elected student representative to graduate school committee at the American Museum of Natural History.
- Journal Referee: *Arthropod Structure and Development, Cladistics, Comptes rendus Palevol, Journal of Morphology, Myrmecological News, Nature Scientific Reports, Neues Jahrbuch für Geologie und Paläontologie, Sociobiology, and Zootaxa.*